REMEDIAL ACTION WORK PLAN

NYSDEC BCP Number: C224147

HUXLEY ENVELOPE SITE

145 WEST STREET

BROOKLYN,

JULY 2013

Prepared for:

145 West Street, LLC

235 Park Avenue South, 8th floor

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Prepared by:

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CERTIFICATIONS

I, Richard D. Galli, P.E., am currently a registered professional engineer licensed by the State of New York. I have primary direct responsibility for implementation of the remedial program for the Huxley Envelope Site (NYSDEC BCA Site No. C224147).

I certify that the Site description presented in this RAWP is identical to the Site descriptions presented in the Brownfield Cleanup Agreement for the Huxley Envelope Site and related amendments.

If Track 1 is not achieved, I certify that this plan includes proposed use restrictions, Institutional Controls, Engineering Controls, and plans for all operation and maintenance requirements applicable to the Site and provision for development of an Environmental Easement to be created and recorded pursuant ECL 71-3605. This RAWP requires that all affected local governments, as defined in ECL 71-3603, will be notified that such Easement has been recorded. This RAWP requires that a Site Management Plan must be submitted by the Applicant for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, for approval by the Department.

I certify that this RAWP has a plan for transport and disposal of all soil, fill, fluids and other material removed from the property under this Plan, and that all transport and disposal will be performed in accordance with all local, State and Federal laws and requirements. All exported material will be taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

I certify that this RAWP has a plan for import of all soils and other material from off-Site and that all activities of this type will be in accordance with all local, State and Federal laws and requirements.

I certify that that this RAWP has a plan for nuisance control during the remediation and all invasive development work, including a dust, odor and vector suppression plan and that such plan is sufficient to control dust, odors and vectors and will prevent nuisances from occurring.
I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

59461	7/23/13	
NYS PE #	Date	Signature

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

Appendix A – Metes and Bounds

Appendix B – Proposed Development Plan

Appendix C – Boring Logs

Appendix D – Well Construction Logs

Appendix E – Monitoring Well Survey

Appendix F – Monitoring Well Sampling Logs

Appendix G – Applicable SCGs

Appendix H – Health and Safety Plan (HASP)

Appendix I – Quality Assurance Project Plan (QAPP)

Appendix J – Storm-Water Pollution Prevention Plan (SWPPP)

Appendix K – Community Air Monitoring Plan (CAMP)

Appendix L – Resumes of Key Personnel

Appendix M - Remedial Action Construction Schedule

Appendix N – Summary of Remedial Costs

Appendix O – Allowable Constituent Levels for Imported Fill or Soil

LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
COC	Contaminant of Concern
CPP	Citizen Participation Plan
DER-10	New York State Department of Environmental Conservation Technical Guide 10
FER	Final Engineering Report
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IRM	Interim Remedial Measure
NYC VCP	New York City Voluntary Cleanup Program
NYC DOHMH	New York City Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYS DOH ELAP	New York State Department of Health Environmental Laboratory Accreditation Program
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RI	Remedial Investigation
RIR	Remedial Investigation Report
SCO	Soil Cleanup Objective
SVOCs	Semi-Volatile Organic Compounds
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

SITE DESCRIPTION/PHYSICAL SETTING/SITE HISTORY

The Site is known as Huxley Envelope, 145 West Street, Greenpoint, NY, BCA Index #C224147-05-11. The location consists of approximately 2.83 acres, owned by 145 West Street, LLC (Block 2530 Lot 1) and 157-159 West Street, LLC (Block 2530 Lots 55 and 56) (collectively Lots 1, 55 and 56 constitute the "Site"). It is important to note that only 145 West Street, LLC is the BCP Volunteer, since members in 157-159 West Street, LLC are identical, and the parcels owned by this entity will eventually be transferred to 145 West Street, LLC.

The Site is an approximately 123,000 square foot property located at 143-159 West Street in the Greenpoint section of the Borough of Brooklyn, New York. The Brownfield Cleanup Program Site (BCP Site) consists of the entire city block bounded by Huron Street, West Street, India Street, and the East River, in Brooklyn, NY. The Site was identified as Potential Development Site #34 in the Greenpoint Williamsburg Rezoning Final Environmental Impact Statement. Due to the industrial history of this Site, an "E" designation was associated with the Site, which requires that an environmental testing and sampling protocol be conducted before a building permit will be issued.

SUMMARY OF REMEDIAL INVESTIGATION

As required by the RIWP, Galli Engineering and Trinity Environmental advanced forty seven (47) soil borings at the subject property in a grid sampling pattern on June 1 to June 22, 2012, using a track mounted Geoprobe 7600 equipped with a direct push hydraulic driven probe for sample collection. These soil borings were advanced to depths ranging from 20' - 30', or until refusal was encountered. Soil borings are designated based on a number and letter depicting the grid location. Two sets of soil samples were collected from each of these borings; a composite sample over the depth of the boring (designated "Grid Soil Samples") and discrete grab samples from the bottom of selected borings (designated Endpoint Soil Samples). Upon

completion of soil sampling, monitoring wells were placed at four (4) soil boring locations, and subsequent groundwater samples were collected. All soil boring and monitoring wells locations are shown on the Boring and Monitoring Well Location Plan provided as Figure 2.

Grid Soil Sampling Results

Metals

Priority pollutant metals were detected in all grid soil samples analyzed. Results of the laboratory analysis for metals in the grid soil samples can be found in Table 1. A total of thirty seven (37) samples were above the Track 1 Unrestricted SCOs, with nineteen (19) of the above 37 samples also above the Track 2 Restricted Residential SCOs.

Arsenic was above the Track 2 Restricted Residential SCO of 16 mg/kg in six of the grid soil samples. The highest Arsenic concentration detected was 49.3 mg/kg in WS-S4. However, Arsenic was not found above the Track 1 SCO in any other samples. The Arsenic values appear to be random with no apparent “hotspots”.

Barium was found above Track 2 Restricted Residential SCO of 400 mg/kg in WS-A2 (463 mg/kg), WS-D5 (893 mg/kg) and WS-F4 (440 mg/kg). However, Barium was not found above the Track 1 SCO in any other samples.

The Track 1 SCO of 50mg/kg for copper was exceeded in 26 of 47 grid soil samples. The highest Copper concentration detected was 25,300 mg/kg in WS-G5 which is significantly above the Track 2 - Restricted Residential SCO of 270 mg/kg. Copper was also detected in WS-D5 at 274 mg/kg which is slightly above the Track 2 SCO. The high amount of Copper detected in WS-G5 is an isolated result and is surrounded by Copper results below 250 mg/kg, which are below Track 2, but above the Track 1 SCO of 50 mg/Kg. Special attention to this area will be needed during foundation excavation to determine if the soil in this area must be treated as hazardous waste.

Lead was detected above the Track 1 SCO of 63 mg/kg in 36 out of 47 grid soil samples. Of the 36 samples above Track 1 SCO's, 16 samples were also above the Track 2 Restricted Residential SCO of 400 mg/kg. The highest lead concentration detected was 3,190 mg/kg in WS-G5, which also contained the highest copper concentration.

Mercury was found above the Track 1 SCO of 0.18 mg/Kg in 26 out of 47 grid samples. Of those 26 samples, 10 samples contained mercury concentrations above the Track 2 – Restricted Residential SCO of 0.81 mg/kg. The highest mercury concentration detected was 6.78 mg/kg in WS-S1.

Zinc was found above the Track 1 SCO of 109 mg/Kg in 26 out of 47 samples. However, Zinc was not found above the Track 2 - Restricted Residential SCOs in any of the grid samples. The grid soil sampling metals results are summarized in Table 1.

Volatiles

VOCs were identified in 25 of the 47 grid soil samples above the Track 1 SCOs but all of these samples were below the Track 2 - Restricted Residential SCOs. The grid sampling VOC results are summarized in Table 2.

Semi-Volatiles

SVOCs were detected above the Track 1 SCOs in 15 of the 47 grid soil samples. Of the 15 samples detected above the Track 1 SCOs, 14 were also detected above the Track 2 - Restricted Residential SCOs. These samples were collected from WS-B2, WS-C1, WS-C2, WS-C3, WS-C5, WS-D1, WS-D5, WS-F1, WS-F4, WS-G1, WS-G2, WS-G5, WS-H3, WS-H5, and WS-S1. The grid sampling SVOC concentrations are summarized in Table 3.

Endpoint Soil Sample Results

Sixteen (16) endpoint samples, described as those grab samples collected from the bottom of selected borings, were visually observed to appear to be representative of native or

near-native conditions. These samples were collected to determine if a Track 1 remedial approach could be realistically achieved.

Metals

Endpoint soil samples collected from 14 out of 16 locations (WS-C2 30', WS-K5 20', WS-D2 25', WS-E2 30', WS-E3 30', WS-F2 30', WS-C3A 30', WS-H2 25', WS-J4 25', WS-I3 25', WS-F1 30', WS-K3-20', WS-K4 30', and WS-I1 30') showed no metals concentrations in excess of the Track 1 SCOs.

However, samples from A1 at 20' and B2 at 25' revealed some metals, in soil that appeared to be native, at concentrations above the Track 1 SCOs. In addition, Arsenic and Mercury were detected in B2 at a concentrations just above of Track 2 – Restricted Residential SCOs. Those results are summarized in the table below. All concentrations are in mg/Kg.

Endpoint Soil Sampling Exceedances				
Metal	**Track 1 Unrestricted 375-6.8(a)**	**Track 2 Restricted Residential 375-6.8(b)**	**Sample Result A1 20'**	**Sample Result B2 25'**
Arsenic	13	16	12.4	**18.2***
Copper	50	270	37.8	**76.4**
Lead	63	400	**132**	**270**
Mercury	0.18	0.81	**0.29**	**1.25***
Nickel	30	140	**31.1**	29.2
Zinc	109	2,200	**113**	**185**

Notes:

BOLD = Concentration above Track 1 SCO.

BOLD*= Concentration above Track 2 SCO.

As a result, a Track 1 cleanup may be attainable if excavation occurs to a depth greater than the limit of end point borings. A complete summary of the endpoint soil sampling metals results can be found in Table 4.

Volatiles

No Volatile Organic Compounds were reported in any endpoint sample above the Track 1 SCOs. The endpoint soil sampling VOC results are summarized in Table 5.

Semi-Volatiles

No Semi-Volatile Organic Compounds were reported in any endpoint sample above the Track 1 SCOs. The endpoint soil sampling SVOC results are summarized in Table 6.

PCBs

No PCBs were reported in any endpoint sample above the Track 1 SCOs Unrestricted limit found at 6 NYCRR 375-6.8(a). The endpoint soil sampling PCB's results are summarized in Table 7.

Herbicides/Pesticides

No herbicides/pesticides were reported in any endpoint sample above the Track 1 SCOs. The endpoint soil sampling pesticides/herbicides results are summarized in Table 8.

Groundwater Analytical Results

Monitoring wells MW-101, MW-102, MW-103 and MW-104 are located around the subject building as shown on the Soil Boring and Monitoring Well Location Map (Figure 2).

Laboratory results of the groundwater samples were analyzed and assessed in accordance with 6 NYCRR Chapter X, Part 703 "Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations" and NYSDEC Technical and Operational Guidance Series (TOGS 1.1.1): "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" ("groundwater standards"). Please note that the metals samples collected during the RI were unfiltered.

Metals

Some metals were detected at varying concentrations above and below their Ambient Limits in each of the monitoring wells. Those results are summarized below and a complete summary of the groundwater metals analysis can be found in Table 9.

- Aluminum was detected in groundwater samples MW-101 and MW-102 at concentrations of 2.02 mg/L and 0.417 mg/L. These results are above the groundwater standard for Aluminum of 0.1 mg/L.
- Iron was found in groundwater samples from MW-101, MW-102 and MW-103 at concentrations of 7.49 mg/L, 10.4 mg/L and 1.31 mg/L. These results are above the groundwater standard for Iron of 0.3 mg/L.
- Lead was detected in groundwater samples from MW-103 at concentrations of 0.278 mg/L, above the groundwater standard for lead of 0.025 mg/L.
- Magnesium was detected in MW-103 and MW-104 at concentrations of 834 mg/L and 291 mg/L, respectively, which exceed the groundwater standard for Magnesium of 35 mg/L.
- Manganese was detected in all four monitoring wells and exceeded the groundwater standard of 0.3 mg/L in MW-101 at 5.12 mg/L and MW-104 at 0.457 mg/L.
- Sodium was detected in all four monitoring wells and exceeded the groundwater standard of 20 mg/L in MW-101 through MW-104 respectively at 158 mg/L, 130 mg/L, 7,740 mg/L and 2,210 mg/L. MW 103 and MW-104 are the monitoring wells closest to the East River.

Volatiles

VOCs were detected at varying low concentrations in the groundwater samples collected from the monitoring wells. Except in MW-102, no VOCs were detected above the analytical method detection limit in any of the groundwater samples. The MW-102 groundwater sample detected Methyl t-butyl ether (MTBE) at 1.6 ug/L, which is below the groundwater standard of 10 ug/L. A summary of the groundwater VOC results is provided in Table 10.

Semi-Volatiles

No SVOCs were detected above the method detection limit in any of the four groundwater samples. A summary of the groundwater SVOC results is provided in Table 11.

CONCLUSIONS

The analytical data confirm that the subject property has been impacted by contaminants that are consistent with the past use of the property. Based on the analytical and physical data, the following key findings are identified:

Soil Results

- SVOCs and metals are the primary COCs in soil. SVOCs and metals are prevalent throughout the contaminated historic fill layer of soils throughout the Site to depths varying from 20 feet on the east side of the Site to approximately 30 feet on the west side of the site.
- An area of VOC petroleum contamination was detected in the vicinity of a large 20,000 gallon UST.
- No VOC, SVOC, PCB or herbicide/pesticide were reported in any endpoint sample above the Track 1 SCOs, including in the vicinity of the UST. Therefore, other than in the area of the UST, VOCs contamination at the Site can be addressed through source removal activities in the vicinity of the UST.
- No Semi-Volatile Organic Compounds were reported in any endpoint sample above the Track 1 Unrestricted limit found at 6 NYCRR 375-6.8(a).
- Lead, Mercury Nickel and Zinc were reported above Track 1 SCOs in the endpoint sample from A-1 at 20'. Copper and Zinc were also reported above Track 1 SCOs in the endpoint sample from B-2 at 25'. Additionally, concentrations of Arsenic and Mercury were above Track 2 SCOs in the sample from B-2 at 25'.
- No PCBs were reported in any sample at the Site above the Track 1 SCOS. Therefore, PCBs are not a COC at this Site.

- No Pesticides/Herbicides were reported in any sample at the Site above the Track 1 SCOS. Therefore, Pesticides/Herbicides are not a COC at this Site.

Groundwater Results

- Metals were the only COCs detected above the groundwater standards in each monitoring well.
- With exception of 1.6 ug/L of MtBE in MW-102, no VOCs were detected in any of the monitoring wells. Therefore, VOCs are not a COC in groundwater.
- No SVOCs were detected above the method detection limit in any of the four groundwater samples. Therefore, SVOCs are not a COC in groundwater.

SUMMARY OF THE REMEDY

Based upon the results of soil and groundwater sampling at the site, Galli Engineering, PC recommends implementation of the following preferred remedial action:

1. Installation of a Perimeter Sea Wall, permanent sheeting, shoring and underpinning required to stabilize the Site for the large scale remediation effort requiring excavation;
2. Removal of the former 20,000-gallon UST and all associated piping located in the southeast corner of the property. Excavate any contaminated soils and collect end-point samples.
3. Excavation and proper disposal of impacted soil within the proposed building footprints to depths ranging from approximately 15’ below land surface (bls) at Bldg. A, through ~30’ bgs at Bldg C with the goal of attempting to achieve Track 1 SCOs. Collect sidewall and endpoint samples as suggested by DER-10.
4. A vapor barrier system will be installed under the building foundation slab and up the foundation walls to grade.
5. Installation of a sub-grade basement ventilation system to avoid build up of vapors.
6. Excavation and removal of contaminated soils to depths ranging from approximately 2’ to 3’ bgs in the area of the property west of Building A with the goal of attempting to achieve Track 1 SCOs , which will be comprised mainly of landscaped areas and sidewalks.

In addition, if based upon the results of end-point sampling, residual soil contamination remains above Track 1 Unrestricted Use SCO's, which is possible west of the proposed buildings due to the results of previous soil investigations in that area, the following institutional controls may also be required:

7. The soil cover layer to be located in the landscaped areas on the Site will be a minimum of 2-feet thick and will consist of clean soil that meets 6NYCRR Part 375-6 Track 1 Unrestricted SCOs. The soil cover will overly a demarcation layer indicating the top of residual contaminated soil. The top six inches of the soil cover will be of sufficient quality to support vegetation.
8. Establishment of use restrictions in an environmental easement including prohibitions on the use of groundwater from the site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways;
9. Establishment of an approved Site Management Plan to ensure long-term management of the engineering controls including the engineered cap, the performance of periodic inspections and certification that the controls are performing as they were intended; and
10. Recording of the environmental easement to require the engineering and institutional controls to run with the land to ensure that future owners of the site continue to maintain these controls as required.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

145 West Street, LLC, entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in June 2011, to investigate and remediate a 2.83-acre property located at 155 West Street, Greenpoint, Brooklyn, New York. 145 West Street, LLC is a Volunteer in the Brownfield Cleanup Program.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between May 18, 2012 and October 26, 2012, and the preferred Track 1 remedial alternative and another potential Track 2 remedial alternative, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) will soon make a Determination of Significance indicating whether this Site poses a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

A summary of the final remedial work performed, and the end point data obtained, during implementation of this RAWP will be submitted in a Final Engineering Report.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the County of Brooklyn, New York, NY, and is identified as Block 2530, Lots 1, 55, and 56 on the New York City tax maps. A United States Geological Survey (USGS) topographical quadrangle map (Figure 1) shows the Site location. The Site is situated on an approximately 2.83-acre area bounded by Huron Street to the north; India Street to the south; West Street to the east; and the East River to the west (see Figure 1). A boundary map is

attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 2.83-acre property is fully described in Appendix A – Metes and Bounds.

1.2 CONTEMPLATED REDEVELOPMENT PLAN

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated residential end use. The proposed redevelopment plan and end use is described here to provide the basis for this assessment. The development will include a waterfront promenade and park, accessible to the public during daylight hours via India Street and Huron Street.

Both building designs include implementation of the "Green Building " requirements to meet a minimum LEED Silver standard for the market rate building and LEED Certified standard for the affordable housing building.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The approximately 123,363 square foot Site is currently occupied by three buildings: a vacant 95,000 square foot 1 to 2-story building previously utilized for manufacturing of glued envelopes and manufacturing and storage of Christmas decorations, a vacant 3,359 square foot 2-story building previously containing a commercial heating facility, and a vacant 3,696 square foot 2-story building formally used an iron works.

Predominant land uses within a quarter-mile of the Site include industrial, residential and scattered institutional uses. Industrial and warehousing uses, including vehicle open storage and underutilized industrial sites, are located to the north and south, along the waterfront, while residential uses dominated by 3 and 4 story multi-family walk up buildings are located to the east of the project site. Manhattan and Greenpoint Avenues are the two closest commercial corridors to the Site containing predominantly commercial uses.

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Immediately to the north of the Site is a two-story warehouse. Also to the north of the Site is the Greenpoint Lumber Exchange Site - a 22-acre waterfront site located between Green

and Clay Streets used for vehicle and open storage. To the east of the Site are older multi-family attached residential buildings, a few vacant buildings and vehicle open storage.

There are scattered institutional uses near the Site including the Church of the Ascension and St. Elias Roman Catholic Church, both on Kent Street between Manhattan Avenue and Franklin Street; St. Johns German Lutheran Church on Milton Street between Franklin and Manhattan Avenues; and, the John Smolenski Memorial Democratic Club on Java Street between Franklin and Manhattan Avenues.

As with many formerly industrial areas in New York City that have been subject to rezoning, the study area is experiencing a trend toward residential and commercial development. The recent adoption by the City of the Greenpoint-Williamsburg (GW) Rezoning in 2005 is expected to transform Greenpoint into a mixed-use community, with much of the area to be occupied by primarily residential buildings with commercial uses, including retail and community facilities, and a planned shore walkway on the new waterfront esplanade. However, this is the first major new development along the former heavy industrial waterfront.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation (RI) Work Plan dated November 15, 2011. The investigation was conducted between May 18, 2012 and October 26, 2012. The RI was submitted to NYSDEC on December 14, 2012.

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

The Remedial Investigation comprised the following elements;

1. Mark out of all utilities;
2. Mark out the sampling grid according to the RI Boring and Monitoring Well Locations Plan;
3. Installation of 47 successful soil borings using a Geoprobe 7600,
4. Installation of four on-site monitoring wells;
5. Development of the wells in accordance with NYSDEC protocols;
6. Survey of monitoring wells;
7. Collection of 47 soil samples from the 47 borings;
8. Collection of 16 endpoint soil samples from 16 of the 47 borings in the clay layer under the historic fill in an attempt to determine the nature and extent of the contaminated fill layer and if a Track 1 cleanup can be met;
9. Collection of unfiltered groundwater samples from the four newly installed monitoring wells;
10. Collection of all appropriate QA/QC samples for soil and groundwater analyses;
11. Excavation of two test pits after collecting soil samples from boring locations C3 and E3;
12. Performance of laboratory analysis of soil samples for volatile organic compounds according to United States Environmental Protection Agency (US EPA) Method 8260; semi-volatile organic compounds (SVOCs) according to US EPA Method 8270 Acid and

Base/Neutral extractable; Pesticides and Herbicides according to US EPA Method 8081, Priority pollutant metals (except mercury) according to US EPA Method 6010; and mercury according to US EPA Method 7470/7471 from each boring. PCBs were collected from five borings according to US EPA Method 8082;

13. Performance of laboratory analysis of groundwater samples for volatile organic compounds according to United States Environmental Protection Agency (US EPA) Method 8260; semi-volatile organic compounds (SVOCs) according to US EPA Method 8270 Acid and Base/Neutral extractable; priority pollutant metals (except mercury) according to US EPA Method 6010; and mercury according to US EPA Method 7470/7471;
14. Evaluation of laboratory data;
15. Bracketing of samples around a large underground storage tank (UST) with four of the grid samples preparatory to ultimate removal of the tank; and,
16. Preparation of a Remedial Investigation Report (RIR).

2.1.1 Borings, Wells, and Test Pits

As required by the RIWP, Trinity Environmental initially advanced forty seven (47) soil borings at the subject property on June 1 to June 22, 2012, using a track mounted Geoprobe 7600 equipped with a direct push hydraulic driven probe for sample collection. Soil samples were collected using a single-use environmental grade disposable plastic sleeve inserted into the *Geoprobe* Macrocore soil sample probe. Soil samples were transferred from Macrocore using a single-use environmental grade disposable plastic scoop and placed into clean glass jars fitted with Teflon lined caps. These soil borings were advanced to depths ranging from 20’ -30’, or until refusal was encountered. The soil borings were designated based on a number and letter depicting the grid location. During drilling activities, a second building foundation slab was encountered. This required bringing in Eastern Concrete Coring and Laurel Environmental to the Site to use concrete coring machines to advance the borings past this slab. Copies of the Soil Boring Logs are included in Appendix C, and the soil boring locations are shown on the Boring and Monitoring Well Location Plan provided as Figure 2.

During drilling activities inside the building footprint, two concrete slabs were encountered beneath the current building's concrete floor. The slabs each ranged in thickness from 1 foot to 3 feet. The additional slabs were most prominent on the western portion of the building. At least one sub-surface building slab was encountered in most interior borings, necessitating the use of a concrete coring machine prior to sample collection with a Geoprobe. The nature of the subsurface materials in the borings ranged from gravels to sands to clays. Urban fill in the form of concrete, brick and wood were observed in some of the borings.

As required by the RIWP, a total of four groundwater monitoring wells were installed as part of this RI. These are designated MW-101, MW-102, MW-103 and MW-104 on the Boring and Monitoring Well Location Plan included as Figure 2. Monitoring wells were advanced by Trinity Environmental using a Geoprobe 7600 equipped with hollow stem augers.

The monitoring wells were installed with 2" diameter Schedule 40 PVC to approximately 20' below land surface, using 5' of well casing and a 15' of 20 slot well screen, set to intersect the water table in saturated soils. The wells were completed at grade with flush mount 6" well boxes. Well logs were constructed for each monitoring well, and are presented in Appendix D. After installation, each well was developed in accordance with NYSDEC protocols.

Monitoring Well Guaging Data

Well Number	Total Depth of Well	Casing Elevation	Date*:	Depth to Water	Water Elevation
MW-101	20’	6.18	1/14/13	6.70	-0.52
MW-102	20’	8.41	1/14/13	7.89	0.52
MW-103	20’	4.64	1/14/13	5.63	-0.99
MW-104	20’	4.80	1/14/13	5.53	-0.73

Note:
The water levels were re-measured on January 14, 2013, to produce the GW flow map.

Drill cuttings from installation of the monitoring wells were drummed and stored inside the building. This material will be disposed of along with all other excavated material when excavation commences.

The monitoring wells were developed in August of 2012. Each well was developed in accordance with NYSDEC protocols until the turbidity was less than 50 NTU. Development was performed by pumping and surging utilizing a submersible 12-volt pump with 5/8” tubing and a surge block. The submersible pump and surge block were decontaminated between wells utilizing Alconox and potable water. Tubing to the submersible pump and the surge block were disposed of after use and new tubing was utilized for each well. All development waters were retained on-site in DOT 55 gallon drums awaiting groundwater laboratory results to determine disposal.

The monitoring wells were surveyed for well location and casing elevation by Montrose Surveying Company, LLC on October 26, 2012. A copy of the survey is included in Appendix E.

Two test pits were dug at locations C3 and E3 indicated on the Boring and Monitoring Well Location Plan (Figure 2) for the purpose of obtaining a general sense of the physical nature of sub-surface fill and debris in these areas. The test pits were dug with a backhoe by making a narrow trench as deep as feasible given the nature of the equipment and consistent with changes in sub-surface strata and water table encroachment. Test pits were dug to a depth of approximately 11 feet after initial completion of the soil boring and then filled back in using the same soils excavated from the test pit. Groundwater was encountered at approximately eleven (11) feet bgs in both test pits, where excavation was forced to cease due to the possibility of collapse.

Only one concrete slab was observed in E-3 at four (4) feet bgs but an asphalt paving layer was observed at three (3) feet bgs. Both test pits had obvious construction and demolition debris above and between the various slabs from top of boring to approximately four (4) feet bgs. Neither test pit encountered wooden construction timbers. Both test pits encountered fine brown sand/fine sandy-silt from base of concrete slab at four (4) feet bgs to total depth of test pits at eleven (11) feet bgs. This brown sand may be native material, but no evidence was observed in sidewalls of the test pits such as cross bedding and other depositional structures, in-place peat layers, fauna or other evidence of the assumed original depositional environment of a tidal estuary to suggest that this material is undisturbed. No odors were noticed during excavating the test pits.

2.1.2 Samples Collected

Grid Soil Samples

A total of 47 soil samples were collected from the 47 soil borings for field screening with a photoionization detector (PID) between June 1, 2012 and June 22, 2012. Each of the samples was placed into a clean Ziploc bag. The soil samples collected for field screening were placed in a sample collection staging area to allow for samples to equilibrate with ambient temperature. The headspace of each of the soil samples was then screened for the presence of volatile organic vapors using a broadband photoionization detector (PID). The PID was zero calibrated and

checked with a known concentration of isobutylene prior to screening soil samples at the subject property. Field screening results are listed in the boring logs, included in Appendix C.

Endpoint Samples

Endpoint samples (those grab samples collected from the bottom of selected borings to be representative of native or near-native conditions) were collected from 16 locations. Each of the samples was placed into a clean Ziploc bag. The soil samples collected for field screening were placed in a sample collection staging area to allow for samples to equilibrate with ambient temperature. The headspace of each of the soil samples was then screened for the presence of volatile organic vapors using a broadband photoionization detector (PID). The PID was zero calibrated and checked with a known concentration of isobutylene prior to screening soil samples at the subject property. Field screening results are listed in the boring logs, included in Appendix C.

Groundwater

Groundwater sampling was accomplished on September 21 and September 24, 2012. Sampling utilized a QED SamplePro Portable Micropurge Pump, a QED Micropurge MP10 Standard Pressure Controller and QED Compressor. Water parameters were measured with a Horiba U-50 with Flow Cell and water levels were measured with a HERON interface probe. Sampling was conducted utilizing low flow (or low stress) methods similar to "EPA Region 1 Low Stress (low flow) Procedure for the Collection of Groundwater Samples from Monitoring Wells, Revision 3, January 2010".

The SamplePro pump is a submersible bladder pump, which uses a surface supply of compressed air to power the compression of a polyethylene bladder to pump water to the surface via 3/8" polyethylene tubing. The pump, with air supply and water return hoses, is lowered to the designated zone. The target depth of pump is normally midway between the top of the water and total depth of the well, when the slotted pipe extends higher then the top of water as was the case with all four of the subject wells.

Purging the monitoring wells consisted of lowering the pump to the desired depth, after first measuring depth to water. All purge water was retained on-site for future disposal. The discharge hose is attached to the U-50 Flow Cell and Sensor to continuously monitor water quality parameters. Temperature, pH, Oxidation/Reduction Potential, Conductivity, Turbidity, Dissolved Oxygen, Total Dissolved Solids and Depth to Water were the parameters measured and recorded during purging operations. Water discharge rates are monitored with respect to depth of water. Pumping rates are adjusted that after initial drawdown, the depth to water stabilizes. This indicates that the pumping (or discharge) rate is equivalent to the rate of inflow thereby minimizing stress to the aquifer/monitoring well system. Sampling was conducted when groundwater parameters stabilized, indicating that a homogeneous pool of water was being measured. The assumption in low flow sampling is that if, while pumping, groundwater parameters stabilize, then you have encountered a large homogenous body of water. It is assumed that this is aquifer or formation water versus well bore water, as the well bore water volume is finite and the formation or aquifer water is very large in comparison. Sampling by filling laboratory supplied sample bottles is accomplished at that time. Water parameter measurements for current round of purging/sampling are located in the Monitoring Well Sampling Logs presented in Appendix F.

No samples were filtered, either in the field or by the lab. Low flow sampling techniques were utilized which allowed the collection of samples where the measured turbidity was less than 50 NTU. In some cases samples measured less than 5 NTU. Analysis of unfiltered groundwater samples has the potential for reporting metals adsorbed onto sediment in the groundwater, hence the requirement for low turbidity samples. Collection of unfiltered samples is consistent with procedures set forth in DER-10.

2.1.3 Chemical Analytical Work Performed

Grid Soil Samples

The samples were placed into clean 2-ounce, 4-ounce and 8-ounce glass jars fitted with Teflon lined caps using a single-use environmental grade disposable plastic scoop.

Each jar was then labeled with designated sample identification, date and time of collection, and the requested laboratory analyses: volatile organic compounds according to United States Environmental Protection Agency (US EPA) Method 8260; semi-volatile organic compounds (SVOCs) according to US EPA Method 8270 Acid and Base/Neutral extractable; priority pollutant metals (except mercury) according to US EPA Method 6010; and mercury according to US EPA Method 7470/7471. Each soil sample jar was packed in a plastic bag and placed in a secure cooler with separately bagged ice. The samples were then logged on a chain of custody document by sampling personnel, and remained in the custody of Galli Engineering until transport of the samples to the analytical laboratory via laboratory courier.

Endpoint Samples

The samples were placed into clean 2-ounce, 4-ounce and 8-ounce glass jars fitted with Teflon lined caps using a single-use environmental grade disposable plastic scoop.

Each jar was then labeled with designated sample identification, date and time of collection, and the requested laboratory analyses: volatile organic compounds according to United States Environmental Protection Agency (US EPA) Method 8260; semi-volatile organic compounds (SVOCs) according to US EPA Method 8270 Acid and Base/Neutral extractable; PCBs according to US EPA Method 8082; priority pollutant metals (except mercury) according to US EPA Method 6010; and mercury according to US EPA Method 7470/7471. Five of the samples were also analyzed for PCBs according to US EPA Method 8082; Pesticides according to US EPA Method 8081; and Herbicides according to US EPA Method 8151. Each soil sample jar was packed in a plastic bag and placed in a secure cooler with separately bagged ice. The samples were then logged on a chain of custody document by sampling personnel, and remained in the custody of Galli Engineering until transport of the samples to the analytical laboratory via laboratory courier.

Groundwater

The samples were placed into clean 40 ml, and 1 liter glass bottles fitted with Teflon lined septum caps.

Each bottle was then labeled with designated sample identification, date and time of collection, and the requested laboratory analyses: volatile organic compounds according to United States Environmental Protection Agency (US EPA) Method 8260; semi-volatile organic compounds (SVOCs) according to US EPA Method 8270 Acid and Base/Neutral extractable; priority pollutant metals (except mercury) according to US EPA Method 6010; and mercury according to US EPA Method 7470/7471. Each sample bottle was packed in a plastic bag and placed in a secure cooler with separately bagged ice. The samples were then logged on a chain of custody document by sampling personnel, and remained in the custody of Galli Engineering until transport of the samples to the analytical laboratory via laboratory courier.

The following table summarizes all the samples collected and the analysis performed for each sample.

Summary of Sampling Performed
Huxley Envelope Site
145 West Street Brooklyn, NY

Grid Soil Samples						
Sample ID	**VOCs**	**SVOCs**	**TAL Metals**	**PCBs**	**Pesticides**	**Herbicides**
WS A1 0-15ft	X	X	X			
WS A2 0-20ft	X	X	X			
WS B1 0-15ft	X	X	X			
WS B2 0-20ft	X	X	X			
WS B3	X	X	X			
WS C-1 0-15ft	X	X	X			
WS C2	X	X	X			
WSC3 Test Pit	X	X	X			
WS-C3A	X	X	X			
WSC 5	X	X	X			
WSD1 0-15ft	X	X	X			
WS-D3	X	X	X			
WS-D4	X	X	X			
WSD 5	X	X	X			
WS E1 0-15ft	X	X	X			
WS-E2	X	X	X			
WSE3 Test Pit	X	X	X			
WS-E5	X	X	X			
WS F1 0-15ft	X	X	X			
WS-F2	X	X	X			
WS-F3	X	X	X			
WS-F4	X	X	X			

Grid Soil Samples (Continued)						
Sample ID	**VOCs**	**SVOCs**	**TAL Metals**	**PCBs**	**Pesticides**	**Herbicides**
WS F5	X	X	X			
WSG1 0-15ft	X	X	X			
WS G2	X	X	X			
WS-G4 3-15ft	X	X	X			
WS G5	X	X	X			
WS H1 0-15ft	X	X	X			
WS H2	X	X	X			
WSH3	X	X	X			
WSH4 3-15ft	X	X	X			
WSI-1 0-15ft	X	X	X			
WS-12	X	X	X			
WS 13	X	X	X			
WS 15	X	X	X			
WS J1	X	X	X			
WS J3	X	X	X			
WS J4	X	X	X			
WS J 5	X	X	X			
WS-K1	X	X	X			
WS-K2	X	X	X			
WS-K3	X	X	X			
WS-K4	X	X	X			
WS-K5	X	X	X			
WS-S-1	X	X	X			
WS-S-2	X	X	X			
WS-S-4	X	X	X			
Endpoint Soil Samples						
Sample ID	**VOCs**	**SVOCs**	**TAL Metals**	**PCBs**	**Pesticides**	**Herbicides**
WS A1 20ft	X	X	X	X	X	X
WS B2 25ft	X	X	X	X	X	X
WS-C2 30ft	X	X	X	X	X	X
WS-C3A 30ft	X	X	X	X	X	X
WS D2-25ft	X	X	X	X	X	X
WS-E2 30ft	X	X	X	X	X	X
WS F1 30ft	X	X	X	X	X	X
WS-F2 30ft	X	X	X	X	X	X
WSH1 20-22ft	X	X	X	X	X	X
WS H 2-25ft	X	X	X	X	X	X
WS I-1 30ft	X	X	X	X	X	X
WS I3 25ft	X	X	X	X	X	X
WSJ4 25ft	X	X	X	X	X	X
WSK3 20ft	X	X	X	X	X	X
WS K4 30ft	X	X	X	X	X	X
WSK5 20ft	X	X	X	X	X	X

Groundwater Samples						
Sample ID	**VOCs**	**SVOCs**	**TAL Metals**	**PCBs**	**Pesticides**	**Herbicides**
MW101	X	X	X			
MW102	X	X	X			
MW103	X	X	X			
MW104	X	X	X			

2.1.4 Test Pits

Two test pits were dug at the locations indicated on the Boring and Monitoring Well Location Plan (Figure 2) for the purpose of obtaining a general sense of the physical nature of sub-surface fill and debris in these areas. The test pits were dug with a backhoe by making a narrow trench as deep as feasible given the nature of the equipment and consistent with changes in sub-surface strata and water table encroachment. Test pits were dug to a depth of approximately 11 feet after initial completion of the soil boring and then backfilled using the same soils excavated from the test pit. Groundwater was encountered at approximately eleven (11) feet bgs in both test pits, where excavation was halted due to the potential for collapse of the test pit walls.

Two concrete slabs were observed beneath the building floor in test pit C-3 at three (3) feet and at four (4) feet bgs. Only one concrete slab was observed in E-3 at four (4) feet bgs but an asphalt paving layer was observed at three (3) feet bgs. Both test pits had obvious construction and demolition debris above and between the various slabs from top of boring to approximately four (4) feet bgs. Neither test pit encountered wooden construction timbers. Both test pits encountered fine brown sand/fine sandy-silt from base of concrete slab at four (4) feet bgs to total depth of test pits at eleven (11) feet bgs. This brown sand may be native material, but no evidence was observed in sidewalls of the test pits such as cross bedding and other depositional structures, in-place peat layers, fauna or other evidence of the assumed original depositional environment of a tidal estuary to suggest that this material is undisturbed. No odors were noticed during excavating the test pits.

2.1.5 Documentation

Below is a summary of RI findings.

2.1.5.1 Grid Soil Sample Results

Metals

Priority pollutant metals were detected in all grid soil samples analyzed. Results of the laboratory analysis for metals in the grid soil samples can be found in Table 1. A total of 37 samples were above the Track 1 Unrestricted SCOs, with 19 of those 37 samples also above the Track 2 Restricted Residential SCOs. Sampling locations are provided on the Soil Boring and Monitoring Well Location Plan included as Figure 2.

Arsenic was found above both the Track 1 (13 mg/kg) and Track 2 Restricted Residential SCO (16 mg/Kg) in seven of the 46 grid soil samples. The Arsenic concentrations detected ranged from 16.6 mg/Kg in WS-D1 to 49.3 mg/kg in WS-S4. The Arsenic values appear to be random with no apparent “hotspots”.

Barium was found above Restricted Residential SCO of 400 mg/kg in WS-A2 (463 mg/kg), WS-D5 (893 mg/kg) and WS-F4 (440 mg/kg). However, Barium was not found above the Track 1 SCO in any other samples.

The Track 1 SCO of 50mg/kg for copper was exceeded in 26 of 47 grid soil samples. The highest concentrations of Copper were found in WS-D5 at 274 mg/Kg and WS-G5 at 25,300 mg/Kg, which are both above the Track 2 Restricted Residential SCO of 270 mg/kg. The high amount of Copper in WS-G5 is an isolated result, and is surrounded by Copper results below 250 mg/kg, which is below Track 2 Restricted Residential standards, but above Track 1 SCO. Special attention to this area will be needed during proposed foundation excavation to determine if the soil in this area must be treated as hazardous waste.

Lead was detected above the Track 1 SCO of 63 mg/kg in 36 of 47 grid soil samples collected at the Site. Of those 36 samples, 16 samples contained Lead concentrations in excess

of the Track 2 Restricted Residential SCO of 400 mg/kg. The highest lead concentration detected was 3,190 mg/kg in WS-G5.

Mercury was found above the Track 1 SCO in 26 of 47 soil samples collected at the Site, 10 of those 26 soil samples contained mercury concentrations above the Track 2 Restricted Residential SCO of 0.81 mg/kg. The highest mercury concentration detected was 6.78 mg/kg in WS-S1.

Zinc was found above the Track 1 SCO of 109 mg/Kg in 26 out of 47 grid soil samples. The highest concentration detected was 9,830 mg/Kg in WS-G5 however, Zinc was not found above the Track 2 Restricted Residential SCO of 10,000 mg/Kg in any of the grid samples. The grid soil sampling metals results are summarized in Table 1.

Volatiles

VOCs were identified in 25 of the 47 grid soil samples above the Track 1 SCOs but all of these samples were below the Track 2 Restricted Residential SCOs. The grid sampling VOC results are summarized in Table 2.

Semi-Volatiles

SVOCs were detected above the Track 1 SCOs in 15 of the 47 grid soil samples. Of the 15 samples detected above the Track 1 SCOs, 14 were also detected above Track 2 Restricted Residential SCOs. These samples were collected from WS-B2, WS-C1, WS-C2, WS-C3, WS-C5, WS-D1, WS-D5, WS-F1, WS-F4, WS-G1, WS-G2, WS-G5, WS-H3, WS-H5, and WS-S1. The grid sampling SVOC concentrations are summarized in Table 3.

2.1.5.2 Endpoint Soil Sample Results

Sixteen (16) endpoint samples, described as those grab samples collected from the bottom of selected borings, were visually observed and appeared to be representative of native or near-native conditions.

Metals

Endpoint soil samples collected from 14 locations (WS-C2 30', WS-K5 20', WS-D2 25', WS-E2 30', WS-E3 30', WS-F2 30', WS-C3A 30', WS-H2 25', WS-J4 25', WS-I3 25', WS-F1 30', WS-K3-20', WS-K4 30', and WS-I1 30') showed no metals concentrations in excess of the Track 1 SCOs.

However, samples from A1 at 20' and B2 at 25' revealed some metals, in soil that appeared to be native, at concentrations above the Track 1 SCOs. In addition, Arsenic and Mercury were detected in B2 at concentrations just above Track 2 Restricted Residential SCOs. Those results are summarized in the following table. All concentrations are in mg/Kg.

Endpoint Soil Sampling Exceedances				
Metal	**Track 1 Unrestricted 375-6.8(a)**	**Track 2 Restricted Residential 375-6.8(b)**	**Sample Result A1 20'**	**Sample Result B2 25'**
Arsenic	13	16	12.4	**18.2***
Copper	50	270	37.8	**76.4**
Lead	63	400	**132**	**270**
Mercury	0.18	0.81	**0.29**	**1.25***
Nickel	30	140	**31.1**	29.2
Zinc	109	2,200	**113**	**185**

Notes:

BOLD = Concentration above Track 1 SCO.

BOLD*= Concentration above Track 2 SCO.

As a result, it appears that a Track 1 cleanup may only be attainable if excavation occurs to the west of the proposed buildings and to a depth greater than the limit of end point borings. A complete summary of the endpoint soil sampling metals results can be found in Table 4.

Volatiles

No VOCs were reported in any endpoint sample above the Track 1 SCOs. The endpoint soil sampling VOC results are summarized in Table 5.

Semi-Volatiles

No SVOCs were reported in any endpoint sample above the Track 1 SCOs. The endpoint soil sampling SVOC results are summarized in Table 6.

PCBs

No PCBs were reported in any endpoint sample above the Track 1 - Unrestricted Use SCOs found at 6 NYCRR 375-6.8(a). The endpoint soil sampling PCB's results are summarized in Table 7.

Herbicides/Pesticides

No herbicides/pesticides were reported in any endpoint sample above the Track 1 SCOs. The endpoint soil sampling pesticides/herbicides results are summarized in Table 8.

2.1.5.3 Groundwater Analytical Results

Monitoring wells MW-101, MW-102, MW-103 and MW-104 are located around the subject building as shown on the Soil Boring and Monitoring Well Location Map (Figure 2).

Laboratory results of the groundwater samples were analyzed and assessed in accordance with 6 NYCRR Chapter X, Part 703 "Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations" and NYSDEC Technical and Operational Guidance Series (TOGS 1.1.1): "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" ("groundwater standards"). Please note that the metals samples collected were unfiltered.

Groundwater Results

Metals were the only COC detected above the groundwater standards in each monitoring well. With the exception of 1.6 ug/L MtBE detected in MW-2, which is below groundwater standards, no other VOCs were detected in any of the groundwater samples. In addition, no SVOCs were detected above the method detection limit in any of the four monitoring wells. Therefore, neither VOCs nor SVOCs are a COC in groundwater.

Metals

Some metals were detected in unfiltered samples at varying concentrations above and below their Ambient Limits in each of the monitoring wells. Those results are summarized below and a complete summary of the groundwater metals analysis can be found in Table 9.

- Aluminum was detected in groundwater samples MW-101 and MW-102 at concentrations of 2.02 mg/L and 0.417 mg/L. These results are above the groundwater standard for Aluminum of 0.1 mg/L.
- Iron was found in groundwater samples from MW-101, MW-102 and MW-103 at concentrations of 7.49 mg/L, 10.4 mg/L and 1.31 mg/L. These results are above the groundwater standard for Iron of 0.3 mg/L.
- Lead was detected in groundwater samples from MW-103 at concentrations of 0.278 mg/L, above the groundwater standard for lead of 0.025 mg/L.
- Magnesium was detected in MW-103 and MW-104 at concentrations of 834 mg/L and 291 mg/L, respectively, which exceed the groundwater standard for Magnesium of 35 mg/L.
- Manganese was detected in all four monitoring wells and exceeded the groundwater standard of 0.3 mg/L in MW-101 at 5.12 mg/L and MW-104 at 0.457 mg/L.

- Sodium was detected in all four monitoring wells and exceeded the groundwater standard of 20 mg/L in MW-101 through MW-104 respectively at 158 mg/L, 130 mg/L, 7,740 mg/L and 2,210 mg/L. Monitoring wells MW 103 and MW-104 are located the closest to the East River.

Volatiles

With the exception of MW-102, no VOCs were detected above the analytical method detection limit in any of the monitoring wells. The MW-102 groundwater sample detected Methyl t-butyl ether (MTBE) at 1.6 ug/L, which is below the groundwater standard of 10 ug/L. . A summary of the groundwater VOC results is provided in Table 10.

Semi-Volatiles

No SVOCs were detected above the method detection limit in any of the four groundwater samples. A summary of the groundwater SVOC results is provided in Table 11.

2.1 SIGNIFICANT THREAT

The NYSDEC and NYSDOH are currently reviewing the Remedial Investigation Report (RIR) for this project, in order to make a Significant Threat Determination. This determination will be based upon the data presented in the RIR and should be made within 20 days of RIR approval. If completed before final submittal of the RAWP, the Significant Threat Decision will be included within this report. Otherwise, the Determination will be presented in the Final Engineering Report.

2.2 SITE HISTORY

2.2.1 Past Uses and Ownership

Lot 1 contains a single-story warehouse building [approx. 96,000 square feet (“sf”)], constructed about 1970. The site is now inactive, but was occupied from 1995 through about 2006 by Variety Accessories, Inc., a maker of holiday decorations and ornaments. From 1970

through 1995, this lot was occupied by Huxley Envelope Corp., an envelope manufacturer. Prior to that, the lot contained four one-story office buildings and an adjoining lumber yard. A 20,000-gallon heating oil UST was properly closed by abandoning in place in 1994 by Langan Engineering & Environmental Services (Langan) when the facility switched to from oil to natural gas heat. Langan was provided with spill and tank closure documentation from DEC, which was included in the BCP Application for this Site.

Lot 55 (159 West Street) contained a seafood distribution facility, approximately 2,500 sf, which includes a loading area and refrigerated storage units on the ground floor, an office on the second floor, and a storage area in the basement. The building was constructed in 1931.

Lot 56 (157 West Street) contains a single unoccupied, two-story building. The building formerly contained a garage on the first floor and a mezzanine on the second floor. The building was constructed in 1931.

2.2.2 Phase I and Phase II Reports

Each of the three of these lot (Lots 1, 55, and 56) that constitute the Site have been designated as sites with potential environmental impacts by New York City Dept. of Environmental Protection ("E" designated sites) because, based on documented past use industrial uses on each lot, the potential exists for environmental contamination to be present. The "E" designation is a mechanism which ensures that no significant adverse impacts would result from a proposed action until remedial steps are first undertaken prior to the development of an "E" overlay zone and before a building permit is issued.

A number of previous investigations have been conducted on the Site by Langan as described in the BCP Application and attached thereto. These include:

Environmental Site Assessment, 145 West Street (Lot 1), November 1994

In November 1994, EEA inspected and documented operations at the existing Huxley Envelope facility. Solvents, inks, waste solvent, photo developing solutions, compressor oil and

waste compressor oil were all being used and/or generated at this time as documented in this report from visual observations. The presence of 5-6 floor drains was documented, and the manager of Huxley Envelope at the time did not know the end point of the drains or how any discharges into the drains was being handled. The presence of a large 20,000-gallon heating oil tank and chemical storage tanks was also documented.

According to this initial Phase I Report, Huxley produced solvent waste materials during on-site printing operations. Huxley also produced photo developing waste, compressor oil waste and degreasing waste. Manifests for off-site disposal of this material were produced to EEA dating back to 1985, but the facility was in business at the Site since 1970, and no records of disposal prior to 1985 were produced. Sloppy housekeeping practices were noted (e.g. staining near utility sinks which could migrate to drains). The Report stated that according to EPA records, Huxley Envelope Corp. generated 110 gallons per year of halogenated F001 solvent waste.

A 1992 spill is documented in the Report related to liquefied ink wastes leaking into the adjacent East River. Spill #9203518 related to a reported sheen on the East River emanating from the facility. The NYSDEC and the Coast Guard inspected the sheen's origin, and documented that it was coming from ink wastes that were being disposed by Huxley in outside dumpsters near the River. The company was instructed to cease dumping these materials in exterior dumpsters. The on-line information related to this spill did not specify it was an ink spill, but rather suggests it was a petroleum related spill, and notes the spill was closed the same day because Huxley allegedly promised not to dump the ink wastes in the dumpster any longer. However, this practice was likely occurring for a period of 22 years dating back to 1970, and NYSDEC required no investigation of the area in and around the dumpster.

This report indicates that a 20,000-gallon heating oil UST failed a tightness test in September 1994, but no spill report was noted to have been made in the report. Shortly after this Report was prepared, however, someone must have reported the spill because there are two 1994 documented spill numbers relating to this UST.

Phase I ESA, Lots 55/56, 155 West St., (Nov 2005 Phase I Report; Rev. March 31, 2006);

A November 2005 Phase I, revised March 2006 Phase I was prepared by Langan for Bear Stearns and a prospective purchaser at the time the last tenant to occupy the Site was present - Variety Accessories, Inc. According to this report, Variety's manufacturing activities included the fabrication of ribbons and ornaments from pre-printed textile materials with the use of pneumatic and electrical machines and air brushing equipment for painting.

A new 10,000-gallon above ground storage tank (AST) was allegedly installed at the site in 1994 to replace the closed in place 20,000-gallon heating tank, but this AST was no longer on the property in 2005/2006 when this Phase I investigation was performed. The facility was heated by gas at this time. However, Langan identified the still present 20,000-gallon UST, a lacquer storage and handling area, floor drains and asbestos as recognized environmental conditions (RECs) during this investigation. Langan observed 55 gallon drums and smaller containers of flammable and inflammable lacquers, spray paints, hydraulic oil, and one unidentified 55 gallon drum, four floor drains and three additional drains grouted in place.

Langan's Phase I analyzed the November 1994 tank closure report, explaining the UST was properly closed by abandoning in place and noted in parentheses sampling at "ground water level" was performed. While suggesting sampling at the groundwater table may be an issue, and noting that no map was attached to that report showing sampling locations, Langan relied on the 1994 results and DEC's closure of the spill to conclude this tank was not a REC. However, no sampling was performed under the UST, and only limited sampling was performed around the UST, and not at bottom depths under where the tank may have leaked.

Phase II ESI Report, Lot 1, 145 West Street (May 2006 Phase II ESI)

This Phase II report summarizes the Phase I investigation Langan prepared in March 2006. This Phase II Report was prepared and submitted to the New York City DEP on May 2, 2006 for purposes of satisfying "e" designation requirements. A geophysical investigation was performed as part of the Phase I/II investigation. The UST was identified on the southeastern

portion of the Site in the parking lot near the corner of India and West Street. The tank is oriented north-south and is approximately 35 feet long by 8.2 feet [10 feet?] in diameter.

Direct-push Geoprobe borings were advanced by Aquifer Drilling and Testing, Inc. (ADT) of New Hyde Park, New York, and soil and groundwater samples were collected by Langan on March 22 and 24, 2006. Eight subsurface soil borings were advanced to maximum depths of 16 feet below ground surface (bgs). A total of 15 soil samples (two from each boring with one exception in B-3 due to shallow refusal), 5 groundwater samples, and related QA/QC samples were collected.

Five borings (B-1, B-2, and B-5 through B-8) were advanced from the ground surface through the depth of groundwater [approximately 7 to 12 feet below ground surface (bgs)]. After three offset attempts, refusal was encountered in fill material in soil borings B-3 and B-4 at four feet bgs. One boring was advanced in the parking lot on the eastern portion of the facility (B-1); two borings were advanced inside the manufacturing facility (B-2 and B-3); three borings were advanced in the storage area on the western portion of the Site (B-4 through B-6); and two borings were advanced in the loading dock area on the western portion of the Site (B-7 and B-8). Soil samples were collected continuously from the ground surface to the top of the groundwater table (or refusal in boring B-3 and B-4) with a Geoprobe Macrocore sampler in four foot increments using new disposable sleeves.

Laboratory analytical results from the soil samples were compared to applicable NYSDEC Technical and Administrative Guidance Memorandum # 4046 (TAGM) Recommended Soil Cleanup Objectives (RSCOs) at this time. Groundwater sampling results were compared to NYSDEC Technical & Operations Guidance Series (TOGS) Ambient Water Quality Standards (AWQS). Results were as follows:

Soil Samples – May 2006

1. Fill material consisting of brownish grey fine sand with a trace of silt and ash and fragments of brick and wood extended to the termination depth of borings B-2 through B-8. Black, coarse sand was observed in the fill material on the western portion of the site near the East River. Native soil, which consisted of grey coarse sand, was observed in boring B-1 at a depth of 10 feet bgs.

2. Minor staining and a faint petroleum odor were observed at approximately 0 to 4 feet bgs in soil samples collected from borings B-3 and B-6. An elevated PID reading of 14.1 ppm was detected in boring B-3 at a depth of two to four feet bgs. Staining, odors, or other indications of contamination were not observed in samples collected elsewhere on the Site.

3. VOCs were not detected at concentrations that exceeded TAGM RSCOs in samples collected from depths between 6 and 8 feet bgs in borings B-1, B-2, or B-7.

4. SVOCs were not detected at concentrations that exceeded TAGM RSCOs in samples collected from depths between 6 and 8 feet bgs in boring B-1, B-2, or B-7.

5. Total SVOC concentrations ranged between 0 ug/kg (B-1-8-10) and 635,200 ug/kg (B-6-0-2). Twelve SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene) were detected at concentrations that exceeded TAGM RSCOs in samples collected from borings B-1 through B-8.

6. Seven metals (arsenic, copper, magnesium, zinc, mercury, lead, and nickel) were detected at concentrations that exceeded TAGM RSCOs in samples collected from borings B-1 through B-8. Mercury was found at the following concentrations: 0.23 mg/Kg @ B-1; 0.33 ug/Kg @ B-2; 0.35 ug/Kg @ B-4; 0.71 ug/Kg, also in B-4; 0.20 ug/Kg @ B-5; 0.71 ug/Kg @ B-6; 0.31 ug/Kg, also in B-6; 2.8 ug/Kg @ B-7; and 0.25 ug/Kg @ B-8.

Groundwater Samples - May 2006

1. Groundwater was encountered at depths between 7 and 12 feet bgs in the borings.
2. VOCs, SVOCs, and PCBs were not detected at concentrations that exceeded TOGS AWQS in the five collected groundwater samples.
3. Nine metals (antimony, arsenic, iron, lead, magnesium, manganese, sodium, thallium and mercury) were detected in unfiltered groundwater samples at concentrations that exceeded TOGS AWQS.

Based on these results, Langan recommended preparation of a RAP and CHASP.

- Phase II Environmental Site Investigation (ESI) Work Plan and HASP, Lot 1, 145 West St. (January 2006 Phase II ESI);
- Remedial Action Plan and HASP for Lot 1, 145 West Street (May 2006 RAWP);

The RAP and CHASP were submitted to the City of New York on the same day as the Phase II Report.

Since the elevated Petroleum, VOC, SVOC and metal concentrations detected in soil samples exceeded the Recommended Cleanup Objectives stated in the applicable TAGM 4046 guidance document (now the Part 375 Unrestricted Use Soil Cleanup Objectives), the RAP required: (1) removal of the petroleum source area located under the building slab; (2) removal of the 20,000-gallon UST and any associated remediation; (3) remediation of the contamination fill material from 0-10 feet (13’ where pile caps will be emplaced for foundation support); (4) mitigation of human contact with impacted soil; (5) importation of 2 feet of clean soil cover; and (6) soil vapor barrier in future on-Site buildings.

Phase I on full Site for Lots 1, 55, and 56 (December 1, 2008)

In 2007, 145 West Street, LLC was able to purchase the two small remaining lots that are part of Block 2530 – Lots 55 and 56 – to complete the assemblage of this entire block for redevelopment purposes. As a result, all of the environmental reports had to be updated to

include these lots, and thus create documents related to the entire Site. Therefore, in December 2008, the earlier Phase I report was updated and added Lots 55 and 56. This Phase I Environmental Site Assessment Report was prepared based on ASTM Practice E1527-05.

The 2008 Phase I Report determined that the prior uses at 157 West Street (former iron works as late as 1992) and 159 West Street (commercial heating oil facility) could have resulted in contamination and were recognized environmental conditions (RECs).

A 275-gallon heating oil AST, located in the basement of the building at 159 West Street, was a listed REC. A vent pipe and fill port were also observed by Langan along the northern exterior wall of the building along West Street. Although staining or other evidence of spills was not observed, rust on the surface of the tank and associated piping was noted, suggesting that the age of the tank probably predated enactment of the Petroleum Bulk Storage regulations, which went into effect in the 1990's. Potential leakage or spillage associated with the connecting piping and fill port constituted a REC.

In addition, an approximately two-foot by two-foot pit, covered with a flush-mounted steel plate and encased in cinder blocks, was uncovered in the northeast portion of the 157 West Street building. The floor of the pit is covered with concrete and fill, and lies approximately six feet below the floor level. The 2008 Phase I Report concluded the pit is a preferential pathway for potential solvent or petroleum spills in the open garage area to infiltrate sub-surface soil and groundwater, and therefore was identified as a REC.

Phase II Addendum #1 to May 2006 Phase II ESI, Lots 55/56 (Langan, February 25, 2009)

Interior access was restricted to the on-Site building at 159 West Street due to ongoing commercial seafood market activities at the time of this supplemental Phase II Investigation. Therefore, borings were advanced outside this building, which was inspected during the Phase I.

The 2009 Phase II Investigation on Lots 55 and 56 revealed shallow soil underlying Lots 55 and 56 also consisted of contaminated fill, which was comprised of brown to gray fine- and

medium-grained sand with some silt, gravel, brick, and concrete. Ash was observed in borings B-11 and B-12 adjacent to the 159 West Street building. The fill layer on these parcels, which are located more inland, extends to about 5 ft bgs, and is underlain by native fine-to medium-grained sand with varied amounts of silt, clay, and gravel. Odors, staining, or elevated vapor concentrations were not observed in the soil samples. The highest PID reading was 6.8 parts per million (ppm), which was detected in soil collected directly below the concrete slab in boring B-12. The depth to groundwater ranged from 6.80 ft bgs in monitoring well MW-12 to 9.22 ft in MW-10.

Analytical results from four soil borings were compared to applicable NYSDEC TAGM 4046 RSCOs. Groundwater sampling results were compared to TOGS Ambient Water Quality Standards (AWQS) or Class GA groundwater. The analytical results were as follows:

Soil Samples

SVOCs were detected at concentrations that exceeded TAGM RSCOs in the sample collected from 0 ft to 2 ft bgs in boring B-10, SVOCs exceeding TAGM RSCOs included benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthrene, chrysene, and dibenzo(a,h)anthracene. Total SVOC concentrations ranged from none detected in the native soil samples to 20,940 micrograms per kilograms (µg/kg) in the sample collected from 0 ft to 2 ft bgs in boring B-10.

Metals were detected in all of the borings at concentrations that exceeded their respective TAGM RSCO levels at the time. The following eight metals were identified in soils at concentrations exceeding TAGM RSCOs: beryllium, chromium, copper, iron, mercury, nickel, selenium, and zinc. Two samples collected from the fill material in borings B-9 and B-12 contained mercury at 0.277 mg/kg and 0.458 mg/kg, respectively, which exceeded the TAGM RSCO of 0.1 mg/kg.

Groundwater

Methyl t-Butyl Ether (MtBE) was detected in the four groundwater samples at concentrations ranging from 1.3 micrograms per liter (µg/l) to 13.4 µg/l. The MtBE concentration detected in the sample collected from MW-9 (13.4 µg/l) exceeded the TOGS AWQS of 10 µg/l.

Aluminum, cobalt, copper, iron, magnesium, manganese, nickel, selenium, sodium, and thallium were detected in groundwater samples at concentrations that exceeded their TOGS AWQS.

July 8, 2009 Langan Amended RAP and CHASP to include Lots 1, 55, and 56

The July 2009, RAP submitted by Langan was amended only to include additional lots 55 and 56 otherwise the report remained relatively the same as their original RAP. The key difference between this Galli RAWP and the first Langan RAP is the addition of a two level below grade basement, and a sub-level basement ventilation system. The Langan RAP proposed soil excavation ranging from depths of 2 to 10 feet below land surface (bls) for construction of the proposed buildings. This RAWP proposes to excavate contaminated soils across the site from depths ranging from 2 to 35 feet bls, necessary to allow for the installation of the two sub-grade basement levels The area of the proposed building will be excavated to a maximum depth of 35 feet at the elevator pits. The remainder of the proposed foundation outline will be excavated to a depth of approximately 30 feet bls. Both proposed remediation plans recommend a vapor barrier installation. The only difference between the two reports is in the type of vapor barrier proposed for installation. In addition, both the Langan RAP and the Galli RAWP includes the removal of both the 20,000 gallon UST on Lot 1 and the 275-gallon AST in the basement of Lot 55.

2.3 GEOLOGICAL CONDITIONS

Local Geology

Brooklyn and Queens at the western end of Long Island are underlain by Cretaceous sedimentary formations consisting of sands and clay that strike northeast and dip gently to the

southeast. These formations consist of the Magothy Formation, the Raritan Formation and the Lloyd Sand Member.

Resting unconformably on top of these sands and clays and forming the highest elevation is a belt of glacially deposited debris composed of an unsorted, unstratified mixture of boulders, sand, silt and clay consisting of the Upper Pleistocene deposits, the Gardners Clay and the Jameco Gravel. This debris was deposited during the Pleistocene when the area was covered by a massive glacial ice sheet. In the vicinity of New York, the ice was moving in a generally southerly direction, bringing with it a large load of detached bedrock, sediment and soil that it had scoured from more northerly regions. This debris was deposited at the periphery of the glacier forming a belt of deposits known as a terminal moraine.

Sloping gently southeastward from the edge of the terminal moraine in Brooklyn and Queens is an apron of sediment (outwash plain) that slopes very gently toward the Atlantic Ocean. This rests on the underlying inclined sedimentary layers and was formed through the deposition of sand, silt and clay by streams that are carrying melt waters from edge of the glacier. A geologic cross section from the Site is included as Figure 3.

The depths measured to groundwater were found to be 7’-12’ in previous investigations. Groundwater flow direction at the Site was generally found to be to the west and in the direction of the East River. There were not enough data or monitoring points from previous investigations to evaluate seasonal groundwater fluctuations and overburden/bedrock groundwater relationships. However, the recent RI included enough sample wells to provide data for the development of a groundwater contour map, which is included as Figure 4. Groundwater flow direction is in the direction of the East River.

2.4 CONTAMINATION CONDITIONS

The following sections summarize the general Areas of Concern (AOC) based on past uses of the Site, and observed contamination identified during the Remedial Investigation.

2.4.1 Description of Areas of Concern

The following Areas of Concern (AOC) exist at the Site as noted in the EEA Environmental Site Assessment, 145 West Street, Lot 1, (November 1994), the Langan Phase II ESI Report, Lot 1, 145 West Street (May 2006,), and the Langan Phase I ESI Report, 143-159 West Street, (December 2008).

The following AOCs were observed at the Site:

1) Former interior building storage of solvents, inks, waste solvent, photo developing solutions, compressor oil, waste compressor oil and halogenated F001 solvent waste.
2) Former Exterior Storage of solvents, inks, waste solvent, photo developing solutions, compressor oil, waste compressor oil and halogenated F001 solvent waste in Dumpsters (Spill #9203518 related to liquefied ink wastes leaking into the adjacent East River).
3) 5-6 Floor Drains.
4) 20,000-gallon Heating Oil Tank.
5) Chemical storage tanks.
6) Lacquer storage and handling area.
7) Asbestos.
8) 275-gallon above-ground storage tank (AST) is located in the basement of the building at 159 West Street.
9) 6 - 30 feet of Contaminated Historic Fill material consisting of sand with gravel, organic material, and construction debris.
10) 55-gallon drums and smaller containers of flammable and non-flammable lacquers, spray paints, hydraulic oil.

It is anticipated that this Remedial Action Work Plan will provide for remediation of these AOCs, such that Track 1 Unrestricted Use limits will be achieved.

2.4.2 Identification of Standards, Criteria and Guidance

See Appendix G of this document for Applicable SCG's. Applicable SCG's will be used to govern procedures to investigate and remediate the Site, to protect and involve the public, and to assess effectiveness of the remedial efforts.

2.4.3 Soil/Fill Contamination

Between May 18, 2012 and October 26, 2012, Galli Engineering, PC, performed a Remedial Investigation at the Site to fully delineate the nature and extent of contamination, and fill in data gaps from earlier studies. This investigation included the installation of 47 soil borings and collection of soil samples for analysis of Metals, VOC's, and SVOC's. Endpoint samples from 16 of the boreholes were also analyzed for PCB's, pesticides and herbicides.

2.4.3.1 Summary of Grid Sampling Soil/Fill Data

Results of the grid soil sampling performed by Galli Engineering during May and June of 2012 RI, identified the presence of SVOCs and metals as the primary COCs in soil. SVOCs and metals are prevalent throughout the contaminated historic fill layer of soils throughout the Site at depths varying from 6 feet on the east side of the Site to 30 feet on the west side of the site.

The highest SVOCs detected in the grid samples included:

- Benz(a)anthracene at concentrations ranging from 1,300 ug/Kg in D-1 to 14,000 ug/Kg in D-5.
- Benzo(a)pyrene at concentrations ranging from 1,300 ug/Kg in G-2 to 10,000 ug/Kg in D-5.
- Chrysene at concentrations ranging from 1,200 ug/Kg in D-1 & E-3 to 17,000 ug/Kg in C-2.
- Indeno(1,2,3-cd)pyrene at concentrations ranging from 510 ug/Kg in G-2 to 22,000 ug/Kg in F-4.

The highest Metals detected in the grid samples included:

- Arsenic at concentrations ranging from 16.3 ug/Kg in G-4, to 49.3 ug/Kg in S-4.
- Copper concentrations ranging from 52.2 ug/Kg in B-2, to 25,300 ug/Kg in G-5.
- Lead concentrations ranging from 72.1 ug/Kg in E-3 to 2,360 ug/Kg in G-2.
- Mercury concentrations ranging from 0.21 ug/Kg in B-2 to 6.78 ug/Kg in S-1.
- Zinc at concentrations ranging from 112 ug/Kg in B-2 to 969 ug/Kg in A-2.

The grid soil sampling data is summarized and compared to the Track 1 Unrestricted Use and the Track 2 Restricted Residential SCOs, and presented in Tables 1 through 3.

The comparison of the results with the SCOs resulted in the following conclusions:

Metals

Priority pollutant metals were detected in all grid soil samples analyzed. Results of the laboratory analysis for metals in the grid soil samples can be found in Table 1. A total of thirty seven (37) samples were above the Track 1 SCOs, with nineteen (19) of the above 37 samples also above the Track 2 Restricted Residential SCOs.

Arsenic was above the Track 2 Restricted Residential SCO of 16 mg/kg in WS-A1 (17.9 mg/kg), WS-D1 (44.2 mg/kg), WS-G4 (16.3 mg/kg), WS-G5 (19.4 mg/kg), WS-S4 (49.3 mg/kg) and WS-C3 Test Pit (44.2 mg/kg). However, Arsenic was not found above the Track 1 SCO in any other sample. The Arsenic values appear to be random with no apparent “hotspots”.

Barium was found above both the Track 1 and Track 2 Restricted Residential SCO of 400 mg/kg in three samples. The concentrations were as follows: WS-A2 (463 mg/kg), WS-D5 (893 mg/kg) and WS-F4 (440 mg/kg). Barium was not found above the Track 1 SCO in any other samples.

The Track 1 SCO of 50 mg/kg for Copper was exceeded in 29 of the 47 grid soil samples. Of those 29 soil samples, only two samples were above the Track 2 Restricted Residential SCO of 270 mg/L. The results are as follows: WS-A1 (172 mg/kg), WS-A2 (70.7 mg/kg), WS-B1 (64.8 mg/kg), WS-B2 (52.2 mg/kg), WS-B3 (55.6 mg/kg), WS-C1 (65.8 mg/kg), WS-C2 (93.7 mg/kg), WS-C3 Test Pit (203 mg/kg), WS-C3A (107 mg/kg), WS-C5 (88.6 mg/kg), WS-D1 (76.6 mg/kg), WS-D3 (199 mg/kg), WS-D4 (89.2 mg/kg), WS-D5 (274 mg/kg), WS-E1 (55.9 mg/kg), WS-E2 (66.3 mg/kg), WS-E5 (165 mg/kg), WS-F2 (151 mg/kg), WS-F4 (265 mg/kg), WS-F5 (175 mg/kg), WS-G1 (85.7 mg/kg), WS-G2 (102 mg/kg), WS-G4 (90.5 mg/kg), WS-G5 (25,300 mg/kg), WS-H2 (101 mg/kg), WS-H3 (156 mg/kg), WS-H3 (140 mg/kg), WS-I3 (76 mg/kg), and WS-H5 (142 mg/kg).

The high amount of Copper in WS-G5 appears to be an isolated result since it is surrounded by Copper results below 250 mg/Kg, which is below the Track 2 SCO, but above Track 1 SCO. Special attention to this area will be needed during proposed foundation excavation to determine if the soil in this area must be treated as hazardous waste.

Lead was found in excess of the Track 2 Restricted Residential SCO of 400 mg/kg in sixteen (16) samples: WS-A1 (761 mg/kg), WS-C2 (545 mg/kg), WS-C3 Test Pit (450 mg/kg), WS-C5 (404 mg/kg), WS-D1 (400 mg/kg), WS-D5 (895 mg/kg), WS-E5 (769 mg/kg), WS-F2 (673 mg/kg), WS-F4 (1,020 mg/kg), WS-G1 (551 mg/kg), WS-G2 (2,630 mg/kg), WS-G4 (436 mg/kg), WS-G5 (3,190 mg/kg), WS-H3 (421 mg/kg), WS-S2 (700 mg/kg) and WS-S4 (1,740 mg/kg). Lead was also found above the Track 1 SCO of 63 mg/kg in 20 additional samples: WS-A2 (314 mg/kg), WS-B1 (396 mg/kg), WS-B2 (216 mg/kg), WS-B3 (194 mg/kg), WS-C1 (323 mg/kg), WS-D4 (353 mg/kg), WS-E1 (118 mg/kg), WS-E2 (155 mg/kg), WS-E3 Test Pit (72.1 mg/kg), WS-F1 (396 mg/kg), WS-F5 (349 mg/kg), WS-H1 (94.2 mg/kg), WS-H2 (162 mg/kg), WS-H4 (245 mg/kg), WS-H5 (310 mg/kg), WS- I1 (116 mg/kg), WS-I2 (158 mg/kg), WS-I3 (77.8), WS-I5 (94.1), and WS-J3 (96.5 mg/kg). Therefore, a total of 36 exceedances out of 47 samples taken for Lead are present at the Site above the Track 1 SCOs.

Mercury was found above the Track 2 Restricted Residential SCO of 0.81 mg/kg in ten (10) soil samples: WS-A1 (1.91 mg/kg), WS-D1 (1.86 mg/kg), WS-E2 (1.56 mg/kg), WS-E5 (5.63 mg/kg), WS-F2 (3.33 mg/kg), WS-G2 (3.31 mg/kg), WS-H4 (2.56 mg/kg), WS-S1(6.78 mg/kg), WS-S2 (3.42 mg/kg) and WS-S4 (1.78 mg/kg). In addition, Mercury was found above Track 1 SCO in sixteen (16) soil samples: WS-A2 (0.24 mg/kg), WS-B1 (0.55 mg/kg), WS-B2 (0.21 mg/kg), WS-B3 (0.27 mg/kg), WS-C1 (0.74 mg/kg), WS-C3 (0.3 mg/kg), WS-C3 Test Pit (0.47 mg/kg), WS-D5 (0.22 mg/kg), WS-E1 (0.73 mg/kg), WS-F1 (0.71 mg/kg), WS-F4 (0.52 mg/kg), WS-G1 (0.31 mg/kg), WS-G5 (0.39 mg/kg), WS-H2 (0.22 mg/kg), WS H3 (0.4 mg/kg), WS-I2 (0.29 mg/kg). Therefore, a total of 26 exceedances out of 47 samples taken for Mercury are present at the Site above the Track 1 SCOs.

Nickel was detected above Track 1 SCO of 30 mg/Kg in three grid soil samples. Those results were as follows; 39.7 mg/Kg in WS-CA, 68.1 mg/Kg in WS-D3, and 31.4 mg/Kg in WS-F2. However, it was not detected above Track 2 SCOs in any of the grid samples.

Zinc was found above the Track 1 SCOs in 26 out of 47 samples. However, none of the samples were above Track 2 Restricted Residential SCOs. The grid soil sample metals analyses are summarized in Table 1.

Volatiles

VOCs were identified in 25 of the 47 grid soil samples above the Track 1 SCOs, but all of these samples were below the Track 2 Restricted Residential SCOs. The VOC sampling results are summarized in Table 2.

Semi-Volatiles

SVOCs were detected above the Track 1 SCOs in 15 of the 47 grid soil samples. Of the 15 samples detected above the Track 1 SCOs, 14 were also detected above the Track 2 Restricted Residential SCOs. These samples were collected from WS-B2, WS-C1, WS-C2, WS-C3, WS-C5, WS-D1, WS-D5, WS-F1, WS-F4, WS-G1, WS-G2, WS-G5, WS-H3, WS-H5, and WS-S1. The SVOC grid sampling results are summarized in Table 3.

Based upon the results of the grid soil sampling, SVOCs and metals are the primary COCs present in the soil at the Site. SVOCs and metals are prevalent throughout the historic fill layer of soils throughout the Site to depths varying from 15 feet on the east side of the Site to 30 feet on the west side of the site. The analytical data confirm that the Site has been impacted by contaminants that are consistent with the past use of the property. The analytical data collected as part of this investigation indicate that the impacted soils do not meet the criteria for hazardous waste, with the possible exception of the one isolated hot spot of Copper. The grid soil sampling data is summarized and compared to Track 1 and 2 SCOs, in Tables 1 through 3. Spider Maps showing the exceedances of Track 1 SCO's and the respective sampling locations are included as Figures 6 through 11.

2.4.3.3 Endpoint Soil Sampling

Sixteen (16) endpoint soil samples, described as those grab samples collected from the bottom of selected borings in soil that was visually observed, and appeared to be representative of native or near-native conditions. The following paragraphs describe the results of the endpoint sampling:

Metals

Endpoint samples collected from locations: WS-C2 30', WS-K5 20', WS-D2 25', WS-E2 30', WS-E3 30', WS-F2 30', WS-C3A 30', WS-H2 25', WS-J4 25', WS-I3 25', WS-F1 30', WS-K3-20', WS-K4 30', and WS-I1 30' showed no metals concentrations in excess of the Track 1 SCOs. However, samples A1 at 20' and B2 at 25' revealed some metals in soil that appeared to be native, at concentrations above both Track 1 and Track 2 Restricted Residential SCOs. As shown in the following table, concentrations of Arsenic and Mercury in B2 at 25' are slightly above the Track 2 Restricted Residential SCOs. Mercury, Nickel, and Zinc were detected above Track 1 SCOs in A1 at 20 feet while Copper, Lead and Zinc exceeded Track 1 SCOs in B2 at 25 feet. Due to the fact that only shallow excavation is required (under the current development plan) for the area surrounding these borings, a decision will likely be made to over-excavate this area and remove additional contaminated material, with the goal of attaining Track 1 limits for

the entire site (as confirmed by endpoint sampling) or to keep these levels and then meet the Track 2 Restricted Residential SCOs.

Soil Sampling Results Endpoint Metals Exceedances				
Metal	**Track 1 – Unrestricted Use 375-6.8(a)**	**Track 2 - Restricted Residential 375-6.8(b)**	**Sample Result A1 at 20'**	**Sample Result B2 at 25'**
Arsenic	13	16	12.4	**18.2***
Copper	50	270	37.8	**76.4**
Lead	63	400	**132**	**270**
Mercury	0.18	0.81	**0.29**	**1.25***
Nickel	30	140	**31.1**	29.2
Zinc	109	2,200	**113**	**185**

All concentrations are in mg/Kg

BOLD = Sample Result above Track 1- Unrestricted Use SCO.

BOLD* = Sample Result above Track 2 - Restricted Residential SCO.

Volatiles

No Volatile Organic Compounds were reported in any endpoint sample above the Track 1 SCOs.

Semi-Volatiles

No Semi-Volatile Organic Compounds were reported in any endpoint sample above the Track 1 SCOs.

PCBs, Herbicides/Pesticides

No PCBs, herbicides or pesticides were reported in any endpoint sample above the Track 1 SCOs.

Conclusions

Based upon the results from the endpoint soil sampling, it is possible to achieve a Track 1 remediation at this Site with over-excavation of soils near boring A1 and A2. No VOCs, SVOCs, PCBs, or pesticides/herbicides were reported in any endpoint sample above the Track 1 SCOs, including the results from the vicinity of the UST. Therefore, VOCs, SVOCs, PCBs and herbicide/pesticide contamination at the Site can be addressed through urban fill/source removal activities proposed for building construction. However, Metals were reported in two endpoint samples (A-1 and B-2) above the Track 1 SCOs in the westernmost portion of the Site. In addition, the Arsenic concentration in B-2 at 25 ft was 18.2 mg/Kg, and the mercury concentration was 1.25 mg/kg, both of which are slightly above the Track 2 Restricted Residential SCOs.

Therefore, the endpoint soil sampling results suggest that a Track 1 cleanup could be achieved if the contaminated historic fill was removed from the Site to the point where Track 1 endpoints can be achieved. With the exception of the lead, mercury, nickel and zinc concentrations found in A-1 at 20’ which are above Track 1 SCOs, and the arsenic and mercury concentrations in B-2 at 25’, which are just above the Track 2 Restricted Residential SCO, all other endpoint samples were below Track 1 SCOs for all compounds identified. At completion of excavation, endpoint samples will be collected from the bottom of the excavation to confirm which SCOs have been reached.

2.4.4 On-Site and Off-Site Groundwater Contamination

2.4.4.1 Summary of Groundwater Data

Monitoring wells MW-101, MW-102, MW-103 and MW-104 are located around the subject building as shown on the Soil Boring and Monitoring Well Location Plan included as Figure 2. Laboratory results of the groundwater samples were analyzed and assessed in

accordance with 6 NYCRR Chapter X, Part 703 "Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations" and NYSDEC Technical and Operational Guidance Series (TOGS 1.1.1): "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" ("groundwater standards").

Metals

Some metals were detected at varying concentrations above and below the groundwater standards in each of the monitoring wells. Those results are summarized below and a complete summary of the groundwater metals analysis can be found in Table 9.

Aluminum was detected in groundwater samples MW-101 and MW-102 at concentrations of 2.02 mg/L and 0.417 mg/L. These results are above the groundwater standard for Aluminum of 0.1 mg/L.

Iron was found in groundwater samples from MW-101, MW-102 and MW-103 at concentrations of 7.49 mg/L, 10.4 mg/L and 1.31 mg/L. These results are above the groundwater standard for Iron of 0.3 mg/L.

Lead was detected in groundwater samples from MW-103 at concentrations of 0.278 mg/L, above the groundwater standard for lead of 0.025 mg/L.

Magnesium was detected in MW-103 and MW-104 at concentrations of 834 mg/L and 291 mg/L, respectively, which exceed the groundwater standard for Magnesium of 35 mg/L.

Manganese was detected in all four monitoring wells and exceeded the groundwater standard of 0.3 mg/L in MW-101 at 5.12 mg/L and MW-104 at 0.457 mg/L.

Sodium was detected in all four monitoring wells and exceeded the groundwater standard of 20 mg/L in MW-101 through MW-104 respectively at 158 mg/L, 130 mg/L, 7,740 mg/L and 2,210 mg/L. MW 103 and MW-104 are the monitoring wells closest to the East River.

Volatiles

Volatile organic compounds (VOCs) were detected at varying low concentrations in the groundwater samples collected from the monitoring wells. Except in MW-102, no VOCs were detected above the analytical method detection limit in any of the groundwater samples. The MW-102 groundwater sample detected Methyl t-butyl ether (MTBE) at 1.6 ug/L, which is below the groundwater standard of 10 ug/L. A summary of the groundwater VOC results is provided in Table 10.

Semi-Volatiles

No SVOCs were detected above the method detection limit in any of the four groundwater samples. A summary of the groundwater SVOC results is provided in Table 11.

2.4.4.2 Comparison of Groundwater with SCGs

Groundwater Results

Metals were the only COCs detected above groundwater standards in each monitoring well. Volatile organic compounds (VOCs) were detected above their method detection limit at varying concentrations in the groundwater samples collected from all four of the monitoring wells, with the exception of MW-102. However, none of the VOCs detected were above the groundwater standards. Therefore, VOCs are not a COC in groundwater. In addition, no SVOCs were detected above the method detection limit in any of the four groundwater samples. Therefore, SVOCs are not a COC in groundwater. Since the groundwater sample results from the nearby monitoring well down gradient from the UST site showed no impacts from the petroleum contamination in the vicinity of the UST, the UST must be carefully removed during Site remediation activities to avoid the creation of any environmental impacts from the spill associated with this UST, which currently appears to be confined to the area immediately around UST. A table showing the exceedances of the groundwater sampling is summarized below.

Groundwater Metals Results vs. GA Standards

ANALYTE	TOGS WQ/GA STANDARD	WELL ID			
		MW-101	MW-102	MW-103	MW-104
Aluminum	0.1	**2.02**	**0.417**	0.055	0.01
Iron	0.3	**7.49**	**10.4**	0.132	**1.31**
Lead	0.025	0.004	0.002	**0.278**	ND
Magnesium	35	22.5	16.1	**834**	**291**
Manganese	0.3	**5.12**	0.241	0.024	**0.457**
Sodium	20	**158**	**130**	**7,740**	**2,210**

Note:
All results are in mg/L.
Bold: Results above TOGS WQ/GA Standard.
ND: Not detected above the reporting level.

2.5 ENVIRONMENTAL AND PUBLIC HEALTH ASSESSMENTS

2.5.1 Qualitative Human Health Exposure Assessment

All three of the lots (Lots 1, 55, and 56) that make up the Site have been designated as having potential environmental impacts by New York City Department of Environmental Protection ("E" designated sites) because the potential exists, based on documented past use of the properties, for environmental contamination.

Contaminants of Concern

The COCs at the Site are based on the laboratory analytical results from soil and groundwater sampled during previous investigations. The COCs in soil include: Volatile organic compounds (VOCs - solvents and total petroleum hydrocarbons), semi-volatile organic compounds (SVOC's – petroleum chemical compounds), and metals (heavy metals). These COCs were identified above Track 1 standards, in soil samples collected from grade to depths ranging from 20' to 30' below land surface (bls). Groundwater sampling results reported only

metals concentrations above Groundwater Quality Standards (GQS), 6NYCRR Part 703.5 Class GA.

Potential Exposure Pathways

VOC and SVOC chemical compounds were detected in soil samples during previous investigations. The potential routes of migration for VOC and SVOC contaminants may include the following:

- Volatilization directly from the ground surface into the air;
- Migration vertically from subsurface soils to overburden groundwater; and
- Migration horizontally and vertically through the overburden soil.

Heavy metals detected in soil and groundwater samples from previous investigations at the Site included; arsenic, copper, lead, mercury, nickel and zinc. The potential routes of migration for metals (heavy metals) may include the following:

- Migration horizontally and vertically through the overburden soil; and,
- Migration vertically from subsurface soils to overburden groundwater.

Since VOCs, SVOCs, and heavy metals in soil may all leach into overburden groundwater, although some breakdown of contaminants may occur in the subsurface over time, these compounds or their breakdown chemical compounds may migrate vertically through the soils and may impact the groundwater within the bedrock formation. The proposed remedial plan would be to eliminate the source of the soil contamination that may cause this potential leaching into the groundwater to eliminate this potential exposure pathway.

Human Health Exposure Assessment

The following “Contaminants Profile” summary table provides descriptions of potential exposure pathways for potential current on-site and off-site human populations. No potential exposure pathways have been identified that pose a significant and imminent threat (as identified by 6 NYCRR Part 375) to human health such that an interim remedial measure is required to protect human health.

CONTAMINANTS PROFILE

Chemical	Exposure Route	Symptoms of Overexposure
Arsenic	Inhalation Ingestion Skin Contact	• Stomach ache, nausea, vomiting, diarrhea. • Fatigue, abnormal heart rate. • Skin changes- redness and swelling.
Cobalt	Inhalation Ingestion Skin Contact	• Abdominal discomfort, nausea and/or constipation, diarrhea, • Weakness, muscle pains, irritability, headache. • Dizziness.
Lead	Inhalation Ingestion Skin Contact	• Abdominal discomfort, nausea and/or constipation, diarrhea, metallic taste. • Weakness, muscle pains, irritability, headache. • Dizziness.
Magnesium	Skin Contact	• FLAMMABLE SOLID in metal form • WATER REACTIVE in metal form
Manganese	Inhalation Ingestion Skin Contact	• Cause metal fume fever • Abdominal pain and nausea • Hypoglycemia • Chronic exposure can cause impairment of central nervous system
Mercury	Inhalation Ingestion Skin Contact	• Lung damage, nausea, vomiting, diarrhea. • Increase in blood pressure and/or heart rate. • Skin rash, eye irritation.
Nickel	Skin Contact Inhalation Ingestion	• Skin sensitization, allergic reaction • Nausea, vomiting, diarrhea • Metal fume fever (sever flu like symptoms)

Selenium	Inhalation Ingestion Skin Contact	• Highly toxic via inhalation • Toxic – may be fatal • May cause skin burns
Thallium	Inhalation Ingestion Skin Contact	• HIGHLY TOXIC via all routes in metallic form.
Zinc	Inhalation Ingestion Skin Contact	• Stomach cramps, nausea, diarrhea. • "Metal Fume Fever". • Skin irritation.
MtBE	Inhalation Ingestion Skin Contact	• Possible Human Carcinogen • Irritating to eyes, nose, and throat • Headaches • Dizziness
PAH's Polycyclic Aromatic Hydrocarbons	Inhalation Ingestion Skin Contact	• Probable Human Carcinogen.

Potentially Exposed Receptors

Because the Site is currently occupied by vacant buildings, the only current, on-site risk for exposure would be for visitors or trespassers. Visitors or trespassers have the potential for exposure to surface soil via the ingestion (oral), dermal contact and inhalation exposure pathways. The building is currently locked, although gaps exist in the perimeter fence; therefore, the possibility exists for people to trespass on the site. Current off-site human populations include residences to the east of the Site as well as workers at the industrial facilities located to the north and south of the Site. No residence is located immediately adjacent to the Site.

These populations have the potential for exposure to Site-related COCs via ingestion of and dermal contact with surface soil, inhalation of particles and inhalation of vapors in ambient

air. The groundwater in the vicinity of the Site is not utilized for public drinking water; therefore this is not considered a COC pathway.

Future Potential Exposure

The project is located in the Greenpoint Area of Brooklyn, New York. The project consists of a new 39 story residential tower with two 5-story wings and a 6-story building, totaling approximately 777,038 gross square feet on a 123,363 sf site, with a sub-grade cellar with parking and retail uses and two levels of above grade parking. The lower of these two levels (the First Floor) will be for residential and non-residential parking, community space and some retail. The upper (Second Floor) will be for residential parking. The 39-story tower, a Huron Street wing and an India Street wing will consist of market rate rental apartments. The West Street building will consist of affordable rental housing and ground floor commercial space. Therefore, some limited landscaping will be present in the park like area near the East River.

Once excavation is complete, end-point samples will be collected to confirm the removal of all contaminated media. If the results of end-point sampling confirm that all contaminated soils have been excavated (Track 1 Remedy), no further engineering or institutional controls will be required. If the results of end-point sampling indicate that some limited soil contamination remains, endpoint samples will be compared to the Track 2 SCOs (Track 2 Remedy), to determine if these levels can be met. Depending on the extent of remaining contamination the Department will make a determination if engineering and institutional controls are required to be incorporated into the remedy to render the overall Site remedy protective of public health and the environment or if such controls are not required.

Per NYSDEC Soil Cleanup Policy (CP-51), Track 2 is generally achieved by excavating the top 15 feet of soil from land surface (or bedrock if less than 15 feet). However, two endpoint samples collected in the northwest corner of the Site (A1 and B2) suggest that Track 2 may not be reached at 20’ and 25’ deep respectively. Confirmatory endpoint samples will be taken at the completion of excavation, quite possibly at lower depths, in an attempt to meet Track 2 (or even

Track 1) SCOs. If Tracks 1 or 2 cannot be achieved, engineering controls in the form of a 2 foot cap will be placed above any residual contaminated soil. In addition, a vapor barrier system will be installed under the building foundation slab and up the foundation walls to grade, as well as installation of a sub-grade basement ventilation system. In the landscaped areas a minimum of 2 feet of clean soil meeting Unrestricted Use SCOs will be used, with the top 6 inches capable of sustaining vegetation.

If a Track 2 Remedy is implemented, and the residual contaminants can still leach into the groundwater, the following institutional controls may also be required:

- Establishment of use restrictions including prohibitions on the use of groundwater from the Site and prohibitions on sensitive Site uses, such as farming or vegetable gardening, to eliminate future exposure pathways;
- Establishment of an approved Site Management Plan to ensure long-term management of these engineering and institutional controls, including the performance of periodic inspections and certification that the controls are performing as they were intended; and
- Recording of an environmental easement to memorialize the remedial action and the Engineering and Institutional Controls to ensure that future owners of the Site continue to maintain these controls as required.

2.6 INTERIM REMEDIAL ACTION POSTPONEMENT

Spill Observed during Remedial Investigation

During the RI, the large 20,000 gallon UST was supposed to be removed as an IRM. However, during installation of soil boring WS-J5 near the southeast corner of the site, a thin layer (<1”) of free product was observed at a depth of 10 feet. The substance appeared to be fuel oil. This discovery was called in to the NYSDEC spills hotline and Spill Number 12-02875 was assigned.

No other evidence of free product was observed in any other soil boring. Furthermore, no evidence of free product was discovered in groundwater when groundwater was subsequently

sampled in well MW-102, which lies essentially down gradient from the observed free product. The location of the UST is also capped by a concrete sidewalk, and therefore, it is inaccessible to the general public. In addition, the nearest down gradient monitoring well (MW-3) showed no volatile contamination in soil samples and no organic contamination in groundwater samples. Finally, if there was impacted soil under the 145 West Street building as a result of this UST, it was determined that no excavation prior to building demolition could be accomplished any way. With limited risk to the public of exposure to the fuel oil contamination, and a more efficient cleanup possible, it was judged that waiting until the demolition of the building to remove the UST and piping and any fuel oil impacted soils was more reasonable than performing an IRM. As a result of this discovery, Galli determined that the UST IRM tank excavation work should be delayed until the approved RAWP is implemented so as to perform a prescribed UST excavation in a manner that does not cause an impact to groundwater quality.

Although the data suggest that this is a very localized phenomena, this spill will be addressed when the tank is removed and during any excavation of the surrounding area. Additional sampling will be conducted. Documentation will be prepared and submitted to NYSDEC to close the spill and as part of the Final Engineering Report (FER) for the Certificate of Completion to close out the remedial action on the Site.

While the RIWP called for the removal of the 20,000-gallon UST on the southeast corner of the Site as an IRM, since contamination was detected in and around this UST during the RI, a deviation from the RIWP was determined to be appropriate since remediation of the entire Site, including the area under the UST, will be performed as early as possible after excavation begins on the Site. At the time of full Site excavation, the UST will be carefully removed and the contaminated soil there under properly excavated. Any piping that may still be attached will be uncovered by hand if necessary and removed. The UST will then be properly disposed off-Site.

Post excavation sampling in the UST excavation pit will consist of collecting samples from four walls and two from the floor of the excavation and analyzing for the Track 1 SCOs.

2.7 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site:

2.7.1 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota due to ingestion/direct contact with contaminated soil that would cause toxicity or bioaccumulation through the terrestrial food chain.

2.7.2 Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

The goal of the remedy selection process is to select a remedy that is protective of human health and the environment, which also takes into consideration the future use of the property. The remedy selection process begins by establishing remedial action objectives (RAOs) for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). A remedy is then developed based on the following ten criteria:

1. Protection of human health and the environment;
2. Compliance with SCGs;
3. Short-term effectiveness and impacts;
4. Long-term effectiveness and permanence;
5. Reduction of toxicity, mobility, or volume of contaminated material;
6. Implementability;
7. Cost effectiveness;
8. Community Acceptance;
9. Land use; and
10. Sustainability.

While the preferred remedial plan is to achieve a Track 1 Remedy for the entire Site, a Track 2 remedy is also analyzed in this RAWP.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required by NYSDEC, a minimum of two remedial alternatives (including a Track 1 and Track 2 Remedy) are evaluated, as follows:

Alternative 1 – Track 1 Remedy:

1. Installation of a Perimeter Sea Wall, permanent sheeting, shoring and underpinning required to stabilize the Site for the large scale remediation effort requiring excavation;
2. Removal of the former 20,000-gallon UST and all associated piping located in the southeast corner of the property, excavation of any contaminated soils, associated dewatering of contaminated groundwater, and collection of end-point samples;
3. Removal of contaminated soil/fill material exceeding the Track 1 SCOs and associated dewatering throughout the Site. This alternative would require excavation to depths across the entire site ranging from approximately 15-30 feet below grade to remove all historic fill. Note that this alternative would likely involve additional excavation of the northwestern portion of the Site down to a depth of approximately 30 feet bls, when construction plans only require fine grading and topsoil installation (where required) for concrete walks and landscaping in this location;
4. Perform screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
5. Confirm that Track 1 SCOs have been achieved through post-excavation end point sampling;
6. Off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
7. Import of materials to be used for backfill that meets the Track 1 SCOs for landscaped areas and cover in compliance with: (1) chemical limits and other specifications included in Table 12, (2) all Federal, State and local rules and regulations for handling and transport of material;
8. A vapor barrier will be installed beneath the basement foundation and behind the foundation sidewalls of the new building to prevent possible exposure from any residual contamination or soil vapor or from off-site exposure pathways, and

9. Construction of a sub-grade ventilated basement, per NYC codes, will also act as voluntary engineering control to prevent possible exposure from off-site exposure pathways.

Alternative 2 – Track 2 Remedy:

1. Installation of a Perimeter Sea Wall, permanent sheeting, shoring and underpinning required to stabilize the Site for the large scale remediation effort requiring excavation;
2. Removal of the former 20,000-gallon UST and all associated piping located in the southeast corner of the property, excavation of any contaminated soils, associated dewatering of contaminated groundwater, and collection of end-point samples.
3. Removal of contaminated soil/fill material exceeding Track 2 Restricted Residential SCOs for the Site and associated dewatering. This would require excavation of soil across the site to depths ranging from approximately 2 feet to an average depth of 15 feet. However, certain areas of the site contained concentrations above Track 2 SCOS at depths greater than 15 feet. In these areas (i.e.: A2, B2, D1, D5, E2, E5, F4, F5, G, G2, G4 G5. H3, H4, S1, S2 and S4) deeper excavation will be required to achieve Track 2 standards. In addition, since the end point sampling data at 25 feet in soil boring B2, located in the western portion of the Site, indicated mercury and arsenic concentrations remained above Track 2 SCOs, this alternative would include excavation of contaminated fill in the vicinity of B2 to depths greater than 25 feet.
4. After completion of the proposed soil excavation and building construction, the Site will be capped with either concrete building material or otherwise backfilled in landscaped areas with clean fill with the top 6” required to support vegetation in the landscaped areas.
5. Identifying the Track 2 soils with a demarcation layer, followed by a land survey and, if the residual contamination can contribute to groundwater contamination,

recording institutional and engineering controls for the Site in an environmental easement.

6. Perform screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
7. Off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
8. Import of materials to be used for backfill that meets the Track 1 SCOs for landscaped areas, and cover in compliance with: (1) chemical limits and other specifications included in Table 12, (2) all Federal, State and local rules and regulations for handling and transport of material;
9. Confirm that the Track 2 Remedy has been met through post-excavation end point sampling;
10. Installation of a vapor barrier system under the building foundation slab and up the foundation walls to grade to prevent any exposure from soil vapor and residual contamination and/or off-site exposure pathways;
11. Installation of a sub-grade ventilated basement to prevent any exposure from soil vapor and residual contamination and/or off-site exposure pathways;
12. In the event the residual soil contamination can still contribute to groundwater contamination, establishment of an environmental easement, including use restrictions, such as prohibitions on the use of groundwater from the site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways and required implementation of the Site Management Plan to ensure that future owners of the site continue to maintain these controls as required; and
13. Establishment of an approved Site Management Plan to ensure long-term management of these engineering and institutional controls including the performance of periodic inspections and certification that the controls are performing as they were intended.

Both the Track 1 and Track 2 Remedy alternatives will remove significant amounts of contaminated fill from the subject Site. Alternative 1 will remove approximately 51,000 cubic yards of soil fill from the Site and includes excavation of basically all soil and fill to a depth of approximately 30 feet bls (five foot deeper at the elevator pits). Alternative 2 will likely require the removal of slightly less contaminated soil/fill due to the decrease in the total depth of excavation outside the proposed building(15 to 20 feet bls) required to meet Track 2 guidelines across the Site. In either case, Site controls would be implemented during remedial activities to prevent exposure of site workers, the surrounding community, and nearby surface water. Those controls would include a Construction Health and Safety Plan (CHASP), Community Air Monitoring Plan (CAMP), and Erosion and Sediment Control Plan (E&SC).

3.1.1 Threshold Criteria

1.0 Protection of Public Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

Alternative 1 would be protective of human health and the environment by protecting the Site from off-site migration of neighborhood or river contaminants onto the Site and removing the on-Site source of contaminated soil to depths ranging from 15-35 feet bls. Soil within the building "C" footprint would be removed to a depth of 28 feet, and soil within the building "B' and building "A" footprints would be removed to depths of approximately 21 and 20 feet, respectively. In addition, all locations for elevator pits will be excavated an additional five feet.

Soil outside the proposed building footprint would be excavated until Track 1 SCOs are reached which is estimated to vary between 15 and 30 feet bls. Reaching Track 1 SCOs basically eliminates the potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contamination leaching into groundwater. Implementing

an approved Soil and Materials Management Plan and Community Air Monitoring Plan (CAMP) would minimize potential exposure to contaminated soils during construction. Since construction and remediation will occur in close proximity to contaminated groundwater, special attention will be given to selecting appropriate remediation techniques during the Site development. Dewatering will be performed in accordance with NYSDEC, NYC Department of Buildings and NYC Department of Environmental Protection requirements for dewatering and discharge, respectively. The sub-grade portion of the building developed within the interim unsaturated zone will be insulated with a specialized waterproofing membrane to prevent off-site contamination in the river or from adjacent sites from entering the Site. Additionally, a vapor barrier system (beneath the building foundation slab and up the foundation sidewalls to grade) and a parking ventilation system (for the sub-grade basement) will be installed at the Site to maintain Track 1 conditions on the Site and prevent any potential migration of soil vapor into the new building.

Alternative 2 would achieve comparable protections of human health and the environment for the proposed restricted residential use since the soil within the building "C" footprint would be removed to a depth of 28 feet, while soil within the building "B' and building "A" footprints would be removed to depths of approximately 21 and 20 feet, respectively. In addition, all locations for elevator pits will be excavated an additional five feet.

Due to the less restrictive Track 2 SCOs, soil outside of the proposed building would be removed to shallower depths ranging from approximately 2 feet to 15 feet bls. However, one area of the Site, outside of the proposed building, (B2 at 25') contained Arsenic and Mercury concentrations above Track 2 SCOS In this area excavation deeper than 25 feet is likely to be required to achieve Track 2 standards.

This alternative will likely require institutional and engineering controls, to prevent direct contact with any remaining on-Site soil/fill. Implementing institutional controls, including an environmental easement if required, and a Site Management Plan, would ensure that the Sea Wall and foundation remains intact and protective. Establishment of contaminant levels below

the Track 2 SCOs would minimize the risk of contamination leaching into groundwater. Implementing an approved Soil and Materials Management Plan (SMP) and Community Air Monitoring Plan (CAMP) would minimize potential exposure to contaminated soils during construction. Potential contact with contaminated groundwater would be prohibited by the environmental easement. Additionally, a vapor barrier system (beneath the building foundation slab and up the foundation sidewalls to grade) and a ventilation system (for the basement) will be installed at the Site to prevent any potential migration soil vapor or contamination into the new buildings.

2.0 Compliance with Standards, Criteria and Guidance (SCGs)

Alternative 1 would achieve compliance with the remedial goals, SCGs and RAOs because any soil left in place would be at concentrations lower than the Track 1 SCOs. Focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs.

Alternative 2 would address the chemical-specific SCGs for soil and soil vapor by removing all soil/fill exceeding Track 2 SCOs, Similar to the Track 1 alternative, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs.

3.0 Short-term Effectiveness and Impacts

This evaluation criterion assesses the effectiveness of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Both **Alternative 1 and 2** have similar-short term effectiveness during their respective implementations. Both Alternative 1 and 2 are considered to be effective in protecting human

health and the environment in the short term. Alternative 1 would eliminate all exposures to the contaminant sources and Alternative 2 would significantly reduce exposure to the contaminant sources. Both Alternative 1 and 2 would employ appropriate measures to prevent short term impacts created as a result of the excavation of the contaminated soil, including a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-site soil disturbance activities and would effectively prevent the release of significant contaminants into the environment. Both alternatives provide short term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-site contaminants. Construction workers operating under appropriate management procedures and a Health and Safety Plan (HASP) will be protected from on-site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones). Alternative 2 may be slightly more effective in the short term since less soil is being excavated near receptors.

4.0 Long-term Effectiveness and Permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

Alternative 1 would achieve long-term effectiveness by providing a permanent cleanup of on-Site contamination through removal of all impacted soil/fill material in excess of the Track 1 SCOs and the Sea Wall, waterproofing/vapor barrier foundation system and a sub-grade ventilated basement will be a permanent barrier against off-site migration of contaminants or contaminated soil vapor.

Alternative 2 would also be effective over the long-term attaining Track 2 Restricted Residential standards but slightly more residual contamination will remain, which may require additional institutional and/or engineering controls. The Department will determine if a Site Management Plan will be required to establish use restrictions, ensure long-term management of Institutional Controls (ICs) and Engineering Controls (ECs), and if required due to the ongoing risk of groundwater contamination, recording an environmental easement to memorialize these controls for the long term. Additionally, a vapor barrier system and a ventilation system (for the basement) will be installed to protect against off-site migration back onto the Site and to protect tenants in the new on-Site structures.

5.0 Reduction of Toxicity, Mobility, or Volume of Contaminated Material

This evaluation criterion assesses each remedial alternatives use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. The preferred remedial alternative is to remove contaminants from a Site to eliminate contaminants at the Site, and if this is not possible to reduce through removal the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 would provide maximum reduction of toxicity, mobility, and volume of contaminated material/soil on-site soil by excavation and removal of all soils that exceed Track 1 Unrestricted Use SCOs. Alternative 1 would also eliminate a greater total mass of contaminants from the Site than Alternative 2.

Alternative 2 would greatly reduce the toxicity, mobility, and volume of contaminants from on-Site soil because it would include removal of soils that exceed Track 2 SCOs to allow for a restricted residential use, but would not be as protective as Alternative 1.

6.0 Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative, and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking a remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

Both **Alternative 1 and 2** are feasible and implementable once the Sea Wall and excavation side wall shoring is completed. As part of the remedy, these engineering controls will enable the depth required for the large excavation to occur. The new sea wall will also act to prevent the migration of contaminants onto or off the subject Site. They use standard materials and services, and well established technology that are readily available to allow for the large scale excavation work that will be required to achieve a Track 1 or Track 2 residential cleanup. Installation of the waterproofing/vapor barrier system will be conducted in accordance with standard methods utilized to prevent any future soil vapor intrusion into the buildings from on or off-site sources. However, Alternative 1 is less implementable than Alternative 2 because less soil removal may be required for Alternative 2.

For implementation of both remedies, standard construction equipment utilized for the overall earthwork would be used. OSHA trained personnel will complete all activities that include excavation and handling of impacted soils. No special permits, other than earthwork permits required for completion of the required site redevelopment scope, are required for implementation of the remedy. The reliability of each remedy is also high. There are no special difficulties associated with any of the activities proposed.

7.0 Cost Effectiveness

Initial costs associated with **Alternative 1** will be considerably higher due to the excavation and disposal of a larger quantity of soil from the Site. Alternative 1 includes excavation and disposal of all contaminated soil at the Site to depths ranging from 15-33 feet,

(plus 5 more feet at the elevator pits) thus eliminating potential for direct contact with contaminated soil/fill. Soil within the building "C" footprint would be removed to a depth of 28 feet, and soil within the building "B' and building "A" footprints would be removed to depths of approximately 21 and 20 feet, respectively. In addition, all locations for elevator pits will be excavated an additional five feet.

Due to the less restrictive Track 2 SCOs, in **Alternative 2,** soils in the northwestern portion of the Site, outside of the proposed building would be removed to shallower depths ranging from approximately 2 feet to 15 feet bls. However, one soil boring in that area (B2 at 25') contained Arsenic and Mercury concentrations above Track 2 SCOS. In that area excavation deeper than 25 feet is likely to be required to achieve Track 2 standards. Upon excavation in this area, end point samples will need to be collected and analyzed to determine if/when concentrations fall within Track 2 SCOs.

Therefore, **Alternative 1** will require more upfront cost for removal and disposal of a larger quantity of soil/fill from an area where significant excavation is not necessary for construction. However, **Alternative 2** will include long term costs if an SMP and easement are required, and no long- term costs are associated with **Alternative 1.** In both cases, appropriate public health and environmental protections are achieved.

8.0 Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

Based on the overall goals of the remedial program, and initial permitting associated with the proposed site development, no adverse community opinions are anticipated for either alternative. Both of the alternatives for the Site would provide a remedial action that is protective of public health and the environment, and would be safe to achieve. This RAWP will be subject to and undergo public review under the NYSDEC BCA and approved Citizen

Participation Plan, and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedial action.

9.0 Land Use

Both Alternatives are appropriate with respect to the proposed residential and commercial land use, and land uses in the vicinity of the Site. The proposed redevelopment of the Site is compatible with its current existing zoning designation of R8 along the waterfront, R6 within 275 feet of West Street, and R6 with a C2-4 overlay within 150 feet of West Street, and is consistent with recent development patterns. Predominant zoning classifications surrounding the Site include M1-2, R6A and R6B to the east and M1-1 to the south and the proposed cleanup provides comprehensive protection of public health and the environment for these uses. Improvements in the current condition of the Site achieved by both cleanup alternatives are also consistent with the City's goals for cleanup of contaminated land, bringing such properties to productive reuse, and making such properties protective of natural and cultural resources.

10.0 Sustainability of the Remedial Action

Alternative 1 would potentially result in larger energy usage based upon the larger quantity of soil/fill that will have to be excavated and properly disposed of in order to reach the Track 1 SCOs. In addition, **Alternative 1** will require a larger quantity of clean backfill to replace the additional soil/fill removed to reach Track 1 SCOs.

Alternative 2 would potentially result in a much smaller initial energy usage based on the reduced amount of soil/fill that will need to be excavated and properly disposed of. **Alternative 2** will also require a smaller quantity of clean fill that would need to be imported to the Site. However, the final project will be a sustainable green building project.

3.2 SELECTION OF THE PREFERRED REMEDY

The preferred remedial action alternative is Alternative 1 (Track 1 Remedy). The preferred remedial alternative achieves protection of public health and the environment for the intended residential and commercial use of the property. The preferred remedial action

alternative will attempt to achieve the highest level remedial action objectives established under the BCP. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants both on- and off-Site. The preferred remedial action alternative is cost effective and implementable, and uses standards methods that are well established in the industry.

3.2.1 Citizen Participation

The BCP requires public participation to inform the public about the process of investigating and cleaning up contaminated sites, and to enable citizens to more fully participate in decisions that affect their health, environment, and social well being. The program provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment;
- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process;
- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process;
- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community; and
- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation Plan (CPP) provides information about how the public will be informed during the investigation and cleanup of the Site. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

3.2.2 Environmental Justice

Environmental Justice (EJ) means the fair treatment and meaningful involvement of all people regardless of race, color, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. It is the general policy of the DEC, (see DEC Policy # CP-29) to promote environmental justice and incorporate measures for achieving environmental justice into its programs, policies, regulations, legislative proposals and activities.

The Enhanced Public Participation Plan (EPPP), in accordance with NYSDEC Policy CP-29 (Environmental Justice and Permitting), is a program of activities required by the NYSDEC that provide opportunities for citizens to be informed about and involved in the review of a proposed action. To ensure meaningful and effective public participation, this policy requires applicants for permits covered by this policy to actively seek public participation throughout the permit review process. Applicants are encouraged to consider implementing the public participation plan components prior to application submission.

The proposed project on the Site does not adversely impact the surrounding area within a 400 foot radius of the subject site. The project is also consistent with the City's goals to replace vacant, underutilized industrial land uses with residential, commercial and community spaces, including affordable rental housing and public open space on a new esplanade that will be paid for by the Volunteer on the East River waterfront.

Significant adverse effects of traffic, noise and air quality are not anticipated as a result of the proposed project. Since the impacts will be minimal, and since the project will improve rather than cause a detrimental environmental impact to the neighborhood, the proposed project has no Environmental Justice impacts.

3.2.3 Land Use Designations

As discussed in Section 3.2.5, above, the entire project site lies within the designated NYC Coastal Zone Boundary. As such, the proposed action is subject to review for its consistency with the City's Waterfront Revitalization Program. The New York City Waterfront Revitalization Program (WRP) is the City's principal coastal zone management tool, and is included as part of New York State's Coastal Zone Management Program. It establishes the City's policies for development and use of the waterfront and provides the framework for evaluating the consistency of all discretionary actions in the coastal zone with those policies.

3.2.4 Fish and Wildlife Assessment

From a natural resources perspective, the Site is located within a disturbed, urban setting where little or no indigenous vegetation exists and common invasive species are present. Terrestrial and avian wildlife on the project site and in its vicinity are generally limited to species tolerant of urban conditions and low-quality habitat.

The Site is adjacent to a National Wetland Inventory (NWI) mapped tidal wetland. The shoreline along the project site consists primarily of urban bulkhead. These wetlands are low-quality habitats as this type of urban structural shoreline significantly limits the potential for higher quality tidal wetlands such as tidal marsh or submerged aquatic vegetation. The FWS National Wetlands Inventory classifies the majority of the waters along the Greenpoint shore area as estuarine sub-tidal with unconsolidated bottom (at least 25 percent of particles are smaller than 6-7 cm (2.4-2.8 in.) stones). Subtidal estuarine habitats are continuously submerged areas with low energy and variable salinity, influenced and often enclosed by land. Unconsolidated bottoms have less than 30 percent vegetative cover.

The Site is adjacent to the East River waterfront. This waterfront is largely urbanized and contains stressed ecological communities and deteriorated built conditions.

Aquatic Resources

The strong hydrodynamic features of the East River, combined with numerous municipal and industrial discharges that have occurred in the river over many years, make this river a physically harsh environment. Therefore, many of the species using the area are tolerant of highly variable conditions. The following is a description of the aquatic biota that may be found in the East River:

Phytoplankton: Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents.

Zooplankton: Zooplankton is an integral component of aquatic food webs—they are primary grazers on phytoplankton and detritus material, and are themselves consumed by organisms of higher trophic levels as food.

Benthic Invertebrates: Invertebrate organisms that inhabit river bottom sediments as well as surfaces of submerged objects (such as rocks, pilings, or debris) are commonly referred to as benthic invertebrates.

Fish: Despite the relatively low value of the East River for fish propagation, the waterway does serve as a major migratory route between the Hudson River/New York Harbor and Long Island Sound. Harsh conditions in the East River, including its swift current, lack of shoal and protected habitat, and possibly a lack of prey, are possible explanations as to why the East River experiences only limited utilization by fish at various times of the year.

Marine Species

Winter flounder, scup, and bluefish are marine species common to the East River. Bluefish are also reported as an abundant species in the East River.

Estuarine Species

Species found in the East River are the resident fish Atlantic silverside, striped killifish, and common killifish. White perch is an additional estuarine species that has been found in the East River.

Anadromous Species

Anadromous species that use the East River include striped bass and tomcod, and members of the herring family.

Catadromous Species

The single catadromous species common to the East River is American eel.

The East River is an Essential Fish Habitat (EFH) as designated by the FWS. The EFH species greater potential to occur in the East River in the vicinity of the project site include Pollock, Red hake, Winter flounder, Windowpane flounder, Atlantic sea herring, Bluefish, Atlantic butterfish, Summer flounder, Scup, and Black sea bass.

Avian Resources

As a tidal strait linking New York Harbor with Long Island South, the East River is an important flyway, particularly for shorebirds that feed and forage in water environments. In addition, there are migratory and overwintering birds that would be attracted to the river as well as raptors that have re-appeared, some of them nesting in the East River bridges and structures along the river.

Shoreline improvements under the proposed action would include the Sea Wall, which has been approved by the Army Corps of Engineers and upland landscape zones (e.g., trees, shrubs and groundcover) that would provide new habitat for migratory species and songbirds, as well as other wildlife.

The proposed project is not expected to result in any natural resource impacts for the following reasons:

- The wetlands along the project site are low-quality habitats; therefore, no moderate to high quality wetland environments would be impacted.
- The proposed project does not involve placing fill in the river or building over the river (e.g., new piers or docks). Rather, there would be a repair and replacement of existing shoreline protection structures. The impacts of such activities are temporary and are typically not significant.
- Any impacts to aquatic resources that are present along the existing shoreline (e.g., algae, crustaceans) would not be significant due to the generally degraded quality of existing habitats. Impacts on primary organisms should be short-term or minimal.
- Essential Fish Habitat (EFH) species that are expected in the vicinity of the Site would not be impacted. No primary or secondary habitats for these species would be affected. In addition, as no in-water structures are proposed the project will have no impact on bottom habitats or the ability of EFH species to migrate along the river.

3.2.5 Off-Site Groundwater Impacts;

Groundwater flow is typically topographically influenced, as shallow groundwater tends to originate in areas of topographic highs and flows towards areas of topographic lows, such as rivers, stream valleys, ponds and wetlands. A variety of other factors can also affect the path of groundwater flow, such as joints and fractures in the bedrock, buried river valleys and stream beds, buried fault zones, as well as sewer lines and other subsurface utilities. Variables such as precipitation, evaporation, extent of vegetation cover, and coverage by impervious surfaces can also affect the groundwater depth and flow direction. Based on the topography of the Site and surrounding area, groundwater is expected to flow to the west towards the East River. However, based on the Site's proximity to the East River, tidal fluctuations likely influence the

groundwater flow direction. Therefore, the Sea Wall will serve a variety of functions including the prevention of off-site migration of contamination into the river, enabling the large scale excavation remediation to take place, and to make the Site more resilient to flooding conditions.

Depth to groundwater at the Site averages less than 10 feet bls. Groundwater in the New York City area is not used as a potable water source. The potable water supply for the Site is provided by the City of New York, and originates from upstate reservoirs.

3.2.6 Proximity to Floodplains

A portion of the Site is within the 100-year Federal Emergency Management Agency (FEMA) floodplain. The proposed building would be flood-proofed in accordance with New York City Local Law 58 and constructed in accordance with all applicable laws and regulations.

3.2.7 Geography and Geology of the Site

Geographic Boundaries of the Site

Industrial and warehousing uses including vehicle open storage and underutilized industrial sites are located to the north and south, along the waterfront, while residential uses dominated by 3- and 4-story multi-family walk-up buildings are located to the east of the project site. Manhattan and Greenpoint Avenues are the two closest commercial corridors to the Site containing scattered commercial uses. Immediately to the north of the Site is a two story warehouse. Also to the north of the Site is the Greenpoint Lumber Exchange Site - a 22-acre waterfront site located between Green and Clay Streets used for vehicle and open storage. To the east of the Site are older multi-family attached residential buildings, a few vacant buildings and vehicle open storage.

According to the United States Geological Survey (USGS) Brooklyn, N.Y. 7.5-Minute Quadrangle Map, dated 1967 and revised 1979, the elevation of the site is approximately 10 feet above mean sea level. The topography of the Site and surrounding area slopes to the West towards the East River.

Pleistocene glacial activity modified the landscapes and surficial features of Brooklyn, Queens, and the remainder of Long Island. The glaciation scoured uplands areas and deposited varying amounts of till (an unsorted mixture of sand, clay and boulders) across the lowlands and valleys.

The area of Brooklyn in which the Site is located is underlain by glacial deposits known as ground moraine. The ground moraine is a widespread dense layer of till material that typically consists of clay, sand and boulders. Bedrock outcrops were not observed on the Site. According to the USGS Bedrock and Engineering Geologic Maps on New York County and parts of Kings and Queens Counties, dated 1994, the Site straddles a bedrock contact between the Cambrian-Ordovician Ravenswood Granodiorite on the northwest portion of the site and the Hartland Formation on the remainder of the Site. The Ravenswood Granodiorite consists of mica-quartz-feldspar gneiss, and the Hartland Formation is characterized by granulite, mica schist and amphibolite. According to a geotechnical investigation performed by Langan in 2005, bedrock at the Site is located between 70 ft and 100 ft below surface grade.

Based on results of Langan's 2005 geotechnical investigation, the Site is underlain with 6 feet of fill material, which consists of sand with gravel, silt, organic material and construction debris. The bottom depth of the fill material increases towards the East River shoreline. The western portion of the property contains a 2 ft to 7 ft thick layer of organic silty clay that underlies the historic fill. A silty sand layer extends from the bottom of the fill and clay to approximately 40 ft to 50 ft below surface grade. The eastern portion of the Site also contains a brown clay layer located within or below the silty sand to depths of about 40 ft below grade. A fine silty sand layer extends from the bottom of the clay and silty sand to the top of decomposed rock between 70 ft and 85 ft below surface grade.

3.3 SUMMARY OF SELECTED REMEDIAL ACTIONS

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

Alternative 1 (Track 1) involves:

- Removal of the former 20,000-gallon UST and all associated piping located in the southeast corner of the property. Excavate any contaminated soils and collect end-point samples from the UST Excavation;
- Removal of all soil/fill exceeding Unrestricted Use (Track 1) Soil Cleanup Objective (SCOs) throughout the Site. This alternative would require excavation to depths across the site ranging from approximately 15-33 feet below grade to remove all historic fill;
- Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
- Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
- Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in Table 12, (2) all Federal, State and local rules and regulations for handling and transport of material;
- Confirmation that Track 1 SCOs have been achieved through post-excavation end point sampling;
- No engineering or institutional controls are required on a Track 1 cleanup, but a vapor barrier beneath the basement foundation and behind the foundation sidewalls of the new building would be installed as a part of the remedy to prevent any exposure from off-site soil vapor;
- A sub-grade level of ventilated basement will also be installed as part of the remedy;
- All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations; and
- Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP. All deviations from the RAWP will be promptly reported to NYSDEC for approval and fully explained in the FER.

Alternative 2 involves:

1. Removal of the former 20,000-gallon UST and all associated piping located in the southeast corner of the property. Excavate any contaminated soils and collect end-point samples;
2. Establishment of Restricted Use (Track 2) Residential SCOs for the Site;
3. Removal of soil/fill exceeding Track 2 –Restricted Residential SCOs from the Site;
4. Locating the terminus of the Track 2 area by way of a demarcation barrier and land survey;
5. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
6. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
7. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in Table 12, (2) all Federal, State and local rules and regulations for handling and transport of material;
8. Confirmation that Track 2 – Restricted Residential SCOs have been achieved through post-excavation end point sampling;
9. Installation of a vapor barrier system under the building foundation slab and up the foundation walls to grade to prevent any possible residual contamination from entering the building;
10. Installation of a sub-grade ventilated basement,
11. Establishment of an approved Site Management Plan, if required, to ensure long-term management of these engineering and institutional controls including the performance of periodic inspections and certification that the controls are performing as they were intended; and,

12. Placement of a deed notice, if required, to memorialize the remedial action and the Engineering and Institutional Controls to ensure that future owners of the site continue to maintain these controls as required.

Initial costs associated with **Alternative 1** will be slightly higher due to the excavation and disposal of a larger quantity of soil from the Site. Alternative 1 includes excavation and disposal of all contaminated soil at the Site to depths ranging from 15-33 feet, thus eliminating potential for direct contact with contaminated soil/fill. Soil within the building "C" footprint would be removed to a depth of 28 feet, and soil within the building "B' and building "A" footprints would be removed to depths of approximately 21 and 20 feet, respectively. In addition, all locations for elevator pits will be excavated an additional five feet.

Due to the less restrictive Track 2 SCOs, in **Alternative 2**, soils in the northwestern portion of the Site, outside of the proposed building, would be removed to shallower depths ranging from approximately 2 feet to 15 feet bls. However, one soil boring in that area (B2 at 25') contained Arsenic and Mercury concentrations above Track 2 SCOS. In that area excavation deeper than 25 feet is likely to be required to achieve Track 2 standards. Upon excavation in this area, end point samples will need to be collected and analyzed to determine if/when concentrations fall within Track 2 SCOs.

Therefore, **Alternative 1** will require more slightly more upfront cost for removal and disposal of a larger quantity of soil/fill from the Site, in an area where significant excavation is not necessary for construction. However, **Alternative 2** will include long term costs if an SMP and easement are required, and no long- term costs are associated with **Alternative 1.** In both cases, appropriate public health and environmental protections are achieved.

During implementation of both alternatives, site controls would be implemented to prevent exposure of site workers, the surrounding community, and nearby surface water; those controls would include a Construction Health and Safety Plan (CHASP), Community Air Monitoring Plan (CAMP), and Erosion and Sediment Control Plan (E&SC).

A decision to seek a Track 1 cleanup for the entire Site, or to seek a less stringent Track 2 cleanup, will be made based upon further evaluation of data collected during the investigation.

4.0 REMEDIAL ACTION PROGRAM

4.1 GOVERNING DOCUMENT

The following documents will be considered a part of this RAWP.

4.1.1 Site Specific Health and Safety Plan (HASP)

- The Health and Safety Plan (HASP) from the Remedial Investigation Work Plan will continue to remain in full force and effect and be used for any additional sampling required during the Remedial Action work.
- All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.
- The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.
- The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.
- The Site Safety Coordinator will be Frank Gehrling. A resume will be provided to NYSDEC prior to the start of remedial construction.
- Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

A copy of the HASP is included in Appendix H.

4.1.2 Quality Assurance Project Plan (QAPP)

The QAPP from the Remedial Investigation Work Plan will continue to remain in full force and effect and be used for any additional sampling required during the Remedial Action work, including evaluation of the excavation of the 20,000-gallon UST and any additional endpoint samples that may be required. A copy of the QAPP is included in Appendix I.

4.1.3 Soil/Materials Management Plan (SoMP)

This document includes detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport and disposal. It specifies all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. The SoMP is included in Section 5.4.

4.1.4 Storm-Water Pollution Prevention Plan (SWPPP)

This document addresses requirements of New York State Storm-Water Management Regulations including physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water. The erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. A copy of the SWPPP is included as Appendix J.

4.1.5 Community Air Monitoring Plan (CAMP)

The Community Air Monitoring Plan describes how off-site impacts from air-borne pollutants will be monitored and the actions to be taken if these impacts approach certain thresholds. A copy of the CAMP is included as Appendix K.

4.1.6 Contractors Site Operations Plan (SOP)

Contractors will provide copies of their Contractors Site Operations Plans to the Remedial Engineer prior to beginning work on the Site. The Remediation Engineer will review all plans and submittals for this remedial project and confirm that they are in compliance with

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

4.1.7 Citizen Participation Plan (CPP)

A Citizen Participation Plan has been prepared describing the steps that will be taken to outreach to the Community, where plan documents can be examined, and who to contact for further information. It will also maintain a list of contacts for all public notifications.

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

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

Document repositories have been established at the following locations and contain all applicable project documents:

Brooklyn Central Library
10 Grand Army Plaza
Brooklyn, NY 11238
(718) 230-2100
M – Th: 9:00 AM – 9:00 PM
Fri – Sat 10:00 AM – 6:00 PM
Sun 1:00 PM – 5:00 PM

4.2 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.2.1 Project Organization

This project will be run by a cooperative effort between the Owner/Developer, Architect, Construction Manager, Environmental Engineer, Contractors, and regulatory agencies. An organization chart is included in Figure 13. Resumes of key personnel involved in the Remedial Action are included in Appendix L.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Richard D. Galli. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Huxley Envelope Site (NYSDEC BCA Site No. C224147). The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

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

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

The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

4.2.3 Remedial Action Construction Schedule

A schedule for performance of the remedial work, broken down into Remedial Action elements is attached as Appendix M.

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements or according to specific variances issued by that agency. DEC will be notified by the Applicant of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

Before any construction begins on the Site, the Site will be completely enclosed by a continuous fence. A security force will be maintained 24/7.

4.2.6 Traffic Control

Only DOT authorized Truck routes will be used to access the Site. Contractors scheduling trips to and from the Site will be advised of these routes. An attendant will be posted at designated access points, and he will also advise on traffic patterns.

4.2.7 Worker Training and Monitoring

Worker training for remedial activities will be as specified in the Health and Safety Plan.

4.2.8 Agency Approvals

The Applicant has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning and/or evidence to show that the planned use conforms to zoning designations will be provided to the NYSDEC prior to issuance of a Certificate of Completion (COC). A COC will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work is attached in Table 13. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the Final Remediation Report.

All planned remedial or construction work in regulated wetlands and adjacent areas will be specifically approved by the NYSDEC Division of Natural Resources to ensure that it meets the requirements for substantive compliance with those regulations prior to the start of construction. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

4.2.9 NYSDEC BCP Signage

Signs of a specific design and content will be prominently displayed at the entrance to the Site at all times during the remediation and development of the Site.

A project sign will be erected at the main entrance to the Site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the New

York State Brownfield Cleanup Program. The sign will meet the detailed specifications provided by the NYSDEC Project Manager.

4.2.10 Pre-Construction Meeting with NYSDEC

A Pre-Construction meeting will take place prior to the start of major construction activities to discuss arrangements, safety concerns, schedules, and coordination of Site activities.

Emergency Contact Information

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

Remedial Action Costs

The total estimated cost of the Remedial Action is To Be Determined. An itemized and detailed summary of estimated costs for all remedial activity is attached as Appendix N. This will be revised based on actual costs and submitted as an Appendix to the Final Remediation Report.

4.3 SITE PREPARATION

4.3.1 Demolition

All Site structures and features, including the shoreline slabs and underwater pilings will be demolished prior to the start of remedial activities. The Site will be secured with fencing during this step.

4.3.1 Mobilization

Equipment will be mobilized to the Site as needed. The Construction Manager will determine the sequences of steps and the required equipment. An early step will be the excavation, investigation and removal of the 20,000-gallon UST.

4.3.2 Erosion and Sedimentation Controls

Erosion and sedimentation controls will be implemented as needed and described in the SWPPP.

4.3.3 Stabilized Construction Entrance(s)

The truck wash exit will be followed immediately by a stone-based egress path so that trucks do not get re-contaminated prior to departure from the Site.

4.3.4 Utility Marker and Easements Layout

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

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. The location of a sewer easement in the southwest corner of the property will require caution when working in this area and prevent any significant soil/fill excavation.

4.3.5 Sheeting and Shoring

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

required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

4.3.6 Equipment and Material Staging

All staging of equipment and material, and its secure storage, will be under the direction of the full time construction manager.

4.3.7 Decontamination Area

A decontamination area for personnel and sampling equipment will be set-up within the Site. The location of the area may change as the work progresses to accommodate work schedules and areas of activity.

4.3.8 Site Fencing

A secure construction fence, meeting the requirements of the NYSDEC Department of Buildings, will be erected around the property. The fence will have a lockable gate and display the required NYCDOB required signs.

4.3.9 Demobilization

The plan for demobilization from the Site will address:

- Restoration of areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management area[s], and access area);
- Removal of temporary access areas (whether on-Site or off-Site) and restoration of disturbed access areas to pre-remediation conditions;
- Removal of sediment and erosion control measures and disposal of materials in accordance with acceptable rules and regulations;

- Equipment decontamination; and,
- General refuse disposal.

4.4 REPORTING

All reports required by the BCP will be prepared by the Remedial Engineer. Copies of all daily and monthly Reports will be included in the Final Engineering Report.

4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day following the reporting period and will include:

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

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

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

A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports submitted to NYSDEC is attached in Figure 2.

4.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period and will include:

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

4.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be submitted to NYSDEC on CD or other acceptable electronic media and will be sent to NYSDEC's Project Manager (2 copies) and to NYSDOH's Project Manager (1 copy). CD's will have a label and a general file inventory structure that separates photos into directories and sub-directories according to logical Remedial Action components. A photo log keyed to photo file ID numbers will be prepared to provide

explanation for all representative photos. For larger and longer projects, photos should be submitted on a monthly basis or another agreed upon time interval.

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

4.4.4 Complaint Management Plan

Complaints submitted to the NYSDEC, NYSDOH or the Applicant will be directed to the Construction Manager for resolution. The Construction Manager will keep a log of all complaints received and actions taken.

4.4.5 Deviations from the Remedial Action Work Plan

If for any reason, it becomes necessary to deviate from the RAWP, this deviation will be reported to the NYSDEC Project Manager within 24 hours. This written notification will include the following:

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

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

All material required to be removed to remediate the Site will be removed from the Site in accordance with the Soil and Materials Management Plan. Any structures or obstacles encountered during excavation will be disposed of in a suitable manner.

5.1 SOIL CLEANUP OBJECTIVES

The Soil Cleanup Objectives for the Track 1 remedy for this Site are those listed as "Unrestricted Use Soil Cleanup Objectives" in Table 375-6.8(a). In the event attainment of Track 1 objectives cannot be documented, a Track 2 remedy utilizing SCO's expressed in Table 375-6.8(b) -Restricted Residential will be used. The soil cleanup objectives for Track 1 and Track 2 are listed in Table 12.

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

Tables 1 through 8 summarize all soil samples that exceed the SCOs proposed for this Remedial Action. Tables 9 through 11 summarize the results of all groundwater samples that exceed the SCOs. Spider maps showing all soil and groundwater samples that exceed the SCOs are included as Figures 6-11.

5.2 REMEDIAL PERFORMANCE EVALUATION (END-POINT SAMPLING)

Compliance with Site specific soil cleanup levels will be documented by soil sampling and laboratory analysis at a rate in compliance with DER-10. The selected remedy is to excavate soil at the Site to achieve Track 1 compliance, with Track 2 compliance as an alternative. Confirmation soil samples from the side-walls (if possible due to interlocking sheeting) and the bottom of the excavation will be collected and analyzed to determine if compliance with the selected remedy has been achieved.

5.2.1 End-Point Sampling Frequency

According to DER-10, confirmation sidewall samples are to be collected at a frequency of approximately one sample every 50 linear feet of excavation perimeter at the bottom of the sidewall and one sample from excavation bottom for every 2,500 square feet of bottom area. The perimeter of the project is approximately 1,520 feet and the area of the project is approximately 123,000 square feet. Accordingly, 30 sidewall soil samples and approximately 33 bottom samples are suggested for analysis to confirm compliance with the selected remedy. However, the presence of sheeting and shoring, necessary for building construction and dewatering, may interfere with collection of sidewall samples. Therefore, due to the presence of this sheeting, Galli Engineering, on behalf of the Volunteer, proposes to collect sidewall samples at ~50' intervals along the bottom edge of the sidewalls, as well as routine bottom sampling at the same ~50' grid intervals.

There is one known 20,000-gallon underground storage tank on the property. When this tank is removed, a separate set of confirmation soil samples will be obtained per DER-10 5.4(b)(6) and analyzed to determined compliance with the selected remedy. Soil samples collected for UST remedial compliance confirmation will be analyzed for NYS DEC Part 375 Table 6.8(a) soil cleanup parameters. If any additional tanks are found during excavation, compliance soil samples will be obtained post removal to determine compliance with cleanup objectives per the above instructions for the one known UST.

If any unknown situations arise that require separate excavation outside the planned excavation for the building construction to achieve compliance to the selected remedy, soil sampling will comply with the sampling frequency stated in paragraph one (1) of this section. These samples will also be analyzed for Part 375 Table 6.8(a) soil cleanup parameters.

5.2.2 Methodology

Once the Sea Wall and Side Walls are installed, the base of the excavation will be overlain by a grid on 50 foot centers. This will provide the 2,500 square foot grid spacing for sampling of the bottom of the excavation. These grid lines will also determine the 50 foot

spacing on the sidewalls. All samples will be discrete samples obtained utilizing a soil auger and obtained at a minimum of 0.5 feet below the soil surface. Samples will be analyzed for NYS DEC Part 375 Table 6.8(a) Track 1 unrestricted and Table 6.8(b) Track 2 restricted residential soil cleanup parameters.

Please note that the presence of interlocked sheeting and shoring, necessary for construction and dewatering, will interfere with the collection of sidewall samples. Therefore, due to the presence of this sheeting, Galli Engineering proposes to collect sidewall samples at 50' intervals along the bottom edge of the sidewalls (inside the shoring), as well as routine bottom sampling at the same 50' grid intervals.

Any soil samples collected for UST removal or other unknown situations will be grab or discrete samples. Samples will be obtained manually with a soil auger, unless excavation safety determines that assistance from mechanical excavating equipment is the preferred method.

5.2.3 Reporting of Results

Data management, including chain-of-custody review and correction, data review, reduction and transfer to data management systems, quality control charts, quality control procedures, and sample receipt, storage and disposal, will be in accordance with applicable SOPs and accepted industry practices.

Documentation will be in accordance with applicable SOPs and accepted industry practices, and will include the sampling reports, copy of the chain-of-custody, and field QA controls with the analytical results. All sample documents will be legibly written in ink. Any corrections or revisions to sample documentation shall be made by lining through the original entry and initialing and dating any changes. Data reduction will occur in accordance with contractor analytical SOPs for each parameter. If difficulties are encountered during sample collection or sample analyses, a brief description of the problem will be provided in the sampling report prepared by contractor. Data reporting will be in accordance with applicable SOPs and will include, at a minimum:

- Sample documentation (location, date and time of collection and analysis, etc.)
- Chain-of-custody forms
- Initial and continuing calibration
- Determination and documentation of detection limits
- Analyte(s) identification
- Analyte(s) quantitation
- Quality Control sample results
- Duplicate results

Adequate precautions will be taken during the reduction, manipulation, and storage of data in order to prevent the introduction of errors or the loss or misinterpretation of data.

To ensure that measurement data generated when performing environmental sampling activities are of an appropriate quality, all data will be validated. Data validation is a systematic procedure for reviewing a body of data against a set of established criteria to provide a specified level of assurance of its validity prior to its intended use. The techniques used must be applied to the body of the data in a systematic and uniform manner. The process of data validation must be close to the origin of the data, independent of the data production, and objective in its approach. The review will evaluate the data in terms of adherence to sampling and analysis protocols and to quality control criteria outlined in this QAPP. The criteria for data validation include checks for internal consistency, duplicate sample analysis, spike addition recoveries, instrument calibration and transcription errors. The acceptance or rejection of data, depending on the adherence to the quality control criteria, will be in a uniform and consistent manner based on the established validation criteria provided in the QAPP.

All data, as applicable, will be validated in accordance with EPA guidance, per Data Quality Objectives Process. Any deviations will be documented and provided with the analytical

data report. When the individual who will prepare the Data Usability Summary Report (DUSR) is identified, that person's resume will be provided to DER for review and approval. The DUSR will be prepared in accordance with DER-10, Appendix 2B.

The raw data will be reported in concentrations to two significant figures. Premature rounding of intermediate results can significantly affect the final result. Therefore, the reported results will be rounded to the correct number of significant figures only after all calculations and manipulations are completed. As many significant figures as are warranted by the analytical method will be used in reporting calculations. Only data meeting the validation criteria will be reported. Percent recovery and relative percent difference values will also be reported using two significant figures. Compounds that are not detected will be reported as less than the analytical method detection limit.

The final analytical data reports will be submitted to the Galli Engineering Project Manager and Quality Assurance Coordinator for their review and acceptance of the data in terms of completeness with respect to technical requirements of the project. All data will be assessed for accuracy, precision, completeness, representativeness and comparability. This data will then be presented in a technical report prepared by Galli Engineering, P.C.

5.2.4 QA/QC

Data will be analyzed in accordance with provisions in the QAPP (see Appendix K). Laboratory analytical data generated through the implementation of the investigation will be submitted for independent analysis in accordance with NYSDEC guidance for completion of a Data Usability Summary Report (DUSR) presented in Appendix 2B of DER-10, "Guidance for the Development of Data Usability Summary Reports".

5.2.5 Data Usability Summary Report (DUSR)

Data validation will be performed by a qualified independent contractor for the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) SW-846 inorganics, volatile organics (VOCs), semi-volatile organics (SVOCs),

polychlorinated biphenyls (PCBs), herbicides, and pesticides analyses will follow the guidelines presented in the following documents:

- USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, USEPA-540-R-08-01, June 2008.
- USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, USEPA-540-R-10-011, January 2010.
- CLP organics Data Review and Preliminary Review, SOP No. HW-6 Revision #14, USEPA Region II, September 2006.
- Validation of Metals for the Contract Laboratory Program (CLP) based on SOW ILMO5.3, SOP No. HW-2, Revision #13, USEPA Region II, September 2006.
- Validating Semi-volatile Organic Compounds By gas Chromatography/Mass Spectrometry SW-846 Method 8270D, SOP No. HW-22 Revision #4, USEPA Hazardous Waste Support Branch, August 2008.
- Validating Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry SW-846 Method 8260B, SOP No. HW-24 Revision #2, USEPA Hazardous Waste Support Branch, August 2008.
- Exhibit E of New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP), NYSDEC June 2005.

The data usability summary report (DUSR) will provide a discussion of QA/QC deviations from established criteria presented in the guidance documents specified above, a summary of data qualified for QA/QC deviations, a discussion regarding the usability of the data, and a discussion of the Precision, Accuracy, Representativeness, Comparability, and Completeness (PARCC) of the qualified data.

5.2.6 Reporting of End-Point Data in FER

End point sampling, including bottom and side-wall sampling, will be performed in accordance with DER-10 sample frequency requirements. Side-wall samples will be collected a minimum of every 50 linear feet, (if possible due to interlocking sheeting) following the methodology described in Section 5.2.2. Bottom samples will be collected at a rate of one for every 2,500 square feet. Chemical labs used for all end-point sample results and contingency sampling will be NYSDOH ELAP certified.

Upon completion of the soil/fill removal at the Site, a Final Engineering Report (FER) will be prepared summarizing the results of the work. The FER will include a summary of the work performed and provide a tabular and map summary of all end-point sample results and exceedances of SCOs.

5.3 ESTIMATED MATERIAL REMOVAL QUANTITIES

It is estimated that 51,000 cubic yards of material will be removed from the Site to achieve Track 1-Unrestricted Use SCOs. All material required to be excavated for installation of footers and foundations will be removed. Additional material may also be removed beyond this estimate, if, by removing further contaminated material, Track 1 is feasible to achieve. This decision will be made by the Site developer and consulting team in the field if this planned extent of excavation does not achieve the remedial goal.

Two endpoint soil samples collected from the western portion of the Site contained concentrations of metals and SVOCs that exceed both Track 1 and Track 2 SCOs. One of those samples (B2 at 25') reported metals concentrations above Track 2 SCOs. Therefore, due to the depth of contamination in this area, and the 50 foot sewer easement in the southwest corner of the Site, it may not be cost effective to remove all soil contamination down to Track 1 SCOs across the entire Site. Again, this determination will be discussed upon evaluation of end-point sampling results obtained during excavation.

The estimated quantity of soil to be imported into the Site for backfill and cover soil will be determined based on project needs. Some quantity of soil/fill may be reused/relocated on Site, consistent with provisions of the Soil/Materials Management Plan.

5.4 SOIL/MATERIALS MANAGEMENT PLAN

The following sections include detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport, disposal, and importation. It specifies all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations.

5.4.1 Soil Screening Methods

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

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

5.4.2 Stockpile Methods

This section provides details describing erosion and sedimentation controls for soil stockpiles, if required. This work plan calls for direct loading of soil into trucks for proper off-site disposal; therefore, soil stockpiles should not be necessary. If stockpiles are necessary, they will be located away from the property lines, and wetland areas. In addition, if stockpiles are created, they will adhere to the methods described below.

- Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.
- Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.
- Soil stockpiles will be continuously encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.
- A dedicated water truck equipped with a water cannon will be available on-Site for dust control.

5.4.3 Materials Excavation and Load Out

The following section describes all methods to be followed for materials loading and on-Site management prior to leaving the Site.

- The Remediation Engineer or a qualified environmental professional under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material.
- The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.
- The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.
- Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

- A truck wash will be operated on-Site. The Remediation Engineer will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the remedial construction is complete.
- Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking.
- The Remediation Engineer will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.
- The Applicant and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).
- The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.
- Each hotspot and structure to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.
- Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.
- Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

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

5.4.4 Materials Transport Off-Site

This section describes the methods to be followed for materials management while being transported off-Site.

- All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.
- Truck transport routes will be determined before excavation begins and discussed with the NYSDEC Case Manager. All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.
- Proposed truck routes to and from the Site will consider the most appropriate route and 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; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport;
- Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.
- Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.
- Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.
- Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

- All truck tailgates and tires will be cleaned prior to leaving the Site.

5.4.5 Materials Disposal Off-Site

Disposal locations will be selected based on their authorization to accept the material being generated and the cost of disposal. Disposal locations established at a later date will be reported to the NYSDEC Project Manager.

The total quantity of material expected to be disposed off-Site is approximately 51,000 cubic yards of urban fill (for Track 1). Other waste types, if encountered, will be handled appropriately.

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

Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for

the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2.

Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

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

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

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

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

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

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

5.4.6 Materials Reuse On-Site

This section provides a summary of details for the methods to be followed for materials reuse on-site; 'Reuse on-Site' means reuse on-Site of material that is originally derived from the Site and which does not leave the Site during the remedy.

- The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site.
- Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos.
- Concrete crushing or processing on-Site is prohibited.

  Note: DEC will consider the use of specially designed devices that are self-contained and capable of providing misting for dust control. DEC approval must be obtained. If dust-free operations are not achieved with such devices, this exception will be revoked.

- Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site.
- Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. This will be expressed in the final Site Management Plan.

5.4.7 Fluids Management

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

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site. Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream or river) is prohibited without a SPDES permit.

5.4.8 Demarcation

If a Track 1 remedy is not achieved, it will be necessary to clearly define and record the limits of Track 1 versus the other Track portions of the remaining soils. In the event that this occurs, after the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the Site Management Plan if required. The survey will measure the grade covered by the demarcation layer before the placement of cover

soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the Site Management Plan if required. A map showing the survey results will be included in the Final Remediation Report and the Site Management Plan.

5.4.9 Backfill from Off-Site Sources

The following section summarizes the methods to be followed for import and usage of backfill material from off-Site:

- All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site.
- Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.
- The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan".
- All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are presented in Appendix Q. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.
- Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this Remedial Action Work Plan should be construed as an approval for this purpose.

- Solid waste will not be imported onto the Site.
- Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

5.4.10 Stormwater Pollution Prevention

A summary of the Stormwater Pollution Prevention Plan (SWPPP) conforming to the requirements of NYSDEC Division of Water guidelines and NYS regulations is included below. A copy of the plan is included Appendix L.

- 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 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 RAWP 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 remedial construction area.

5.4.11 Contingency Plan

If underground tanks, or other previously unidentified contaminant sources, are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs).

These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

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

5.4.12 Community Air Monitoring Plan

The Community Air Monitoring Plan (CAMP) describes how off-site impacts from air-borne pollutants will be monitored and the actions to be taken if these impacts approach certain thresholds.

The Community Air Monitoring Plan is included as **Appendix M**. Generally the CAMP includes the following items:

- Details of the perimeter air monitoring program;
- Action levels to be used;
- Methods for air monitoring;
- Analytes measured and instrumentation to be used; and,
- A map of the location(s) of all air monitoring instrumentation. A map showing specific locations must be presented for both roving and fixed stations with a note that the exact

locations monitored on a given day will be established based on the prevailing wind direction.

Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers, and included in the Daily Report.

5.4.13 Odor, Dust and Nuisance Control Plan

This section describes all methods to be followed for odor, dust and nuisance control. The Final Engineering Report will include the following certification by the Remedial Engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

5.4.13.1 Odor Control Plan

The odor control plan is capable of controlling emissions of nuisance odors off-Site [and on-Site, if there are residents or tenants on the property]. Specific odor control methods to be used in the event of any odor complaint will include application of odor neutralizing agents applied through misters, at strategic locations, as long as any odor is being produced. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Applicant's Remediation Engineer, who is responsible for certifying the Final Engineering Report.

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

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

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

5.4.13.2 Dust Control Plan

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

- Dust suppression will be achieved though the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

5.4.13.3 Other Nuisances

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

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Based upon the results from the Remedial Investigation, it is possible that residual contaminated soil may remain beneath the Site after this remedy is complete, particularly in the case of an Alternative 2 (Track 2) cleanup. If this occurs, Engineering and Institutional Controls (ECs and ICs) will be required to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a Site specific Site Management Plan (SMP) that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) will have two (2) primary EC systems. These are: (1) a vapor barrier system will be installed under the building foundation slab and up the foundation walls to grade, to prevent any soil vapor from entering the building, and (2) Installation of a sub-grade basement ventilation system to allow fresh air to circulate through the basement.

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of any exceedances of either Track 1 or Track 2 portions of the site.

7.0 ENGINEERING CONTROLS: TREATMENT SYSTEMS

Based upon the results of the Remedial Investigation, soil and groundwater treatment systems shall not be required at the Site. However, engineering control systems may be required. A summary of the Engineering Control Systems is provided below.

7.1 ENGINEERING CONTROL SYSTEMS

Composite Cover

A composite cover system consisting of asphalt covered roads, concrete covered sidewalks, and concrete building slabs will be installed, inspected, certified and maintained as required in the SMP;

Soil Management in SMP

A Soil Management Plan will be developed and implemented describing how soil and fill materials will be managed, screened, characterized, transported, disposed of and/or reused on-Site. The SMP will also describe procedures for documenting where such material came from and where on the Site it will be used.

8.0 INSTITUTIONAL CONTROLS

After this remedial work is completed, it is possible that the Site will still have residual contamination remaining in place. In the event that the Track 1 Remedy is not achieved, Institutional Controls (ICs) for the residual contamination are incorporated into the remedy, to render the overall Site remedy protective of public health and the environment. Two elements will then need to be implemented to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a Site Management Plan. These elements are described in the following paragraph.

A Site-specific Environmental Easement will be recorded with Kings County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. In addition, a Site Management Plan (SMP) will be created to describe the appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

8.1 ENVIRONMENTAL EASEMENT

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete when concentrations are above the Track 1 standards ,or above the Track 2 standards if the residual contaminants are still contributing to groundwater contamination. If the Site will have residual contamination after completion of all Remedial Actions, then an Environmental Easement is required. As part of this remedy, an Environmental Easement

approved by NYSDEC will be filed and recorded with the Kings County Clerk. The Environmental Easement will be submitted as part of the Final Remediation Report.

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

The Institutional Controls that support Engineering Controls are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan;
- The Controlled Property may be used for Restricted Residential use only, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed;

- The Controlled Property may not be used for a higher level of use, (such as Un-Restricted use) without an amendment or extinguishment of this Environmental Easement;
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.

Adherence to these Institutional Controls for the Site will be mandated by the Environmental Easement, which requires the implementation of the Site Management Plan (discussed in the next section).

8.2 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial Action in cases where Track 1 criteria are not met. A Site Management Plan is not required if Track 1 or an unrestricted Track 2 is attained such that the residual contaminants cannot impact groundwater. For other than Track 1 and unrestricted Track 2 clean-ups, a Site Management Plan is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

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

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

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annual. The Site Management Plan will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

The Site Management Plan in the Final Remediation Report will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site-wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed immediately down-gradient of all volatile organic carbon remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.]

No exclusions for handling of residual contaminated soils will be provided in the Site Management Plan (SMP). All handling of residual contaminated material will be subject to provisions contained in the SMP.

9.0 FINAL ENGINEERING REPORT

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

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

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

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

The FER will provide a thorough summary of all residual contamination left on the Site, if any, after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6. A table that shows

exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

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

The Final Engineering Report will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

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

9.1 CERTIFICATIONS

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

I, Richard D. Galli, am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the Huxley Envelope Site (NYSDEC BCA Site No. C422147), located at 145 West Street, Greenpoint, NY.

I certify that the Site description presented in this FER is identical to the Site descriptions presented in the Environmental Easement, the Site Management Plan, and the Brownfield Cleanup Agreement for the Huxley Envelope Site and related amendments.

I certify that the Remedial Action Work Plan dated [Date], and Stipulations [if any] in a letter dated [month day year] and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

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

I certify that all use restrictions, Institutional Controls, Engineering Controls, and all operation and maintenance requirements applicable to the Site are contained in an Environmental Easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded. A Site Management Plan has been submitted by the Applicant for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by the NYSDEC.

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

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

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

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

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

10.0 SCHEDULE

A schedule of Remedial Actions is mandatory. It must subdivide work elements and provide estimated dates for performance of work and deliverables.

TABLES

FIGURES

APPENDICES

APPENDIX A

Metes and Bounds

APPENDIX B

Proposed Development Plan

APPENDIX C

Boring Logs

APPENDIX D

Well Construction Logs

APPENDIX E

Monitoring Well Survey

APPENDIX F

Monitoring Well Sampling Logs

APPENDIX G

Applicable SCGs

APPENDIX H

Health and Safety Plan

APPENDIX I

Quality Assurance Project Plan

APPENDIX J

Storm-Water Pollution Prevention Plan

APPENDIX K

Community Air Monitoring Plan

APPENDIX L

Resumes of Key Personnel

APPENDIX M

Remedial Action Construction Schedule

APPENDIX N

Summary of Remedial Costs

APPENDIX O

Allowable Constituent Levels for Imported Fill or Soil