

38-05 31ST STREET
QUEENS, NEW YORK

Remedial Action Work Plan

OER Project Number 12EHAN398Q

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REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC BCP	New York City Brownfield Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer

PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

I, Kosta Kamberis am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 38-05 31st Street, Long Island City, NY, Site No. CEQR 08DCP021Q

I certify that this Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Kosta Kamberis

Name

082012

NYS PE License Number



Signature

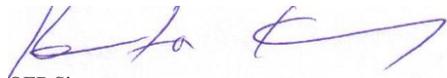
10/05/2013

Date



Kosta Kamberis

QEP Name



QEP Signature

10/05/2013

Date

EXECUTIVE SUMMARY

Anastasios Matsikas has enrolled in the New York City Voluntary Brownfield Cleanup Program (NYC VCP) to investigate and remediate a 2,228-square foot site located at 38-05 31st Street in Queens, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Current Usage

The Site is located in the Long Island City section of Queens, New York and is identified as Block 382 and Lot 14 on the New York City Tax Map. Figure 1 is a Site location map. The Site is 2,228-square feet and is bounded by a residential building to the north, commercial building used as auto shop to the south, residential property to the east, and 31st Street to the west. Currently, the Site is used for parking and contains no building or other structures

Summary of Proposed Redevelopment Plan

The proposed use of the Site will consist of six (6) stories mixed-use building. Layout of the proposed site development is presented in Figure 2. The current zoning designation is M1-2R/6A in the Map 9b of Queens County Zoning Map.

The proposed project consists of six (6) stories mixed-use building. The basement and the 1st floor will be used as community facility. From the 2nd to the 6th floor of building, ten (10) one bedroom residential apartments will be constructed as part of the proposed development.

The proposed structure will cover the entire footprint of the Site. The total gross building area is 8,910-square feet. According to the proposed plan, it will be no open spaces and landscapes areas. The maximum excavation depth will be approximately 11 feet. The excavation is anticipated to be approximately 10 feet above the groundwater level. Approximately 906.48 cubic yard (954 tons) of soil will be removed from the Site during excavation.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

Summary of the Remedy

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Unrestricted Use Track 1 Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 SCOs. For development purposes, the entire site will be excavated to depths of eleven feet below grade.
6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.

8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities.
9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
10. As part of development, installation of a vapor barrier system beneath the building slab and outside foundation sidewalls below grade.
11. As part of development, construction and maintenance of an engineered composite cover consisting of 6" thick concrete slab in the basement of the proposed structure covering the entire footprint of the Lot. The proposed concrete slab will prevent human exposure to residual soil/fill remaining under the Site.
12. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site.
15. If Track 1 SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for maintenance, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
16. If Track 1 SCOs are not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls; and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of

the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

The Office of Environmental Remediation created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies that show the location of contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities and also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

Remedial Investigation and Cleanup Plan. Under the NYC VCP, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

Identification of Sensitive Land Uses. Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

Qualitative Human Health Exposure Assessment. An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

Health and Safety Plan. This cleanup plan includes a Construction Health and Safety Plan (CHSP) that is designed to protect community residents and on-Site workers. The elements of this plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration (OSHA). This plan includes many protective elements including those discussed below.

Site Safety Coordinator. This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is John Doko and can be reached at 646-287-1093.

Worker Training. Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

Community Air Monitoring Plan. Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a ‘Contingency Plan’).

Odor, Dust and Noise Control. This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical

covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager Kosta Kamberis 917-865-0399 or NYC Office of Environmental Remediation Project Manager Zach Schreiber 212-788-3056.

Quality Assurance. This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

Storm-Water Management. To limit the potential for soil erosion and discharge, this cleanup plan has provisions for storm-water management. The main elements of the storm water management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

Hours of Operation. The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 8AM to 5PM Monday to Friday.

Signage. While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Voluntary Cleanup Program, provides project contact names and numbers, and locations of project documents can be viewed.

Complaint Management. The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager Kosta Kamberis at 917-865-0399, the NYC Office of Environmental Remediation Project Manager Zach Schreiber at 212-788-3056, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

Utility Mark-outs. To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

Soil and Liquid Disposal. All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations and required permits will be obtained.

Soil Chemical Testing and Screening. All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

Stockpile Management. Soil stockpiles will be kept covered with tarps to prevent dust, odors and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed to protect storm water catch basins and other discharge points.

Trucks and Covers. Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with all laws and regulations.

Imported Material. All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on-Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

Equipment Decontamination. All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

Housekeeping. Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

Truck Routing. Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

Final Report. The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review in the public document repositories located at NYC Public Library, 37-44 21st Street, Long Island City, NY 11101

Long-Term Site Management. Long-term protection after the cleanup is required, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed or established through a city environmental designation. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

Anastasios Matsikas has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 38-05 31st Street, in the Long Island City section of Queens, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND CURRENT USAGE

The Site is located in the Long Island City section of Queens, New York and is identified as Block 382 and Lot 14 on the New York City Tax Map. Figure 1 is a Site location map. The Site is 2,228-square feet and is bounded by a residential building to the north, commercial building used as auto shop to the south, residential property to the east, and 31st Street to the west. Currently, the Site is used for parking and contains no building or other structures

1.2 PROPOSED REDEVELOPMENT PLAN

The proposed use of the Site will consist of six (6) stories mixed-use building. Layout of the proposed site development is presented in Figure 1. The current zoning designation is M1-2R/6A in the Map 9b of Queens County Zoning Map.

The proposed project consists of six (6) stories mixed-use building. The basement and the 1st floor will be used as community facility. From the 2nd to the 6th floor of building, ten (10) one bedroom residential apartments will be constructed as part of the proposed development.

The proposed structure will cover the entire footprint of the Site. The total gross building area is 8,910-square feet. According to the proposed plan, it will be no open spaces and landscapes areas.

The maximum excavation depth will be approximately 11 feet. The excavation is anticipated to be approximately 10 feet above the groundwater level. Approximately 906.48 cubic yard of soil will be removed from the Site during excavation.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

Address	Direction	Zoning	Use
38-07 31 st Street	South-West	M1-2/R6A	Auto Repair
38-03 31 st Street	North-East	M1-2/R6A	Two Family Residential
31-14 38 th Avenue	East	M1-2/R6A	Mixed-Use Residential-Commercial
31-18 38 th Avenue	East	M1-2/R6A	Industrial-Manufacturing
31 st Street	North-West	M-2/R6A	Road with Overhead Subway Train Line

Figure 2 shows the surrounding land usage.

1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 38-05 31st Street, LIC, NY*”, dated March, 2013.

Summary of Past Uses of Site and Areas of Concern

EMS reviewed the Sanborn Maps provided by EDR. In the Sanborn Maps of 1936, 1947, 1950, is indicated the presence of residential structure in the subject property. In the Sanborn Map of 1970 is indicated the use of property as parking lot. According to the rest of available Sanborn Maps provided by EDR, the subject property has been used as a parking lot from 1970 until now.

Summary of the Work Performed under the Remedial Investigation

EMS performed the following scope of work:

1. Conducted a geophysical survey to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed three (3) soil borings across the entire project Site, and collected six (6) soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three(3) groundwater monitoring wells throughout the Site to establish groundwater flow and collected three (3) groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed three (3) soil vapor probes throughout the Site and collected three (3) samples for chemical analysis.

Summary of Environmental Findings

1. Depth to groundwater ranges from 21 to 22 feet at the Site.
2. Groundwater flow is generally from East to West beneath the Site.
3. The stratigraphy of the site consists of gravel fill material up to depth of 5 feet, light tan sand and gravel to a depth of 10 feet and light brown to coarse grained sand up to a depth of 15 feet.
4. Soil/fill samples collected during the RI showed no detections of VOCs, SVOCs, or pesticides/PCBs in any of the shallow or deep soil samples. Metals were detected in all soil borings. Metals including lead (max. of 982 ppm), mercury (at 0.30 ppm) and zinc (max. of 589 ppm) exceeded Unrestricted Use SCOs, and of these lead also exceeded Restricted Residential SCOs. Lead was identified in two shallow soil samples above its Restricted Residential SCO (453ppm and 982ppm). Lead also exceeded of its Unrestricted Use SCOs in the third shallow soil sample (220 ppm) and in two deep (223 and 357 ppm) soil samples. Mercury was detected in one shallow soil sample and zinc

was detected in all samples exceeding its Unrestricted Use SCO. Overall, the findings were consistent with observations for shallow historical fill sites in areas throughout NYC.

5. Groundwater samples collected during the RI showed no SVOCs, or pesticides/PCBs in exceedance of their respective NYS Part 703.5 Class GA Ground Water Standards (GQS). Two VOCs including MTBE (8.5 ug/L) and chloroform (0.57 and 0.62 ug/L) were detected above their GQS in one sample and two samples, respectively. No indication of MTBE or chloroform was identified in site soils. Several metals were identified in site ground water, but only chromium (max. of 196 ug/L), iron and sodium exceeded their respective GQS
6. Soil vapor samples collected during the RI indicated low level concentrations of petroleum-related and chlorinated VOCs. Most compounds were detected at a concentration below 20 $\mu\text{g}/\text{m}^3$. Highest reported concentrations were for acetone (max. of 712 $\mu\text{g}/\text{m}^3$, benzene ($\mu\text{g}/\text{m}^3$), toluene (92 $\mu\text{g}/\text{m}^3$) and xylene (Max. of 291 $\mu\text{g}/\text{m}^3$). Chlorinated VOCs included trichloroethene (TCE) was detected in all samples with low concentrations not exceeding 0.91 $\mu\text{g}/\text{m}^3$, and tetrachloroethene (PCE) also detected in all soil vapor samples at a maximum concentration of 35.3 $\mu\text{g}/\text{m}^3$. 1,1,1-Trichloroethene was identified at a maximum concentration of 1.09 $\mu\text{g}/\text{m}^3$. Low concentrations of PCE and TCE are well below the monitoring thresholds established by NYS DOH vapor intrusion guidelines (October 2006). No onsite source of BTEX or chlorinated VOC was detected in soil or ground water.

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this site.

2.0 REMEDIAL ACTION OBJECTIVES

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

Groundwater

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from groundwater.

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater contamination.

Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

3.0 REMEDIAL ALTERNATIVES ANALYSIS

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

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance;
- Land use; and
- Sustainability.

The following is a detailed description of the Alternative 1 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 involves:

- Establishment of Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs has been achieved with post-excavation endpoint sampling. Based on the results of the remedial investigation, it is expected that this alternative would require excavation to a depth of 11 feet across the entire site to remove all historic fill. If soil/fill containing analytes at concentrations above Track 1

Unrestricted Use SCOs is still present at the base of the excavation after removal of all soil, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs.

- No engineering or institutional controls are required in a Track 1 cleanup, but a vapor barrier system/waterproofing membrane will be installed beneath the entire new floor slab and behind new foundation walls part of construction and will prevent potential future exposures from off-Site soil vapor: and
- Placement of concrete/asphalt cap over the entire property will be completed as part of the new development.

Alternative 2 involves

- Establishment of Track 4 Site-Specific SCOs.
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-Specific SCOs have been achieved with post-excavation endpoint sampling. For development purposes, entire property will be excavated to depths of more than 11 feet. Therefore, if soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs.
- Placement of a final engineered cover consisting of concrete/asphalt cap over the entire Site to prevent exposure to remaining soil/fill.
- Installation of a waterproofing membrane/vapor barrier beneath the building slab and along foundation side walls to prevent any potential future exposures to contaminants in soil vapor.
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval.
- Establishment of an approved Site Management Plan (SMP) 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. SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP; and

- The property will continue to be registered with a Hazardous Materials E-Designation at the NYC Department of City Planning. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP.

3.1 THRESHOLD CRITERIA

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 eliminating the historic fill at the Site, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contamination leaching into groundwater.

Alternative #2 would achieve comparable protections of human health and the environment by excavating the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCOs, as well as by placement of Institutional and Engineering controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil/Materials Management Plan and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential post-remediation exposures to on-Site residents from off-site soil vapor migration would be prevented by installing a waterproofing membrane/vapor barrier as part of construction below the new building's basement slab and continuing the barrier around foundation walls.

3.2. BALANCING CRITERIA

Compliance with Standards, Criteria and Guidance (SCGs)

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative #1 would achieve compliance with the remedial goals, chemical specific SCGs and RAOs for soil through removal to Track 1 Unrestricted Use SCOs and groundwater protection standards. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier below the new building's basement slab and continuing the vapor barrier around foundation walls, as part of development.

Alternative # 2 would achieve compliance with the remedial goals, chemical specific SCGs and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCOs. Compliance with groundwater SCGs will not be affected by the remedial action. Compliance with SCGs for soil vapor would also be achieved by installing a a waterproofing membrane/vapor barrier below the new building's basement slab and continuing the vapor barrier around foundation walls, as well as a final engineered cover over the entire Site. A Site Management Plan would ensure that these controls remained protective for the long term.

For both Alternatives, 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. Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) that comply with the applicable SCGs shall be implemented during Site redevelopment under this RAWP. These measures would protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-term effectiveness and impacts

This evaluation criterion assesses the effects 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 alternatives 1 and 2 have similar short-term effectiveness during their respective implementations, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short term impacts could likely be higher for Alternative 1 due to excavation of greater amounts of historical fill material.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 954 tons of soil will be excavated from this project. Approximately forty (40), 25-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

Both alternatives would employ appropriate measures to prevent short term impacts, including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. The Alternative 1 provides 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 (CHASP) will be protected from on-Site contaminants (personal protective equipment would be worn consistent with the documented risks within the respective work zones).

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 and permanence related to on-Site contamination by permanently removing all impacted soil/fill material above Track 1 Unrestricted Use SCOs. Removal of on-Site contaminant sources will prevent future groundwater contamination. Installation of a waterproofing membrane/vapor barrier below the new building's basement slab and up along foundation walls, as part of construction, would prevent potential future migration of soil vapors into the new building

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; establishing Engineering Controls including a composite cover system across the Site; establishing Institutional Controls to ensure long-term management including use restrictions, a Site Management Plan and continued registration as an E-designated property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy would provide a continued high level of protection in perpetuity.

Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative's 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. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 - Unrestricted Use SCOs.

Alternative 2 would remove most of the impacted soil present on the Site and any remaining soil would meet Track 4 - Site-Specific SCOs. Alternative 1 could potentially eliminate a greater total mass of contaminants on Site.

All potential on-site sources for groundwater contamination will be removed as part of the remedial action via soil excavation and removal of any tanks, etc. identified as part of the development project.

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 remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

The techniques, materials and equipment to implement the Alternative 1 are readily available and have been proven effective in remediating the contaminants associated with the Site. They use identical standard materials and services and well established technology. The reliability of each remedy is high. There are no special difficulties associated with any of the activities.

Cost effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

The remedial plan creates an approach that combines the remedial action with the redevelopment of the Site, including the construction of the building foundation and subgrade structures. The remedial plan is also cost effective in that it will take into consideration the selection of the closest and most appropriate disposal facilities to reduce transportation and disposal costs during the excavation of historic fill and other soils during the redevelopment of the Site.

Costs associated with Alternative 1 could potentially be higher than Alternative 2 if soil containing contaminants above Unrestricted Use SCOs are encountered below the depth required for excavation for development. Additional costs would include installation of additional shoring/underpinning, disposal of additional soil, and import of clean soil for backfill. However, long-term costs for Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

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 the intended Site use, it is anticipated that Alternative 1 for the Site would be acceptable to the community. This RAWP

will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial action. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Attachment B.

Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The proposed redevelopment is consistent with the existing zoning designation for the property and is consistent with recent development patterns. The Site is surrounded by residential and commercial properties and the proposed alternative provides comprehensive protection of public health and the environment for these uses. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs, which is appropriate for its planned residential use. Improvements in the current brownfield condition of the property achieved by the alternatives are also consistent with the City's goals for cleanup of contaminated land and bringing such properties into productive reuse. The alternative 1 is protective of natural resources and cultural resources.

Sustainability of the Remedial Action

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in *PlaNYC: A Greener, Greater New York*. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. The New York City Clean Soil Bank program may be utilized for reuse of native soils. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. While Alternative 2 would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix C

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

The preferred remedial action alternative is Alternative 1 the Track 1 Alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Unrestricted Use Track 1 Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 SCOs. For development purposes, the entire site will be excavated to depths of eleven feet below grade.
6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.

8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities.
9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
10. As part of development, installation of a vapor barrier system beneath the building slab and outside foundation sidewalls below grade.
11. As part of development, construction and maintenance of an engineered composite cover consisting of 6" thick concrete slab in the basement of the proposed structure covering the entire footprint of the Lot. The proposed concrete slab will prevent human exposure to residual soil/fill remaining under the Site.
12. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and if Track 1 SCOs are not achieved, describes all Engineering and Institutional Controls to be implemented at the Site.
15. If Track 1 SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for maintenance, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
16. If Track 1 SCOs are not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls; a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the

following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

Track 1 Soil Cleanup Objectives (SCOs) are proposed for this project.

If Track 1 Unrestricted Use SCOs are not achieved, the following Track 4 Site-Specific SCOs will be used:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	250 ppm
Lead	1,000 ppm
Mercury	1.5 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 3. The location of planned excavations is shown in Figure 2.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed off-Site is 954 cubic yards or 1,004 tons.

Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

End-Point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation soil sampling. Three (3) confirmation samples will be collected from the base of the excavation at locations to be determined by OER. For comparison to Track 1 SCOs, analytes will include metals according to analytical methods described below. For comparison to Track 4 SCOs, analytes will only include trigger compounds and elements established on the Track 4 SCO list.

In addition, if hotspots are encountered, hotspot removal end-point sampling frequency will consist of the following:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
 - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
 - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.

For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

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

New York State ELAP certified labs will be used for all confirmation and end-point sample analyses. Labs performing confirmation and end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all confirmation and end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be Confirmation samples will be analyzed for compounds and elements as described above utilizing the following methodology:

Soil analytical methods will include:

- Volatile organic compounds by EPA Method 8260
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

Quality Assurance/Quality Control

Endpoint soil samples will be containerized in laboratory-prepared jars, labeled, sealed, and placed in a chilled cooler for shipment to the laboratory. Chain of Custody procedures outlined in the RIWP will followed. Soil samples were analyzed by an ELAP-certified laboratory approved by the NYSDOH. For every 20 soil samples, one duplicate soil sample will also be collected and analyzed for all parameters.

Import and Reuse of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 21 cubic yards. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is 21 cubic yards

4.3 ENGINEERING CONTROLS

The excavation required for the proposed Site development will achieve Track 1 Unrestricted Use SCOs. No Engineering Controls are required to address residual contamination at the Site. However, the following elements will be incorporated into the foundation design as part of the development: composite cover system and soil vapor barrier. If Track 1 is not achieved, these two elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

Composite Cover System

As part of new development, the entire property will be covered by an engineered permanent cover system. This cover system will be comprised of a 6 inch thick concrete-building slab beneath the area of the proposed building. This composite cover system that will be built as part of standard construction practice is comprised of:

- Concrete covered sidewalks;
- Concrete building slabs.

Figure 3 shows the typical design for each remedial cover type used on this Site and the location of each cover type built at the Site.

If Track 1 SCO's are not achieved at the Site, the composite cover system will be a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR.

Vapor Barrier

Migration of soil vapor will be mitigated with a combination of building slab and vapor barrier. As part of standard construction practices, a 20-mil low permeability geo-membrane liner will be installed underneath the floor of the building extending up along the entire

foundation sidewalls to sidewalk grade and attached to the foundation as per manufacturer's specifications. (Vaporblock Plus 20).

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. Figure 5 shows the installation locations and details of the vapor barrier beneath the floor slab and along the exterior foundation walls. Specifications and installation diagrams and a Chemical Compatibility Letter from the manufacturer are provided in Appendix 5.

The Remedial Closure Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturer's certificate of warranty.

4.4 INSTITUTIONAL CONTROLS

Institutional Controls are not required on sites that achieve Track 1 Remedial Action. If a Track 1 Cleanup is not accomplished, Institutional Controls (IC) will be incorporated into this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below.

Long-term employment of EC/ICs will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR.

Institutional Controls for this remedial action are:

- Continued registration of the E-Designation for the property at the NYC Buildings Department. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate , maintenance, inspection, and certification of ECs and ICs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the

controls were approved by OER; 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. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determined by OER in the SMP and will comply with RCNY §43-1407(1)(3).

- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for residential/commercial use and will not be used for a higher level of use without prior approval by OER.

4.5 SITE MANAGEMENT PLAN

Site Management is not required for Track 1 remedial actions. However, if Track 1 SCOs are not achieved, Site Management will be the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by the DCR and this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Brownfield Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's

and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) reporting.

Site management activities, reporting, and EC/IC certification will be scheduled by OER on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 31 of the year following the reporting period.

4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Sources

Historic fill is present in the top 1 to 5 feet of soil of the Site. Based on the results of the RIR, the contaminants of concern found are:

Soil

Several metals were identified but only Lead exceeded Restricted Residential Use SCOs

Groundwater

- Two VOCs including MTBE and chloroform were detected their GQS.
- Several metals were identified in site ground water, but only chromium, iron and sodium exceeded their respective GQS.

Soil vapor

- Low levels of chlorinated VOCs including PCE and TCE were detected in soil vapors. The concentration did not exceed the NYS DOH soil vapor sub-slab vapor Guidance Values

Nature, Extent, Fate and Transport of Contaminants

The soil/fill material contains concentrations of Lead, Zinc and Mercury above applicable standards. The elevated constituents are associated with historic fill which is present throughout the full extent of the property and is several feet thick.

Receptor Populations

On-Site Receptors – The entire area of the Site is currently used as parking with no structures. Onsite receptors are limited to trespassers and site workers and visitors granted access to the property. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents and visitors.

Off-Site Receptors - Potential off-Site receptors within a 0.25-mile radius of the Site include: adult and child residents, and commercial and construction workers, pedestrians, trespassers, and cyclists, based on the following:

1. Commercial Businesses (up to 400 feet) – existing and future
2. Residential Buildings (up to 400 feet) – existing and future
3. Building Construction/Renovation (up to 400 feet) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to 400 feet) – existing and future

5. Schools (up to 400 feet) – existing and future

Potential Routes of Exposure

The five elements of an exposure pathway are (1) a contaminant source, (2) contaminant release and transport mechanisms, (3) a point of exposure, (4) a route of exposure, and (5) a receptor population. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of water, fill, or soil;
- Inhalation of vapors and particulates; and
- Dermal contact with water, fill, soil, or building materials.

Existence of Human Health Exposure

Current Conditions: The Site is paved and used for parking. Under current Site conditions, exposure to surficial historic fill material is possible. Groundwater is marginally contaminated but is not exposed at the Site, and because the Site is served by the public water supply, groundwater is not used at the Site. There are no structures on Site where soil vapor could accumulate, and existing exposure to soil vapor is unlikely.

Construction/ Remediation Activities: The potential exposure pathways to onsite contamination are by ingestion, dermal, or inhalation exposure by onsite workers during the remedial action. Similarly, off-Site receptors could be exposed to dust from onsite activities. Groundwater is not expected to be encountered during construction/ remediation, and there will be no structures on Site where soil vapor could accumulate. During the remedial action, on-site exposure pathways will be eliminated by preventing access to the site, through implementation of soil/ materials management, storm water pollution prevention, and dust controls, employment

of a community air monitoring plan, and implementation of a Construction Health and Safety Plan.

Proposed Future Conditions: Under future remediated conditions, all soils in excess of Track 1 SCOs will be removed. The site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and engineering controls will prevent potential for inhalation via soil vapor intrusion. Any on-Site exposures to residual vapors and vapors from off-site sources will be prevented by installation of a soil vapor membrane. Long term assurance of these protections will be achieved by Site inspections and periodic certifications under an approved Site Management Plan. The site is served by the public water supply, groundwater is not used at the site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

Overall Human Health Exposure Assessment

There are potential complete exposure pathways for the current site condition. There is a potential complete exposure pathway that requires mitigation during implementation of the remedy. There is no complete exposure pathway under future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide impervious surface cover cap, and a subsurface vapor barrier system for the building. During the remedial action, on-site exposure pathways will be minimized by preventing access to the Site, through implementation of soil/materials management, storm water pollution prevention, dust controls, employment of a community air monitoring plan, and implementation of a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways, as all soil above Unrestricted Use SCOs will have been removed. There will also be no remaining exposure pathways to soil vapor that may accumulate in the sub-surface from off-site sources, as a waterproofing membrane/vapor barrier system will have been installed as part of development. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Kosta Kamberis, P.E. Environmental Engineer and Project Manager John Doko The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Kosta Kamberis, P.E. and John Doko.

5.2 SITE SECURITY

Site access will be controlled by gated entrances or wooden construction fence, which will surround the property.

5.3 WORK HOURS

The hours for operation of remedial construction will be from 07:00 to 4:00. These hours conform to the New York City Department of Buildings construction code requirements.

5.4 CONSTRUCTION HEALTH AND SAFETY PLAN

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be Kosta Kamberis, P.E. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the HASP. That document will define the specific project contacts for use in case of emergency.

5.5 COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

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

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

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate

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

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for OER personnel to review.

5.6 AGENCY APPROVALS

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

5.7 SITE PREPARATION

Pre-Construction Meeting

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

Stabilized Construction Entrance

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

Truck Inspection Station

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the NYC VCP Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from holes, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped

stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, haybales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Storm-water control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) and will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the OER project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.8 TRAFFIC CONTROL

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is right out of the property onto 31st Street. The directions to Long Island Expressway (I 495) are as follows:

1. Make right to 31st Street
2. Make right to Northern Blvd
3. Make left to Queens Blvd
4. Make right to Van Dam Street
5. Make Left onto ramp to I 495 East.

5.9 DEMOBILIZATION

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (*e.g.*, soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

5.10 REPORTING AND RECORD KEEPING

Daily Reports

Daily reports providing a general summary of activities for each day of *active remedial work* will be emailed to the OER Project Manager by the end of the following day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);

- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

Record Keeping and Photo-Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

5.11 COMPLAINT MANAGEMENT

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

All changes to the RAWP will be reported to the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
- Determination that the remedial action with the deviation(s) is protective of public health and the environment.

6.0 REMEDIAL ACTION REPORT

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Continue registration of the property with an E-Designation by the NYC Department of Buildings.

- Reports and supporting material will be submitted in digital form.

Remedial Action Report Certification

The following certification will appear in front of the Executive Summary of the Remedial Action Report. The certification will include the following statements:

I, _____, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the Site name Site Site number.

I, _____, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the Site name Site Site number. (Optional)

I certify that the OER-approved Remedial Action Work Plan dated month day year and Stipulations in a letter dated month day, year; if any were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a six (6) month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	2	1
Remedial Excavation	5	3
Demobilization	6	1
Submit Remedial Action Report	15	6

APPENDIX 1

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and Anastasios Matsikas have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, Anastasios Matsikas will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Zach Schreiber, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841

Project Contact List. OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project

manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

Repositories. A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. Anastasios Matsikas will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Long Island City Public Library

37-44 21st Street, LIC, NY 11101

Telephone: 718) 752-3700

Hours of Operation:

Mon 9:00 AM - 8:00 PM

Tue 2:00 PM - 7:00 PM

Wed 11:00 AM - 7:00 PM

Thu 11:00 AM - 7:00 PM

Fri 11:00 AM - 7:00 PM

Sat 10:00 AM - 5:30 PM

Sun Closed

Digital Documentation. NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

Identify Issues of Public Concern. No site-specific issues of public concern are anticipated.

Public Notice and Public Comment. Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with

descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by Anastasios Matsikas, reviewed and approved by OER prior to distribution and mailed by Anastasios Matsikas. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

Citizen Participation Milestones. Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

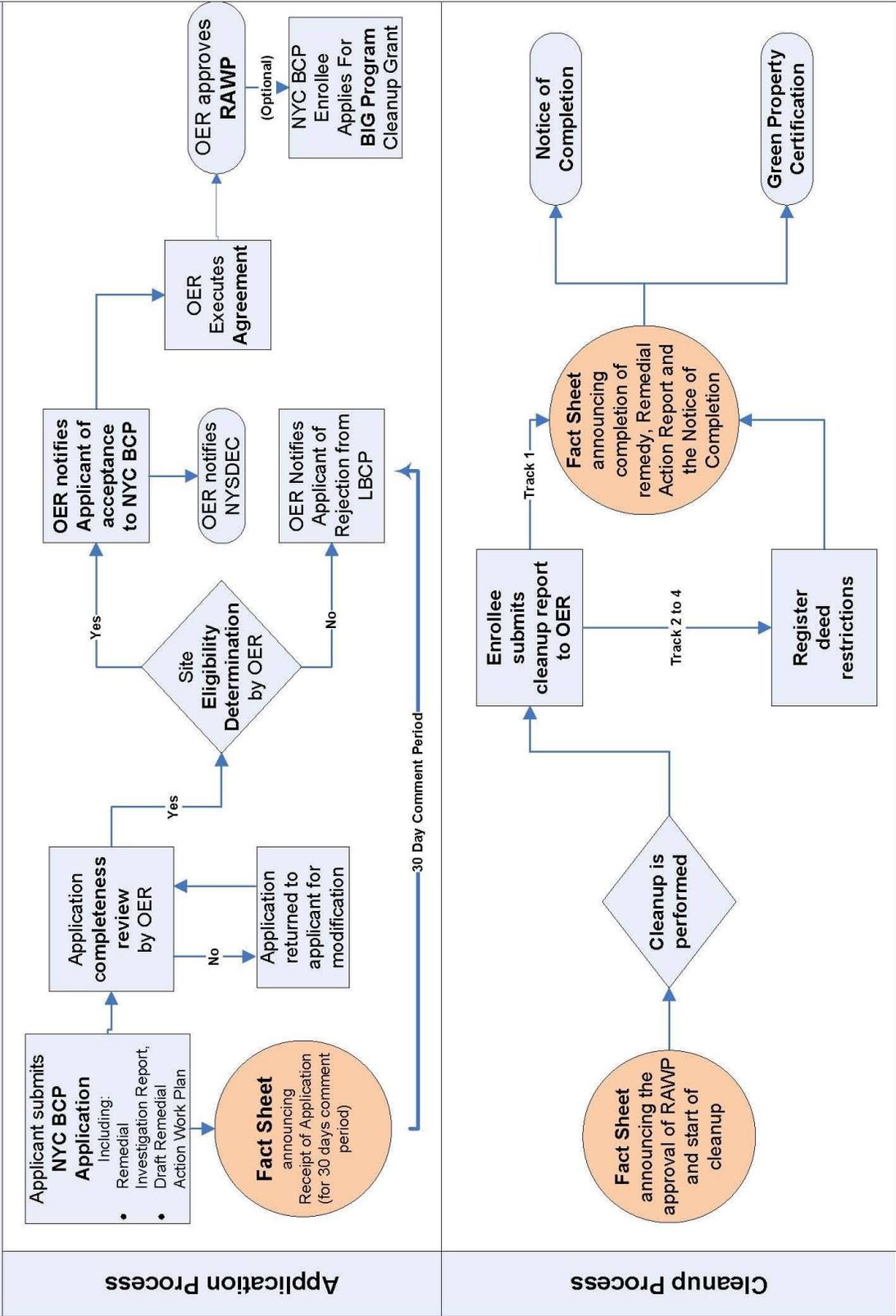
Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

Flow Chart For NYC Brownfield Cleanup Program (NYC BCP)



APPENDIX 2

SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

Reuse of Clean, Recyclable Materials. Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

Approximately 500 tons of clean, non-virgin materials will be reused under this plan will be quantified and reported in the RAR.

Reduce Consumption of Virgin and Non-Renewable Resources. Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency. Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Conversion to Clean Fuels. Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control. Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Storm-water Retention. Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

Linkage with Green Building. Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

Paperless Brownfield Cleanup Program. Anastasios Matsikas is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program. Anastasios Matsikas is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and

teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

Trees and Plantings. Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

APPENDIX 3

SOIL/MATERIALS MANAGEMENT PLAN

1.1 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

1.2 STOCKPILE METHODS

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

1.5 OFF-SITE MATERIALS TRANSPORT

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are right out of the site onto 31st Street. The directions to Long Island Expressway (I 495) are as follows:

1. Make right to 31st Street
2. Make right to Northern Blvd
3. Make left to Queens Blvd
4. Make right to Van Dam Street
5. Make Left onto ramp to I 495 East.

This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing 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. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Queens, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in Table 1. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed. The expected location for placement of reused material is shown in Figure 6.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

1.8 DEMARCATION

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in Table 1.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

Source Screening and Testing

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

1.11 STORM-WATER POLLUTION PREVENTION

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to

receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

1.12 CONTINGENCY PLAN

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

1.13 ODOR, DUST AND NUISANCE CONTROL

Odor Control

All necessary means will be employed to prevent on- and off-Site odor 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) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. 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. OER will be notified of all odor

complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the Remedial Action Report.

Dust Control

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

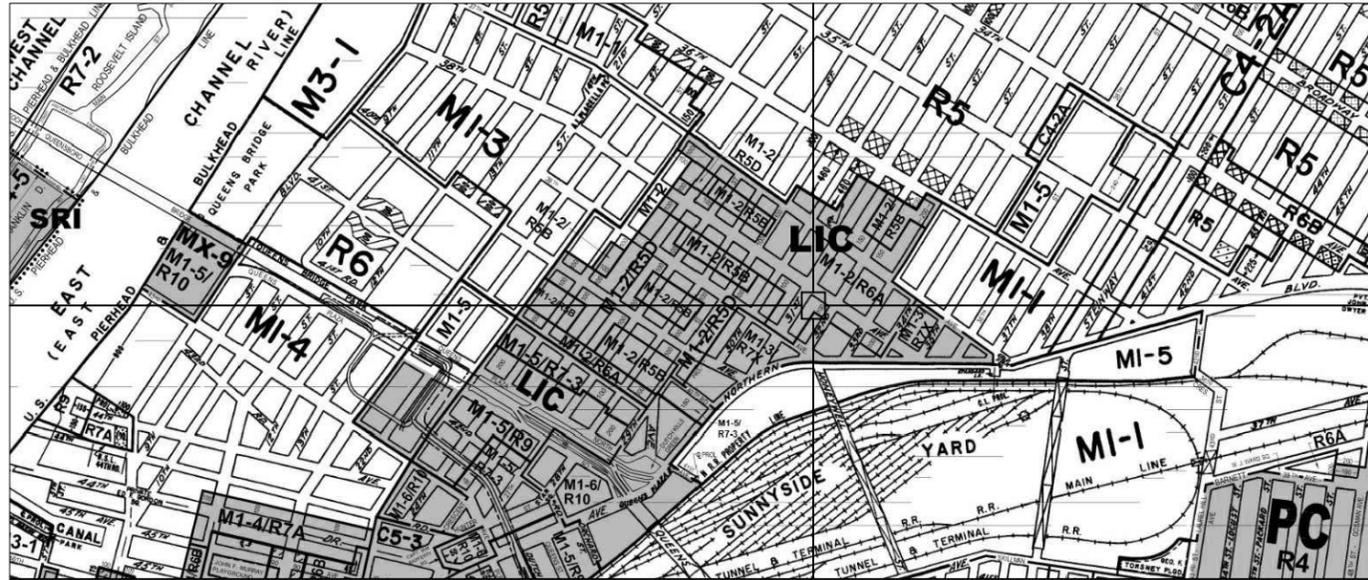
This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

Other Nuisances

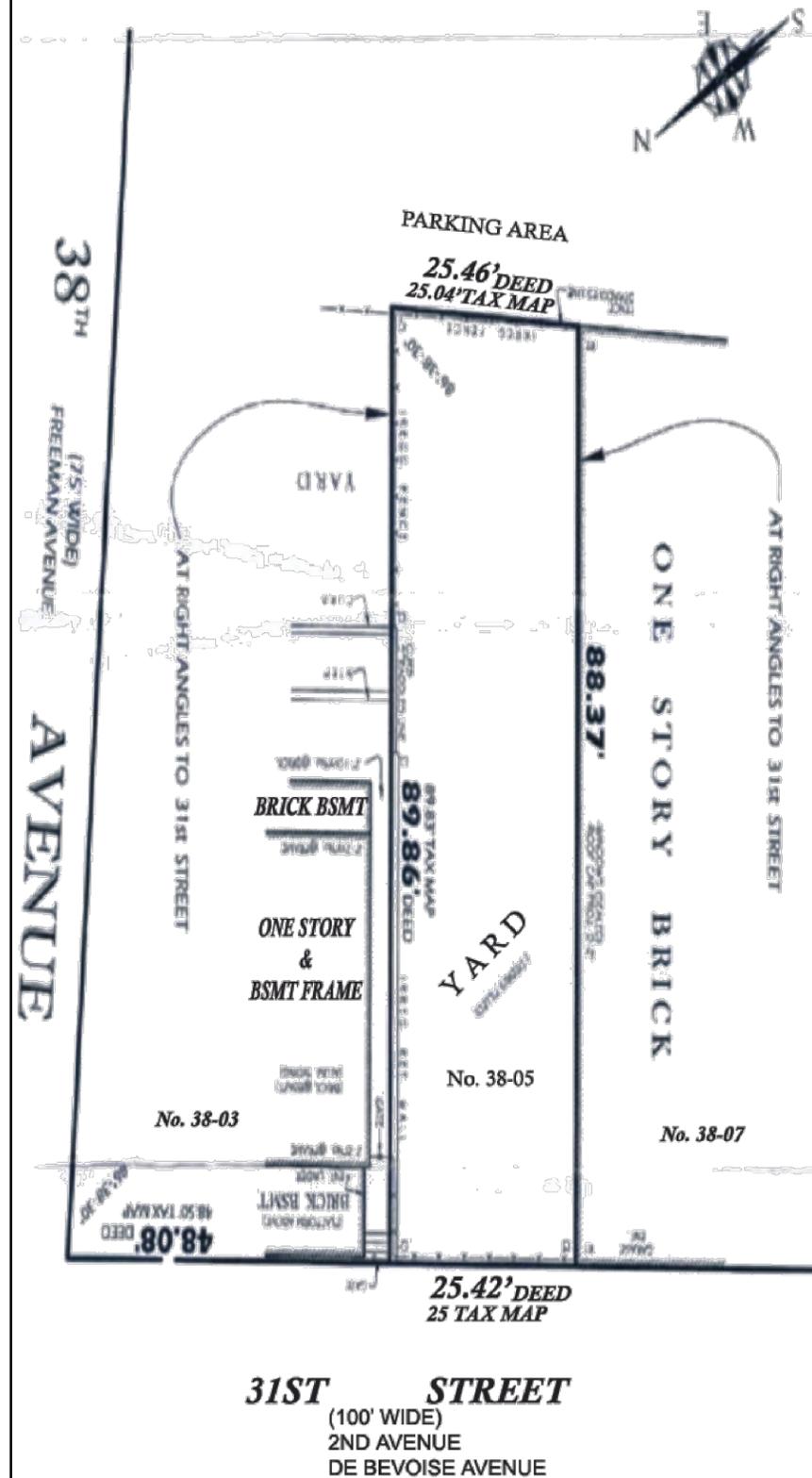
Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

FIGURES



SITE MAP: ZONE MAP 9b



SITE LOCATION MAP
NOT IN SCALE

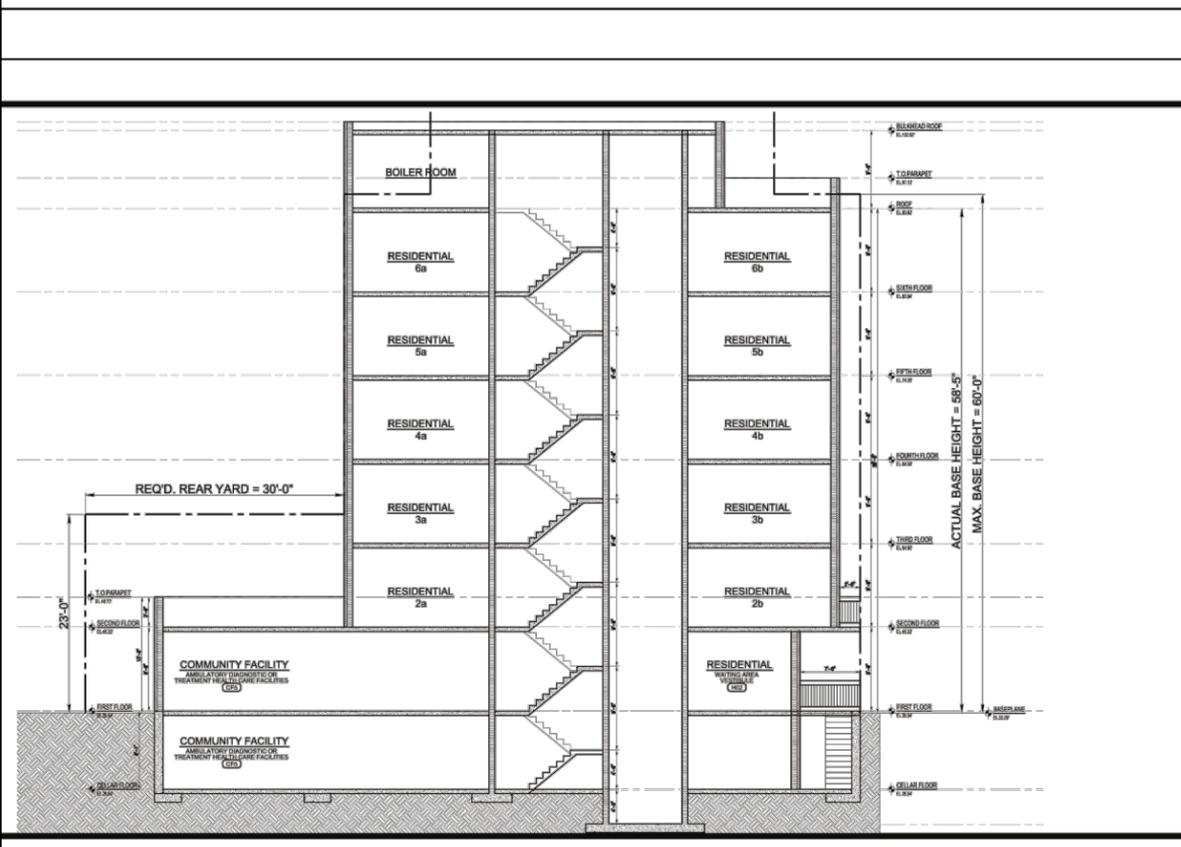
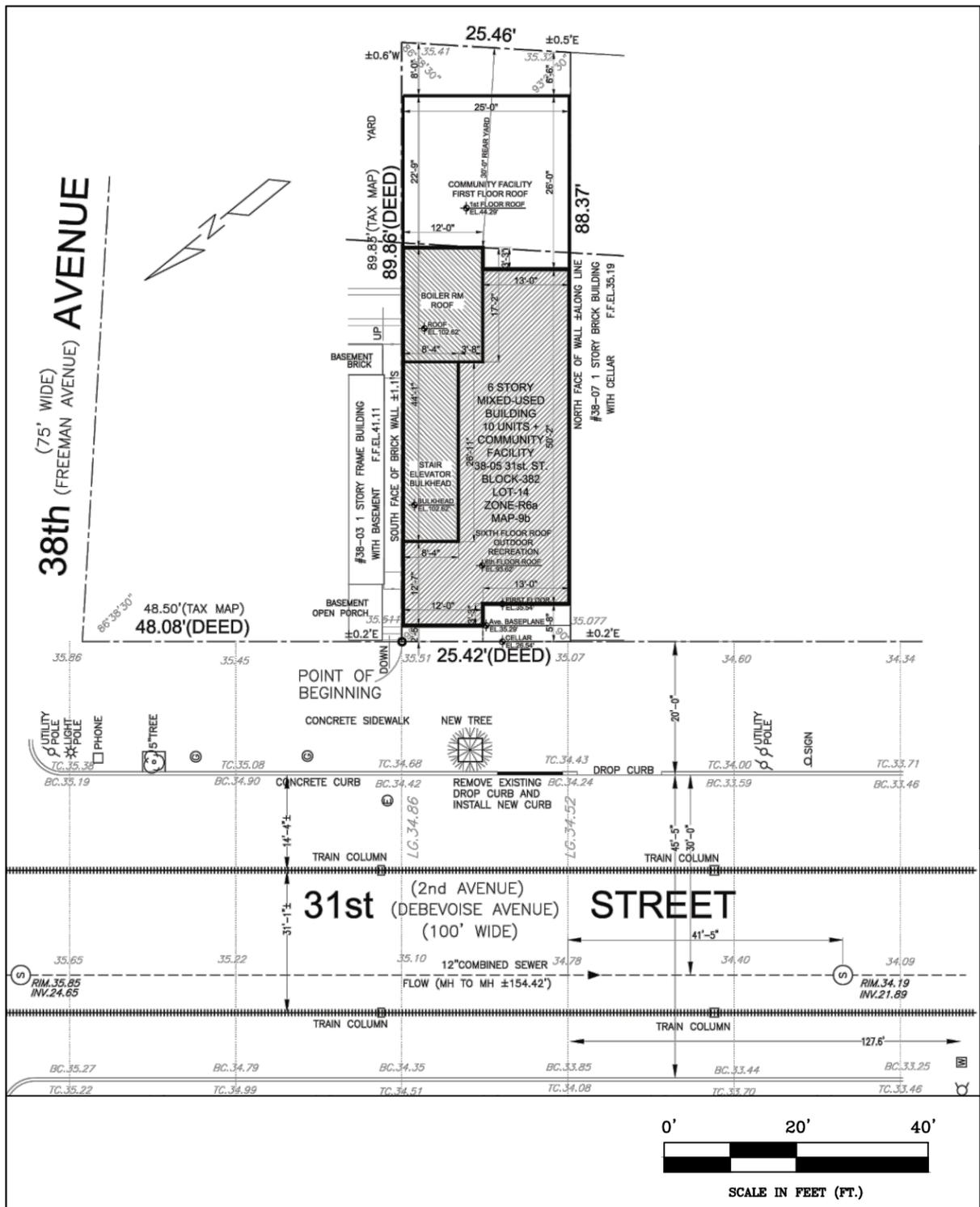


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Astoria, NY 11105
Tel: 347-396-5556
Fax: 347-242-3803

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LONG ISLAND CITY, NY

FIGURE 1: SITE MAP &
SITE LOCATION MAP

DATE:	04/08/2013
APPROVED BY:	K.KAMBERIS
SCALE:	AS NOTED
1 of 6	



**REDEVELOPMENT
NOT IN SCALE**

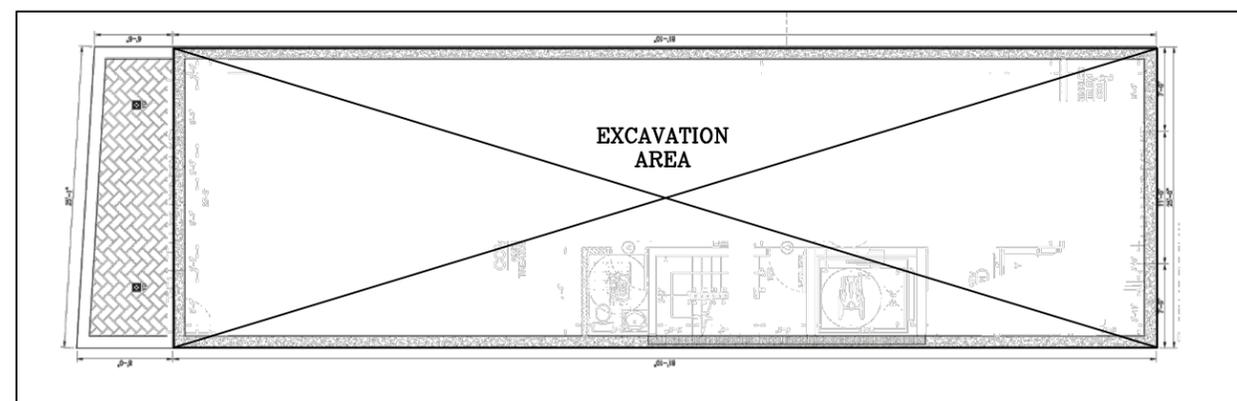
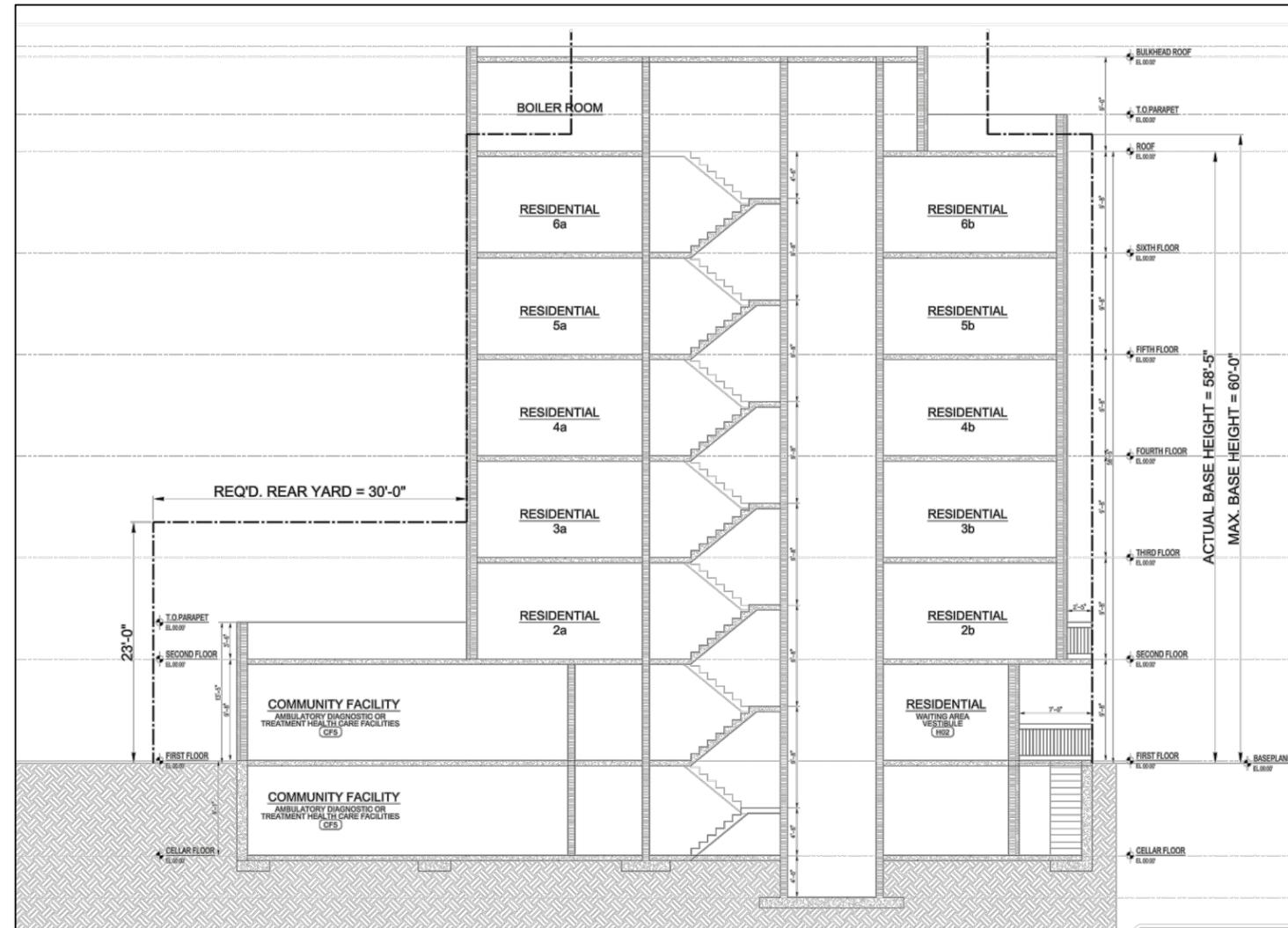


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**38-05 31ST. AVENUE
LONG ISLAND CITY, NY**

**FIGURE 1: REDEVELOPMENT
PLANS**

DATE:	02/12/2013
APPROVED BY:	K.KAMBERIS
SCALE:	AS NOTED
1 of 5	



EXCAVATION PLAN
NOT IN SCALE



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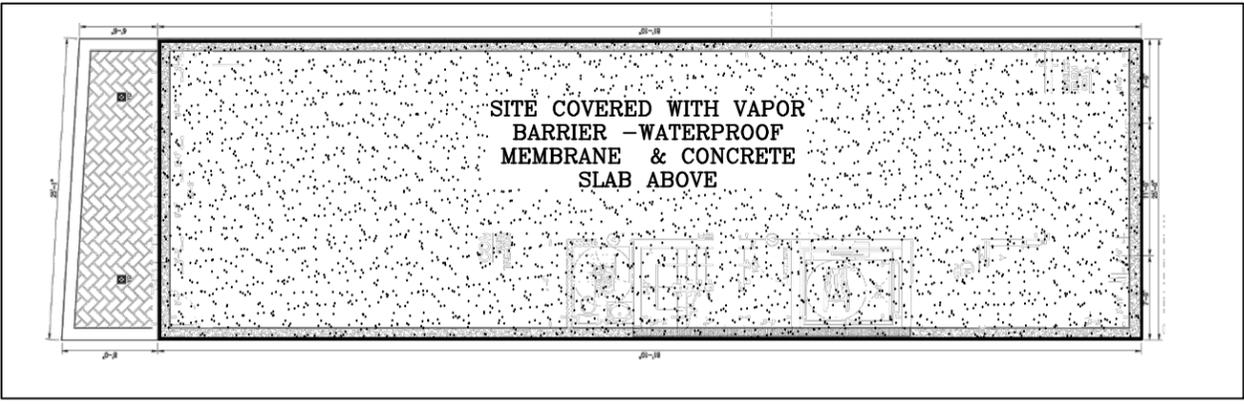
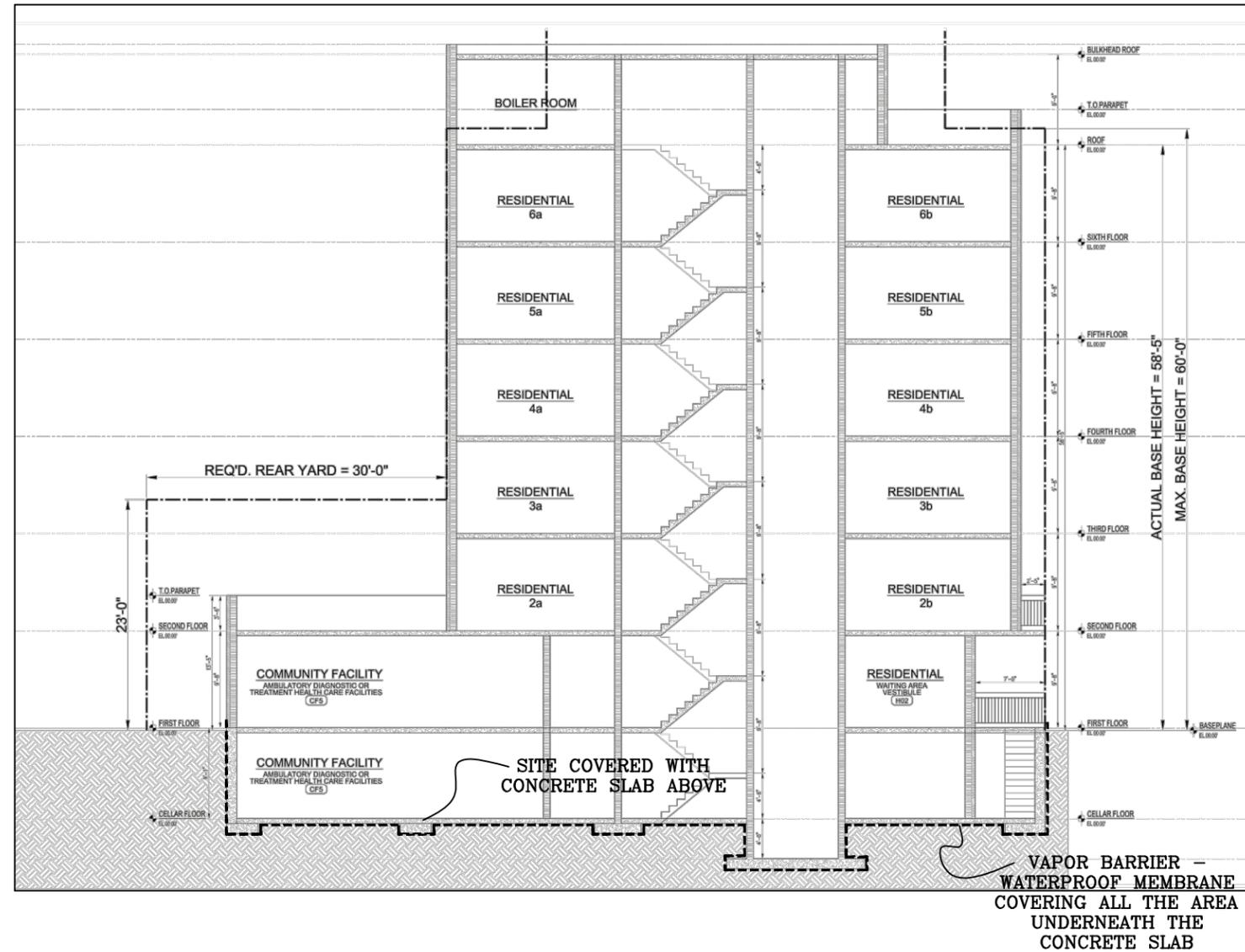
38-05 31ST. AVENUE
LONG ISLAND CITY, NY

FIGURE 2: EXCAVATION PLAN

DATE: 02/12/2013

APPROVED BY: K.KAMBERIS

SCALE: AS NOTED



EXCAVATION PLAN
NOT IN SCALE



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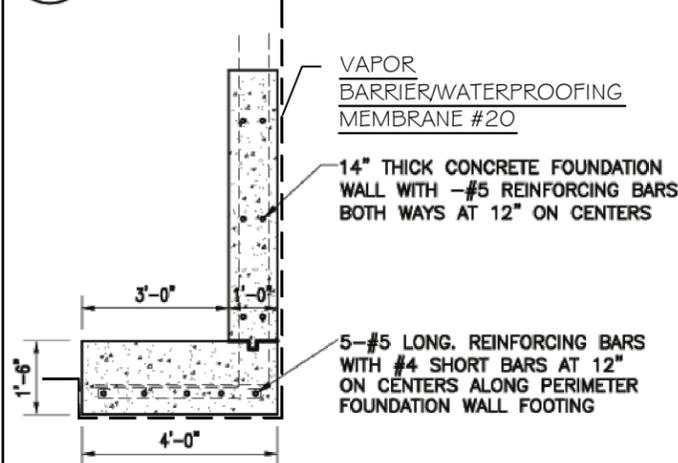
38-05 31ST. AVENUE
LONG ISLAND CITY, NY

FIGURE 3: SITE-WIDE COVER SYSTEM PLAN

DATE:	02/12/2013
APPROVED BY:	K.KAMBERIS
SCALE:	AS NOTED
	3 of 5

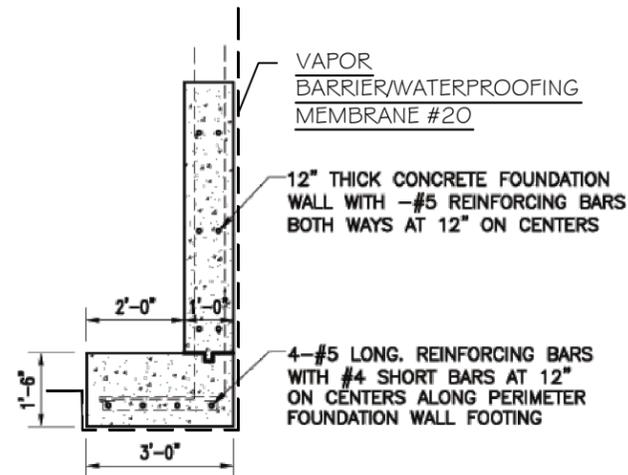
FOOTING DETAILS

SCALE 1/2" = 1'-0"



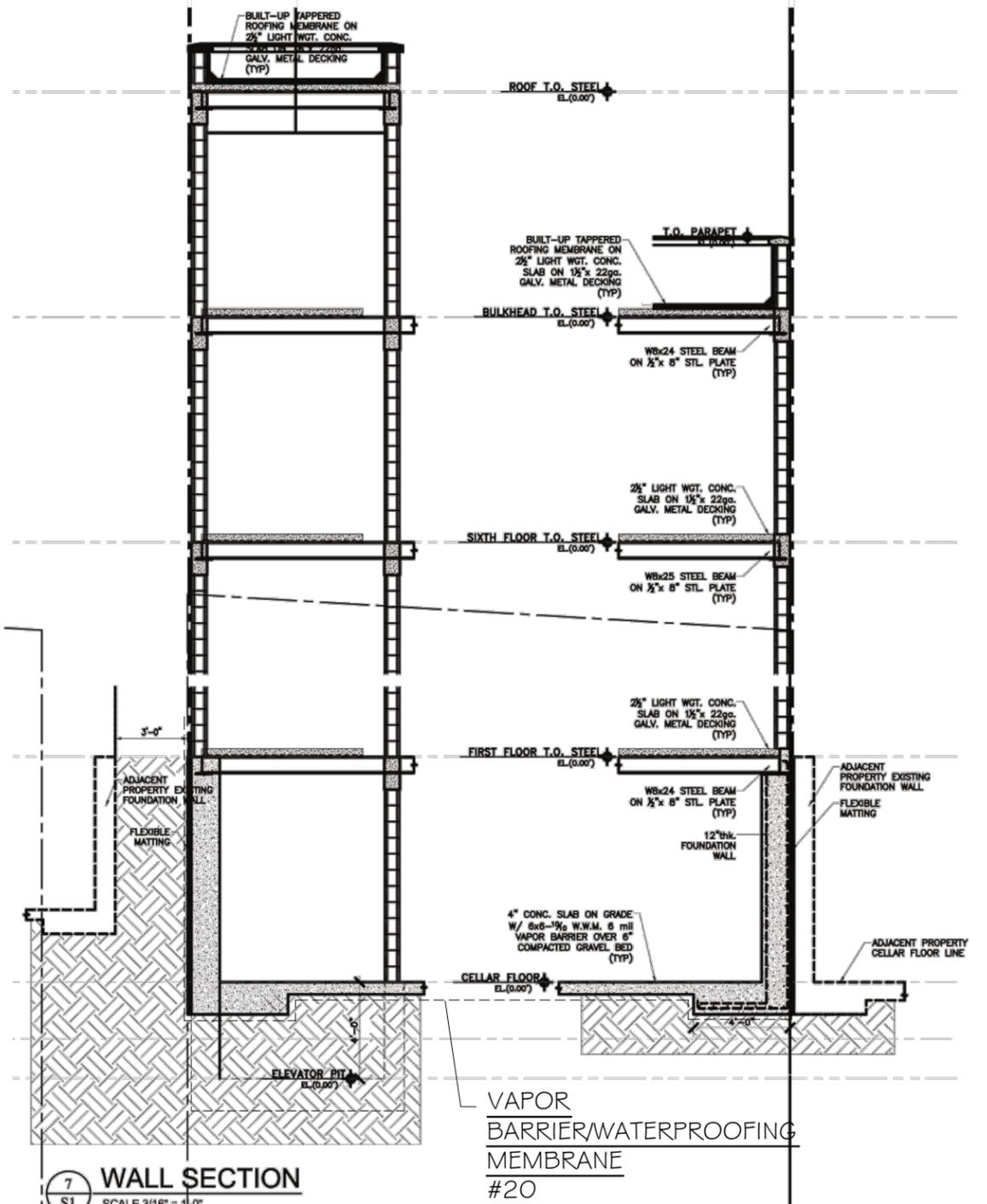
2 SIDE LOTLINE FOOTING DETAILS

S1 SCALE 1/2" = 1'-0"



3 FRONT+REAR LOTLINE FOOTING DETAILS

S1 SCALE 1/2" = 1'-0"



7 WALL SECTION

S1 SCALE 3/16" = 1'-0"

EMS
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FIGURE 4 TYPICAL COVER
DETAIL FOR ALL COVER TYPES

DATE: 02/12/2013

APPROVED BY: K.KAMBERIS

SCALE: AS NOTED

4 of 5

COMMON APPLICATIONS

- Radon Barrier
- Methane Barrier
- VOC's Barrier
- Under-Slab Vapor Retarder
- Foundation Wall Vapor Retarder



VaporBlock Plus
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VaporBlock Plus 20

UNDERSLAB VAPOR RETARDER / GAS BARRIER

TECHNICAL DATA SHEET

PROPERTIES	TEST METHOD	VAPORBLOCK PLUS 20	
		English	Metric
APPEARANCE		White/Gold	
THICKNESS, NOMINAL		20 mil	0.51 mm
WEIGHT		102 lbs/MSF	498 g/m ²
CLASSIFICATION	ASTM E 1745	CLASS A, B & C	
TENSILE STRENGTH 1" (2.54 cm) Average MD & TD (New Material)	ASTM E 154 Section 9 (D882)	58 lbs	258 N
PUNCTURE RESISTANCE	ASTM D 1709 *Method B	2600 g	
MAXIMUM USE TEMPERATURE		180°F	82°C
PERMEANCE (New Material)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.025 U.S. Perms	0.016 Metric Perms
RADON DIFFUSION COEFFICIENT		< 0.25 x 10 ⁻¹² m ² /s	
METHANE PERMEABILITY	ASTM D 1434	< 5 x 10 ⁻¹⁰ m ³ /d·atm	

*Method B conditioned at 65% humidity for 14 days.

VaporBlock Plus Placement

Instructions on architectural or structural drawings should be reviewed & followed. Detailed installation instructions accompany each roll of VaporBlock Plus. ASTM E 1643 also provides general installation information for vapor retarders.

VaporBlock Plus
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VaporBlock Plus™ is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and barrier resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock Plus contains a bright white on one side and a metallic gold on the other side.

EMS
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FIGURE 5: VAPOR BARRIER/
WATERPROOFING MEMBRANE

DATE: 02/12/2013

APPROVED BY: K.KAMBERIS

SCALE: AS NOTED

5 of 5

PRODUCT DESCRIPTION

VaporBlock Plus[™] is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and barrier resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock Plus is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab. VaporBlock Plus is more than 50 times less permeable than typical high-performance polyethylene vapor retarders against Methane, Radon and other harmful VOC's.

VaporBlock Plus is one of the most effective underslab barriers in the building industry today far exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Available in 6 (Class C) and 20 (Class A) mil thicknesses designed to meet the most stringent requirements. VaporBlock Plus is produced within the strict guidelines of our ISO 9001:2000 Certified Management System.

PRODUCT USE

VaporBlock Plus resists gas and moisture migration into the building envelop when properly installed. It can be installed as a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive system it is recommended to also include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock Plus works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.

SIZE & PACKAGING

VaporBlock Plus 6 is available in 12' x 200' rolls and VaporBlock Plus 20 in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements. Installation instructions and ASTM E-1745 classifications accompany each roll.



PRODUCT	PART NUMBER
VaporBlock Plus 6	VBP 6
VaporBlock Plus 20	VBP 20

COMMON APPLICATIONS

- Radon Barrier
- Methane Barrier
- VOC's Barrier
- Under-Slab Vapor Retarder
- Foundation Wall Vapor Retarder



VaporBlock[®] Plus[™] 6 & 20

UNDERSLAB VAPOR RETARDER / GAS BARRIER

TECHNICAL DATA SHEET					
PROPERTIES	TEST METHOD	VAPORBLOCK PLUS 6		VAPORBLOCK PLUS 20	
		English	Metric	English	Metric
APPEARANCE		White/Black		White/Gold	
THICKNESS, NOMINAL		6 mil	0.15 mm	20 mil	0.51 mm
WEIGHT		28 lbs/MSF	139 g/m ²	102 lbs/MSF	498 g/m ²
CLASSIFICATION	ASTM E 1745	CLASS C		CLASS A, B & C	
TENSILE STRENGTH 1" (2.54 cm) Average MD & TD (New Material)	ASTM E 154 Section 9 (D882)	22 lbs	98 N	58 lbs	258 N
PUNCTURE RESISTANCE	ASTM D 1709 *Method B	800 g		2600 g	
MAXIMUM USE TEMPERATURE		180°F	82°C	180°F	82°C
PERMEANCE (New Material)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.090 U.S. Perms	0.060 Metric Perms	0.025 U.S. Perms	0.016 Metric Perms
RADON DIFFUSION COEFFICIENT		N/A		< 0.25 x 10 ⁻¹² m ² /s	
METHANE PERMEABILITY	ASTM D 1434	N/A		< 5 x 10 ⁻¹⁰ m ² /d·atm	

*Method B conditioned at 65% humidity for 14 days.

VaporBlock Plus Placement

Instructions on architectural or structural drawings should be reviewed & followed. Detailed installation instructions accompany each roll of VaporBlock Plus. ASTM E 1643 also provides general installation information for vapor retarders.



VaporBlock Plus[™] is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and barrier resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock Plus contains a bright white on one side and a metallic gold on the other side.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. NO WARRANTIES ARE MADE AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage.



ISO 9001:2000
CERTIFIED MANAGEMENT SYSTEM

TABLES

TABLE 1

Groundwater Level Data

Table 1
Groundwater Elevation Surveying Details - February 2013
38-05 31st Street, Long Island City NY

Monitoring Well (MW)	Feb-13				
	Casing Elevation(Feet)	Depth to Product (Feet)	Depth to Water (Feet)	Benchmark	Groundwater Elevation (Feet)
MW-1	4.74	ND	21.95	30	3.31
MW-2	7.92	ND	21.1	30	3.98
MW-3	5.03	ND	21.22	30	3.75

ND.....None Detected

TABLE 2

**SUMMARY OF INVESTIGATION SOIL SAMPLE ANALYTICAL
RESULTS**

SUMMARY OF INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS

SEMI-VOLATILE ORGANICS (SVOCs)

SAMPLE NO: SAMPLE TYPE: SAMPLE INTERVAL: SAMPLE DATE: Units: SAMPLE NO:	NYS Soil Cleanup Objectives Residential ug/kg	S1 SOIL 0'-2' 2/13/2013 ug/kg	S2 SOIL 11'-13' 2/13/2013 ug/kg	S3 SOIL 0'-2' 2/13/2013 ug/kg	S4 SOIL 11'-13' 2/13/2013 ug/kg	S5 SOIL 0'-2' 2/13/2013 ug/L	S6 SOIL 11'-13' 2/13/2013 ug/L
Phenol	100,000	ND	ND	ND	ND	ND	ND
bis(2-Chloroethyl)ether	NS	ND	ND	ND	ND	ND	ND
2-Chlorophenol	NS	ND	ND	ND	ND	ND	ND
Benzyl Alcohol	NS	ND	ND	ND	ND	ND	ND
2-Methylphenol	NS	ND	ND	ND	ND	ND	ND
2,2-oxybis(1-Chloropropane)	NS	ND	ND	ND	ND	ND	ND
3+4-Methylphenols	NS	ND	ND	ND	ND	ND	ND
N-Nitroso-di-n-propylamine	NS	ND	ND	ND	ND	ND	ND
Hexachloroethane	NS	ND	ND	ND	ND	ND	ND
Nitrobenzene	NS	ND	ND	ND	ND	ND	ND
Isophorone	NS	ND	ND	ND	ND	ND	ND
2-Nitrophenol	NS	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	NS	ND	ND	ND	ND	ND	ND
bis(2-Chloroethoxy)methane	NS	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	NS	ND	ND	ND	ND	ND	ND
Benzoic acid	NS	ND	ND	ND	ND	ND	ND
Naphthalene	100,000	290	ND	420	ND	ND	ND
4-Chloroaniline	NS	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	NS	ND	ND	ND	ND	ND	ND
4-Chloro-3 methylphenol	NS	ND	ND	ND	ND	ND	ND
2-Methyl naphthalene	NS	ND	ND	ND	ND	ND	ND

SAMPLE NO:	NYS	S1	S2	S3	S4	S5	S6
SAMPLE TYPE:	Soil Cleanup	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE INTERVAL:	Objectives	0'-2'	11'-13'	0'-2'	11'-13'	0'-2'	11'-13'
SAMPLE DATE:		2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013
Units:	Residential						
SAMPLE NO:	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L
2-Nitroaniline	NS	ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	NS	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	NS	ND	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	NS	ND	ND	ND	ND	ND	ND
2-Chloronaphthalene	NS	ND	ND	ND	ND	ND	ND
Dimethylphthalate	NS	ND	ND	ND	ND	ND	ND
Acenaphthylene	100000	ND	ND	ND	ND	ND	ND
2,6 Dinitrotoluene	NS	ND	ND	ND	ND	ND	ND
3-Nitroaniline	NS	ND	ND	ND	ND	ND	ND
Acenaphthene	100000	ND	ND	ND	ND	ND	ND
2,4 Dinitro phenol	NS	ND	ND	ND	ND	ND	ND
4-Nitrophenol	NS	ND	ND	ND	ND	ND	ND
Dibenzofuran	NS	ND	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	NS	ND	ND	ND	ND	ND	ND
Diethylphthalate	NS	ND	ND	ND	ND	ND	ND
4-Chlorophenyl-phenylether	NS	ND	ND	ND	ND	ND	ND
Fluorene	100000	ND	ND	ND	ND	ND	ND
4-Nitroaniline	NS	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	NS	ND	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	NS	ND	ND	ND	ND	ND	ND
Azobenzene	NS	ND	ND	ND	ND	ND	ND
4-Bromophenyl-phenylether	NS	ND	ND	ND	ND	ND	ND

SAMPLE NO:	NYS	S1	S2	S3	S4	S5	S6
SAMPLE TYPE:	Soil Cleanup Objectives	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE INTERVAL:		0'-2'	11'-13'	0'-2'	11'-13'	0'-2'	11'-13'
SAMPLE DATE:		2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013
Units:	Residential						
SAMPLE NO:	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/L	ug/L
Hexachlorobenzene	330	ND	ND	ND	ND	ND	ND
Pentachlorophenol	2400	ND	ND	ND	ND	ND	ND
Phenanthrene	100000	ND	ND	780	ND	2600	ND
Anthracene	100000	ND	ND	ND	ND	620	ND
Di-n-butylphthalate	NS	ND	ND	ND	ND	ND	ND
Fluoranthene	100000	570	ND	1300	ND	2000	ND
Pyrene	100000	440	ND	1200	ND	2000	ND
Butylbenzylphthalate	NS	ND	ND	ND	ND	ND	ND
3,3-Dichlorobenzidine	NS	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	1000	ND	ND	650	ND	930	ND
Chrysene	3,900	450	ND	710	ND	1000	ND
bis(2-Ethylhexyl)phthalate	NS	ND	ND	ND	ND	ND	ND
Di-n-octyl phthalate	NS	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	1000	ND	ND	770	ND	870	ND
Benzo(k)fluoranthene	1000	680	ND	630	ND	ND	ND
Benzo(a)pyrene	1000	ND	ND	600	ND	750	ND
Indeno(1,2,3-cd)pyrene	500	ND	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	330	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	100000	ND	ND	ND	ND	ND	ND

Qualifiers:

ug/kg- Microgram per kilogram(ppb)

ND-Not detected; detection limit shown

SUMMARY OF INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
SUMMARY OF METALS

SAMPLE NO:	N Y State	S1	S2	S3	S4	S5	S6
SAMPLE TYPE:	SCOs	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE INTERVAL:		0'-2'	11'-13'	0'-2'	11'-13'	0'-2'	11'-13'
SAMPLE DATE:	Residential	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum		ND	ND	ND	ND	ND	ND
Antimony		ND	ND	ND	ND	ND	ND
Arsenic	16	ND	ND	ND	ND	ND	ND
Barium	350	340	65.3	320	251	95.3	201
Beryllium	14	ND	ND	ND	ND	ND	ND
Cadmium	2.5	ND	ND	ND	ND	ND	ND
Calcium		1460	1080	1570	1130	4160	2150
Chromium	36	ND	ND	ND	ND	ND	ND
Cobalt		8.54	7.19	6.45	5.66	7.28	10.1
Copper	270	ND	ND	ND	ND	ND	ND
Iron		20400	15100	16600	11200	19100	22900
Lead	400	453	3.52	220	357	982	223
Magnesium		1760	4150	1790	2400	2080	3950
Manganese	2000	345	215	247	176	262	306
Mercury	0.81	0.159	ND	0.301	ND	ND	0.071
Nickel	140	19.9	16.5	17.1	14.5	21.1	26.4
Potassium		388	1390	414	650	641	1390
Selenium	36	ND	ND	ND	ND	ND	ND
Silver	36	ND	ND	ND	ND	ND	ND

SAMPLE NO:	N Y State	S1	S2	S3	S4	S5	S6
SAMPLE TYPE:	SCOs	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE INTERVAL:		0'-2'	11'-13'	0'-2'	11'-13'	0'-2'	11'-13'
SAMPLE DATE:	Residential	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sodium	ND	ND	ND	ND	ND	ND	ND
Thallium	ND	ND	ND	ND	ND	ND	ND
Vanadium	ND	ND	ND	ND	ND	ND	ND
Zinc	2200	249	59.1	194	33	589	179

Qualifiers:

ug/kg- Microgram per kilogram(ppb)

ND-Not detected; detection limit shown

Bold: Detected value is greater than Recommended Soil Clean up Objectives (RSCO)

SUMMARY OF INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS

SUMMARY OF POLYCHLORINATED BIPHENYLS (PCBs)

Table 4

SAMPLE NO: SAMPLE TYPE: SAMPLE INTERVAL: SAMPLE DATE:	NYS Soil Cleanup Objectives	S1 SOIL 0'-2' 2/13/2013	S2 SOIL 11'-13' 2/13/2013	S3 SOIL 0'-2' 2/13/2013	S4 SOIL 11'-13' 2/13/2013	S5 SOIL 0'-2' 2/13/2013	S6 SOIL 11'-13' 2/13/2013
Units:	Residential ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Aroclor-1016	1000	ND	ND	ND	ND	ND	ND
Aroclor-1221	1000	ND	ND	ND	ND	ND	ND
Aroclor-1232	1000	ND	ND	ND	ND	ND	ND
Aroclor-1242	1000	ND	ND	ND	ND	ND	ND
Aroclor-1248	1000	ND	ND	ND	ND	ND	ND
Aroclor-1254	1000	ND	ND	ND	ND	ND	ND
Aroclor-1260	1000	ND	ND	ND	ND	ND	ND

Qualifiers:
 ug/kg- Microgram per kilogram(ppb)
 ND-Not detected; detection limit shown
 Bold: Detected value is greater than Recommended Soil Clean up Objectives (RSCO)

SUMMARY OF INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS

SUMMARY OF PESTICIDES

SAMPLE NO:	NYS	S1	S2	S3	S4	S5	S6
SAMPLE TYPE:	Soil Cleanup	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE INTERVAL:	Objectives	0'-2'	11'-13'	0'-2'	11'-13'	0'-2'	11'-13'
SAMPLE DATE:		2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013
Units:	Residential ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Alpha-BHC	97	ND	ND	ND	ND	ND	ND
Beta-BHC	72	ND	ND	ND	ND	ND	ND
Delta BHC	100000	ND	ND	ND	ND	ND	ND
Gamma-BHC		ND	ND	ND	ND	ND	ND
Heptachlor	420	ND	ND	ND	ND	ND	ND
Aldrin	19	ND	ND	ND	ND	ND	ND
Hephtaclor epoxide		ND	ND	ND	ND	ND	ND
Endosulfan I	4800	ND	ND	ND	ND	ND	ND
Dieldrin	39	ND	ND	ND	ND	ND	ND
4,4'-DDE	1800	ND	ND	ND	ND	ND	ND
Endrin	2200	ND	ND	ND	ND	ND	ND
Endosulfan II	4800	ND	ND	ND	ND	ND	ND
4-4'DDD	2600	ND	ND	ND	ND	ND	ND
Endosulfan sulfate	4800	ND	ND	ND	ND	ND	ND
4,4'-DDT	1700	ND	ND	ND	ND	ND	ND
Methoxychlor		ND	ND	ND	ND	ND	ND

SAMPLE NO:	NYS	S1	S2	S3	S4	S5	S6
SAMPLE TYPE:	Soil Cleanup	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE INTERVAL:	Objectives	0'-2'	11'-13'	0'-2'	11'-13'	0'-2'	11'-13'
SAMPLE DATE:		2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013
Units:	Residential	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Endrin keytone		ND	ND	ND	ND	ND	ND
Endrin aldehyde		ND	ND	ND	ND	ND	ND
alpha-chlordane	910	ND	ND	ND	ND	ND	ND
gamma-chlordane		ND	ND	ND	ND	ND	ND
Toxaphene		ND	ND	ND	ND	ND	ND

Qualifiers:
 ug/kg- Microgram per kilogram(ppb)
 ND-Not detected; detection limit shown
 Bold: Detected value is greater than Recommended Soil Clean up Objectives (RSCO)

SUMMARY OF INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
VOLATILE ORGANICS (VOCs)

Table 1

SAMPLE NO:	NYS	S1	S2	S3	S4	S5	S6
SAMPLE TYPE:	Soil Cleanup	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE INTERVAL:	Objectives	0'-2'	11'-13'	0'-2'	11'-13'	0'-2'	11'-13'
SAMPLE DATE:		2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013	2/13/2013
Units:	Residential ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Dichlorodifluoromethane		ND	ND	ND	ND	ND	ND
Chloromethane		ND	ND	ND	ND	ND	ND
Vinyl Chloride	2100	ND	ND	ND	ND	ND	ND
Bromomethane		ND	ND	ND	ND	ND	ND
Chloroethane		ND	ND	ND	ND	ND	ND
Trichlorofluoromethane		ND	ND	ND	ND	ND	ND
Tert butyl alcohol		ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	100000	ND	ND	ND	ND	ND	ND
Acrolein		ND	ND	ND	ND	ND	ND
Acrolonitrile		ND	ND	ND	ND	ND	ND
Acetone	100000	ND	ND	ND	ND	ND	ND
Carbon Disulfide		ND	ND	ND	ND	ND	ND
Methyl-tert-butyl Ether	62000	ND	ND	ND	ND	ND	ND
Methylene Chloride	51000	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethene		ND	ND	ND	ND	ND	ND
Vinyl Acetate		ND	ND	ND	ND	ND	ND
1,1 Dichloroethane	19000	ND	ND	ND	ND	ND	ND
2-Butanone		ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	1400	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane		ND	ND	ND	ND	ND	ND
Cis-1,2-Dichloroethene	59000	ND	ND	ND	ND	ND	ND
Bromochloromethane		ND	ND	ND	ND	ND	ND
Chloroform	10000	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	100000	ND	ND	ND	ND	ND	ND

SAMPLE NO: SAMPLE TYPE: SAMPLE INTERVAL: SAMPLE DATE:	NYS Soil Cleanup Objectives Residential ug/kg	S1-1 SOIL 4'-5' 7/14/2008 ug/kg	S1-2 SOIL 12'-15' 7/14/2008 ug/kg	SB2-1 SOIL 8'-10' 7/14/2008 ug/kg	SB2-2 SOIL 15'-20' 7/14/2008 ug/kg	GW-1 Water 7/14/2008 ug/L	GW-2 Water 7/14/2008 ug/L
1,1-Dichloropropene		ND	ND	ND	ND	ND	ND
Benzene	2900	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene		ND	ND	ND	ND	ND	ND
Trichloroethane		ND	ND	ND	ND	ND	ND
1,2-Dichloropropane		ND	ND	ND	ND	ND	ND
Dibromomethane		ND	ND	ND	ND	ND	ND
Bromodichloromethane		ND	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone		ND	ND	ND	ND	ND	ND
Toluene	100000	ND	ND	ND	ND	ND	ND
t- 1,3-Dichloropropene		ND	ND	ND	ND	ND	ND
cis- 1,3-Dichloropropene		ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane		ND	ND	ND	ND	ND	ND
1,3-Dichloropropane		ND	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether		ND	ND	ND	ND	ND	ND
2-Hexanone		ND	ND	ND	ND	ND	ND
Dibromochloromethane		ND	ND	ND	ND	ND	ND
1,2-Dibromoethane		ND	ND	ND	ND	ND	ND
Tetrachloroethane	5500	ND	ND	ND	ND	ND	ND
Chlorobenzene	100000	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane		ND	ND	ND	ND	ND	ND
Ethyl Benzene	30000	ND	ND	ND	ND	ND	ND
m/p-Xylenes		ND	ND	ND	ND	ND	ND
o-Xylene		ND	ND	ND	ND	ND	ND
Styrene		ND	ND	ND	ND	ND	ND
Bromoform		ND	ND	ND	ND	ND	ND
Isopropylbenzene		ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane		ND	ND	ND	ND	ND	ND

SAMPLE NO:	NYS	S1-1	S1-2	SB2-1	SB2-2	GW-1	GW-2
SAMPLE TYPE:	Soil Cleanup	SOIL	SOIL	SOIL	SOIL	Water	Water
SAMPLE INTERVAL:	Objectives	4'-5'	12'-15'	8'-10'	15'-20'		
SAMPLE DATE:		7/14/2008	7/14/2008	7/14/2008	7/14/2008	7/14/2008	7/14/2008
Units:	Residential						
	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
1,2,3-Trichloropropane		ND	ND	ND	ND	ND	ND
Bromobenzene		ND	ND	ND	ND	ND	ND
n-propylbenzene	100000	ND	ND	ND	ND	ND	ND
2-Chlorotoluene		ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	47000	ND	ND	ND	ND	ND	ND
4-Chlorotoluene		ND	ND	ND	ND	ND	ND
Tert-Butylbenzene	100000	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	47000	ND	ND	ND	ND	ND	ND
Sec-Butylbenzene	100000	ND	ND	ND	ND	ND	ND
p-Isopropyltoluene		ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	17000	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene		ND	ND	ND	ND	ND	ND
Naphthalene		ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene		ND	ND	ND	ND	ND	ND

Qualifiers:

ug/kg- Microgram per kilogram(ppb)

ND-Not detected; detection limit shown on attached laboratory results.

Bold: Detected value is greater than Recommended Soil Clean up Objectives (RSCO)

TABLE 3

**SUMMARY OF INVESTIGATION GROUNDWATER ANALYTICAL
RESULTS**

Summary of Water Analytical Data

Metals Water

Analyte	Groundwater Quality Standards Class GA (ug/L)	GW-1 E1309-07 2/14/2013 WATER (ug/L)	GW-2 E1309-08 2/14/2013 WATER (ug/L)	GW-3 E1309-09 2/14/2013 WATER (ug/L)	GW-1 E1309-10 2/14/2013 WATER(Dissolved) (ug/L)	GW-2 E1309-11 2/14/2013 WATER(Dissolved) (ug/L)	GW-3 E1309-12 2/14/2013 WATER(Dissolved) (ug/L)
Aluminum	NS	ND	ND	ND	ND	ND	ND
Antimony	3	ND	ND	ND	ND	ND	ND
Arsenic	25	ND	ND	ND	ND	ND	ND
Barium	1000	225	58.8	188	198	40.5J	97.3
Beryllium	NS	ND	ND	ND	ND	ND	ND
Cadmium	5	ND	ND	ND	ND	ND	ND
Calcium	NS	132000	65500	93500	128000	54900	88800
Chromium	50	33.5	117	115	90.9	196	82.3
Cobalt	5	ND	ND	24.4	ND	ND	ND
Copper	200	10.5	ND	53.1	ND	ND	ND
Iron	300	2730N	2440N	21700N	346N	720N	323N
Lead	25	50.6	ND	15.8	ND	ND	ND
Magnesium	NS	54900	24700	43700	53100	20400	40300
Manganese	300	313	127	643	159	62.6	42.8
Mercury	0.7	0.097	ND	ND	ND	ND	ND
Nickel	100	31.4	193	111	51.2	72.8	42.7
Potassium	NS	5780	4080	6450	5490	3360	5220
Selenium	10	ND	ND	ND	ND	ND	ND

Analyte	Groundwater Quality Standards Class GA (ug/L)	GW-1 E1309-07 2/14/2013 WATER	GW-2 E1309-08 2/14/2013 WATER	GW-3 E1309-09 2/14/2013 WATER	GW-1 E1309-10 2/14/2013 WATER(Dissolved) (ug/L)	GW-2 E1309-11 2/14/2013 WATER(Dissolved) (ug/L)	GW-3 E1309-12 2/14/2013 WATER(Dissolved) (ug/L)
Silver	50	ND	ND	ND	ND	ND	ND
Sodium	20,000	116000	9080	53500	115000	7830	57900
Thallium	NS	10U	10U	10U	10U	10U	10U
Vanadium	NS	10U	10U	26.2	10U	10U	10U
Zinc	NS	35.6	16J	58.5	24.7	12.8J	13.7J
Total Concentration		313011.317	107110.29	226767.5	302503.78	87620.23	192860.41

TABLE 4

SUMMARY OF INVESTIGATION SOIL VAPOR RESULTS

SAMPLE IDENTIFICATION	G-1	G-2	G-3
SAMPLE TYPE:	SOIL VAPOR	SOIL VAPOR	SOIL VAPOR
SAMPLE DATE:	2/13/2013	2/13/12	2/13/12
Units:	ug/m3	ug/m3	ug/m3
Dichlorodifluoromethane	1.43	1.58	0.94
tert-Butyl alcohol	14.2	15.8	2.24
Chloromethane	0.21	0.5	0.72
Methyl Methacrylate	0.41	0.41	4.91
Vinyl Chloride	0.08	0.08	0.23
Bromomethane	0.39	0.39	0.39
Chloroethane	0.26	0.26	3.69
Trichlorofluoromethane	3.54	1.4	1.12
Dichlorotetrafluoroethane	0.7	0.7	0.7
1,1,2-Trichlorotrifluoroethane	0.77	0.77	0.77
Bromoethene	0.44	0.44	0.44
Heptane	16.8	25	0.74
1,1-Dichloroethene	0.4	0.4	0.4
Acetone	617	688	712

Carbon Disulfide	2.21	6.23	0.31
Methyl tert-Butyl Ether	1.19	3.97	0.36
Methylene Chloride	0.35	2.88	0.35
Allyl Chloride	0.31	0.31	0.31
trans-1,2-Dichloroethene	0.4	0.4	0.4
1,1-Dichloroethane	0.4	0.4	0.45
Cyclohexane	6.2	7.57	0.83
2-Butanone	12.1	24.5	5.01
Carbon Tetrachloride	0.38	0.31	0.5
cis-1,2-Dichloroethene	0.4	0.4	0.99
Chloroform	3.47	0.49	0.49
1,4-Dioxane	0.36	0.36	0.36
1,1,1-Trichloroethane	0.98	1.09	0.16
Tetrahydrofuran	11.2	17.1	13.3
2,2,4-Trimethylpentane	17.3	16.4	0.47
Benzene	5.43	10.2	64.2
1,2-Dichloroethane	0.4	0.4	0.4
Trichloroethene	0.91	0.16	0.38

1,2-Dichloropropane	0.46	0.46	0.46
Bromodichloromethane	0.67	0.67	0.67
4-Methyl-2-Pentanone	3.98	9.84	1.84
Toluene	58.4	92.7	78.4
t-1,3-Dichloropropene	0.45	0.45	0.45
cis-1,3-Dichloropropene	0.45	0.45	0.45
1,1,2-Trichloroethane	0.55	0.55	0.55
Dibromochloromethane	0.85	0.85	0.85
1,2-Dibromoethane	0.77	0.77	0.77
Tetrachloroethene	35.3	10.2	4.2
Chlorobenzene	0.46	0.46	16.1
Ethyl Benzene	23.9	189	128
m/p-Xylene	67.3	291	371
o-Xylene	27.8	122	161
Styrene	1.02	0.43	100
Bromoform	1.03	1.03	1.03
1,1,2,2-Tetrachloroethane	0.69	0.69	0.69
2-Chlorotoluene	0.52	0.52	0.88

1,3,5-Trimethylbenzene	5.41	7.87	2.51
1,2,4-Trimethylbenzene	18.7	26.1	7.37
4-Ethyltoluene	7.37	9.34	2.51
1,3-Dichlorobenzene	0.6	0.6	0.6
1,4-Dichlorobenzene	0.6	0.6	0.9
1,2-Dichlorobenzene	0.6	0.6	0.66
1,2,4-Trichlorobenzene	0.74	0.74	0.74
Hexachloro-1,3-Butadiene	1.07	1.07	1.07
1,3-Butadiene	0.22	0.22	0.22
Hexane	13	20.1	0.35

APPENDIX 4
HEALTH AND SAFETY PLAN

1.0

GENERAL

This site specific Health and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 Occupational Safety and Health Act (OSHA) Hazardous Waste Operation and Environmental Management Services, Inc. (EMS) Standard Operating Procedures (SOPs). It addresses all activities associated with Phase II Environmental Site Assessment at 38-05 31st Street, LIC, NY 11101, and will be implemented by the designated Site Health and Safety Officer (SHSO) during work at the Subject Property.

This plan establishes EMS's occupational health and safety requirements, responsibilities, and procedures to protect workers during the Site Investigation (SI) at the property located at 38-05 31st Street, Long Island City, New York.

This HASP is developed to assure the protection of the health and safety of the employees of EMS, its subcontractors and/or visitors at the site. The HASP is designed to be protective of on-site workers and to mitigate the potential for off-site releases. As part of this plan, access to the investigation site will be controlled at the location of soil disturbances, downwind and at the site perimeter to minimize the potential for possible on-site and off-site exposure.

The content of this HASP may undergo revision based upon additional information made available. Any changes proposed must be reviewed and approved by the EMS's Health and Safety Manager or his designee.

The requirement for worker health and safety are based on the following:

1. The Standard Operating Safety Guides, USEPA, Office of Emergency and Remedial Response;
2. The Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Parts 1910.120 and 1926

3. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, National Institute of Occupational Safety and Health (NIOSH), OSHA, United State Coast Guard (USCG), and USEPA;
4. Superfund Amendments Reauthorization Act (SARA) Title I, Section 126.

1.1 Scope of Work

The scope of work is to execute a Phase II Site Investigation of the Subject Property, and include, but are not limited to, following:

- Soil boring and sampling;
- Overseeing general health and safety;
- Groundwater sampling; and
- Soil vapor sampling.

The HASP is designated to address any additional work, which may be performed as a result of the Site Investigation.

2.0 EMERGENCY INFORMATION

If a medical emergency occurs, only limited first aid will be available at the Subject Property. If the victim can be transported without substantial risk of additional injury the nearest hospital is provided bellow. Figure 1 shows the location of NY Foundling Hospital and the route to be taken from the Subject Property.

Multiple emergency services may be obtained from 911. More specific numbers for local services are listed below.

SITE LOCATION	38-05 5th Street, Long Island City, NY 11101
NEAREST HOSPITAL	Mount Sinai 25-10 30 th Avenue, Astoria, NY 11102
EMERGENCY RESPONDERS	Police Department911 Fire Department911 Ambulance.....911
OWNER REPRESENTATIVE	Anastasios Matsikas917-807-4012
IN EVENT OF EMERGENCY, CALL FOR HELP AS SOON AS POSSIBLE	Give the following information: Where You Are. Address, cross streets, or landmarks Phone Number you are calling from What Happened. Type of injury, accident How many persons need help What is being done for the victims You hang up last. Let whomever you called hang up first

3.0 HEALTH AND SAFETY PERSONNEL DESIGNATIONS

Personnel Designation	Responsibilities
Health and Safety Manager (HSM)	Implementation and modification of the HASP. Will assign health and safety duties. Provide adequate resources for field health and safety personnel. Assure that field personnel are trained and aware of facility conditions. Schedule adequate personnel and equipment to perform job safety.
Site Health and Safety Officer (SHSO)/Site Emergency Coordinator	Conducts safety briefings and worker awareness meetings. Ensures compliance with HASP. Notify HSM of accidents/incidents Coordinates Health and safety activities. Make contact with local emergency groups prior to beginning work on-site. Responsible for evacuation, emergency treatment, and emergency transport of the personnel.
Field Crew Personnel	Report unsafe or hazardous conditions to SHSO. Understand the information contained in this HASP

4.0 HEALTH AND SAFETY PLAN SUMMARY

LOCATION: 38-05 31st Street, Long Island City, NY 11101

OWNER: Bill Matsikas

PROPOSED DATES OF ACTIVITIES: November 2012

TYPE OF FACILITY: Vacant Lot

LAND USE OF AREA SURROUNDING FACILITY: Manufacturing/Residential

SITE ACTIVITIES: Soil and Groundwater Sampling.

POTENTIAL SITE CONTAMINANTS: Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Silver (Ag), Zinc (Zn), Total Petroleum Hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), and polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins), VOC.

ROUTES OF ENTRY: Skin contact with soil and ground water; incidental ingestion of soil and ground water; and inhalation of airborne droplets, dusts, or vapors.

PROTECTIVE MEASURES: Safety glasses, gloves, protective clothing, and possibly air purifying respirators.

5.0 INTRODUCTION

5.1 Purpose and Regulatory Compliance

This site-specific Health and Safety Plan (HSP) addresses procedures to minimize the risk of chemical exposures, physical accidents to on-site workers, and environmental contamination. The HSP covers each of the 11 required plan elements as specified in 29 CFR 1910.120 equivalent state regulations. Table H-1 lists the sections of this plan, which apply to each of these required elements.

Table H-1 – Locations of Required Health and Safety Plan Elements in This Site-Specific H & S Plan

Required H & S Plan Element	Section in this Health and Safety Plan
Confined space entry	Other Physical Hazards: Drill Rig Operations
Decontamination	Decontamination
Emergency response plan	Emergency Response Plan
Medical surveillance	Medical Surveillance
Monitoring program	Air Monitoring and Action Levels
Names of key personnel	1.2.3. Chain of Command
Personal protective equipment	Protective Equipment. Safety Equipment List
Safety and hazard analysis	Hazard Evaluation and Control Measures
Site control	Exclusion Areas. Site Security and Control
Spill containment	Spill Containment
Training	Training Requirements

5.2. Distribution and Approval

This HSP will be made available to all EMS site personnel involved in field work on this project. It will also be made available to subcontractors and other non-employees who may need to work on the site. For non-employees, it must be made clear that the plan represents minimum safety procedures and that they are responsible for their own safety while present on site. By signing the documentation form provided with this plan project workers also certify their approval and agreement to comply with the plan.

5.3 Chain of Command

The chain of command for health and safety on this project involves the following individuals:

Project Manager: Kosta Kamberis, P.E.

The project Manager has overall responsibility for the successful outcome of the project. The Project Manager, in consultation with the Corporate H&S Manager, makes final decisions regarding questions concerning the implementation of the site-specific HSP. The Project Manager may delegate this authority and responsibility to the Project and/or Field H&S Managers.

Corporate H&S Manager: John Fidanakis

The EMS's Corporate H&S Manager has overall responsibility for the preparation and modification of this H&S Plan. In the event that health and safety issues arise during site operations, he will attempt to resolve them in discussion with the appropriate members of the project team.

Field H&S Manager:

The Field H&S Manager is responsible for implementing this H&S Plan in the field. This individual also observes subcontractors to verify that they are following these procedures, at a minimum. The field H&S Manager will also assure that proper protective equipment is available and used in the correct manner, decontamination activities are carried out properly and that employees have knowledge of the local emergency medical system should it be necessary.

6.0 SITE WORK ACTIVITIES

Activities of concern at the site include:

- Borehole construction to collect soil and ground water samples; and
- Collection of synoptic water level measurements.

Potential safety risks will vary with the specific activity and equipment used. When any new data is collected, potential health and safety hazards will be evaluated and related to the current and planned activities at the site. All sampling work in which the potential hazards have not been identified may require additional precautions to assure protection against potential hazards. Any modification of the Work Plan will require evaluation to determine if the existing health and safety plan is adequate in protecting on-site investigators and mitigate the potential for off-site releases. The total duration of field activities is expected to be One (1) day.

7.0 HAZARD ASSESSMENT

This section discusses the toxicity of chemicals of concern, potential exposure routes, air monitoring requirements, symptoms of heat stress and hypothermia, and other physical hazard. Table H-2 Activity Hazard Analysis lists the potential hazards associated with each site activity and the recommended site control to be used to minimize each potential hazard.

Table H-2 – Activity Hazard Analysis

ACTIVITY	HAZARD	CONTROL
Surveying sampling locations	Slip/Trip hazard on uneven construction site	Wear appropriate slip-resistant boots.
	Skin or clothing contamination	Avoid touching or stepping on surfaces with visibly contaminated soils, puddles, or stains. Appropriate PPE will be worn.
Decontamination of Equipment	Inhalation or eye contact with airborne particulates or vapors	Wear safety glasses, and respirators, if necessary.
	Skin contact with contaminated liquids.	Wear modified Level D personal protection (PPE). Tape openings in garment. Follow heat stress precautions in Section 4.6.
	Accidental ingestion of contaminants.	Decontaminate clothing and skin prior to eating, drinking, smoking, or other hand to mouth contact.
Sampling with Drill	Skin contact with	Wear disposable protective clothing

Rigs and GeoProbe	contaminated soil and ground water.	(polytyvek), eye protection and chemical-resistant gloves required when handling samples.
	Stormy weather.	Do not operate drill equipment in adverse weather conditions. Check weather forecast to avoid being caught in storm or squall.
Sample handling, packaging, and processing	Skin contact with contaminated soil and ground water.	Wear modified Level D PPE.
	Contacting mechanical equipment (exposed gears, and pulleys, etc.)	Install guards on all exposed gears and pulley; inspect equipment; control work area.
	Struck by moving vehicles.	Ensure vehicles have back-up alarms; establish traffic zones in work area; chalk all parked vehicles; driver training. Wear high visibility vests.
	Noise.	Wear hearing protection when noise levels exceed 85 dB.
	Heavy lifting.	Use mechanical lifting devices; use proper lifting techniques.
	Contact with contaminated soil and ground water.	Wear modified Level D PPE.
	Inhalation of petroleum hydrocarbon vapors.	Wear respirator as needed. VOC monitoring will be performed using a PID meter during all aspects of the work.

7.1 Toxicity of Chemicals of Concern

Based on regional information and knowledge of the types of activities conducted at this location, the following chemicals may be present in the soil and ground water: Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Silver (Ag), Zinc (Zn), Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAHs), VOC, SVOC, Polychlorinated Biphenyls (PCBs), total DDT, and dioxins.

Human health hazards of these chemicals are discussed below. This information covers potential toxic effects, which might occur if relatively significant acute and/or chronic exposure were to happen. This information does not mean that such effects will occur from the planned site activities. In general, the chemicals that may be encountered at this site are not expected to be present at concentrations, which could produce significant exposures. The types of planned work activities, establishes safe work practices, (air) monitoring protocol and personal protective equipment will limit potential exposures at this site.

Soil and ground water samples are handled wet and inhalation is not expected to be a route of exposure. Anticipated route of exposure would be via contact skin absorption. These standards are presented using the following abbreviations:

PEL: Permissible exposure limit.

TWA: Time-weighted average exposure limit for any 8-hour work shift.

STEL: Short-term exposure limit expressed as a 15-minute time-weighted average and not to be exceeded at any time during a workday.

Chromium (Cr)

Chromium metal and insoluble chromium salts can affect the body if inhaled or swallowed. Ferrochrome alloys have been associated with lung disease in humans. Certain forms of chromium (VI) compounds have been found to cause increased respiratory cancer among workers. EPA classifies chromium (VI) as a Class A, or confirmed, human carcinogen via the inhalation exposure route. Unless it can be demonstrated that no chromium (VI) compounds are present, chromium should be treated as a carcinogen. The PEL-TWA for chromium (III) compounds is 0.5 mg/m^3 , and for chromic acids and chromates (chromium VI) the PEL is 0.1 mg/m^3 .

Copper (Cu)

Copper exposure can occur via inhalation of dust or fume, ingestion, or skin and eye contact. Copper salts can act as skin irritants, causing itching and dermatitis. Eye contact can result in severe damage, including corneal damage. Contact with metallic copper can result in skin thickening, but is not associated with dermatitis in industrial settings. Fumes and dusts can irritate the respiratory tract and result in metal fume fever in severe exposures. Ingestion can result in irritation, but industrial exposure seldom results in damage because copper salts normally induce vomiting. Extensive exposure can damage the lungs, kidneys, skin, and liver. The current PEL-TWA for copper as dust and mists is 1.0 mg/m^3 , while the limit for copper as fume is 0.1 mg/m^3 .

Lead (Pb)

Inorganic lead exposure can occur via inhalation of dusts or metal fumes, ingestion of dusts, and skin and eye contact. The principal target organs of lead toxicity include the nervous system, kidneys, blood, gastrointestinal tract, and reproductive systems. Generalized symptoms of lead exposure include decreased physical fitness, fatigue, sleep disturbances, headaches, bone and muscle pain, constipation, abdominal pain, and decreased appetite. More severe exposure can result in anemia, severe gastrointestinal disturbance, a lead-line on the gums, neurological symptoms, convulsions, and death.

Neurological effects are among the most severe of inorganic lead's toxic effects and vary depending on the age of the individual exposed. Effects observed in adults occur primarily in the peripheral nervous system, resulting in nerve destruction and degeneration. Wrist-drop and foot-drop are two characteristic manifestations of this toxicity.

The U.S. EPA also currently lists inorganic lead as a Group B2 probable human carcinogen via the oral route. This conclusion is based on feeding studies conducted in laboratory animals. The current PEL-TWA for inorganic lead is 0.05 mg/m³.

Mercury (Hg)

The health effects of mercury exposure are dependent on the chemical form of mercury involved. Elemental mercury is toxic by inhalation, skin absorption, eye, and skin contact. Symptoms of exposure include coughing, chest pains, headache, fatigue, salivation, weight loss, and skin and eye irritation. The primary target organ of elemental mercury is the central nervous system, resulting in damage to sensory systems. The PEL-TWA for exposure to mercury vapor is 0.05 mg/m³.

Inorganic mercury compounds are toxic by inhalation, ingestion, and skin and eye contact. Acute poisoning results in lung damage. Chronic poisoning typically produces four classical symptoms: gingivitis, salivation, increased irritability, and muscular tremors. Delirium and other psychological abnormalities can also result from chronic exposures. Inorganic mercurials also have corrosive effect on the alimentary tract, and kidney damage can result from exposure. The current PEL-C (Ceiling) limit for inorganic mercury is 0.1 mg/m³.

Organomercury compounds include the methyl mercuries and aryl mercuries, many of which are used as herbicides and pesticides. Methyl mercury is toxic by inhalation, resulting in central nervous system damage manifested in tremors and sensory disturbances. Infants exposed to high methyl mercury before birth can exhibit severe central nervous system damage. The current PEL-TWA for organo-alkyl compounds as Hg is 0.10 mg/m³ with and STEL of 0.03 mg/m³, and the PEL-C (Ceiling) for aryl mercury compounds as Hg is 0.1 mg/m³.

Silver (Ag)

Local effects from metallic silver include implantation of particles into the skin, resulting in permanent discoloration. Silver nitrate is highly corrosive to tissues and may cause severe eye damage. Silver is strongly bio-accumulated and excretion is very low. Chronic exposure to silver dusts can cause lung irritation. Kidney and liver damage can also result from repeated exposure. The current PEL-TWA for silver metal is 0.01 mg/m³.

Zinc (Zn)

Zinc compounds can be hazardous by inhalation of dust and fumes, ingestion, and skin and eye contact. Zinc chloride is corrosive to skin and mucous membranes, and sensitization can occur resulting in dermatitis. Eye contact can produce inflammation and corneal ulceration. Ingestion can result in corrosive damage to the digestive tract. The current PEL-TWA for exposure to zinc chloride fume is 1 mg/m³. Zinc chromate exhibits potential carcinogenic effects and is currently limited with a PEL-TWA of 0.05 mg/m³. Zinc oxide is toxic via inhalation of fumes and dusts and may cause dermatitis. The current PEL-TWA for zinc oxide is 10 mg/m³ as total dust and 5 mg/m³ as the respirable fraction.

Total Petroleum Hydrocarbons (TPH)

TPH is a generic term based on analytical test procedures for the range of hydrocarbon materials from gasoline through heavier fuel oils. These materials typically consist of n-paraffins, isoparaffins, naphthenes, and aromatics in the boiling point range from approximately 50 to 250^o C. Based on materials such as gasoline and fuels oils, TPH can be expected to typically act as a central nervous system depressant, resulting in slurred speech and mental confusion. Higher doses can result in unconsciousness and possibly death from respiratory failure. Skin contact can result in irritation, dermatitis, and defatting. Liver and kidney damage can also result following acute or chronic exposure. No PEL has been established for THP. For comparison, the PEL-TWA for gasoline is 300 ppm, with 500 ppm as a 15-minute STEL.

Polycyclic Aromatic Hydrocarbons (PAHs)

Exposure to PAHs can occur via inhalation of vapors, ingestion, and skin and eye contact. Skin contact can result in reddening or corrosion. Ingestion can cause nausea, vomiting, blood pressure fall, abdominal pain, convulsions, and coma. Damage to the central nervous system can also occur. The U.S. Department of Health and Human Services (1989) has classified 15 PAHs compounds as having sufficient evidence for carcinogenicity, while the U.S. EPA (1990) has classified at least 5 of the identified PAHs as human carcinogens. There are no currently assigned PEL-TWA for PAHs, but the closely related material coal tar is listed as coal tar pitch volatile with a PEL-TWA of 0.2 mg/m³.

Polychlorinated Biphenyls (PCBs)

PCBs is a generic term for a range of polychlorinated biphenyl compounds used commercially in heat transfer media and in the chemical/coatings industry. PCBs have been marketed commercially under the trade names Askarel⁷ and Aroclor⁷, with a destination referring to the percent weight of chlorine. Prolonged skin contact with PCBs may cause acne-like symptoms, known as chloracne. Irritation to eyes, nose and throat may also occur. Acute and chronic exposure can cause liver damage, and symptoms of edema, jaundice, anorexia, nausea, abdominal pains, and fatigue. If pregnant women accidentally ingest PCBs, stillbirth or infant skin and eye problems may occur. PCBs are a suspect carcinogen. The U.S. EPA currently classifies PCBs as a Class B2, or probable, human carcinogen. The PEL-TWA for PCBs with 54 percent chlorine content is 0.5 milligrams per cubic meter (mg/m³), while the PEL-TWA for PCBs with 42 percent chlorine is 1 mg/m³. Skin exposure may contribute significantly to uptake of these chemicals, and therefore all skin exposure should be strictly avoided.

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)

The Human Health Assessment Group in EPA's Office of Health and Environmental Assessment has evaluated 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) for

carcinogenicity. According to their analysis, the weight-of-evidence for TCDD is group B2, which is based on inadequate evidence in humans and sufficient evidence in animals. As a group B2 chemical, TCDD is considered to be probably carcinogenic to humans. Following severe accidental exposure, symptoms of porphyria cutanea tarda, uroporphyrinuria, abnormal liver tests, and liver enlargement were noted. Chloracne was found in 52 percent to 226 workers in 1979 cross-sectional survey at a plant where 2,4,5-T had been manufactured from 1948 to 1969 (TSDD IS A CONTAMINANT OF 2,4,5-T). There is no PEL for TCDD.

2,3,7,8-Tetrachlorodibenzofuran (TCDF).

The major hazards encountered in contacting 2,3,7,8-tetrachlorodibenzofuran (TCDF) stem from its toxicological properties. Having a magnitude of toxicity similar to TCDD, TCDF has been shown to affect biochemical activity, suppress immune function, cause fetal abnormalities, and induce tumors in non-human test organisms. While not used commercially, TCDF is found as an impurity in polychlorinated biphenyl products and 2,4,6-trichlorophenol. Occupational exposure occurs through inhalation and dermal contact to fire fighters and cleanup workers associated with polychlorinated biphenyl transformer fires. There is no PEL or TSDF.

Total DDT

DDT (dichlorodiphenyltrichloroethane, or 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane) is a chlorinated insecticide which was widely used in the United States until banned by the EPA in 1972. This action was motivated primarily by evidence demonstrating DDT's widespread distribution and persistence in the environment, its strong tendency to bio-accumulate in mammalian adipose tissue, and by a series of ecological studies which suggested reduced reproductive success among certain wild bird species when exposed to DDT and its metabolites. The principal mode of insecticidal action for DDT is believed to involve disruption of the normal sodium and potassium ion currents in motor and sensory nerves, such that repetitive and uncontrolled firing occurs. DDT can be toxic to humans by inhalation, ingestion, and eye and dermal contact,

although DDT is reported to be poorly absorbed through the skin. Symptoms of DDT poisoning include tingling of the mouth and facial area, apprehension, irritability, dizziness, tremor, and convulsions. Symptoms may occur several hours after exposure. DDT exposure can also result in liver injury. The chemicals metabolites of DDT designated as DDE (dichlorodiphenylethylenedichloride) and DDD (dichlorodiphenyldichloroethane), also share some of its toxic properties and tendency toward bioaccumulation. The EPA currently classifies DDT, DDD, and DDE as Class B2, or probable, human carcinogens. The current PEL-TWA for DDT is 1.0 mg/m³.

7.2 Potential Exposure Routes

Inhalation

Inhalation of solid or liquid constituents is unlikely because of the lack of particulate or aerosol generated during sampling. However, a very minor potential for inhalation of dusts could be an issue if soil are in dry condition. It is unlikely that volatile chemicals will be present or become airborne during site activities. There is a potential for inhalation of hydrogen sulfite, which could be liberated when samples are exposed to air.

Skin Contact

Exposure via this route could occur if contaminated sediment contacts the skin or clothing. Protective clothing and decontamination activities specified in this plan will minimize the potential for skin contact with the contaminants. At a minimum mod-Level D will be used during all sampling collection and handling activities.

Ingestion

Exposure via this route could occur if individuals eat, drink, or perform other hand-to-mouth contact in the contaminated (exclusion) zones.

Decontamination procedures established in this plan will minimize the inadvertent ingestion of contaminants.

7.3 Monitoring and Surveillance Equipment

The principal forms of chemical contamination at the site are known and are of generally low hazard levels, if appropriate precautionary measures are used. The potential hazards are likely to be restricted to specific work site where field activities are occurring.

However as a precautionary measure, routine monitoring of health and safety will be performed during all on site activities. A Daily Site Safety Log will be used to record ambient VOC and digital dust indicator readings. Other readings will be obtained as appropriate by utilizing the monitoring equipment described below.

All monitoring equipment will be operated and calibrated each working day in accordance with the manufacturer's instructions and EMS's quality assurance procedures. Organic vapor monitoring will be conducted by trained field staff prior to, during well development and sampling, and disturbance of soil or ground water at a sampling site. Should contaminant levels indicate high hazard potential, the HSO will review monitoring procedures and results. The following monitoring equipment will be used for this purpose:

- Century OVA-128 portable flame ionization device for detection VOC
- PhotoVac Microtip portable photoionization device for the detection of organic vapor.
- Portable combustible gas/oxygen/hydrogen sulfide detector will be available for determining lower explosive limits, oxygen and hydrogen sulfide levels in any identified confined spaces. Under no circumstances shall confined spaces be entered unless discussed with HSO and the plan is revised to incorporate additional safety requirements.
- Draeger gas detector for detecting specific hydrocarbons should Organic vapor Analyser(OVA)/PID readings exceed 5ppm.

Please note that monitoring and surveillance equipment are impacted by cold weather, communication transmissions and possibly high voltage electrical transmission wire and other interferences. Any unusual meter response should be noted on the Air Monitoring Form and a diagnosis of potential influencing factors made to determine and eliminate the cause.

7.4 Climate

7.4.1 Heat Stress

Use of impermeable clothing reduces the cooling ability of the body because of evaporation reduction. This may lead to heat stress. If such conditions occur during site activities, we will maintain appropriate work cycles and drink water or electrolyte rich fluids. To minimize heat stress effects. Heat stress monitoring will be conducted when ambient temperatures exceed 70 degrees F during level C and D work activities.

Each employee will check his or her own pulse at the beginning of each break period. Take the pulse at the wrist for 6 seconds, and multiply by 10. If the pulse exceeds 110 beats per minute, then reduce the length of the next work period by one-third.

7.4.2 Hypothermia

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to cold environment, and wind-chill as well as wetness or water immersion can play a significant role. The following section discusses signs and symptoms as well as treatment for hypothermia.

Signs of Hypothermia. Typical warning signs of hypothermia include fatigue, weakness, poor coordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent and the face may appear puffy and pink. Body temperatures below 90 degrees F require immediate treatment to restore temperature to normal.

Treatment of Hypothermia. Current medical practices recommend slow re-warming as treatment of hypothermia, followed by professional medical care. This can be accomplished by moving the person into a shelter area and wrapping with blankets in a warm room. In emergency situations where body temperature falls below 90 degrees F and heated shelter is not available, use a sleeping bag, blanket, and body heat from another individual to help restore normal body temperature.

7.5 Other Physical Hazards

7.5.1 Trips/Falls

As with all field work sites, caution will be exercised to prevent slips on rain slick surfaces, stepping on sharp objects, etc. Work will not be performed on elevated platforms without fall protection. Preventive measures will include wearing non-skid shoes, keeping active areas clear of clutter. And placing safety railing around the perimeter of the boats.

7.5.2 Drilling Equipment Operations

Prior to start of site work, the drilling subcontractor will inspect all drilling equipment in the presence of the FTL. The inspection will be documented in the field records. If field operations last longer than one week, the drilling equipment inspection must be repeated on a weekly basis.

The location of all underground utilities must be ascertained and confirmed prior to the start of drilling operations. Documentation that nearby utilities have been marked on the ground and that the drill site has been cleared shall be in the possession of site supervisor prior to commencement of intrusive investigation at that point of the site.

7.5.3 General Drilling Practices

- The departing driller shall inform the oncoming driller of any special hazards or ongoing work that may affect the safety of the crew.
- Fire fighting equipment should not be tampered with and should not be removed for other than intended fire-fighting purposes or for servicing.
- If lubrication fittings are not accessible with guards in place, machinery shall be stopped for oil and greasing.

- Rigging material equipment for material handling shall be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging shall be removed from the service.
- The area around the derrick ladder shall be kept clear to provide unimpeded access to the ladder.
- Work areas and walkways shall not be obstructed.
- The rotary table of the rig floor shall be kept free of obstructions and free of undue accumulation of oil, water, ice, circulating fluids.

7.5.4 Hoisting Operations

- The derrick must not be raised until the rig has been blocked, leveled, and chocked.
- Drillers shall never engage the rotary clutch without watching the rotary table and ensuring it is clear of personnel and equipment.
- Unless the draw works is equipped with automatic feed control, the brake shall not be left unattended without first being tied down.
- Drill pipe or casing shall not be picked up suddenly.
- Drill pipe shall not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrick man has signaled that he may safely hoist the pipe.
- During instances of unusual loading of the derrick such as when making an unusual pull, only the driller shall be on the rig floor and no one shall be on the rig or derrick.
- The brakes on the draw works of every drilling rig shall be tested by each driller, when he comes on shift, to determine whether they are in good order. The brakes shall be inspected by a competent individual each week.

- A hoisting machine with a load imposed shall not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically design for line contact.
- Workers shall never stand near the well bore whenever any wire line device is being run.
- Hoisting control station shall be kept clean and control labels as to their function.

7.5.5 Riding Hoisting Equipment

Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the cat line be used as a personnel carrier.

7.5.6 Cat Line Operations

- Only experienced workers will be allowed to operate the cat head controls. The kill switch must be clearly labeled and operational prior to operation of the cat line.
- The cat head area must me kept free of obstructions and entanglements.
- The operator shall not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.
- Personnel shall not stand near, step over, or go under a cable or cat line that is under tension.
- Employees rigging loads on cat lines shall:
 - Keep out from under the load;
 - Keep fingers and feet where they will not be crushed;
 - Be sure to signal clearly when the load is being picked up;
 - Use standard visual signals only and not depend on shouting to coworkers; and

- Make sure the load is properly rigged, since a sudden jerk in the cat line will shift or drop the load.

7.5.7 Pipe Handling

- Pipe shall be loaded and unloaded, layer by layer, with the bottom layer pinned or blocked securely on all four corners. Each successive layer shall be effectively blocked or choked.
- Workers shall not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.
- Employees shall be instructed never to try or stop rolling pipe or casing; they shall be instructed to stand clear of rolling pipe.
- Slip handles shall be used to lift and move slips. Employees shall not be permitted to kick slips into position.
- When pipe is being hoisted, personnel shall not stand where the bottom end of the pipe could whip and strike them.
- Pipe stored in racks, catwalks, or on flatbed trucks shall be choked to prevent rolling.

7.5.8 Derrick Operations

- All stands or pipe and drill collars racked in a derrick shall be secured with rope or otherwise adequately secured.
- Tools, derrick parts, or materials of any kind shall not be thrown from the derrick.
- The elevators must be properly clamped onto all pipe joints prior to the driller engaging the load.

7.5.9 Making and Breaking Joints

- Tongs shall be used for the initial making up and breaking of the joint. The rotary table shall not be used for the initial breaking of a joint.

- Employees making of breaking joints shall not be permitted to stand within the arc of the tong handles when the tong pull line is under tension. Employees shall handle the tongs only by the appropriate handles.
- Employees shall be trained in the safe use of spinning chains. Spinning chains shall not be handled near the rotary table while it is in motion. The sampling vessel will be equipped with various winches, motors, booms, and other machines. These present a general physical hazard from moving parts.
- Personnel will stand clear of machinery at all times unless specific instructions are given by the vessel skipper or other person in authority. Steel toe shoes or boots will be worn at all times when on the vessel. As required, appropriate guards will be in place during equipment use.

7.6 Confined Spaces

A confined space is defined as any space, open or closed, which may have contained flammable or toxic materials, or in which the oxygen content may be deficient to support human life; enclosures having limited means of access or egress. Confined spaces include but not limited to: storage tanks, tank cars, process vessels, bins, silos, boilers, and other tank-like compartments with only a manhole for entry. Other examples of confined spaces include: trenches vaults, septic tanks, sewers, pipelines, and underground utility tunnels. Confined space entry is not anticipated to be part of the field investigations. However, if confined spaces are encountered, appropriate Health and Safety measures will be initiated. All work performed in a confined space environment will be conducted in accordance with the appropriate federal, state and local regulations.

7.7 Noise

It is not anticipated that personal noise exposure aboard the boat will exceed the 85 dBA level at any time. Therefore, no hearing protection will be used for this activity. However, drilling operations may generate noise in excess of this exposure limit. If this is the case, workers will be required to wear hearing protection.

8.0 PERSONAL PROTECTIVE EQUIPMENT

Work for this project will be conducted in Level D. Level C is presented as a contingency only, and presents a modified protection level, incorporating respiratory protection only where required by site conditions. Situations requiring Level A or B protection (i.e., supplied air respirators) are not anticipated for this project. If Level B Action Levels are encountered then engineering controls will be initiated to maintain work in Level C or modified Level D. If Level B hazard levels cannot be lowered via engineering controls then work will stop and the HSP will be revised to cover Level B work.

8.1 Level D Activities

Workers performing general site activities where skin contact with highly contaminated materials is unlikely and inhalation risks are not expected will wear regular work clothes, hard hats (if overhead hazard exists), safety boots, and safety glasses.

8.2 Modified Level D Activities

Workers performing site activities where skin contact with free product or heavily contaminated materials is possible will wear chemical-resistant gloves (nitrile, neoprene, or other appropriate outer gloves, nitrile inner gloves) and tyvek7 or other chemical-resistant suits (i.e., polycoated if high splash potential to contaminated liquids) or rain gear. Make sure the protective clothing and gloves are suitable for the types of chemicals which, may be encountered on site. Use face shields or goggles as necessary to avoid splashes in the eyes or face.

A summary of the recommended Modified Level D protection includes the following:

- Hard hats (if overhead hazard exists);
- Rain gear or poly-coated Tyvek7;
- Eye protection required;
- Steel-toed chemical-resistant boots;
- Nitrile inner gloves; and
- Nitrile, neoprene, or equivalent outer gloves.

All sampling and handling activities for this project are expected to be Modified Level D.

Level C Activities

When performing activities in which inhalation of chemical vapors and dusts is a concern, wear half-mask or full-face air-purifying respirators with combination cartridges (organic vapor/HERA). Cartridges should be changed on a daily basis, at a minimum. They should be changed more frequently if chemical vapors are detected inside the respirator or other symptoms of breakthrough are noted (irritation, dizziness, breathing difficulty, etc.) All PPE is needed as required by Modified Level D plus air purifying respirators with appropriate chemical cartridges.

8.4. Safety Equipment List

The following Safety Equipment must be available on site:

- First aid kit;
- Eye wash kit;
- Mobile telephone;
- Steel-toed safety boots;

- Chemical-resistant gloves (inner-nitrile; outer-either nitrile or neoprene);
- Safety glasses;
- Life jackets (offshore);
- Fire extinguishers;
- Life preserver ring/rope;
- Rain gear or poly-coated Tyvek; and
- Hardhat (when overhead hazards are present).

8.5 Exclusion Areas

If migration of chemicals from the work area is a possibility, or as otherwise required by regulations or client specifications, site control will be maintained by establishing clearly identified work zones. These will include the exclusion zone, contaminant reduction zone, and support zone, as discussed below and shown on Figure H-3.

The zone boundaries will be delineated and explained to all persons on board the vessel.

8.5.1 Exclusion Zone

Exclusion zones will be established around each soil and ground water sample collection/handling activity location and drilling site. Only persons with appropriate training, personal protective equipment, and authorization from the Field H&S Manager will enter this perimeter while work is being conducted there. The zone boundaries will be explained to all persons involved with environmental sampling.

8.5.2 Contamination Reduction Zone

A contamination reduction zone will consist of a decontamination station that must be used to exit the exclusion zone. The station will have the brushes and wash fluids necessary to decontaminate personnel and equipment leaving the exclusion zone. Care will be taken to prevent the spread of contamination from this area. Plastic containers will be used to store spent decontamination fluids on a daily basis. The containers, after labeling, will be moved to central storage location(s) pending disposal decisions or disposed of at nearby sanitary sewer drains.

8.5.3 Support Zone

A support zone will be established outside the contamination reduction area to stage clean equipment, don/doff protective clothing, take rest breaks, etc. This zone will include the cabin of the boat.

8.5.4 Work zone

To make the work zone procedure function effectively, the amount of equipment and number of personnel allowed in contaminated areas must be minimized. In addition, the amounts of sediment, water, or other media collected should not exceed what is needed for laboratory analysis and record samples. Use plastic drop clothes and equipment covers where appropriate to minimize the spread of contaminated materials. Eating, drinking, chewing gum, smoking, or using smokeless tobacco is forbidden in the exclusion zone.

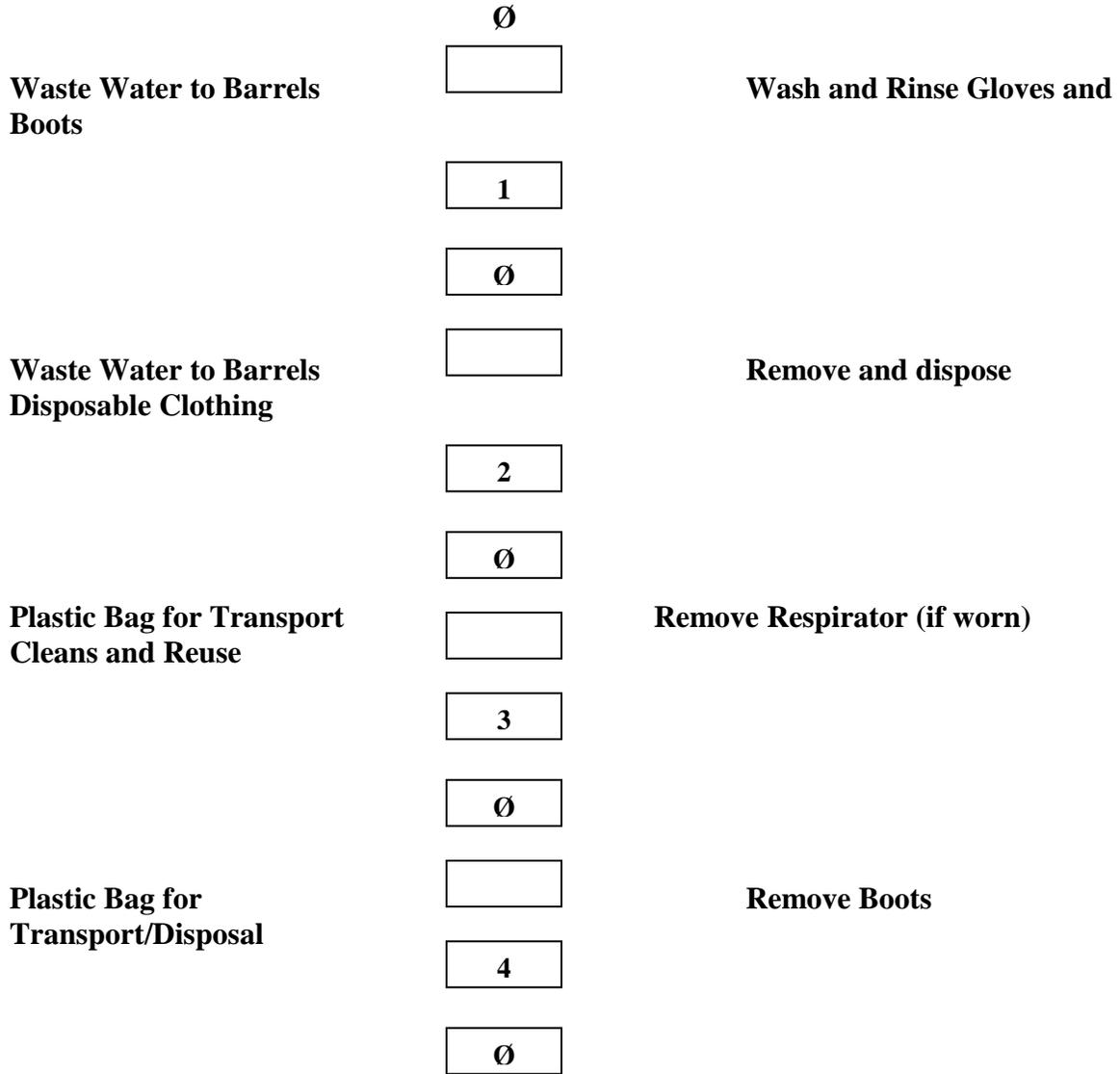
8.5.5 Decontamination

Decontamination is necessary to limit the migration of contaminants from the work zone(s) onto the site or from the site into the surrounding environment Figure H-3 presents a layout for conducting decontamination within the sites zones discussed previously.

Figure H-3 – Typical Decontamination Layout

EXCLUSION ZONE

“HOT LINE”



CONTAMINATION CONTROL LINE

SUPPORT ZONE

Equipment and personnel decontamination are discussed in the following sections, and the following types of equipment will be available to perform these activities:

- Boot and glove wash bucket and rinse bucket;
- Scrub brushes – long handled;
- Spray rinse applicator;
- Plastic garbage bags; and 5-gallon container alkaline decon solution.

8.5.5.1 Equipment Decontamination

Proper decontamination (decon) procedures will be employed to ensure that contaminated materials do not contact individuals and are not spread from the site. These procedures will also ensure that contaminated materials generated during site operations and during decontamination are managed appropriately.

All non-disposable equipment will be decontaminated in the contamination reduction zone.

8.5.5.2 Personnel Decontamination

Personnel working in exclusion zones will perform a mini-decontamination in the contamination reduction zone prior to changing respirator cartridges (if worn), taking rest breaks, drinking liquids, etc. They will decontaminate fully before eating lunch or leaving the site. The following describes the procedures for mini-decon and full decon activities.

Mini Decontamination Procedure

1. In the contamination reduction zone, wash and rinse outer gloves and boots in portable buckets.
2. Inspect protective outer suit, if worn, for severe contamination, rips or tears.
3. If suit is highly contaminated or damaged, full decontamination as outlined below will be performed.
4. Remove outer gloves. Inspect and discard if ripped or damaged.
5. Remove respirator (if worn) and clean off sweat and dirt using premoistened towelettes. Deposit used cartridges in plastic bag. Replace cartridges and outer gloves, and return to work.

Full Decontamination Procedure

1. In the contamination reduction zone, wash and rinse outer gloves, rain gear, and boots.
2. Remove outer gloves and rain gear/protective suit and deposit in labeled container for disposable PPE if they are suitable for additional use.
3. Remove work boots without touching exposed surfaces, and put on street shoes. Put boots in individual plastic bag for later reuse.
4. Remove inner gloves and discard into labeled container for disposable clothing.
5. Immediately wash hands and face using clean water and soap.
6. Shower as soon after work shift as possible.

8.5.5.3 Disposable of Contaminated Materials

All disposable sampling equipment and personal protective equipment (PPE) will be rinsed to remove gross contamination, placed inside of a polyethylene bag or other appropriate containers. These disposable supplies and containers will be removed from the site with the personnel and

disposed of in a normal refuse container (dumpster) and/or solid waste landfill.

8.6 Site Security and Control

Site security and control will be the responsibility of the Field H&S Manager. The buddy-system will be used when working in designated hazardous area. Any security or control problems will be reported to the appropriate authorities. Boat access will be allowed only to necessary project personnel.

8.6.1 Spill Containment

Sources of bulk chemicals subject to spills are not expected to occur in this project. Accordingly, a detailed spill containment plan is not required for this project.

Sediments will be sampled and handled within the Exclusion Zone. Any sediment that is spilled will be promptly washed overboard. Areas outside of the Exclusion Zone impacted by sediment spill will be decontaminated as described in Section 1.14.

9.0 EMERGENCY RESPONSE PLAN

The Emergency Response Plan outlines the steps necessary for appropriate response to emergency situations. The following paragraphs summarize the key Emergency Response Plan procedures for this project, and Table H-3 lists potential emergency hazards associated with this project and immediate responses that should be followed. Consultant personnel and subcontractors will be responsible for identifying an emergency situation, notifying the appropriate personnel or agency, evacuating the hazardous area, and attempting to control only very small hazards that could present an emergency situation. Personnel will not be responsible for handling the emergency.

POTENTIAL EMERGENCY HAZARD	RESPONSE
Fire or Explosion	If manageable, attempt to put out a small fire with a fire extinguisher. Otherwise, call the coast guard or 911 and evacuate the area and meet at designated area. Task Manager will take roll-call to make sure everyone evacuated safely. Emergency meeting places will be determined in the field during the tailgate meetings.
Medical Emergency / Personal Injury	At least one person with current first aid/CPR training will be aboard the vessel at all times. This person will attempt to assess the nature and critical path of the injury, call 911 immediately, and apply CPR if necessary. Stop work and wait for medical personnel to arrive. Fill out a site accident report.
Hydraulic Oil Spill or Leak	In the leak/spill is small, immediately apply absorbent pads to control the leak and continue work. If the leak/spill is uncontrollable, stop work, call 911 immediately and wait for assistance. The vessel operator will assess the personnel safety

	hazard associated with the leak/spill and begin evacuation procedures if necessary. Notify Coast Guard of spill.
Lack of Visibility	If the visibility or personal safety is compromised because of smoke, fog, or other unanticipated hazards, stop work immediately. Task Manager will assess the hazard and if necessary, sent out periodic horn blasts to mark sampling, and wait for the visibility to clear.
Loss of Power	Stop work and call coast guard for assistance. Vessel personnel should watch for potential collision hazards and notify vessel operator if hazards exist. Secure vessel to a berth, dock, or mooring as soon as possible.

9.1 Plan Content and Review

The principal hazards addressed by the Emergency Response Plan include the following: fire or explosion, medical emergencies, uncontrolled contaminant release, and situations such as the presence of chemicals above exposure guidelines or inadequate protective equipment for the hazards present. However, to help anticipate potential emergency situations, field personnel shall always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- Visible or odorous chemical contaminants;
- Drums or other containers;
- General physical hazards (traffic, moving equipment, sharp or hot surfaces, slippery or uneven surfaces, etc.)
- Live electrical wires or equipment;
- Underwater pipelines or cables; and
- Poisonous or dangerous animals.

These and other potential problems should be anticipated and steps taken to avert problems before they occur.

The emergency Response Plan shall be reviewed and rehearsed prior to site activities, as necessary, during the on-site health and safety briefing. This ensures that all personnel will know what their duties shall be if an actual emergency occurs.

9.2 Plan Implementation

The Field H&S Manager shall act as the lead individual in the event of an emergency situation and evaluate the situation. He will determine the need to implement the emergency procedures, in concert with other project personnel including vessel operator, the Project Manager, and the Corporate H&S Manager. Other on-site field personnel will assist the Manager as required during the emergency.

In the event that the Emergency Response Plan is implemented, the Field H&S Manager or designees are responsible for alerting all personnel at the affected area by use of a signal device (such as a hand-held air horn) or visual or shouted instructions, as appropriate. Three blasts of the air horn will initiate an emergency evacuation.

Emergency evacuation routes and safe assembly areas shall be identified and discussed in the on-site health and safety briefing, as appropriate. The buddy-system will be employed during evacuation to ensure safe escape, and the Field H&S Manager shall be responsible for roll-call account for all personnel.

9.3 Emergency Response Contacts

Site personnel must know whom to notify in the event of Emergency Response Plan implementation. The following information will be readily available at the site in a location known to all workers:

- Emergency Telephone Numbers: see list at the beginning of this plan;
- Route to Nearest Hospital: see list and route maps (Figures 1);
- Site Descriptions: see the description at the beginning of this plan; and

- If a significant environmental release of contaminants occurs, the federal, state, and local agencies must be notified within 24 hours. If the release to the environment includes navigable waters also notify the National Response Center.

In the event of an emergency situation requiring implementation of the Emergency Response Plan (fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personnel protection equipment for the hazards present, etc.), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protective equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave the work area, pending approval by the Field H&S Manager for re-start of work. The following general emergency response safety procedures should be followed.

9.4 Fires

Field personnel will attempt to control only very small fires. If an explosion appears likely, evacuate the area (i.e., leave the boat) immediately. If a fire occurs which cannot be controlled with the 10-pound ABC fire extinguisher, then immediate intervention by the local fire department or other appropriate agency is imperative. Use these steps:

- Abandon the boat, using life rafts or swimming to reach a previously agreed upon, upwind location;
- Exit the water as quickly as possible to minimize the risk of hypothermia;
- Contact fire agency identified in the site-specific plan; and
- Inform Project Manager or Field H&S Manager of the situation.

9.5 Medical Emergencies

Contact the agency listed in the site-specific plan if a medical emergency occurs. If a worker leaves the site to seek medical attention, another worker should accompany the

patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach. Notify the Project Manager of the outcome of the medical evaluation as soon as possible. For minor cuts and bruises, an on-site first-aid kit will be available.

- If a worker is seriously injured or becomes ill or unconscious, immediately request assistance from the emergency contact sources noted in the site specific plan. Do not attempt to assist an unconscious worker in an untested or known dangerous confined space without applying confined space entry procedures or without breathing apparatus (SCBA).
- In the event that a seriously injured person is also heavily contaminated, use clean plastic sheeting to prevent contamination of the inside of the emergency vehicle. Less severely injured individuals may also have their protective clothing carefully removed or cut off before transport to the hospital. If it is deemed appropriate to transport the victim to the hospital, follow the route map on Figures H-1.

9.6 Plan Documentation and Review

The Field H&S Manager will notify the Project H&S Manager as soon as possible after the emergency situation has been stabilized. The Project Managers or H&S Manager will notify the appropriate client contacts, and regulatory agencies, if applicable. If an individual is injured, the Field H&S Manager or designates will file a detailed Accident Report with the owner within 24 hours.

The project Managers and the Field, Project, and Corporate H&S Managers will critique the emergency response action following the event. The results of the critique will be used in follow-up training exercises to improve the Emergency Response Plan.

Prior to the start of each workday, the Field H&S Manager will review applicable health and safety issues with all employees and subcontractors working on the site, as

appropriate. These briefings will also review the work to be accomplished, with an opportunity for questions to be asked.

9.7 Medical Surveillance

The participants in this work are required to have a medical surveillance program for employees having exposure to hazardous substances. Exams are given before assignment, annually thereafter, and upon termination. Content of exams is determined by the Occupational Medicine physician in compliance with applicable regulations and is detailed in the General Corporate Health and Safety Plan. No medical surveillance is required of subcontractors if they will not be handling sediment samples.

Each team member will have undergone a physical examination as noted above in order to verify that he/she is physically able to use protective equipment and respiratory equipment, work in hot environments, and not be predisposed to occupationally induced disease. Additional exams may be needed to evaluate specific exposures or unexplainable illness.

10.0 TRAINING REQUIREMENT

The project personnel, subcontractors, and other personnel who perform site work must understand potential health and safety hazards. If they are potentially exposed to hazardous substances, health hazards, or safety hazards, they will have completed 40 hours of hazardous materials health and safety training (1910.120), or will possess equivalent training by past experience. They will also have minimum of three days of actual field experience under the direct supervision of a trained supervisor. All employees will have available evidence of completing this training. Employees will also complete annual refresher, and supervisor courses.

11.0 REPORTING AND DOCUMENTATIONS

The field Health and Safety Report will be completed weekly by the field Health and Safety Manager or designated individual. Included in these reports will be a brief description of the field activities performed, any health and safety-related issue or incident, and any significant deviation from this Health and Safety Plan. In the event that accidents or injuries occur during site work, the Project Manager will be informed, who will notify the client immediately. The consultant staff and subcontractors on this site will sign the Record of H&S Communication document (Table H-4), which will be kept on site during work activities and recorded in the project files.

Route Plan

From: 38-05 31st Street, LIC, NY

To: Mount Sinai Hospital
27-15 30th Ave, LIC, NY 11102

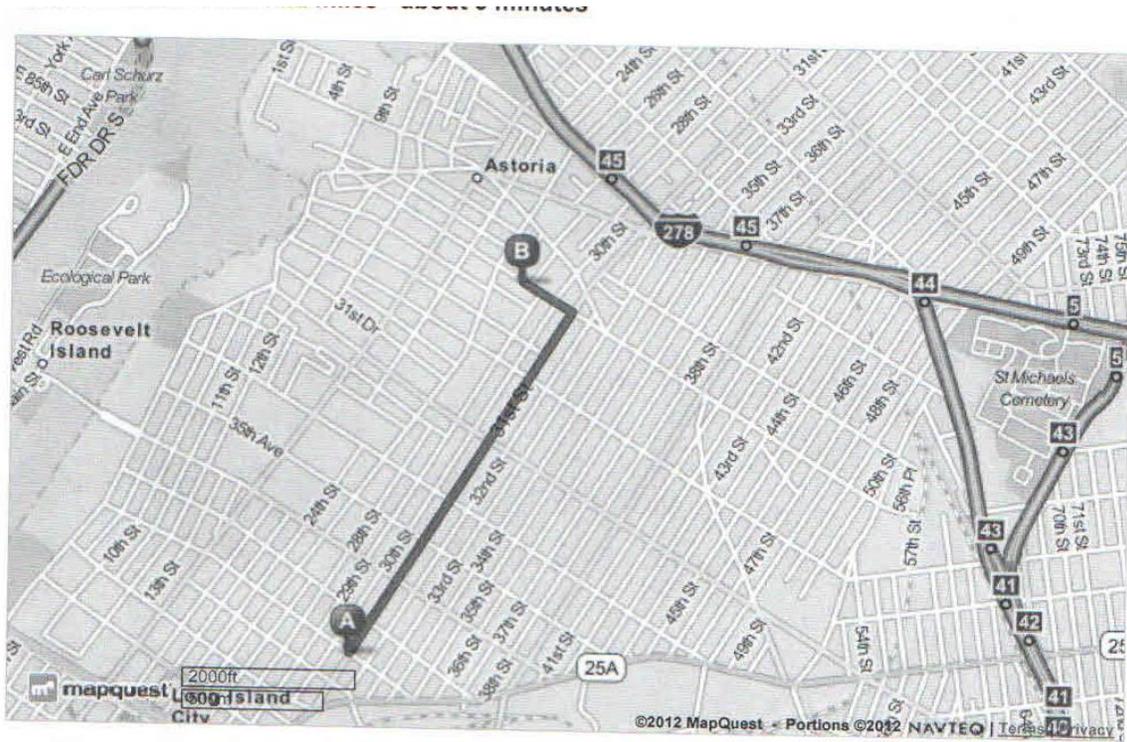


FIGURE 1