



**INTERIM REMEDIAL MEASURE (IRM)  
AND  
REMEDIAL INVESTIGATION ADDENDUM WORK PLAN (RIAWP)**

**NYSDEC Site #C241168**

**Prepared For:  
77-57 Vleigh Place  
Block 6630; Lot 1  
Flushing, New York**

**Prepared By:  
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**Prepared On:  
1 March 2016**

## CERTIFICATION

I Tarek Z. Khouri, P.E. certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measures (IRM) and Remedial Investigation Addendum Work Plan (RIAWP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Tarek Z. Khouri, P.E.

\_\_\_\_\_  
Name



\_\_\_\_\_  
Signature



1 March 2016

\_\_\_\_\_  
Date

## LIST OF ACRONYMS

<b>Acronym</b>	<b>Definition</b>
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BGS	Below Grade Surface
BN	Base Neutral
CAMP	Community Air Monitoring Plan
C&D	Construction & Demolition
CGI	Combustible Gas Indicator
CPP	Citizen Participation Plan
DCE	Cis-1,2-dichloroethene
DB	Decibels
DUSR	Data Usability Summary Report
ESA	Environmental Site Assessment
ELAP	Environmental Laboratory Accreditation Program
FID	Flame Ionization Detector
EZ	Exclusion Zone
HASP	Health and Safety Plan
MDL	Method Detection Limit
NYC DEP	New York City Department of Environmental Protection
NYS DEC	New York State Department of Environmental Conservation
NYS DOH	New York State Department of Health
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PID	Photo Ionization Detector
PM	Particulate Matter
PPE	Personal protective equipment (PPE)
QAO	Qualified Assurance Officer
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional

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QHHEA	Qualitative Human Health Exposure Assessment
QEP	Qualified Environmental Professional
REC	Recognized Environmental Condition
QA/QC	Quality Assurance/Quality Control
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SCBA	Self-Contained Breathing Apparatus
SSO	Site Safety Officer
TAL	Full Target Analyte List
TCL	Full Target Compound List
TCE	Trichloroethene
TICs	Tentatively Identified Compounds
TOGS	Technical and Operational Guidance Series
SVOCs	Semi-Volatile Organic Compounds
USCS	Unified Soil Classification System
USGS	United States Geological Survey
VOCs	Volatile Organic Compounds

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## 1.0 EXECUTIVE SUMMARY

This Interim Remedial Measures and Remedial Investigation Addendum (IRM & RIAWP) has been prepared on behalf of Aldrich Management Co., LLC to document proposed interim remedial measures and additional remedial investigations for the property located at 77-57 Vleigh Place in Flushing, New York, designated as the "Site". Aldrich Management Co., LLC filed an application to enter into the Brownfield Cleanup Program (BCP) Agreement with the New York State Department of Environmental Conservation (NYSDEC) as a Participant. A Site number C241168 was issued to this BCP project. The Site is occupied by a one-story commercial building housing thirteen (13) tenant spaces on the ground floor and 10 individual basements utilized for storage by tenants. An active dry cleaner identified as Paragon Cleaners occupies one of the tenant spaces. All proposed work presented in this document will be performed in accordance with the New York State Department of Environmental Conservation (NYSDEC) requirements as set forth in its correspondence (Immediate Action Determination) dated February 12, 2016 and via a correspondence dated February 23, 2016.

This document defines the objectives, scope and means of implementation of the IRM & RIAWP.

This IRM & RIAWP addresses several main mitigation and remediation components:

1. Design and installation of individual active ventilation systems in a total of 10 individual basements beneath the building. The ventilation system will consist of a suction pipe in each of the basement spaces connected to a radon fan exhausting air drawn from indoor onto the rooftop of the building.
2. The ventilation system will be coupled with a fresh intake system for each of the 10 individual basements beneath the building.
3. Delineate the presence of chlorinated solvents in soil and groundwater beneath the upgradient southeastern portion of the Site in order to determine the potential source of impact at the Site.
4. Investigate the dry well in the northeastern portion of the common alley.
5. Investigate the potential for soil vapor intrusion impact of chlorinated solvents at the adjacent Steppingstone Day school.

The proposed remedy described in this document will be implemented in accordance with the New York State Department of Environmental Conservation (NYSDEC) requirements under the NYS Brownfield Cleanup Program (BCP). This proposed remedy is consistent with the procedures defined in New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006 guidance and will also comply with all applicable Federal, State and local laws, regulations and requirements. The proposed delineation of chlorinated impact in soil and groundwater will be performed in compliance with the

NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) and other acceptable industry standards.

The following sections provide the details and specific information pertaining to the various components of the IRM & RIAWP.

## **2.0 INTRODUCTION**

This Interim Remedial Measures and Remedial Investigation Addendum (IRM & RIAWP) has been prepared for the property located at 77-57 Vleigh Place in Flushing, New York (Site). The Site is occupied by a one-story commercial building housing thirteen (13) tenant spaces on the ground floor and 10 individual basements utilized for storage by tenants. An active dry cleaner identified as Paragon Cleaners occupies one of the tenant spaces. Aldrich Management Co., LLC entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in March 2015, to investigate and remediate this Site as a Participant, under BCP Site number C241168. This IRM & RIAWP provides the protocols and specifications for the proposed interim remedial measures and additional remedial investigation at the Site.

### **2.1 Site Description**

The Site is located in the Flushing section in Queens, New York and is identified as Block 6630 and Lot 1 on the New York City Tax Map. The Site is 39,000-square feet and is bounded by Vleigh Place to the west, a 3-story multi-family building to the east, 78<sup>th</sup> Avenue to the south and 77<sup>th</sup> Road to north. Currently, the Site consists of an approximately 11,500 square foot one-story commercial building with a full basement and an open yard covered by bare soil and utilized for parking by on-Site tenants. The building houses thirteen (13) tenant spaces on the ground floor and 10 individual basements utilized for storage by tenants. A common alley with exit bilco doors into the rear open yard is located in the rear eastern portion of the basement. **Figure 1** provides a Site location Map. **Figure 2** provides a Site Plan.

### **2.2 Summary of Previous Work**

Hydro Tech performed a Site Remedial Investigation during December 2015 in accordance with NYSDEC-approved Remedial Investigation Work Plan dated July 2015. The purpose of the activities was to fully investigate and characterize the nature and extent of contamination that has migrated or emanated from the Site to off-site locations pursuant to previous environmental assessments and investigations that characterized potential impacts associated with Paragon Cleaners, on-site and off-site. A total of sixteen (16) soil probes designated SP-1 to SP-16, nine (9) monitoring wells designated MW-1 to MW-7D including two (2) monitoring well nests identified as MW-3S, MW-3D, MW-5S and MW-5D (the label "S" signifies "shallow" and the label "D" signifies deep), one (1) groundwater probe designated GP-1, six (6) soil vapor probes designated SV-1 to SV-7 and three (3) sub-slab vapor probes designated SSB-1 to SSB-3 were



installed and sampled on-site and off-site. In addition three indoor air samples were collected concurrently with sub-slab vapor samples. **Figure 2** provides the RI sampling locations.

Overall findings of the remedial investigations indicated the groundwater depth beneath the Site was determined to range between 30.08 to 34.14 feet and the groundwater flow direction was determined to be toward the southwest. Tetrachloroethylene (PCE) occurred in a shallow soil sample (SP-3) beneath the eastern portion of the dry cleaner at a concentration of 14.6 mg/kg, which exceeds the Track 1 Unrestricted Use Soil Cleanup Objective (SCO) but below its track 2 Restricted Commercial Use SCO. Dissolved PCE was detected in all on-site and off-site groundwater samples at concentrations exceeding 6NYCRR Part 703.5 Class GA Groundwater Quality Standards (GQS) with a maximum concentration of 300 ug/L detected in the southeastern upgradient portion of the Site (MW-5D). PCE was detected in off-site monitoring wells at a maximum concentration of 31 ug/L (MW-2). VOCs associated with chlorinated compounds are present in sub-slab and soil vapor beneath the Site and also in indoor air.

PCE was the most abundant compound in on-site soil vapors and occurred at a maximum concentration of 740,000 ug/m<sup>3</sup> in the southeastern portion of the court yard (SV-4). PCE was also detected in the two off-site soil vapors at a maximum concentration of 130 ug/m<sup>3</sup> across the western vicinity of the Site (SV-6.) Trichloroethylene (TCE) ranked the second highest soil vapor compound with a maximum on-site concentration of 26,000 detected in a sub-slab vapor sample in the southern portion of the building (SSB-1). PCE and TCE were also detected in the three basement indoor air samples at maximum concentrations of 1,100 ug/m<sup>3</sup> and 57 ug/m<sup>3</sup>. PCE and TCE concentrations in the basement indoor air samples exceeded their respective NYSDOH Guidance values of 30 ug/m<sup>3</sup> and 2 ug/m<sup>3</sup>.

### **2.3 Environmental Setting**

The Site is located in the central portion of Queens County, New York. The elevation of the Subject Property is approximately 77 feet above mean sea level (USGS 7 ½-Minute Jamaica, New York Quadrangle, 1969, Photo revised 1979).

Queens County is located in the western portion of Long Island, which consists of a wedge-shaped mass of unconsolidated deposits that overlie ancient basement rock. The thickness of these deposits ranges from approximately 100 feet on the Island's north shore to approximately 2,000 feet in some portions of the south shore. These deposits contain ground water that is the sole source of drinking water for the Island's over 3.1 million residents.

The major landforms of Long Island of importance to the hydrologic system are the moraines and outwash plains, which originated from glacial activity. The moraines represent the farthest extent of the glacial advances. The moraines consist of till, which is a poorly sorted mixture of sand, silt, clay, gravel and boulders. The till is poor to

moderately permeable in most areas. Outwash plains are located to the south of the moraines. The outwash plains were formed by the action of glacial melt water streams, which eroded the headland material of the moraines and laid down deposits of well-sorted sands, silts and gravels. These outwash deposits have a moderate to high permeability.

The **Upper Glacial Aquifer** is the uppermost hydrogeologic unit. This aquifer encompasses the moraine and outwash deposits, in addition to some localized lacustrine, marine, and reworked materials. A relatively high horizontal hydraulic conductivity and a low vertical hydraulic conductivity characterize the outwash plain portion of this unit. Since the water table is situated in the Upper Glacial Aquifer.

The **Magothy Formation** directly underlies the Upper Glacial Aquifer in the vicinity of the site. This formation is a Cretaceous coastal-shelf deposit, which consists principally of layers of sand and gravel with some interbedded clay. This formation ranges from moderate to highly permeable. A clay layer in some parts of Long Island confines the uppermost portion of the aquifer. The Magothy is Long Island's principal aquifer for public water supply. The United States Environmental Protection Agency (USEPA) has classified the Long Island aquifer system as a sole source aquifer.

The **Raritan Formation** is the deepest unit and rests directly above the bedrock units. This formation is comprised of a sand member (**Lloyd Aquifer**) and a clay member (**Raritan Clay**). The Lloyd sand extends southward from Flushing Bay to the Atlantic Ocean. The thickness of the sand member increases to the southeast and ranges in depth from 200 to 800 feet below sea level (from northwest to southeast). The clay member acts as an aquitard confining the lower Lloyd aquifer between the clay and the underlying bedrock.

The groundwater depth beneath the Site ranges between 30.08 to 34.14 feet and the groundwater flow direction was determined to be toward the southwest. Groundwater at the site is not used as potable source.

## **2.4 Objective & Project Goals**

The objective of the IRM & RIAWP is to initiate an immediate remedial measures for the Site in order to mitigate vapor intrusion impacts of chlorinated solvents in the tenant spaces. The scope of the IRM WP will consist of the installation of individual indoor active ventilation systems in all 10 individual basement spaces at the Site. The IRM & RIAWP also presents provisions to delineate the presence of chlorinated solvents in soil and groundwater beneath the upgradient southeastern portion of the Site in order to determine the potential source of impact at the Site and also determine any soil vapor intrusion impact of chlorinated solvents in soil vapor beneath the adjacent Steppingstone Day School. The scope of this IRM & RIAWP will be performed as per a NYSDEC requirement in a correspondence dated February 12 and 23, 2016. **Appendix A** provides the NYSDEC correspondence.

All related portions of the fieldwork associated with the IRM WP will be performed in accordance with a RAWP Health & Safety Plan and at a minimum, in accordance with acceptable industry standards. These acceptable industry standards include, but are not limited to, the ASTM Standard Guide for Phase II Environmental Site Assessments (E 1903-97), the NYSDEC CP-51/Soil Cleanup Guidance (October 2010), the NYSDEC Bureau of Spill Prevention & Response Sampling Guidelines and Protocols (March 1991), the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) and the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006 guidance.

### 3.0 ORGANIZATIONAL STRUCTURE AND RESPONSIBILITY

The IRM & RIAWP Contractor (Contractor), the Remedial Engineer and New York State regulatory agencies will coordinate together on the implementation of the IRM & RIAWP. The Remedial Engineer has the ultimate responsibility for implementing this IRM & RIAWP for the project and for certifying that the work has been performed in accordance with this Work Plan. NYSDEC and New York State Department of Health (NYSDOH) personnel will provide regulatory oversight of this project. All IRM & RIAWP activities will be implemented in accordance to a Health and Safety Plan (HASP), a Community Air Monitoring Plan (CAMP). **Appendix B** provides a HASP. **Appendix C** provides a Site-specific CAMP.

The Remedial Engineer will be responsible for ensuring that all on-site IRM construction operations are performed per the IRM & RIAWP. The Contractor will manage all communication with regulatory agencies.

The Contractor with oversight by the Remedial Engineer will perform the following components of the IRM:

- Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking;
- Installation of an active ventilation system at each of the tenant spaces;
- Monitoring of the ventilation systems operational integrity prior to start-up;
- Perform Remedial Investigation Addendum involving installation and sampling of soil probes, monitoring wells, sub-slab vapor probes, and indoor air samples in accordance to the scope of work described in this IRM & RIAWP;
- Investigate the potential for soil vapor intrusion impact of chlorinated solvents at the adjacent Steppingstone Day school;
- Perform Community Air Monitoring Plan (CAMP) during the performance of remedial investigation addendum; and
- Transportation and off-Site disposal of investigation derived waste in DOT approved 55-gallon drums at permitted facilities in accordance with applicable laws and regulations.

All IRM & RIAWP details specified herein will be submitted and approved by NYSDEC and NYSDOH prior to performance of the work. The indoor ventilation systems will be installed and operated under the direct oversight of a NYS-licensed Professional Engineer. The Engineer will perform a final site inspection and document the installation of the system in a Construction Completion Report (CCR). Key personnel and their assigned responsibilities for implementation of the remedial design include:

**NYSDEC:**

MD Hoque

New York State Department of Environmental Conservation

Division of Environmental Remediation  
625 Broadway  
Albany, NY 12233  
Phone: (516) 402-9475  
E-mail:md.hoque@gw.dec.ny.gov

**NYSDOH:**

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New York State Department of Health  
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Albany, NY 12237  
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## 4.0 VENTILATION SYSTEM DESIGN, CONSTRUCTION AND OPERATION PROCEDURES

The following sections detail the ventilation system design, installation and procedures and operation protocols prior and after system start-up.

**Figure 3** provides the ventilation system design and details. **Appendix D** provides specification cut sheets of ventilation fan and related components.

### **4.1 Site Preparation**

Preliminary work that will be performed by the Contractor prior to performance of IRM activities will include the following:

**Mobilization:** Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization, marking 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 drilling under this plan by using, at a minimum, the One-Call System (811). 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 prior to the start of drilling or other operations will retain a copy of the Mark out Ticket. Additionally, a Ground-Penetrating Radar (GPR) survey will be conducted to ensure proper identification of sub-grade utilities or other obstructions. Overhead utilities may also be present within the anticipated work zones. Maintaining a safe distance between overhead power lines and drill rig masts will prevent electrical hazards associated with drilling in the vicinity of overhead utilities. 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 Plan. The integrity and safety of on-Site and off-Site structures will be maintained during drilling or other remedial activity performed under the IRM & RIAWP.

**Equipment and Material Staging:** Equipment and materials will be stored and staged on-site in a manner that complies with applicable laws and regulations. The locations of proposed equipment and material staging areas, drum storage area and the project manager will define other pertinent remedial management features during the Site preparation activities.

Decontamination: A temporary decontamination pad will be set up at the Site and will be maintained throughout ongoing IRM field activities. The decontamination pad will be used to remove waste from reusable equipment.

**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 disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- Equipment will be decontaminated and demobilized at the completion of field activities. Investigation equipment and large equipment (e.g., soil excavator) will be washed at a secluded station as necessary. In addition, all investigation derived waste will be appropriately disposed.

**4.2 Ventilation System Design and Installation**

In order to implement immediate remedial measures to reduce exposure to chlorinated solvent vapors identified in indoor air at the Site, an active ventilation system will be installed in each of the 10 individual basement spaces present beneath the building at the Site. The active ventilation system will be coupled with an active aeration system to draw fresh air in to the 10 individual basement spaces.

The construction of these ventilation systems at the Site will be performed during normal business hours. Each ventilation system will consist of open-ended 4-inch cast iron pipe, which will exit the indoor space of each of the 10 occupied basement spaces through the rear foundation wall and into the common alley in the eastern portion of the basement as shown on the attached Figure 1-4 of the proposed design. The pipe will be connected to an inline Radonaway fan model RP-145 located in the alley. The underground piping in each system will be routed outdoor through bilco exit doors from the alley to the rear yard and then connected via a 4-inch riser to 1 foot above the rooftop, and 10 feet away from any exhaust or air intake vents. Fans must be fed independently and directly from the main electric panel. The open ended portion of cast iron pipe in indoor spaces shall be covered with rodent screen and the exhaust termination above roof top shall be covered with an elbow and a screen to prevent bird entry.

The active aeration system will consist of open-ended 6-inch cast iron pipe, which will intrude into the indoor space of each of the 10 occupied basement spaces through the rear foundation wall and into the common alley in the eastern portion of the basement. The pipe will be connected to a Tjernlund Duct Booster Fan, located in the basement or in the alley. The location to be decided during installation based on site conditions and as built drawing will be produced to reflect it. The underground piping in each system

will be routed outdoor through bilco exit doors from alley to rear yard and then connected via a 6-inch riser to 7 feet above ground level, and 10 feet away from any exhaust or air intake vents. The open ended portion of cast iron pipe in indoor spaces shall be covered with rodent screen and the exhaust termination above roof top shall be covered with elbow and a screen to prevent bird entry.

The system will then be started with 100% applied suction from the fan in order to maximize the air flow drawn from indoor space. System parameters including airflow and organic vapor concentrations at the effluents will be monitored following start-up. Vapor concentrations will be measured with the PID at the effluent. System monitoring will be conducted during the first two days of operation as follows: hourly for 5 consecutive hours on the first day and once on the second day. System monitoring will then be performed 7 days, 14 days, 30 days, and 45 days following the initial 2-day startup period.

Field logs will be completed during the course of system monitoring. A field log will be completed on a daily basis that will describe all field activities including:

- Project number, name, manager, and address;
- Description of field activities;
- Date and time of performed tasks;
- Monitoring equipment;
- Apparent weather conditions (e.g. precipitation, outdoor temperature and wind direction) of the work zone; and
- Record of monitoring data on spreadsheets with all requested parameters and point of measurements.

#### **4.3 Post- System Start-Up Air Sampling Plan**

Following the start-up of the aeration/ventilation systems installed at the Site, one indoor air sample will be collected in each of the ten (10) basements tenant spaces. In addition, one (1) ambient air sample will be collected simultaneously with the indoor air samples. For the purpose of this investigation, the indoor air samples will be designated IA-1a, IA-2a, IA-3a and IA-4 to IA-10 and the outdoor air sample will be identified OA-2. The objective of this this sampling is to verify the effectiveness of the installed mitigation system at the Site by investigating the presence of potential levels of chlorinated solvents in indoor air, which were previously detected during the remedial investigation. The sampling will be conducted on day 1, day 3 and day 7, from when the system is up and running.

If the evaluation indicates that chlorinated solvents continue to be present in indoor air at the Site, then additional investigative and/or remedial activities will be considered for modification or expansion of the system following consultation with the NYSDEC.



The air sampling will be conducted in accordance with the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). Indoor air samples IA-1a, IA-2a and IA-3a will be collected in the same basements, where indoor air samples IA-1, IA-2 and IA-3 were previously collected in the vicinity of former sub-slab vapor points SSB-1, SSB-2 and SSB-3. The remaining indoor air samples will be collected in the remaining basements. Outdoor air sample OA-2 will be collected at an upwind location. Indoor and ambient air sample collection will be conducted 3-5 feet above the ground to represent the breathing zone.

**Table 1 - Summary of Proposed indoor Air Sampling Locations and Analyses**

Indoor & Outdoor Air Samples	Location	Analysis
IA-1a	Basement in northwestern portion of Site - vicinity of former SSB-1	*VOCs and via EPA Method TO-15
IA-2a	Basement in west-central portion of Site - vicinity of former SSB-2	
IA-3a	Basement in southwestern portion of Site - vicinity of former SSB-3	
IA-4	Basement in southwestern portion of Site	
IA-5	Basement in southwestern portion of Site	
IA-6	Basement in west-central portion of Site	
IA-7	Basement in west-central portion of Site	
IA-8	Basement in northwestern portion	
IA-9	Basement in northwestern portion	
IA-10	Basement of dry cleaner	
OA-2	Ambient Upwind	

All air samples will be collected utilizing 6 liter pre-cleaned (as certified by the laboratory), passivated and evacuated whole air Summa<sup>®</sup> Canister. Each air sampling canister will then be connected to a flow control valve set to collect the 6-L sample over a period of 6 hours at a rate of less than 0.2 liter per minute. All Summa Canisters will be labeled and sent to a laboratory certified to perform air analysis in New York State. The air samples will be analyzed for common VOCs via EPA Method TO-15

**4.4 General Considerations**

- A Site inspection revealed that (1) a dry well covered with a trench drain is located in the northwestern portion common alley, (2) the common alley has a

concrete slab that is in poor condition and the rear foundation wall in the alley consists of concrete and stones and (3) each of the 10 individual basement spaces has a rear exit door to the common alley that is not tightly closed. Since these exit doors provide a passage of air from the ally indoor, effort should be made to properly seal any openings in their doors frames.

- All instruments and equipment to be installed per manufacturer's requirements.
- All equipment, electrical panels, and piping of considerable weight loading to be mounted and supported by adequate supports.
- The Engineer or Contractor may modify equipment locations during system installation to allow for ease of movement and access following approval.
- All piping and electrical lines should be routed along walls or overhead or installed along floor unless instructed otherwise by the engineer.
- All piping joints must be carefully cemented.
- All sheet rock and ceiling penetrations should be finished and closed with joint compounds and finished appropriately in accordance with applicable waterproofing and fire codes.
- All buildings occupants have been notified about the potential soil vapor intrusion concerns. They will also be notified (pending approval of the IRM RIAWP) of the installation of the ventilation system as a vapor interim mitigation measure and the system mode of operation. The tenants' notification letters regarding the soil vapor intrusion concerns were delivered by certified mail on February 15 and then again on February 18 (public library address was updated in the February 18 letters), along with the fact sheets. Appendix E provides copies of correspondence that was provided to all tenants present at the Site.
- A sign with a contact number will be clearly posted in the building so that current tenants can contact the Contractor for immediate assistance.
- Appropriate stickers indicating the content of pipes and contact numbers in case of emergency for immediate assistance are mounted on each ventilation system piping in a visible casing.
- The ventilation system will be operated and monitored in accordance to an Operation, Maintenance and Monitoring Plan (OM&M). The OM&M will be submitted along a PE-certified Construction Completion Report. The OM&M

- will ensure the system is continuously inspected and maintained for proper operation and integrity.
- The ventilation system will be installed at the site following system design approval by the NYSDEC.

## 5.0 OPERATION MAINTENANCE AND MONITORING OF THE INDOOR VENTILATION SYSTEM

The proposed ventilation system is considered an immediate but interim remedial measure for the Site. The active ventilation system will be operated and maintained in accordance to Operation, Maintenance and Monitoring Plan (OM&M) as prescribed below:

- Tenants will be notified about the potential soil vapor intrusion concerns, the installation of the ventilation system in their basements as a vapor mitigation measure and the system mode of operation.
- The systems proper operation will be continuously monitored by the site ownership and also by the building occupants.
- Routine maintenance of the system will be required if any part if the system has failed or functioning improperly and/or the air flow is not maintained.

The system will be inspected and its performance certified bi-annually via a Certification Letter Report. This inspection will verify the proper functioning of system Radonaway fan, the fresh air intake fan and the evaluation of individual vapor concentrations at exist from each system utilizing a Photoionization Detector (PID).

The certification letter report will include, at a minimum:

- Date of inspections;
- Personnel conducting inspections;
- Description of the inspection activities performed;
- Any observations, conclusions, or recommendations;
- Copy of any inspection forms;
- Certification of the performance of Engineering Controls and Institutional Controls, as discussed below.
- If changes are needed to the system or controls;
- If compliance with the system operations requirements have been maintained;

## **6.0 REPORT OF FINDINGS & PROJECT SCHEDULE**

### **6.1 Report of Findings**

The final design of the active ventilation system including all modifications will be documented in a Construction Completion Report (CCR). The CCR will be prepared 45 days after system start up and will include post-startup system operational data (flow rate and PID reading). The CCR also include the as-built drawings of the system, plus cut sheets for system component. An OM&M Plan will also be included as an appendix in the CCR. A PE-certification letter report certifying the proper operation and maintenance will be provided on a semi-annual basis in accordance with the OM&M Plan.

### **6.2 Project Schedule**

The proposed IRM & RIAWP activities associated with the construction of the ventilation system will be completed within two weeks following NYSDEC approval of system design.

## 7.0 OFF-SITE VAPOR INTRUSION IMPACT ASSESSMENT

A vapor intrusion impact assessment will be performed beneath the adjacent building occupied by Steppingstone Day School, which is located across the southwestern vicinity of the Site at 77-40 Vleigh Place. This investigation will be performed as per a NYSDEC requirement, which were communicated verbally via a conference call on February 12, 2016, a correspondence dated February 23, 2016 and it is intended to evaluate whether chlorinated solvents are impacting indoor air in this facility.

In an effort to gain access to pursue the sub-slab vapor investigation off-site, the operator of this adjacent facility will be contacted by telephone and also via written correspondence. When permission to access to the school is granted, an interior inspection of the basement floor will be performed prior to the vapor intrusion investigation in order to determine the appropriate location of at least three (3) sub-slab vapor points, and three (3) indoor air samples.

The vapor intrusion investigation will be conducted in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006 guidance. An investigation work plan providing details of the scope of the sub-slab vapor investigation will be submitted to NYSDEC for approval. The findings of this investigation will be documented in an Off-Site Soil vapor Intrusion Investigation Report and will include recommendations for mitigation as per NYSDOH action guidelines, if needed.

**Figure 2** provides the location of adjacent Steppingstone Day School property. **Appendix F** provides correspondence to be provided to the executive director of Steppingstone Day School.

## 8.0 REMEDIAL INVESTIGATION ADDENDUM

The purpose of this section is to document the details and protocols intended to be utilized in the further delineation of soil and groundwater contamination in the southeastern portion of the Site, where a maximum PCE concentration of 740,000 ug/m<sup>3</sup> was detected in SV-4 and a maximum PCE concentration of 300 ug/L was detected in MW-5D. To accomplish this, Hydro Tech will install and sample five soil probes and five monitoring wells utilizing direct-push technology. Select soil and groundwater samples will be analyzed via approved analytical methods, and all laboratory results will be evaluated and documented in a Remedial Investigation Report Addendum. All these activities will be implemented in accordance to a site-specific Health and Safety Plan (HASP) and a Community Air Monitoring Plan (CAMP). No waste characterization samples will be collected from the Site as part of this investigation. **Appendix B** provides a Site-specific HASP. **Appendix C** provides a Site-specific CAMP.

Prior to the performance of the fieldwork, a public utility mark-out will be requested from the New York City-Long Island One-Call Center. All work will be coordinated with representatives of the NYSDEC.

### 8.1 Soil Probes

Five soil probes designated SP-17 to SP-21 will be installed during the investigation in the southeastern portion of the rear yard and also off-site in the eastern upgradient vicinity of the Site at the Site. Soil probes SP-17 will be installed at the same location as SV-4. Soil probes SP-18 and SP-19 will be installed to north and east of SV-4. Soil probe SP-20 will be installed to the southeast of MW-5. . Soil probe SP-21 will be installed upgradient in the in the sidewalk in the immediate southeast-adjacent vicinity of the Site, approximately 30 feet to the southeast of SP-20. The purpose of these soil probes is to further characterize the potential source of PCE in the area concern in the vicinities of SV-4 and MW-5 in the southeastern portion of the Site and also to ensure that no off-site sources are contributing to PCE contamination beneath the Site.

**Table 2** - Summary of Proposed Soil Sampling Locations and Analyses

Soil Probe (SP)	Location	Soil Characterization Depth	Analytical Methods
SP-17	Southeastern portion–location of SV-4	Grade to 35 feet or interface with groundwater	TCL VOCs via EPA Method 8260
SP-18	Southeastern portion–north of SV-4		
SP-19	East-central portion–east of SV-4 area		
SP-20	East-central portion–southeast of MW-5		
SP-21	Southeast-adjacent sidewalk within 30 southeast of SP-20		

All soil probes will be installed utilizing Hydro Tech's probe machine units fitted with Geoprobe® tooling and sampling equipment. The probing machine will install the soil probes utilizing direct-push (hydraulic percussion) technology. **Figure 2** provides the proposed locations of the soil probes.

Soil sampling will comply with NYSDEC DER-10 3.5.2. Soil samples will be collected in all probes at 2-foot intervals utilizing a 4-foot long Macro Core sampler fitted with dedicated acetate liners. The Macro sampler allows for the collection of discrete soil samples. Each sampler will be installed with 1½-inch diameter drill rods.

The probes will be extended to the groundwater interface, which was determined at 35 feet bgs. The soil samples will be placed in clean zip-lock storage bags and characterized in the field by a Hydro Tech geologist. The characterization will consist of field screening for evidence of organic vapors utilizing a Photoionization Detector (PID) with an 11.7eV bulb and soil classification.

Headspace analyses will be conducted on each soil sample by partially filling a zip lock bag and sealing it, thereby creating a void. This void is referred to as the sample headspace. To facilitate the detection of any hydrocarbons contained within the headspace, the container will be agitated for a period of thirty (30) seconds. The probe of the PID will then be placed within the headspace to measure the hydrocarbon concentrations present.

The soil classification will be based upon the Unified Soil Classification System (USCS). The USCS identifies common soil details such as grain size, shape, sorting and color. In addition, any visual or olfactory evidence of hydrocarbons will be identified. Soil probe logs will be generated based upon the soil characterization, along with the PID field screening. **Appendix G** provides a sample boring log.

Soil samples collected from each of the five soil probes for lab analysis will consist of the sample at the groundwater interface, and the sample that contains the greatest level of hydrocarbons above the groundwater interface (if present) based upon the field screening results.

All soil samples will be containerized in laboratory supplied soil jars and appropriately labeled.

## **8.2 Groundwater Monitoring Wells**

A total of five (5) monitoring wells identified as MW-8 to MW-11 will be installed during the investigation. The monitoring wells are intended to further delineate the groundwater quality beneath the southeastern portion of the rear yard in the vicinity of MW-5 and SV-4. Specifically, monitoring well MW-8 will be installed at the same location as SV-4 at SP-17, MW-9 and MW-10 will be installed to the north and east of SV-4 at SP-18 and SP-19 and MW-11 will be installed to the southeast of MW-5 at SP-20.



MW-12 will be installed upgradient in the in the sidewalk in the immediate southeast-adjacent vicinity of the Site, approximately 30 feet to the southeast of MW-11. The screened interval of each monitoring well will consist of 0.010-inch slotted PVC and will be generally situated approximately 5 feet above the groundwater interface and 10 feet below. Previous **Figure 2** provides the proposed location of the monitoring wells.

**Table 3 - Summary of Proposed Groundwater Monitoring Well Sampling Locations and Analyses**

Monitoring Well (MW)	Location	Analysis
MW-8	Southeastern portion–location of SV-4 at SP-17	TCL VOCs via EPA Method 8260
MW-9	Southeastern portion–north of SV-4 at SP-18	
MW-10	Southeastern portion –east of SV-4 area at SP-19	
MW-11	Southeastern portion –southeast of MW-5 at SP-20	
MW-12	Southeast-adjacent sidewalk within 30 feet south of MW-12	

The monitoring wells will be installed utilizing similar technology to the soil probes (i.e. direct push). All monitoring wells will be constructed of 1-inch diameter PVC. The casing of each well will be appropriately labeled. **Appendix H** provides a sample groundwater monitoring well construction diagram.

All recently and previously installed monitoring wells, i.e. MW-1 through MW-10 will then be monitored and gauged for separate phase product during a onetime event. The monitoring will be performed utilizing a Solinst® 122 Oil/Water Interface Probe (Interface Probe). The Interface Probe can measure depths to water to 0.01 inch. The static depth to water will be measured in each well from the northern portion of the top of casing. If either LNAPL and/or DNAPL are detected during the well monitoring exercise, appropriate samples will be collected for characterization and “finger print analysis” and adequate remedial alternatives will be proposed.

Following the well monitoring, the wells will be surveyed to determine the casing elevations utilizing a David White LT8-300 Transit. A surveyor’s rod will be placed on the northern portion of the top of casing and the elevation will be read with the transit. The determination of the casing elevation will allow for the calculation of the groundwater elevation beneath the site, which therefore allows for the determination of the groundwater flow direction. The groundwater elevations will then be imported into a computer-contouring program to determine the site-specific groundwater flow direction.

Groundwater samples will then be obtained from the recently installed monitoring wells, i.e. MW-8 through MW-11, utilizing a low flow pump fitted with dedicated polyethylene tubing.

The monitoring wells will be purged and sampled in accordance to the USEPA's Low Stress/Flow Groundwater Sampling Protocol (SOP #GW0001, Rev. 1996) and following the stabilization of water quality indicator parameters. Sampling of groundwater will occur following the stabilization of the following parameters within in the specified confidence limits: pH, turbidity, specific conductance, ORP/Eh, temperature, and dissolved oxygen. As per the USEPA's Low Stress/Flow Groundwater Sampling Protocol, static depth to water will also be gauged at the conclusion of sampling.

Each groundwater sample will then be placed into laboratory supplied containers and appropriately labeled.

### **8.3 Drywell Investigation**

The drywell located in the northwestern portion of the common alley of the basement at the Site will be assessed as a potential source of contamination beneath the property. One (1) sediment sample designated DW-1 will be collected one foot beneath the bottom of the drywell. The sediment sample will be screened for organic vapors and properly characterized and containerized similar to soil samples discussed in Section 8.1.

**Table 4 - Summary of Proposed Dry Well Sampling Location and Analyses**

<b>Monitoring Well (MW)</b>	<b>Drywell Location</b>	<b>Analysis</b>
DW-1	Northwest of common alley	TCL VOCs via EPA Method 8260

### **8.4 Field Management of Investigation Derived Waste**

#### Soil and Groundwater Sampling

- Soil cuttings generated during soil probe installation and sampling will be placed in one 55-gallon drum and properly disposed of.
- Fluids generated during groundwater sampling and equipment decontamination will be contained in the 55-gallons drum and properly disposed of as hazardous waste.
- Fine grade sand will be applied to direct any runoff water away from the boreholes in order to avoid any discharges of unknown surface contaminants into the subsurface soil and groundwater. The sand will be disposed of into the 55-gallon drum along the soil cuttings.

-All boreholes will be back-filled with fine grade sand and properly sealed in surface with a layer of slurry and native shallow dirt.

### **8.5 Laboratory Analytical Methods**

As indicated in **Table 1** and **Table 2** all soil and groundwater samples will be analyzed for volatile organic compounds (VOCs) via EPA Method 8260.

### **8.6 Quality Assurance/Quality Control**

A Hydro Tech Quality Assurance Officer (QAO) (Mark Robbins) will adopt a Quality Assurance Project Plan (QAPP) during the collection of soil, groundwater and soil vapor samples in order to ensure that proper procedures are performed and subsequently followed during sample collection and analysis. The QAPP for this investigation is provided in **Appendix I**.

## **9.0 REPORT OF FINDINGS**

The as built drawings of the active ventilation system will be documented in a Construction Completion Report (CCR). The report will be prepared 45 days after system start up. This report will include post-startup system operational data (flow rate and PID reading).

A Remedial Investigation Report (RIR) Addendum will be prepared following the completion of the fieldwork and the laboratory analyses. This report will be certified by a QEP as per DER-10 Table 1.5 and will contain the findings and conclusions of the additional subsurface investigation and will include appropriate maps and diagrams, tabulations of all analytical data, written narratives, boring logs and well construction diagrams, well purging and sampling logs, and appendices.

The soil quality results will be compared to the 6 NYCRR Part 375 Unrestricted Residential Use, Restricted Residential Use and Commercial Use (SCOs). The groundwater quality results will be compared to the AWQS documented in NYSDEC's Technical and Operational Guidance Series (TOGS) 1.1.1. All soil samples that exceed their respective soil cleanup objectives (SCOs) and groundwater samples that exceed the Ambient Water Quality Standards (AWQS) will be highlighted in tables and shown on spider diagrams. The RIR Addendum will include the Data Usability Summary Report.

All data will also be submitted electronically to NYSDEC through the Environmental Information Management System, using the standardized electronic data deliverable (EDD) format.

### **9.1 Anticipated Project Schedule**

A tentative schedule for the performance of the interim remedial measure and RI addendum is provided in **Appendix J**. This schedule is tentative based upon the approval of this IRM RIWP by the NYSDEC.

## 10.0 REFERENCES

- Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process, ASTM E 1527-05, American Society for Testing and Materials, West Conshohocken, PA.
- New York State Department of Environmental Conservation Final Policy, CP-51/Soil Cleanup Guidance, October 21, 2010.
- NYSDOH. 2006. Final - Guidance for Evaluating Soil Vapor Intrusion in the State of New York. New York State Department of Health, Center for Environmental Health, Bureau of Environmental Exposure Investigation.
- USEPA. 2001. Draft - A Standard EPA Protocol for Characterizing Indoor Air Quality in Large Buildings. U.S. Environmental Protection Agency, Office of Air and Radiation, Washington, DC.
- USEPA. 1997. Engineering Forum Issue Paper: Soil Vapor Extraction Implementation Experiences, Quick Reference Fact Sheet. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response.
- USEPA. 1994. Radon Prevention in the Design and Construction of Schools and Other Large Buildings. U.S. Environmental Protection Agency, Office of Research and Development.
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- Environmental Property Assessment, Merritt Engineering Consultants, P.C., 77-39 to 77-63 Vleigh Place, Flushing, NY, July 16, 1993.
- Phase I Environmental Site Assessment Report, Middleton, Konekosta Associates., Ltd., 77-39 to 77-63 Vleigh Place, Flushing, NY, July 22, 1999.
- Phase I Environmental Site Assessment, Environmental Affiliates, Inc., 77-39 to 77-63 Vleigh Place, Flushing, NY, August 6, 2013.
- Phase II Environmental Site Assessment (ESA), Hydro Tech Environmental, Corp., 77-39 to 77-63 Vleigh Place, Flushing, NY, October 15, 2013.
- Focused Subsurface Investigation, Hydro Tech Environmental, Corp., 77-57 Vleigh Place, Flushing, NY, February 14, 2014.
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- Subsurface Investigation, Hydro Tech Environmental, Corp., 77-57 Vleigh Place, Flushing, NY, January 15, 2015.
- Subsurface Investigation, Hydro Tech Environmental, Corp., 77-57 Vleigh Place, Flushing, NY, April 6, 2015.
- Remedial Investigation Work Plan, Hydro Tech Environmental, Corp., 77-57 Vleigh Place, Flushing, NY, July 14, 2015.
- Draft Remedial Investigation Report, Hydro Tech Environmental, Corp., 77-57

Vleigh Place, Flushing, NY, January 29, 2016.

- NYSDEC Correspondence, NYSDEC Site No. C241168, February 11 and February 23, 2016.