Lakeside Village Apartments

65-67 Lake Avenue

Erie County

Lancaster, New York

SITE MANAGEMENT PLAN

NYSDEC Site Number: C915344

Prepared for:

65 Lake Avenue LLC

32 Central Avenue, Lancaster, New York

Prepared by:

MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2025

CERTIFICATION STATEMENT

I, CHRISTINE M. CURTIS, P.E., certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and Green Remediation (DER-31).

_____ P.E.

12/31/2025 DATE

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List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	Below ground surface
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DCE	Dichloroethene
DER	Division of Environmental Remediation
DNAPL	Dense Non-Aqueous Phase Liquids
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
ID	Inner Diameter
ISCO	*In situ* chemical oxidation
METI	Matrix Environmental Technologies Inc.
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector

PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
SVOC	Semi-volatile organic compound
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound

ES EXECUTIVE SUMMARY

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

Site Identification: Lakeside Village Apartments (Site No. C915344)

65-67 Lake Avenue, Lancaster New York

Institutional Controls:	1. The property may be used for restricted residential use and for unrestricted use (New York State Easement – Flood Protection Project for Cayuga Creek only);
	2. Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP;
	4. All ECs must be operated and maintained as specified in this SMP;
	5. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for other purposes, and the user must first notify and obtain written approval to do so from the Department;
	6. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
	7. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
	8. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
	9. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
	10. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
	11. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;

Site Identification: Lakeside Village Apartments (Site No. C915344)
65-67 Lake Avenue, Lancaster New York

Institutional Controls:	12. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries and any potential impacts that are identified must be monitored or mitigated.	
	13. Vegetable gardens and farming on the site are prohibited.	
Engineering Controls:	1. Cover system	
	2. Sub-slab depressurization (SSD) systems	
	3. Soil vapor extraction (SVE) system	
Inspections:		Frequency
1. Cover inspection		Annually
2. SSD systems inspection		Quarterly/Annually
3. SVE system inspection		Quarterly/Annually
Monitoring:		
1. Groundwater monitoring wells MW1, MW4, MW5, MW6, MW7, MW8, and MW9		Semi-Annually
2. Soil vapor intrusion evaluation for new buildings		As needed
3. SVE system effluent		Semi-annually
Maintenance:		
1. Cover maintenance		As needed
2. SSD and SVE systems maintenance		As needed
Reporting:		
1. Periodic Review Report		Annually

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

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Lakeside Village Apartments Site located in the Town of Lancaster, New York (hereinafter referred to as the "Site"). The site location map can be found in **Figure 1**. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C915344, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

65 Lake Avenue LLC entered into a Brownfield Cleanup Agreement (BCA) on December 16, 2019 with the NYSDEC to remediate the Site. A figure showing the Site location and boundaries of this Site is provided in **Figure 2**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in **Appendix A** – Environmental Easement.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Erie County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

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

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA for the site, and thereby subject to applicable penalties.

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

This SMP was prepared by Matrix Environmental Technologies Inc. (METI) on behalf of 65 Lake Avenue LLC in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 Revisions and Alterations

Revisions and alterations to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Easement for the site, the NYSDEC project manager will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed in accordance with NYSDEC's DER-10 and/or the BCA for the following reasons:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.
2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
5. Notice within 48 hours of any non-routine maintenance activities.
6. Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

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

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

Table 1.1 on the following page includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix B**.

Table 1.1 - Notifications*

Name	Contact Information	Required Notification**
Jason Kryszak - NYSDEC Project Manager	(716) 851-7220 jason.kryszak@dec.ny.gov	All Notifications
Benjamin McPherson, P.E. – NYSDEC Regional Hazardous Waste Remediation Engineer, Region 9	(716) 851-7220 benjamin.mcpherson@dec.ny.gov	All Notifications
Kelly Lewandowski, P.E.	(716) 402-9569 kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
Ryan Minzloff – NYSDOH Project Manager	(518) 408-5146 ryan.minzloff@health.ny.gov	Notifications 4, 6, and 7

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in the Town of Lancaster, Erie County, New York and is identified as SBL #115.27-1-22.21 (addressed as 65 Lake Avenue) and SBL #115.27-1-23.11 (addressed as 67 Lake Avenue) on the Erie County Tax Map (see **Figure 2**). The Site totals approximately 1.22 acres and is bounded by private residences to the north, south, and west and by Lake Avenue to the east (see **Figure 2** – Site Layout Map). The boundaries of the Site are more fully described in **Appendix A –**Environmental Easement. The owner(s) of the site parcels at the time of issuance of this SMP is/are:

65 Lake Avenue LLC
32 Central Avenue
Lancaster, NY 14086

2.2 Physical Setting

2.2.1 Land Use

The Site consists of three two-story townhomes constructed in 2006 (65 Lake Avenue) and a two-story apartment building constructed in 1903 (67 Lake Avenue). The Site is zoned residential and is currently utilized for residential housing. Site occupants include the Lakeside Village Apartments complex. An approximately 2,100 square foot area in the southwestern portion of the site is subject to a New York State Easement (Flood Protection Project for Cayuga Creek).

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include residential properties. The properties immediately south, north, and west of the Site include residential properties; the properties east of the Site across Lake Avenue also include residential properties.

2.2.2 Geology

According to the Surficial Geologic Map of New York, Niagara Sheet (1988) by Donald H. Cadwell and the U.S. Department of Agriculture Soil Conservation Service General Soil Map of Erie County, New York, soils underlying the Site consist of proglacial lake deposits, namely laminated clays and silts. Characterization of soil samples generally depict the subsurface environment as the following, with some variation across the Site:

- Surface to 4 to 5.5 feet below grade – sand with gravel and silt (fill material)
- 4 to 11.3 feet below grade – laminated clay and silt (lacustrine)
- 11.3 to 20 feet below grade – silty sand with gravel, occasional 2- to-3-inch lenses of dry, weathered limestone

Sand was found at a depth of 4 to 5 feet near the underground utilities that service the apartment buildings. It is likely that this sand layer is backfill used as bedding for the utility lines.

According to the Geologic Map of New York, 1970 (Richard and Fisher), the bedrock underlying the Site is shale and/or limestone of the Skaneateles Formation (Hamilton Group) from the Upper Devonian Period (383 to 358 million years ago). Weathered and dry to moist 2- to 3-inch lenses of limestone were identified in several borings ranging from 16 to 20 feet below grade. Auger and sample refusal was also documented in that depth range, suggesting the surface of competent bedrock begins at approximately 20 feet below grade.

Geologic cross sections are shown in **Figures 3A-3C**. Site-specific boring logs are provided in **Appendix C.**

2.2.3 Hydrogeology

Groundwater is encountered at an average depth of 5 to 12 feet below ground surface. This is consistent with observations from soil sample characterization indicating the water table exists within the clay and silt lacustrine sediments. Groundwater elevation data show that the

groundwater flow direction is generally to the west with components of flow to the west northwest and southwest. The gradient is moderate at approximately 0.035 ft/ft. Between the Site and Cayuga Creek, the gradient is estimated to be steeper (e.g. 0.1 ft/ft) due to the difference in topographic elevation (28 feet). The Site and surrounding area are serviced by municipal utilities and groundwater is not used for drinking water purposes. There are no known groundwater supply wells located within a one-mile radius of the Site.

A groundwater contour map is shown in **Figure 4.** Groundwater elevation data is provided in **Table 1**. Groundwater monitoring well construction logs are provided in **Appendix D**.

2.3 Investigation and Remedial History

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

2.3.1 Preliminary Investigations

Subsurface investigations were completed at the Site in August 2005 and May 2018 by Lender Consulting Services, Inc. and in February 2019 by METI. Chlorinated solvents associated with past on-site dry cleaning operations, including cis-1,2-dichloroethene (cis-1,2-DCE), tetrachloroethene (PCE), and trichloroethene (TCE) were identified in soil and groundwater samples. Due to the detections of chlorinated VOCs, vapor intrusion studies were completed in February and April 2019 within the four on-site residential buildings. Vapor intrusion testing results identified chlorinated solvents, specifically PCE and TCE, within both sub-slab and indoor air samples in Buildings 1 and A at levels requiring mitigation. As a result, sub-slab depressurization (SSD) systems were installed and activated within Building A and Building 1 in November and December 2019 to mitigate vapor intrusion. The systems are currently operational.

2.3.2 Remedial Investigation - Remedial Investigation/Alternatives Analysis Report (prepared by METI for 65 Lake Avenue LLC, dated February 23, 2022)

The Remedial Investigation was conducted to characterize the nature and extent of contamination at the Site and evaluate remedial alternatives. The investigation took place over multiple mobilizations from July 2020 to August 2021 and included the following:

- Completion of 13 on-Site soil borings, nine (9) of which were completed as permanent monitoring wells and one of which was utilized for soil vapor sampling, as well as the collection of nine (9) surface soil samples for laboratory analysis.
- Completion of two (2) off-Site soil borings, one of which was completed as a temporary well and one of which was utilized for soil vapor sampling.
- Collection of groundwater samples for laboratory analysis.

Based on the results of the investigation, the main contaminants of concern at the Site were determined to be chlorinated VOCs, specifically PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride. Dense non-aqueous phase liquid (DNAPL) was not found.

<u>Surface Soil</u>

Concentrations of VOCs, semivolatile organic compounds (SVOCs), metals, pesticides, herbicides, polychlorinated biphenyls (PCBs), and cyanide in surface soil samples did not exceed the applicable 6 NYCRR Part 375 soil cleanup objectives (SCOs) for restricted residential use. Concentrations of per- and polyfluoroalkyl substances (PFAS) in surface soil samples did not exceed NYSDEC guidance values.

<u>Subsurface Soil</u>

Concentrations of VOCs, SVOCs, metals, pesticides, herbicides, PCBs, and cyanide in subsurface soil samples did not exceed the applicable 6 NYCRR Part 375 SCOs with the exception of PCE and cis-1,2-DCE in one sample collected from SB102 in the location of the former dry cleaner (source area). Concentrations of PFAS in subsurface soil samples did not exceed NYSDEC guidance values.

Groundwater

Concentrations of one or more chlorinated VOCs, including PCE, TCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride, exceeded NYS TOGS 1.1.1 standards in monitoring wells MW1, MW2, MW3, and MW5. Additionally, concentrations of sodium exceeded NYS TOGS 1.1.1 standards in MW1, MW5 and MW7.

Soil Vapor

Soil vapor samples were collected from the lawn area at an adjacent property on Franklin Street and on Site between Building 1 and the southern property boundary. A total of 24 compounds from the Target Compound List (TCL) were detected at VP1 (Franklin Street) and 23 compounds were detected at VP2 (downgradient property boundary), the source of which is not known. Concentrations were similar to or below background levels as established in the NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, Table C1 Indoor Air Background Levels (upper fence values) for indoor air. TCE, DCE, and vinyl chloride were not detected at either sample location. PCE was detected at low levels (0.68 $\mu g/m^3$) in the sample collected from VP1 and was not detected in the sample collected from VP2. Locations of the soil vapor samples are shown in **Figure 6**.

Remedial Alternatives Evaluation

A combined remedy of shallow soil excavation and SVE system operation in the source area and groundwater remediation with *in situ* chemical oxidation (ISCO) along with the continued operation of the SSD systems was the recommended remedial measure.

2.3.3 Remedy Implementation - Remedial Action Work Plan (prepared by METI for 65 Lake Avenue LLC, dated August 25, 2023)

Three additional investigations were completed subsequent to the Remedial Investigation in March 2022, June 2022, and June 2023. The objectives of the investigations were to further define the limits of the proposed soil excavation and to collect samples for laboratory analysis for landfill approval and calculation of chemical oxidant dosing. Upon submittal of the data, a "contained-in" determination was made by NYSDEC on August 15, 2023. Approximately 1,090 tons of soil were

below current NYSDEC "contained-in" soil action levels and were therefore approved for disposal at a permitted waste disposal facility as non-hazardous waste. A portion of Excavation Area A from ground surface to 3 feet below grade was not part of the contained-in determination and was managed as hazardous waste.

A combined remedy of shallow soil excavation to 5-7 feet below grade in the source area, installation of belowground piping for a soil vapor extraction (SVE) system near the underground utilities in the source area, and injection of potassium permanganate for ISCO was completed in September and October 2023. A summary of the components of the remedy are shown in **Figure 5**, attached.

Analytical results of post-excavation soil samples showed concentrations of PCE, TCE, and cis-1,2-DCE exceeding the applicable SCO for protection of groundwater; the contamination left in place was to be addressed using ISCO and SVE. Sampling locations are shown in **Figure 6**, attached. The excavations were backfilled with clean fill from an approved offsite source. Monitoring wells MW2 and MW3 were destroyed during remedial activities.

Permanganate injections were then completed through direct-push batch injections using a Geoprobe® and injection tooling to disperse the oxidant laterally into the formation. A total of 2,725 pounds of potassium permanganate were injected at discrete depths into the subsurface via 14 injection points. Where the remedial excavation extended to 7 feet below ground surface (bgs) (Excavation Area A), injection was completed in the sand and gravel soils at approximately 16 and 13 feet below grade and in the clay layer at approximately 9 feet below grade. In all other areas, including those where excavation extended to 5 feet bgs, injection was completed in the sand and gravel soils at approximately 15 and 11 feet below grade and in the clay layer at approximately 7 feet below grade, which is the approximate average depth to groundwater within the treatment zone.

The SVE system treats residual concentrations in the unsaturated zone and utility corridors that were inaccessible for excavation. Horizontal screens provide greater surface area in contact with contaminated soil, allowing for more effective treatment over a relatively large area and resulting

in rapid decreases in soil gas contaminant concentrations as well as back diffusion of sorbed contaminants out of the soil matrix. Three 2-inch inner diameter (ID) horizontal wells consisting of 0.030-inch slot well screen were installed at a depth of 4 to 5 feet bgs along the western and northern boundaries of the excavation as shown in **Figure 5**. Vapors are extracted using a regenerative blower. The SVE system was activated on June 4, 2024 and is currently operational.

2.3.4 Post-Remediation Soil Sampling – Work Plan for Soil Borings (prepared by METI for 65 Lake Avenue LLC, dated August 14, 2024)

Soil sampling was completed in September 2024 to collect post-remediation soil data near locations where PCE concentrations in confirmation soil samples were most elevated and exceeded the contained-in determination threshold concentration of 12 mg/kg. Due to the close proximity of subsurface utilities, three of the five proposed soil borings were located approximately 5 feet north of post-excavation samples EX-6 (6.2'), EX-8 (6.5'), and EX-10 (6.5'). To fully delineate contaminant concentrations at this depth, two additional borings were completed approximately 17-25 feet north of the utility corridor. Boring locations are shown on **Figure 6**, attached.

Laboratory analytical results showed PCE detected at elevated concentrations in SB301 (6-7') (350 mg/kg) and SB302 (6-6.5') (150 mg/kg). PCE and other chlorinated VOCs were detected at low levels in the remaining three borings. A summary of analytical results from SB301 and SB302 is included in **Table 2**.

A summary of remedial activities, SVE operational data, and results of post-remedial soil and groundwater sampling will be included in the Final Engineering Report (FER).

2.3.5 BCP Cleanup Track 4 Soil Sampling – Memo on Proposed Change in BCP Cleanup Track (prepared by METI for 65 Lake Avenue LLC, dated May 30, 2025)

A multi-track remedy was proposed to address those limited areas of the Site along the utility corridor where PCE concentrations in soil exceeded restricted residential use SCOs and contamination left in place was identified post-ISCO injection. The Track 4 area is newly paved and meets the Track 4 cover requirements for restricted-residential use as described in 6 NYCRR

Part 375-3.8(e)(4)(iii) with the exception of two small areas along the east and west boundaries measuring approximately 24 and 23 square feet. Soil samples were collected from the two small areas in order to determine if additional paving was required to meet the Track 4 cover requirements for restricted residential use. The borings were completed to a depth of 16 inches below grade using a manual auger on August 8, 2025; soil types were not characterized due to the shallow depth of the borings and the limited scope of the investigation. Laboratory analytical results indicated that TCL VOCs were non-detect with the exception of PCE, detected in both SB401 and SB402 at concentrations below the protection of groundwater SCO, and TCE, detected in SB402 at a concentration below the protection of groundwater SCO. Therefore, the unpaved areas will remain "as-is" within the boundaries of the Track 4 cleanup area.

A summary of analytical results from SB401 and SB402 is included in **Table 2**. Sample locations are shown on **Figure 6**, attached.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated May 2022 and the Explanation of Significant Difference dated September 2025 are as follows:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

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

Soil Vapor

RAOs for Public Health Protection

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

Under the Explanation of Significant Difference, a multi-track remedy was approved for the Site to address administrative and technical issues that arose during implementation of the remedy. There was no fundamental change from the original remedy selected in the 2022 DD, and the changes maintain the same level of protection of public health and the environment as the original remedy.

2.5 Remaining Contamination

2.5.1 Soil

The source of chlorinated VOCs that remain in Site soils is from former dry-cleaning operations. The major contaminants of concern include PCE, TCE, and cis-1,2-DCE. Analytical results of post-remediation soil samples, summarized in **Table 2**, confirm that soil source areas were successfully removed with the exception of areas along the utility corridor in the vicinity of EX-6, EX-8, EX-10, SB301, and SB302 and along the southern boundary of the excavation near Building 1 in the vicinity of EX-7 and EX-11. Concentrations of PCE, TCE, and/or cis-1,2-DCE from 6 to 7 feet below grade in these samples exceeded the applicable protection of groundwater SCOs. All samples located along the utility corridor lie within the Track 4 cleanup area. The estimated volume of soil contamination remaining in this area is approximately 12,300 cubic feet. With the source area soils removed and considering the documented effectiveness of the remedy and data trends showing long term natural attenuation of chlorinated ethenes in groundwater, EX-7 and EX-11 remain in the Track 2 parcel. Further post-remediation reductions in groundwater contaminant concentrations will demonstrate attainment of the soil cleanup objectives.

As shown in **Table 2**, concentrations of PCE in soil samples SB202 (located in the Track 4 cleanup area), SB203 (also located in the Track 4 cleanup area), SB205, and SB207 and TCE in SB202 also exceeded the applicable protection of groundwater and unrestricted use SCOs. However, these borings are located within the ISCO remediation area and the samples were collected prior to implementation of the ISCO remedy, and are therefore unrepresentative of current conditions. Concentrations of PCE and TCE in groundwater are instead used to demonstrate compliance with the protection of groundwater SCOs.

Table 2 and **Figure 6** summarize the results of all soil samples collected that exceed the applicable Protection of Groundwater SCOs and Restricted Residential Use SCOs at the Site post-remediation.

2.5.2 Groundwater

PCE and/or cis-1,2-DCE remain in Site groundwater at concentrations slightly exceeding SCGs in monitoring wells MW1 and MW5 north of the remedial excavation and former source area. Depth to groundwater in these wells ranges from approximately 4.5 to 9 feet below grade. Concentrations of TCE, trans-1,2-DCE, and vinyl chloride in groundwater are currently at non-detect or low levels; however, concentrations of these VOCs were elevated in monitoring wells MW2 and MW3 (destroyed during remedial excavation activities) from sampling events completed in August 2020, August 2021, and September 2023. Based on the results of post-remediation groundwater monitoring, groundwater concentrations have been reduced and will continue to decrease due to the effects of ISCO and natural attenuation. Concentrations remain non-detect in downgradient monitoring wells near and along the property boundary and off-Site migration is therefore not a concern. Post-remediation groundwater quality will be monitored as per Section 4 of the SMP. NYSDEC approval is required to terminate or reduce the frequency of groundwater monitoring and these approvals would require an amendment to this SMP.

Table 1 and **Figure 7** summarize the results of all samples of groundwater that exceed the SCGs after completion of the remedial action.

2.5.3 Soil Vapor

Soil vapor (soil gas) samples have been collected and evaluated at on-Site and off-site locations during preliminary investigations and during the RI.

Vapor intrusion studies were completed in February and April 2019 within the four residential buildings. Vapor intrusion testing results identified chlorinated solvents, specifically PCE and TCE, within both sub-slab and indoor air samples in Buildings 1 and A. Based on guidance from the New York State Department of Health (NYSDOH), the concentrations of these solvents required mitigation in Building A on 65 Lake Avenue and Building 1 on 67 Lake Avenue. Mitigation was not required in Building B or Building C. As a result, sub-slab depressurization (SSD) systems were installed within Building A and Building 1 in November and December 2019 to mitigate vapor intrusion. As detailed in the *Sub-Slab Depressurization Systems Start-Up Report and Operation & Maintenance Plan*, all compounds identified in the NYSDOH soil vapor/indoor air decision matrices were not detected or detected below indoor air background levels during confirmation indoor air sampling events completed in January 2020 for Building A and April 2020 for Building 1. Vacuum in all permanent vapor monitoring points have continued to exceed the target vacuum of 0.004 inches of water column.

Soil vapor samples were collected from the lawn area at an adjacent property on Franklin Street and on Site between Building 1 and the southern property boundary on August 17, 2021 as part of the RI to evaluate the potential for offsite soil vapor intrusion. A total of 24 compounds from the Target Compound List were detected at VP1 (Franklin Street) and 23 compounds were detected at VP2 (downgradient property boundary), the source of which is not known. Concentrations were similar to or below background levels for indoor air. TCE, DCE, and VC were not detected at either sample location. PCE was detected at a concentration of 0.68 µg/m3 in the sample collected from VP1 and was not detected in the sample collected from VP2.

Underground utilities installed through the source area to service Buildings A, B and C and backfill material at the Site are considered preferential pathways for vapor migration as they provide a permeable pathway above the water table from the contaminated soils to the buildings. Given that these underground utility lines do not extend beyond the on-site buildings and the limited extents of the soil and groundwater plumes as defined by samples collected at the down gradient property boundary, preferential pathways for vapor migration to off-site properties, including 69 Lake Avenue, have not been identified.

The potential for vapor intrusion exists for any on-Site buildings that may be constructed in the future due to the remaining soil and groundwater contamination. Additional site development will require soil vapor intrusion testing and will be coordinated with and submitted to NYSDEC and New York State Department of Health (NYSDOH). The SMP will be revised accordingly at that time.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

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

This plan provides:

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

3.2 Institutional Controls

A series of ICs is required by the RAWP, BCA, and Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to restricted residential uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be

discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 8**. These ICs are:

- The property may be used for unrestricted use in Track 1 (NYS Easement Area) only and restricted residential use as shown for the corresponding Track 2 and Track 4 areas;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on **Figure 8**, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Cover System

Exposure to remaining contamination at the site is prevented by a cover system placed over the Site within the Track 4 area. The existing cover system is comprised of asphalt pavement and a minimum of 24 inches of clean soil in two small areas that are unpaved. **Figure 9** presents the location of the cover system. The Excavation Work Plan (EWP) provided in **Appendix E** outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in **Appendix F** and **Appendix G**. Any breach of the Site's cover system must be overseen by a Professional Engineer (PE) who is licensed and registered in New York State or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Sub-Slab Depressurization Systems

Exposure to chlorinated VOCs in Building A and Building 1 is mitigated by continued operation and maintenance of SSD systems in each apartment basement area. The design objective of the SSD systems is to mitigate potential vapor migration into the basement areas of Building 1 and Building A by maintaining a negative pressure of at least 0.004 inches water column (WC) in the sub-slab. The design was developed in accordance with the applicable standards, criteria, and guidance contained in or referenced in NYSDOH's "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006 and its updates.

To complete the design objective, seven (7) separate SSD systems were installed in the following basement areas:

- Building 1 West
- Building 1 Central
- Building 1 East
- Building A, Apartment 1

- Building A, Apartment 2
- Building A, Apartment 3
- Building A, Apartment 4

Installation of the SSD systems was completed by METI from October through November 2019. Deficiencies were identified and addressed through system modifications and repairs completed through June 2020. These included encapsulation of the basement space in Building 1 with a waterproof barrier, replacement of the VP-A1 vacuum gauge, and temporary removal of the VP-1 fan operating in Building 1 for repairs.

Each vapor extraction point was constructed using four-inch I.D. Schedule 40 PVC pipe with screen extending to just below the concrete slab. The annular space was filled with clean gravel and sealed with non-shrinking grout. A hammer drill was used to install vacuum monitoring points at numerous locations in each building. The monitoring points, which include a ¾-inch female coupling and threaded cap, were installed to a depth extending just below the surface of the concrete slab. Construction details are included in **Appendix H**.

Four-inch diameter Schedule 40 PVC vent pipes were installed to convey the vapor to the wall-mounted fans located outside of the buildings. The riser pipes from the vapor extraction points extend vertically up to the basement ceiling, and the vent pipes are routed through the southern basement wall (Building A) and the western basement wall (Building 1) to the outside of the building. All piping is level or sloped toward the vapor extraction points to prevent condensate accumulation in pipe runs. Piping is labeled with an arrow indicating the air flow direction.

Piping from the extraction points terminates at wall-mounted fans located outside the buildings. Each extraction point line is equipped with a Dwyer differential pressure vacuum gauge (0-20 inches WC for Building 1, and 0-5 inches WC for Building A) at the blower. The collected sub-slab vapor is discharged to the atmosphere more than 12 inches above the building roofline, 10 feet above ground level, and 10 feet away from any openings within two feet below the exhaust point. Each discharge point is located least 10 feet from any adjacent buildings, HVAC intakes or supply registers.

Equipment for vapor extraction and treatment in each treatment area is as follows:

Building 1

Three (3) RadonAway HS2000E fans (37 SCFM at 10 inches WC) were installed to maintain a pressure differential of 0.004 inches WC in the sub-slab in Building 1. Based on pilot testing and sub-slab vapor analytical data, vapor phase carbon treatment is not required.

Building A

One (1) RadonAway GP501 fan (50 SCFM at 3 inches WC) was installed to maintain a pressure differential of 0.004 inches WC in the sub-slab in each apartment in Building A. Based on pilot testing and sub-slab vapor analytical data, vapor phase carbon treatment is not required.

Single phase electrical service was installed to each of the fans in Building 1 and Building A. These fans do not have control panels and are operated with an on/off switch. All system piping is labeled with arrows to indicate air flow direction and switches are labeled “ON/OFF – DO NOT SHUT OFF” to avoid accidental changes or system deactivation.

Subsequent to the installation of each SSD system, sub-slab pressure was monitored to verify that a negative pressure of at least 0.004 inches was being achieved in the vapor monitoring points in each treatment area. Each SSD system was started and smoke tubes were used to check for leaks through cracks or floor joints and observable leaks in Building 1 were sealed with non-shrinking caulk.

The systems began operating on November 12, 2019. The fans are operating at 14 to 16 in w.c. in Building 1 and 0.5 to 4.0 in w.c. in Building A. Vacuum in all monitoring points exceeds 0.004 in w.c. Routine monitoring includes the identification and repair of any leaks, operational status checks of blowers and fans and documentation of vacuum at each vapor extraction point and monitoring point. Non-routine maintenance is completed as necessary. Tenants are notified in

advance of system checks requiring apartment access and may refer to information sheets provided to them that include an overview of system operation, maintenance, and monitoring.

Procedures for operating and maintaining the SSD systems are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As-built drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in **Appendix H** – Operations and Maintenance Manual. **Figure 9** shows the location of the ECs for the site.

3.3.3 Soil Vapor Extraction System

Remaining soil contamination in the vicinity of the underground utility corridor is being remediated through continued operation and maintenance of a soil vapor extraction system. The system applies vacuum to unsaturated zone soils via three horizontal extraction wells, two of which are operational. The third extraction well, SVE1, was permanently deactivated in November 2025 due to low VOC recovery and to optimize recovery from the other wells. Each well consists of 0.030-inch slot well screen installed at a depth of 4 to 5 feet bgs along the western and northern boundaries of the excavation and is connected to solid 2-inch ID PVC pipe extending towards a manifold for connection to the regenerative blower. The manifold includes a ball valve, vacuum gauge, and air sample port for each well. An AIRTECH 3BA1500 regenerative blower is utilized to extract vapors. The blower is equipped with an inlet filter, pre- and post-filter vacuum gauges, an air dilution valve, post-blower pressure gauge and an air sample port. The SVE effluent is discharged directly to the atmosphere.

The system is designed to operate on a continuous basis and will not be intentionally turned off or decommissioned without notification and approval from NYSDEC and NYSDOH. Deactivation will be proposed when asymptotic low-level VOC concentrations are attained in the system effluent.

Procedures for operating and maintaining the SVE system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As-built drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in **Appendix H** – Operations and Maintenance Manual. **Figure 9** shows the location of the ECs for the site.

3.3.4 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the site.

3.3.4.1 – Cover System

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

3.3.4.2 – Sub-Slab Depressurization (SSD) Systems

The SSD systems will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. If monitoring data indicates that the SSD system may no longer be required, a work plan to discontinue the SSD system will be submitted by the remedial party to the NYSDEC and NYSDOH project managers. The

work plan must include soil vapor intrusion sampling to verify that the SSD system is no longer needed and must comply with the NYSDOH Soil Vapor Intrusion Guidance.

If the NYSDEC project manager approves termination of operation and maintenance of an SSD system, the remedial party will notify the property owner and ask whether the property owner wants to keep the SSD system. If the property owner elects to keep the system, the property owner will be responsible for the operation and maintenance of the system going forward. If the property owner wants the system removed, the remedial party will remove and dispose of the system and repair any parts of the structure that were altered or modified by the SSD system, such as holes in the basement floor or walls.

3.3.4.3 –Soil Vapor Extraction System (SVE) System

The SVE system will not be discontinued unless prior written approval is granted by the NYSDEC project manager. In the event that monitoring data indicates that the SVE system may no longer be required, a proposal to discontinue the system will be submitted by the remedial party to the NYSDEC project manager. Conditions that may warrant discontinuing the SVE system include contaminant concentrations in groundwater and/or soil that: (1) reach levels that are consistently below ambient water quality standards or the site SCGs, as appropriate; (2) have become asymptotic to a low level over an extended period of time, as accepted by the NYSDEC; or (3) the NYSDEC has determined that the SVE system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC project manager.

3.3.4.4 - Monitoring Wells Associated with ISCO

Groundwater monitoring activities to assess the ISCO remedy will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards or the site SCGs, or have become asymptotic at an acceptable level over

an extended period. If monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the remedy will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional injections, source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

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4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix I**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

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

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Sitewide Inspection

Site-wide inspections will be performed annually. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix J** – Site Management Forms. The form will compile sufficient information to assess the following:

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

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

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;

- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public. The remedial party will submit follow-up status reports to the NYSDEC within 45 days of the event on actions taken to respond to any emergency event requiring ongoing responsive action, describing and documenting actions taken to restore the effectiveness of the ECs.

Exterior inspections will include: confirming that the SVE blower and SSD system fans are running correctly, determining whether there is damage to the stack or other exterior system components, and determining whether there have been structural changes, such as an addition to the structure. Comprehensive inspections include all of the activities required in the exterior inspection and an interior inspection, which includes: confirming a pressure differential on the manometer, inspecting the interior components for damage, recording vacuum readings from sub-slab vacuum monitoring points, and inspecting the basement area for cracks in the basement floors and walls that may have developed since the SSD system was installed. The remedial party will notify the DEC project manager about any problems within three days of inspections. Inspection reports will be emailed to the DEC Project Manager and included in the next PRR. Any needed repairs will be made promptly according to the procedures in the Operation and Maintenance Plan (Section 5.0).

In addition to the comprehensive annual inspection, semi-annual SVE and SSD systems checks, and semi-annual groundwater monitoring events completed by the qualified person or environmental professional, the remedial party will conduct exterior inspections of the SVE and SSD systems on a semi-annual basis. These inspections will be completed by apartment maintenance staff who are trained on these systems and will document vacuum gauge readings at each SSD system fan and the SVE blower for inclusion in the annual PRR.

4.3 Treatment System Monitoring and Sampling

4.3.1 Remedial System Monitoring

Monitoring of the SVE and SSD systems will be performed on a routine basis, as identified in Table 4.1 - Remedial System Monitoring Requirements and Schedule (see below). The annual monitoring of remedial systems must be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the SVE or SSD systems has been reported or an emergency occurs that is deemed likely to affect the operation of the system. SVE and SSD system components to be monitored include, but are not limited to, the components included in Table 4.1 below.

Table 4.1 – Remedial System Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
SVE Blower	Visual inspection, vacuum	15-35 inches W.C.	Quarterly
SSD System Fans	Visual inspection, vacuum	Vacuum (negative pressure)	Quarterly
SVE Effluent	PID measurement	NA	Semi-Annually
SSD System Vapor Monitoring Points	Vacuum	≥0.004 inches W.C.	Annually
Alarms	Function check, disconnect power	NA	Annually

A complete list of components to be inspected is provided in the Inspection Checklist, provided in **Appendix J** – Site Management Forms. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the Operation and Maintenance Plan, is required immediately.

4.3.2 Remedial System Sampling

Samples shall be collected from the SVE system effluent on a routine basis. Sampling locations, required analytical parameters and schedule are provided in Table 4.2 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4.2 – Remedial System Sampling Requirements and Schedule

Sampling Location	**Analytical Parameters**	**Schedule**
	VOCs (EPA Method TO-15)	
SVE Effluent	X	Semi-annually

Detailed sample collection and analytical procedures and protocols are provided in **Appendix K** – Field Activities Plan and **Appendix I** – Quality Assurance Project Plan.

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater on a routine basis. Sampling locations, required analytical parameters and schedule are provided in Table 4.3 – Post Remediation System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4.3 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters				Schedule
	VOCs (EPA Method 8260)	Metals (EPA Method 6010C, 6020B, 7196A, 7470A)	Chloride (EPA Method 300.0)	Permanganate (SM 4500-KMnO4)	
MW1	X	As needed	As needed	As needed	Semi-annually
MW4	X	As needed	As needed	As needed	Semi-annually
MW5	X	As needed	As needed	As needed	Semi-annually
MW6	X				Semi-annually
MW7	X				Semi-annually
MW8	X				Semi-annually
MW9	X				Semi-annually

In addition to VOCs, groundwater samples from select monitoring wells were also submitted for analysis of permanganate, chloride, and metals to assess the efficacy of the ISCO injection at one, four, and 10 months post-injection. As stated in the RAWP and shown in Table 4.3 above, additional monitoring events for these parameters may be completed as necessary or if it is determined that an additional ISCO event is required.

Groundwater samples will be collected using low flow sampling techniques. After static groundwater levels are measured, the wells will be purged and field measurements of pH, specific conductivity, temperature and turbidity will be recorded and monitored for stabilization prior to sampling. Groundwater sampling will commence once the groundwater quality indicator parameters have stabilized for at least three (3) consecutive readings for the following parameters:

- Water Level Drawdown <0.3 feet
- Temperature - +/- 3%
- pH - +/- 0.1 unit
- Dissolved Oxygen - +/-10%
- Specific Conductance - +/-3%
- Oxidation Reduction Potential - +/-10 millivolts
- Turbidity - +/-10% for values greater than 1 NTU

Groundwater samples will be placed in pre-cleaned laboratory-provided sample bottles, labeled and preserved in accordance with USEPA SW-846 methodology, and transported under chain-of-custody to a NYSDOH ELAP certified analytical laboratory. Post-filter purge water will be containerized in a 55-gallon drum on Site and sampled for TCL VOCs by EPA Method 8260 to

confirm that the applicable water quality standards are not exceeded prior to discharge to ground surface. If the applicable water quality standards are exceeded, the drum will be transported for off-site disposal.

Detailed sample collection and analytical procedures and protocols are provided in **Appendix K** – Field Activities Plan and **Appendix J** – Quality Assurance Project Plan.

4.4.1 Groundwater Sampling

As described above, groundwater monitoring will be performed semi-annually to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The network of on-site wells has been designed based on the following criteria:

- A total of nine monitoring wells have been installed at the Site, two of which (MW2 and MW3) were located in the source area and were destroyed during remedial excavation activities. The remaining seven monitoring wells are utilized as part of the sampling plan to determine the effectiveness of the remedy.
- One monitoring well, MW1, was installed upgradient of the source area and is located at the northern (furthest upgradient) edge of the ISCO treatment area.
- One monitoring well, MW5, is located near the downgradient edge of the ISCO treatment area. PCE concentrations are currently most elevated in MW5.
- Monitoring wells MW4 and MW6 through MW9 are located downgradient of the source area, excavation area, and ISCO treatment area. VOC concentrations in these wells are below the applicable groundwater standards or non-detect. Data collected from these monitoring wells continue to indicate that the risk of off-site migration of contaminants is low.

The monitoring well network includes four sentinel wells that monitor downgradient plume migration. Sentinel wells are uncontaminated wells located directly downgradient of the plume and upgradient of sensitive receptors. The monitoring well network for this site includes the following sentinel wells: MW4, MW6, MW7, and MW8. If one or more sentinel wells become contaminated, future actions will be discussed with the NYSDEC project manager.

Table 4.4 summarizes the wells' identification numbers, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, one upgradient well, one source area well, and five downgradient wells are sampled to evaluate the effectiveness of the remedial system. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

Table 4.4 – Monitoring Well Construction Details

Well ID	Latitude (°N)	Longitude (°W)	Casing Elevation (ft)	Well Diameter (in.)	Top of Screen Elevation (ft)	Bottom of Screen Elevation (ft)	Ground Surface Elevation (ft)
MW1	42.89664117	78.66792550	668.47	2	665.53	653.93	668.93
MW4	42.89643383	78.66833550	667.44	2	664.38	651.38	667.88
MW5	42.89662517	78.66834900	667.06	2	664.53	650.63	667.33
MW6	42.89693833	78.66852017	668.09	2	665.25	650.05	668.55
MW7	42.89651733	78.66875300	664.37	2	660.66	645.66	664.91
MW8	42.89643550	78.66787517	667.48	2	665.42	653.42	667.92
MW9	42.89671950	78.66845833	666.47	2	662.97	647.97	666.97

Monitoring well construction logs are included in **Appendix D** of this document.

If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable. Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

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

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.4.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in **Appendix J** – Site Management Forms. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Activities Plan provided as **Appendix K** of this document.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the SVE and SSD systems;
- Will be updated periodically to reflect changes in site conditions or the manner in which the SVE and SSD systems are operated and maintained.

Further detail regarding the Operation and Maintenance of the SVE and SSD systems is provided in **Appendix H** – Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site in the SVE system enclosure. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System Performance Criteria

5.2.1 Sub-Slab Depressurization Systems Performance Criteria

The minimum target differential pressure for each vapor mitigation area is 0.004 in W.C. Sub-slab vacuum measurements are to be taken at each monitoring point during annual inspections to verify that this vacuum is achieved.

Each SSD system includes a fan to recover sub-slab vapors. There are no discharge permits or permit equivalencies associated with the air discharge from the fans. Operating parameters are summarized in Table 5-1 below:

Table 5-1: SSD Systems Performance Criteria

Fan Model	System Area	Recommended Max. Operating Pressure (in W.C.)	Typical Flow Rate (cfm)	
			2.0 in W.C.	4.0 in W.C.
RadonAway GP501	Building A – A1, A2, A3, A4	3.8	66	4
Fan Model	**System Area**	**Recommended Max. Operating Pressure (in W.C.)**	**Typical Flow Rate (cfm)**	
			0 in W.C.	**15 in W.C.**
RadonAway HS2000	Building 1 (VP-1, VP-2, VP-3)	14	63	12

5.2.2 SVE System Performance Criteria

The SVE system recovers soil vapors from three (3) 2-inch ID horizontal wells consisting of 0.030-inch slot well screen installed at a depth of 4 to 5 feet bgs along the western and northern boundaries of the remedial excavation. Each well is connected to solid 2-inch ID PVC pipe extending towards a manifold for connection to a regenerative blower (AIRTECH A197s) utilized to extract vapors. The manifold includes a ball valve, vacuum gauge, and air sample port for each well. The blower is equipped with an inlet filter, pre- and post-filter vacuum gauges, an air dilution valve, post-blower pressure gauge and an air sample port. The extraction wells SVE2 and SVE3 are currently operational. SVE1 was deactivated in November 2025 by closing the ball valve and removing the handle. Operating parameters are summarized in Table 5-2 below:

Table 5-2: SVE System Performance Criteria

Blower Model	Power Requirements	Recommended Max. Operating Pressure (in W.C.)	Typical Flow Rate (cfm)	
			10 in W.C.	70 in W.C.
AIRTECH A197s	2.35 hp / 115 V	72	140	80

5.3 Operation and Maintenance of Sub-slab Depressurization Systems

The following sections provide a description of the operations and maintenance of the SSD systems. Cut-sheets and as-built drawings for the SSD systems are provided in Appendix C – Operations and Maintenance Manual included in **Appendix H - Operation & Maintenance Plan** of this SMP.

5.3.1 System Start-Up and Testing

In the event that the systems are shut off for maintenance or unanticipated power interruptions, the fan or blower will be restarted as soon as possible. Vacuum at each SSD system fan as measured by the Dwyer differential pressure vacuum gauge installed on each vapor extraction line will be recorded, and sub-slab differential pressure readings at each vapor monitoring point will be measured using a hand-held digital micromanometer.

The system testing described above will be conducted if, in the course of the SSD systems lifetime, the systems go down or significant changes are made to the systems and the systems must be restarted.

5.3.2 Routine System Operation and Maintenance

Routine maintenance of systems components will be completed to ensure that the SSD systems are operating as designed. System checks will be completed quarterly, with semi-annual system checks completed on an alternating basis by apartment maintenance personnel and by METI. Site checks will also be completed by METI annually or more frequently as needed for repairs and maintenance. Full system checks are completed by METI and include the identification and repair of any leaks, operational status checks of fans, vacuum at each vapor extraction point, and documentation of vacuum at each monitoring point. Visual inspection of the extraction wells, piping, and fittings will also be completed. Operation and Maintenance Manuals for the fans are included in Appendix C of the Operation & Maintenance Plan included as **Appendix H**.

5.3.3 Non-Routine Operation and Maintenance

System components will only require replacement when the part is damaged or malfunctions. Vacuum gauges will be replaced when the gauge stops recording or the dial becomes "stuck". The replacement gauge will be scaled for the full vacuum range of the fan. If signs of deterioration or damage to the extraction wells, piping, or fittings such as warping or cracking are observed, the component will be replaced.

Table 3 provides a summary and schedule of routine maintenance.

5.3.4 System Monitoring Devices and Alarms

The SSD systems will be equipped with a warning device to indicate that the system is not operating properly (i.e. zero air flow to the fan). In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSD system will be restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

5.4 Operation and Maintenance of SVE System

The following sections provide a description of the operations and maintenance of the SVE system. Cut-sheets and as-built drawings for the SVE system are provided in Appendix C – Operations and Maintenance Manual included in **Appendix H - Operation & Maintenance Plan** of this SMP.

5.4.1 System Start-Up and Testing

Prior to startup, each system component and all system alarms will be tested according to the manufacturer's instructions. At least one SVE well will be partially opened and the air filter dilution valve for the blower will be opened.

During normal startup, the blower will be started and vacuum measurements and temperature will be recorded. With the dilution valve open, the extraction well flow control

valve(s) will be slowly opened and the vacuum for each horizontal well will be recorded. The air dilution valve will be adjusted as necessary as vacuum is established and the system will be monitored for proper operation. The system effluent PID reading will also be recorded, and an air sample will be collected from the system effluent within 30 days of startup.

The system testing described above will be conducted if, in the course of the SVE system lifetime, the system goes down or significant changes are made to the system and the system must be restarted. During a restart, the valves for each horizontal well be adjusted to the settings (closed or % open) recorded during the previous site check or as directed by the Remedial Engineer.

5.4.2 Routine System Operation and Maintenance

Routine maintenance of systems components will be completed to ensure that the SVE system is operating as designed as detailed in the Operation & Maintenance Plan. Visual inspection of the extraction wells, piping, and fittings will also be completed. Potential operating problems include obstructions or blockages in the system, a break or leak in system piping, power loss to the system, and blower malfunction.

System checks will be completed quarterly, with semi-annual system checks completed on an alternating basis by apartment maintenance personnel and by METI. Comprehensive system inspections will also be completed by METI annually or more frequently as needed for repairs and maintenance.

5.4.3 Non-Routine Operation and Maintenance

System components will only require replacement when the part is damaged or malfunctions. Vacuum gauges will be replaced when the gauge stops recording or the dial becomes “stuck”. The replacement gauge will be scaled for the full vacuum range of the blower.

Table 3 provides a summary and schedule of routine maintenance.

5.4.4 System Monitoring Devices and Alarms

The SVE system has a warning device to indicate that the system is not operating properly. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SVE system will be restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

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

This section provides a current vulnerability assessment that evaluates the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding. This section also identifies vulnerability assessment updates that will be conducted for the site in Periodic Review Reports.

Based on FEMA flood insurance maps, the Site is located in an Area of Minimal Flood Hazard (Zone X), although it is adjacent to a Regulatory Floodway (Zone AE) in the vicinity of the NYS Environmental Easement for Flood Control for Cayuga Creek. The Site is not located near a shoreline and is therefore not susceptible to sea level rise or significant storm surge events. Groundwater recharge capabilities and existing stormwater management systems are sufficient to mitigate the risk of flooding during severe rain events. During severe weather events, temporary loss of power to the remediation systems may occur; however, the history of such events in Erie County is low, with fewer than three days with more than 1 inch of precipitation occurring per year on average from 1961 through 1990. Less than three days with more than 1 inch of precipitation occurring per year are predicted through 2039 under both high emissions and low emissions scenarios[1]. According to data from First Street[2], risk factors for flooding (1/10), fire (1/10), high wind (1/10), poor air quality (3/10), and extreme heat (2/10) are minimal to moderate

[1] Data for Erie County, New York from The Climate Explorer (https://crt-climate-explorer.nemac.org/)
[2] https://firststreet.org/property/65-lake-ave-lancaster-ny-14086/360465537_fsid/0

for the Site. Risk for these potential vulnerabilities will be reevaluated in future Periodic Review Reports.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this SMP. This section of the SMP also provides a summary of green remediation evaluations to be completed for the site during site management and reported in Periodic Review Reports (PRRs).

The following Best Management Practices (BMPs) are currently employed at the Site in association with operation and maintenance of the selected remedy:

- **Reduction in air pollutants/greenhouse gas emissions and conservation of material resources/waste reduction:** Reducing the frequency of site inspections and sampling events to semi-annual or annual bases will reduce the amount of fossil fuels used to travel to and from the Site and the generation of waste or non-recyclable materials (disposable gloves, disposable bailers, etc.) associated with air and groundwater sampling.
- **Reduction in total energy use:** Operating data from the SVE system will be evaluated routinely to optimize the rate of contaminant recovery and reduce the lifetime of the engineering control, therefore limiting energy use. Electrical use by the SSD systems is minimal and necessary for the protection of human health and the environment.
- **Waste reduction:** Designation of a portion of the Site as a Track 4 cleanup allows for a limited volume of contaminated soil to remain *in situ* beneath a cover system, reducing the amount of soil needing to be transported off Site for disposal as hazardous or non-hazardous waste. It is anticipated that residual soil impacts will

continue to degrade over time due to SVE system operation, SSD systems operation, and natural attenuation.

The following BMPs were employed at the Site during implementation of the remedy:

- **Site Investigation and Environmental Monitoring**: Field activities were completed in as few mobilizations as possible, reducing fuel consumption and associated air emissions and with less disturbance to the land and local ecosystems. During drilling, plastic sheeting was used to contain and collect decontamination fluids and prevent their entrance into storm drains or groundwater, and purge water from the monitoring wells was treated with carbon filtration onsite prior to discharge.
- **Excavation**: The boundaries of the excavation were well defined during initial investigations, the RI, and subsequent supplemental investigations, allowing machinery to be efficiently operated in the field. The closest qualified waste facilities were selected for disposal of contaminated soil. Machinery was appropriately sized and was restricted to well-defined corridors that were minimally intrusive. Backfill was purchased from local vendors.
- **SVE and SSD Systems:** Systems were designed to minimize pressure drops and the resulting need for additional energy to operate blowers/fans. Waste generation is minimal as emissions are below discharge limits without the use of carbon treatment.
- **ISCO:** A thorough conceptual site model was developed during the design phase to optimize the placement of injection points as well as the volume and type of oxidant. Direct-push technology was used to eliminate the need for disposal of cuttings and improve efficiency of substrate delivery into discrete vertical intervals. Post-injection monitoring ensured that negative byproducts (i.e. mobilization of metals) did not impact local groundwater.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate, (e.g. during significant maintenance events or in conjunction with storm recovery activities).

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities after approval from the DER project manager. Reporting of these modifications will be presented in the PRR.

6.2.2 Remedial Systems

Remedial systems will be operated properly considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate.

Remedial system types and associated parameters to be evaluated include, but are not limited to:

- SVE horizontal wells (operating rates/locations); and
- Gas venting (SSD) systems.

6.2.3 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

Components to be evaluated should include, but are not limited to:

- Heating/cooling systems and temperature set-points;
- Building/shed skin, insulation and building use and occupancy;
- Ventilation;
- Lighting and plug loads; and

- Grounds and property management.

6.2.4 Frequency of System Checks, Sampling and Other Periodic Activities

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

Consideration shall be given to:

- Reduced sampling frequencies to a semi-annual basis;
- Reduced site visits and system checks to a quarterly or annual basis;
- Bundling routine system operation checks, inspections, periodic sampling and other site management activities with other nearby sites;
- Coordination/consolidation of activities to maximize foreman/labor time; and
- Carpooling to and from the Site.

6.2.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in **Appendix J** – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits. A set of metrics has been developed and will be evaluated over time to ensure that green remediation actions are achieving the desired results.

Metrics that will be tracked over time and reported in PRRs may include:

- Water usage;
- Air emissions;
- Waste disposal and transportation;

- Energy consumption by remediation system equipment (blowers/fans); and,
- Offsite laboratory analysis.

6.3 Remedial System Optimization

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

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

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

The RSO study will focus on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to

increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principles are to be considered when performing the RO.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in **Appendix J**. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Quarterly SVE and SSD system checks will be completed by trained maintenance personnel at the apartment complex as previously described and results will be included in the PRR.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 7.1 and summarized in the Periodic Review Report.

Table 7.1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Site Status Report	Semi-Annually
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC

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

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

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;

- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

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

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

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

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

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

7.2 Periodic Review Report

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

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable.
- Description of any change of use, import of materials, or excavation that occurred during the certifying period.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.

- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
  - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
  - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
  - O&M data summary tables;
  - A current plume map for sites with remaining groundwater contamination; and
  - A groundwater elevation contour map for each gauging event.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP), ROD or Decision Document;
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
  - An update to the climate change vulnerability assessment if site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities.
  - A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a site's environmental impacts and recommendations to improve the remedy's environmental footprint. The PRR will include the

completed Summary of Green Remediation Metrics form provided in **Appendix J**.

- An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD or Decision Document; and
- The overall performance and effectiveness of the remedy.

- A performance summary for all treatment systems at the site during the calendar year, including information such as:
  - The number of days the system operated for the reporting period;
  - The average, high, and low flows per day;
  - The contaminant mass removed and the cost per pound of mass removed during the certification period and during the life of the treatment system;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A description of the resolution of performance problems;
  - Alarm conditions;
  - Trends in equipment failure;
  - A summary of the performance, effluent and/or effectiveness monitoring; and
  - Comments, conclusions, and recommendations based on data evaluation. Recommendations must address how receptors would be impacted. Recommendations can include:
    - Proposals to address efficiency and costs such as: instituting remote operation, system changes to decrease maintenance costs and downtime, and system changes to decrease energy use; and
    - Proposals to modify or shut down a treatment system due to remediation completion, system performance or changed conditions. System shutdowns are addressed in Section 6.4 of DER-10.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice and registered in New

York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

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

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

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

210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative].

I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

Every five years, the following certification will be added:

"The assumptions made in the qualitative exposure assessment remain valid."

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

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

7.4 Remedial System Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in **Appendix L**. The RSO report will document the research/ investigation and data

gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

8.0 REFERENCES

6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

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NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

TABLES

TABLE 1

Historical Groundwater Data Summary

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

Well ID	Casing Elevation (feet)	Sampling Date	Depth to Water (feet)	Groundwater Elevation (feet)	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)	Total VOCs (µg/L)	KMnO4 (mg/L)	Manganese (µg/L)	Chloride mg/L
			NYSDEC Groundwater Standard		*5*	*5*	*5*	*5*	*2*				
MW1	668.47	08/11/20	5.51	662.96	**180**	2.3	ND	ND	ND	182	NA	ND	NA
		08/31/21	5.43	663.04	**85**	0.93	ND	ND	ND	86	NA	NA	NA
		09/19/23	5.58	662.89	**78**	0.92	ND	ND	ND	79	NA	NA	NA
		01/05/24	5.52	662.95	**35**	ND	ND	ND	ND	35	ND	1,200	231
		04/16/24	5.23	663.24	**21**	ND	ND	ND	ND	21	ND	300	235
		08/27/24	7.25	661.22	ND	ND	ND	ND	ND	0.78	ND	2,500	210
		11/06/24	7.93	660.54	**15**	ND	ND	ND	ND	15	ND	770	ND
		06/17/25	5.83	662.64	**17**	ND	ND	ND	ND	29	NA	NA	NA
MW2	667.97	08/10/20	5.55	662.42	**2,200**	**160**	**670**	**11**	**20**	3,061	NA	NA	NA
		08/31/21	5.07	662.90	**3,200**	**160**	**830**	ND	ND	4,190	NA	NA	NA
		09/19/23	5.95	662.02	**1,300**	**85**	**620**	ND	ND	2,005	NA	NA	120
		WELL DESTROYED											
MW3	666.81	08/11/20	7.71	659.10	2.9	1.2	ND	ND	ND	4.1	NA	NA	NA
		08/31/21	7.34	659.47	**15**	**18**	**23**	1.3	1.7	62	NA	NA	NA
		09/19/23	6.72	660.09	**18**	**15**	**13**	ND	ND	46	NA	NA	NA
		WELL DESTROYED											
MW4	667.44	08/10/20	10.08	657.36	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/31/21	10.90	656.54	ND	ND	ND	ND	ND	ND	NA	NA	NA
		09/19/23	11.50	655.94	ND	ND	ND	ND	ND	ND	NA	NA	NA
		01/05/24	6.74	660.70	ND	ND	ND	ND	ND	ND	ND	17	31.3
		04/16/24	5.90	661.54	ND	ND	ND	ND	ND	ND	ND	ND	4.5
		08/27/24	11.11	656.33	ND	ND	ND	ND	ND	4.9	ND	210	12.9
		11/06/24	11.32	656.12	ND	ND	ND	ND	ND	ND	ND	ND	ND
		06/17/25	8.94	658.50	ND	ND	ND	ND	ND	6.6	NA	NA	NA
MW5	667.06	08/11/20	8.05	659.01	**480**	**33**	**140**	**5.3**	ND	658	NA	46	NA
		08/31/21	6.46	660.60	**580**	**30**	**56**	ND	ND	666	NA	NA	NA
		09/19/23	6.77	660.29	**400**	**22**	**61**	ND	ND	483	NA	NA	NA
		01/05/24	4.44	662.62	**140**	2.8	ND	ND	ND	143	ND	46	98.0
		04/16/24	4.23	662.83	**130**	3.0	ND	ND	ND	133	ND	17	68.4
		08/27/24	8.86	658.20	ND	ND	ND	ND	ND	0.54	ND	47	105
		11/06/24	9.30	657.76	**94**	**6.0**	**64**	1.1	ND	165	ND	ND	ND
		06/17/25	7.91	659.15	**71**	3.5	**9.2**	ND	0.42	90	NA	NA	NA

TABLE 1 (Continued)
Historical Groundwater Data Summary

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

Well ID	Casing Elevation (feet)	Sampling Date	Depth to Water (feet)	Groundwater Elevation (feet)	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2-DCE (µg/L)	Vinyl chloride (µg/L)	Total VOCs (µg/L)	KMnO4 (mg/L)	Manganese (µg/L)	Chloride mg/L
MW6	668.09	08/12/20	11.20	656.89	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/31/21	11.29	656.80	ND	ND	ND	ND	ND	4.1	NA	NA	NA
		09/19/23	12.17	655.92	ND	ND	ND	ND	ND	ND	NA	NA	NA
		01/05/24	NG	NG	NS	NS	NS	NS	NS	NS	NA	NA	NS
		04/16/24	10.06	658.03	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/27/24	12.13	655.96	0.45	ND	ND	ND	ND	4.6	NA	NA	NA
		11/06/24	12.44	655.65	ND	ND	ND	ND	ND	ND	NA	NA	NA
		06/17/25	11.13	656.96	ND	ND	ND	ND	ND	7.0	NA	NA	NA
MW7	664.37	08/12/20	8.44	655.93	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/31/21	8.36	656.01	ND	ND	ND	ND	ND	ND	NA	NA	NA
		09/19/23	8.51	655.86	ND	ND	ND	ND	ND	ND	NA	NA	NA
		01/05/24	7.55	656.82	ND	ND	ND	ND	ND	ND	NA	NA	NA
		04/16/24	7.13	657.24	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/27/24	8.80	655.57	ND	ND	ND	ND	ND	4.4	NA	NA	NA
		11/06/24	8.65	655.72	ND	ND	ND	ND	ND	ND	NA	NA	NA
		06/17/25	7.97	656.40	ND	ND	ND	ND	ND	19	NA	NA	NA
MW8	667.48	08/11/20	7.78	659.70	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/31/21	7.79	659.69	ND	ND	ND	ND	ND	ND	NA	NA	NA
		09/19/23	8.06	659.42	ND	ND	ND	ND	ND	ND	NA	NA	NA
		01/05/24	6.43	661.05	ND	ND	ND	ND	ND	ND	NA	NA	NA
		04/16/24	5.02	662.46	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/27/24	7.77	659.71	**34**	ND	ND	ND	ND	34.6	NA	NA	NA
		11/06/24	8.24	659.24	ND	ND	ND	ND	ND	ND	NA	NA	NA
		06/17/25	6.90	660.58	ND	ND	ND	ND	ND	19	NA	NA	NA
MW9	666.47	08/31/21	8.38	658.09	ND	ND	1.3	ND	ND	1.5	NA	NA	NA
		09/19/23	9.17	657.30	ND	ND	ND	ND	ND	ND	NA	NA	102.0
		01/05/24	8.01	658.46	ND	ND	ND	ND	ND	ND	NA	NA	NA
		04/16/24	7.66	658.81	ND	ND	ND	ND	ND	ND	NA	NA	NA
		08/27/24	9.13	657.34	**80**	4.9	**47**	ND	0.95	134	NA	NA	NA
		11/06/24	9.44	657.03	ND	ND	ND	ND	ND	ND	NA	NA	NA
		06/17/25	8.45	658.02	ND	ND	ND	ND	ND	5.4	NA	NA	NA

NOTES:
ND = not detected NA = not analyzed NG = not gauged NS = not sampled
Remedial excavation and injection of potassium permanganate completed September-October 2023.
Bolded values exceed the applicable NYSDEC groundwater standard.

Table 2
Post-Remediation Soil VOC Concentrations

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

PARAMETER	Unrestricted Use SCO	Restricted-Residential Use SCO	Protection of Groundwater SCO	SS1	SS2	SS3	SS4	SS4 DUP	SS5	SS6	SS7	SS9	SB101 (5.0'-7.0')	SB104 (16.0'-16.5')
			Sampling Date	7/20/2020	8/3/2020	7/20/2020	7/23/2020	7/23/2020	7/21/2020	7/21/2020	7/20/2020	7/20/2020	7/21/2020	7/23/2020
2-Butanone	0.12	100	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	0.05	100	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.019
Chloroform	0.37	49	0.37	0.0069	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	2.3	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	0.05	100	0.05	ND	ND	ND	ND	0.0034	ND	ND	ND	ND	ND	0.0080
Tetrachloroethene	1.3	19	1.3	ND	ND	ND	ND	ND	ND	0.040	ND	ND	0.75	ND
Xylenes (Total)	0.26	100	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			Cleanup Track Area	*2*	*2*	*2*	*2*	*2*	*1*	*2*	*2*	*2*	*2*	*2*
			Under Cover?	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*YES*	*NO*

PARAMETER	Unrestricted Use SCO	Restricted-Residential Use SCO	Protection of Groundwater SCO	SB105 (15.5'-17.0')	SB106 (19.5'-20.0')	SB107 (18.0'-18.5')	SB108 (17.0'-18.0')	SB109 (14.0'-15.0')	SB109 (14.0'-15.0') DUP	SB110 (14.0'-15.0')	SB111 (17.5')	SB112 (5.7')
			Sampling Date	7/23/2020	7/27/2020	7/28/2020	7/27/2020	7/28/2020	7/28/2020	7/28/2020	7/22/2020	8/16/2021
2-Butanone	0.12	100	0.12	ND	ND	ND	ND	ND	ND	ND	ND	0.410J
Acetone	0.05	100	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	0.37	49	0.37	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NA	NA	NA	ND	ND	0.0037	ND	ND	ND	ND	ND	ND
Isopropylbenzene	2.3	NA	NA	ND	0.0048	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	NA	NA	NA	ND	ND	0.0036	0.0015	0.0021	ND	ND	ND	ND
Methylene chloride	0.05	100	0.05	0.0035	0.0062	0.0066	ND	ND	ND	ND	0.0024	ND
Tetrachloroethene	1.3	19	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (Total)	0.26	100	1.6	ND	ND	0.0012	ND	ND	ND	ND	ND	ND
			Cleanup Track Area	*2*	*2*	*2*	*2*	*1*	*1*	*2*	*2*	*2*
			Under Cover?	*YES*	*NO*	*YES*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*

PARAMETER	Unrestricted Use SCO	Restricted-Residential Use SCO	Protection of Groundwater SCO	SB202 (2-2.5)	SB202 (6-6.5)	SB203 (2-2.5)	SB203 (5-5.5)	SB205 (1.5)	SB205 (7)	SB206 (2)	SB206 (6)	SB207 (1-3)	SB207 (6-8)
			Sampling Date	3/2/2022	3/2/2022	3/2/2022	3/2/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022
2-Butanone (MEK)	0.12	NA	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.004 J
Acetone	0.05	100	0.05	ND	ND	ND	ND	ND	ND	ND	0.0053	ND	0.024
cis-1,2-Dichloroethene	0.25	100	0.25	ND	0.210	ND	0.160	ND	ND	ND	ND	ND	0.0061
Cyclohexane	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl acetate	NA	NA	NA	ND	ND	ND	0.046 J	ND	ND	ND	ND	ND	0.009 J
Methylcyclohexane	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1.3	19	1.3	**8.800**	**2.900**	**1.600**	0.230 J	0.490	**8.100**	0.670	ND	**3.400**	ND
trans-1,2-Dichloroethene	0.19	100	0.19	ND	0.013 J	ND	0.013 J	ND	ND	ND	ND	ND	ND
Trichloroethene	0.47	21	0.47	0.180 J	**0.710**	ND	0.037 J	ND	0.160	ND	ND	ND	ND
			Cleanup Track Area	*4*	*4*	*4*	*4*	*2*	*2*	*2*	*2*	*2*	*2*
			Under Cover?	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*

Table 2 (Continued)
Post-Remediation Soil VOC Concentrations

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

PARAMETER	Unrestricted Use SCO	Restricted-Residential Use SCO	Protection of Groundwater SCO	SB113 (1-5)	SB113 (15-18)	SB114 (0.5-2)	SB114 (6-10)	SB114 (12-16)	SB115 (0-3)	SB115 (6-8)	SB116 (0.5-2.5)	SB116 (6.0-7.5)	SB117 (0.5-3.0)	SB117 (8-10)
Sampling Date				6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022	6/20/2022
2-Butanone (MEK)	0.12	NA	0.12	ND	ND	ND	0.004 J	ND	ND	ND	ND	ND	ND	ND
Acetone	0.05	100	0.05	ND	0.012 J	ND	0.027	0.0063 J	ND	0.0058 J	ND	ND	ND	ND
Benzene	0.06	4.8	0.06	ND	0.00046 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	NA	NA	ND	ND	ND	0.0051	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NA	NA	NA	ND	0.0016 J	ND	ND	ND	ND	ND	ND	ND	0.051 J	ND
Methyl acetate	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	0.140 J	ND	0.130 J	ND
Methylcyclohexane	NA	NA	NA	ND	0.00094	ND	ND	ND	ND	ND	0.027 J	ND	0.150	ND
Tetrachloroethene	1.3	19	1.3	0.410	ND	0.140	ND	ND	ND	ND	0.140 J	0.00054 J	0.092	ND
Toluene	0.7	100	0.7	ND	0.0019 JT	ND	ND	ND	ND	ND	ND	ND	0.031 J	ND
Xylenes, Total	0.26	100	1.6	ND	0.0011 JT	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cleanup Track Area				*2*	*2*	*2*	*2*	*2*	*2*	*2*	*1*	*1*	*2*	*2*
Under Cover?				*YES*	*YES*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*	*NO*

PARAMETER	Unrestricted Use SCO	Restricted-Residential Use SCO	Protection of Groundwater SCO	EX-1 (3.4)	EX-2 (4.6)	EX-3 (6.1)	EX-4 (6.2)	EX-5 (4.1)	EX-6 (6.2)	EX-7 (6.5)	EX-8 (6.5)	EX-9 (5.5)	EX-10 (6.5)	EX-11 (6.0)
Sampling Date				9/26/2023	9/26/2023	9/26/2023	9/26/2023	9/27/2023	9/27/2023	9/28/2023	9/28/2023	9/28/2023	9/28/2023	9/28/2023
Acetone	0.05	100	0.05	ND	0.009J	0.0087J	0.0083J	0.0094J	ND	0.360 F1	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.25	100	0.25	ND	ND	0.0090	0.02	ND	**16**	**0.290 F1F2**	ND	ND	ND	ND
Methylene Chloride	NA	NA	NA	ND	ND	ND	ND	ND	ND	0.015 JF1	ND	ND	ND	ND
Tetrachloroethene	1.3	19	1.3	0.110	ND	0.0064	ND	0.0041	**370**	ND	**53**	ND	**34**	**5**
trans-1,2-Dichloroethene	0.19	100	0.19	ND	ND	0.00086J	ND	ND	ND	0.016 JF1F2	ND	ND	ND	ND
Trichloroethene	0.47	21	0.47	ND	ND	0.0054	ND	ND	**46**	0.082 F1F2	**3.8**	ND	**0.74**	0.27
Vinyl chloride	0.02	0.9	0.02	ND	ND	ND	0.0082	ND	ND	ND	ND	ND	ND	ND
Cleanup Track Area				*2*	*2*	*2*	*2*	*2*	*4*	*2*	*4*	*2*	*4*	*2*
Under Cover?				*NO*	*NO*	*NO*	*NO*	*NO*	*YES*	*YES*	*YES*	*NO*	*YES*	*NO*

PARAMETER	Unrestricted Use SCO	Restricted-Residential Use SCO	Protection of Groundwater SCO	DER-10 Appendix 5	SB301 (6-7')	SB302 (6-6.5')	SB303 (6-7')	SB303 (6-7') DUPLICATE	SB304 (6-7')	SB305 (6-7')	SB401	SB402
Sampling Date					9/3/2024	9/3/2024	9/3/2024	9/3/2024	9/3/2024	9/3/2024	8/5/2025	8/5/2025
Acetone	0.05	100	0.05	0.05	ND	ND	0.012J	0.010J	0.0089J	0.0068J	ND	ND
Chloroform	0.37	49	0.37	0.37	ND	ND	ND	ND	0.0003J	0.00025J	ND	ND
cis-1,2-Dichloroethene	0.25	100	0.25	0.25	ND	ND	0.053	0.110	ND	ND	ND	ND
Tetrachloroethene	1.3	19	1.3	1.3	**350**	**150**	0.00092J	0.0095	0.0010J	ND	0.0006	0.0021
trans-1,2-Dichloroethene	0.19	100	0.19	0.19	ND	ND	0.0011J	0.0048	ND	ND	ND	ND
Trichloroethene	0.47	21	0.47	0.47	**16**	ND	ND	0.083	ND	ND	ND	0.00015J
Vinyl chloride	0.02	0.9	0.02	0.02	ND	ND	0.0044	0.0014J	ND	ND	ND	ND
Cleanup Track Area					*4*	*4*	*4*	*4*	*4*	*2*	*4*	*4*
Under Cover?					*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*

NOTES:
1. Analytical testing for VOCs via EPA Method 8260C by Eurofins Buffalo, Hampton-Clarke, and Pace Analytical Services LLC.
2. Results present in mg/kg.
3. ND = Not Detected; NA = Not Applicable
4. Soil Cleanup Objectives (SCOs) from NYCRR Part 375
5. DER-10 Appendix 5 Allowable Consitiuent Levels for Imported Fill or Soil
6. "J" = estimated value; "F1" = MS and/or MSD recovery exceeds control limits; "F2" = MS/MSD RDP exceeds control limits.
7. Regulatory standards and results are shown for detected compounds in each sampling event only.
8. Bolded values exceed the protection of groundwater SCO. Highlighted values exceed the restricted residential SCO.

Table 3
Routine Maintenance Summary and Schedule

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

Event	Frequency	Anticipated Schedule*	Responsibility	Summary of Activities
Routine SSD Systems Inspection	Semi-Annually	February, August	Maintenance personnel	Fan operational check, extraction point vacuum measurements
Routine SVE System O&M	Semi-Annually	February, August	Maintenance personnel	Blower operational check, vacuum measurement
Routine SSD Systems Inspection	Semi-Annually	May, November	Environmental professional	Fan operational check, extraction point vacuum measurements
Routine SVE System O&M	Semi-Annually	May, November	Environmental professional	Blower operational check, vacuum measurement, effluent PID reading, effluent air sampling
Groundwater monitoring	Semi-Annually	May, November	Environmental professional	Groundwater elevation gauging and sampling
SSD Systems O&M and Annual Inspection	Annually	May	Environmental professional	Identification and repair of any leaks, operational status checks of fans, vacuum at each vapor extraction point, and documentation of vacuum at each monitoring point
SVE System O&M and Annual Inspection	Annually	May	Environmental professional	Inspection of blower and blower enclosure, documentation of vacuum at blower and extraction wells, effluent PID reading, individual extraction well PID readings

*NOTE: The anticipated schedule of the system checks is subject to change but will occur at the indicated frequency, i.e. once per quarter for routine checks and once per year for annual inspections.

Table 4
System Sampling Requirements

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

Sample Point	Frequency	Testing Required
SVE Blower Effluent	Semi-Annual	PID reading, TCL VOCs by Method TO-15
Groundwater monitoring wells	Semi-Annual	TCL VOCs by EPA Method 8260
Groundwater monitoring wells	As needed	Metals by EPA Methods 6010, 6020, 7196, and 7470 Chloride by EPA Method 300.0 Permanganate by Method SM 4500-KMnO4

Table 5
Reporting Summary and Schedule

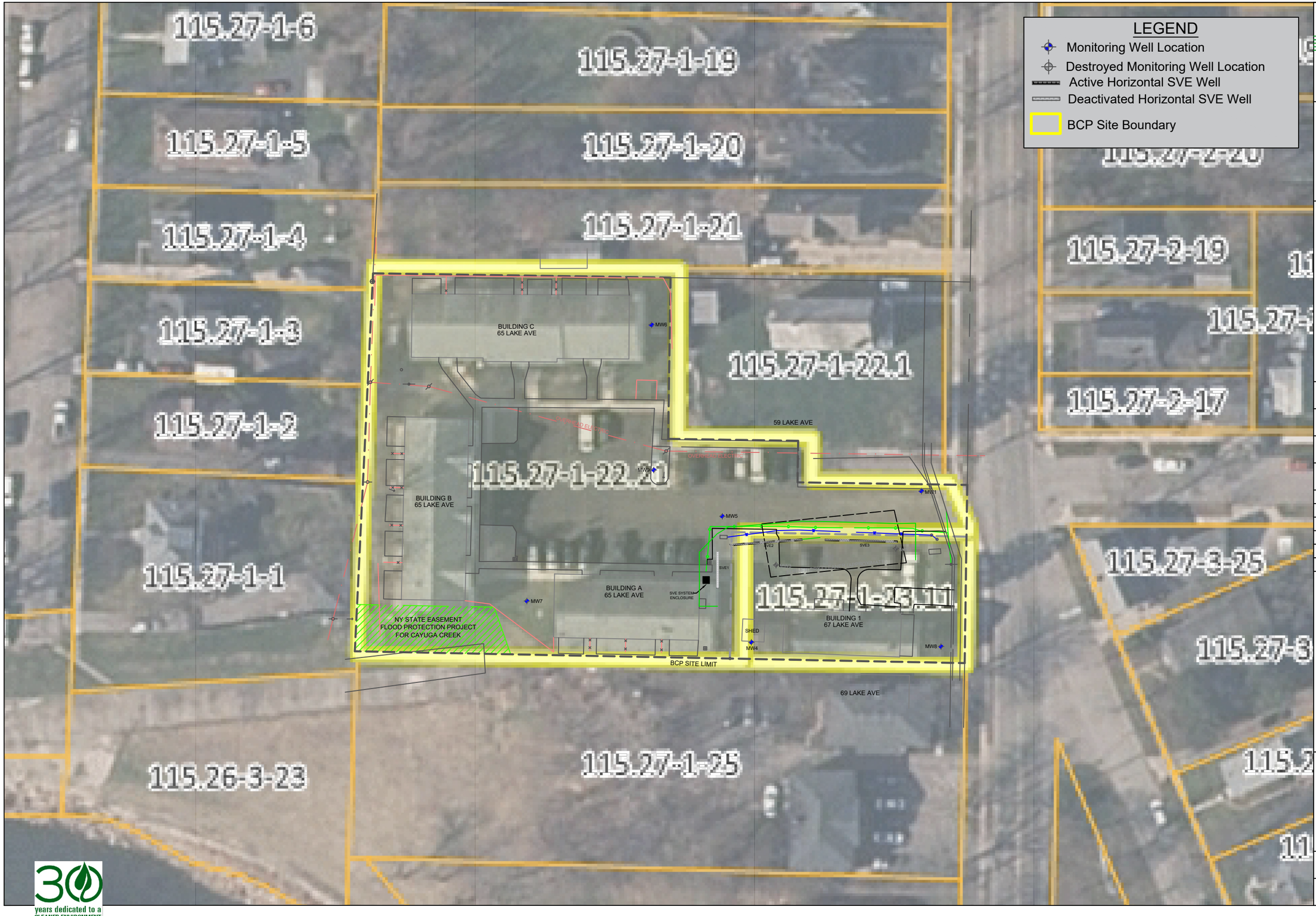
Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

Deliverable	Schedule	Report Summary
Site Status Report	Semi-Annual	Summary of low-flow groundwater quality data, static water levels, VOC concentration data summary, groundwater potentiometric contour map, SVE system operational data, SVE effluent air analytical data
Periodic Review Report	Annually (1st PRR due 16 months after COC issuance)	Documents and provides records for compliance with the SMP and protectiveness of the remedy

FIGURES

FIGURE:	TITLE:	PROJECT NAME / LOCATION:	REVISION		PROJECT MGR:	PREPARED FOR:	PREPARED BY:
1	Site Location Map	Lakeside Village Apartments 65-67 Lake Avenue Lancaster, New York BCP Site No. C915344	BY	DATE	SLM	65 Lake Avenue LLC	MATRIX ENVIRONMENTAL TECHNOLOGIES INC. 3730 California Road P.O. Box 427 Orchard Park, NY 14127 p:716.662.0745 www.matrixbiotech.com
DATE: N/A			CMC	6/15/24	DESIGNED BY: CMC		
PROJECT NO.: 18-046					REVIEWED BY: SRC		
			SCALE IN FEET: 1" = 100' 0 100		DRAWN BY: CMC		

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021



30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:

MATRIX ENVIRONMENTAL TECHNOLOGIES INC.

ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:

65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:

LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046

PROJECT MANAGER: SLM

DRAWN BY: CMC

REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	10/29/25

N

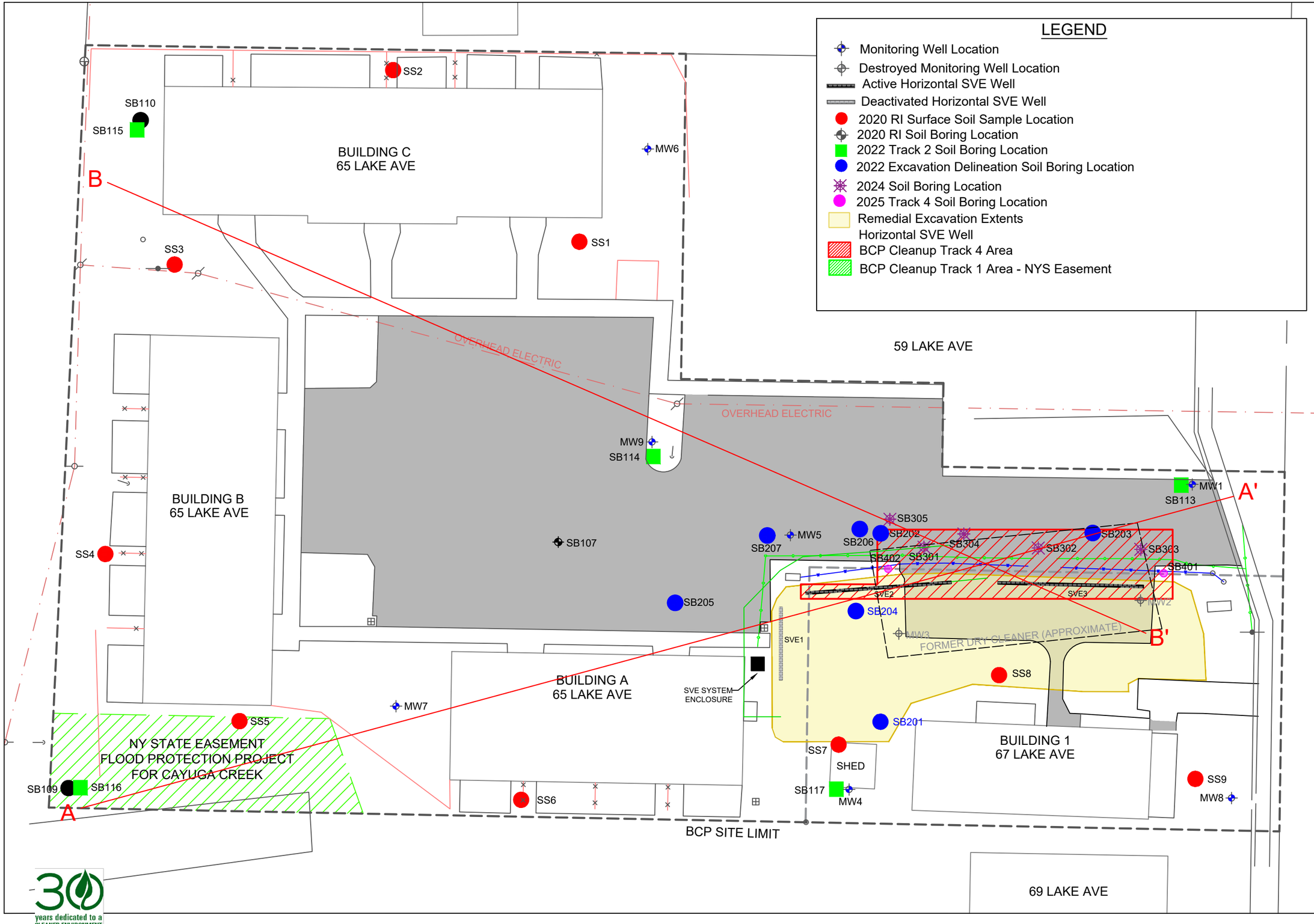
1" = 50'
0 50

TITLE:

SITE LAYOUT MAP

DATE:

FIGURE: 2



30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:
MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ORCHARD PARK - ROCHESTER - ITHACA
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PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	11/5/25

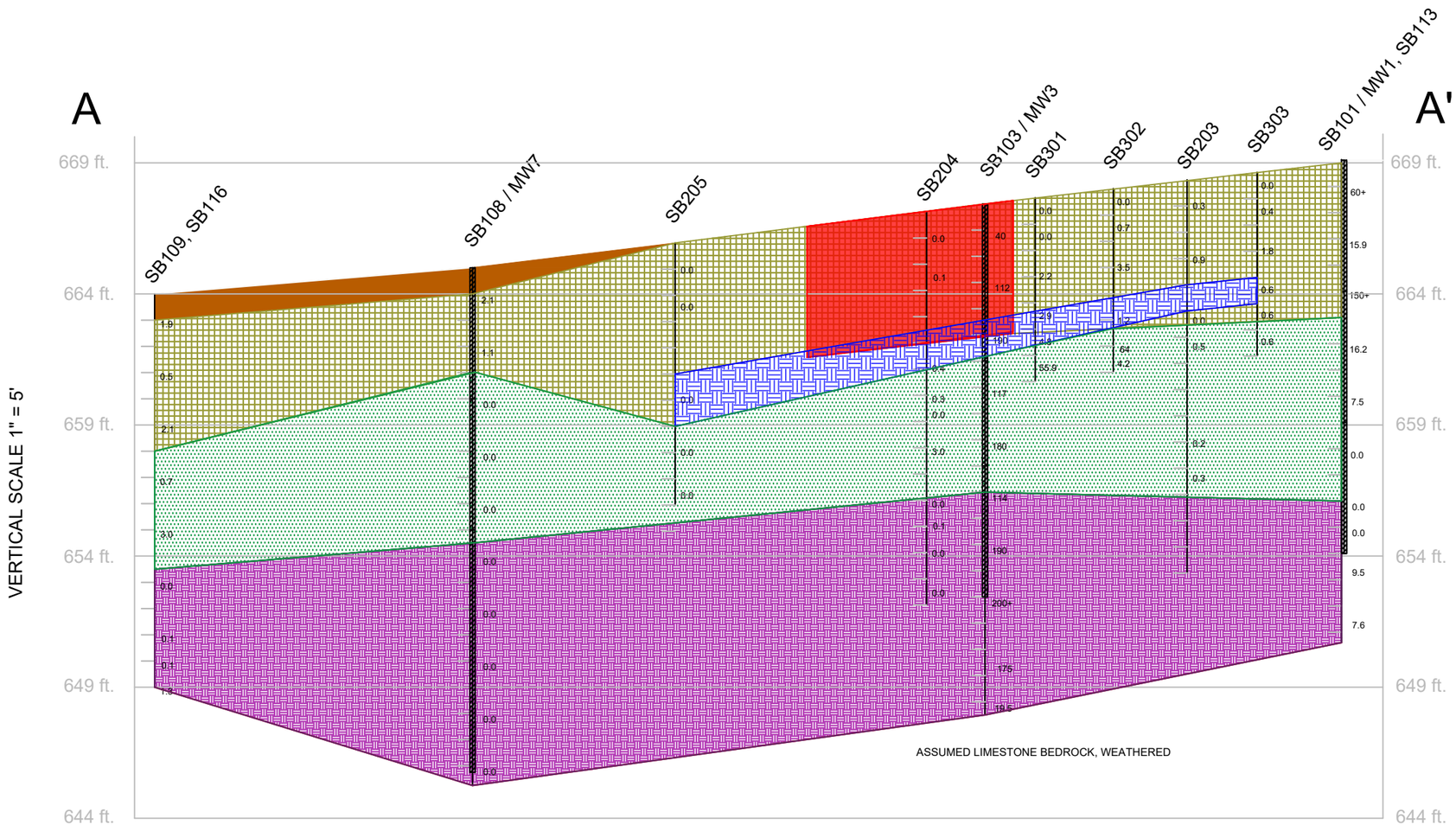
N

1" = 25'
0 25

TITLE:
GEOLOGIC CROSS SECTIONS OVERVIEW

DATE:

FIGURE: 3A



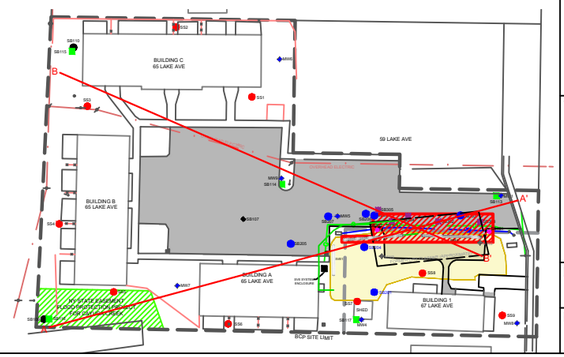
HORIZONTAL SCALE 1" = 30'

LEGEND

- = TOPSOIL
- = CLAY AND SILT (LAMINATED, LACUSTRINE)
- = GRAVELLY SAND (UTILITY LINE BEDDING)
- MONITORING WELL SCREENED INTERVAL
- = SILTY SAND WITH GRAVEL (FILL)
- = SILTY SAND WITH GRAVEL (ALLUVIUM)
- = EXCAVATED/BACKFILLED AREA
- SOIL BORING INTERVAL

0.0 = PID Measurements (ppm)

For detailed soil descriptions, see soil boring logs.



30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:

MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:

65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:

LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046

PROJECT MANAGER: SLM

DRAWN BY: CMC

REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	11/5/25

N

AS NOTED

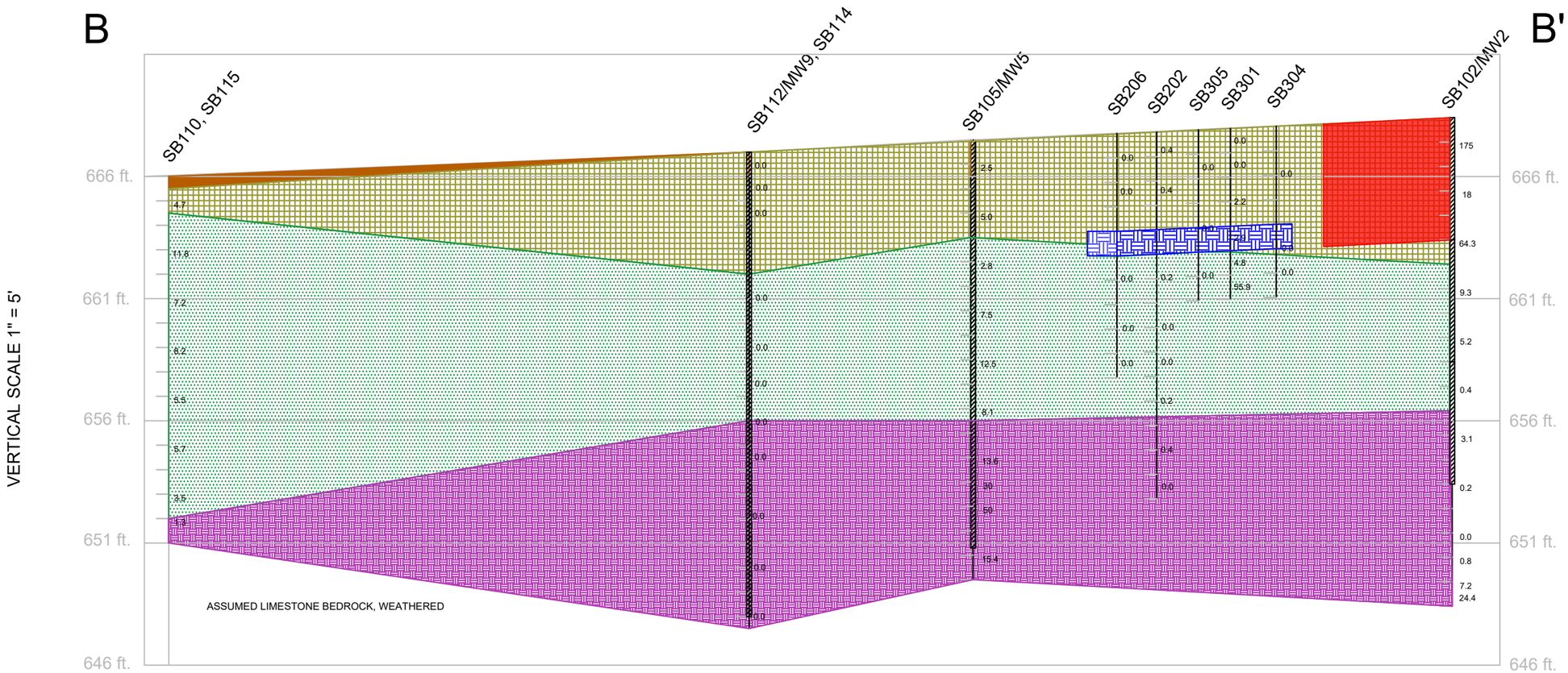
0

TITLE:

GEOLOGIC CROSS SECTIONS A-A'

DATE:

FIGURE: 3B



LEGEND

- = TOPSOIL
- = CLAY AND SILT (LAMINATED, LACUSTRINE)
- = GRAVELLY SAND (UTILITY LINE BEDDING)
- MONITORING WELL SCREENED INTERVAL
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- = SILTY SAND WITH GRAVEL (ALLUVIUM)
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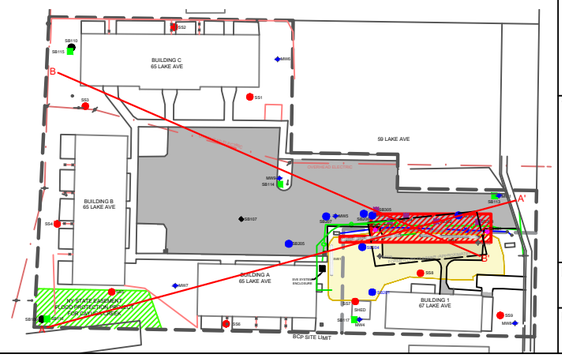
For detailed soil descriptions, see soil boring logs.



30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

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PROJECT NAME/LOCATION:

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65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046

PROJECT MANAGER: SLM

DRAWN BY: CMC

REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	11/5/25

N

AS NOTED

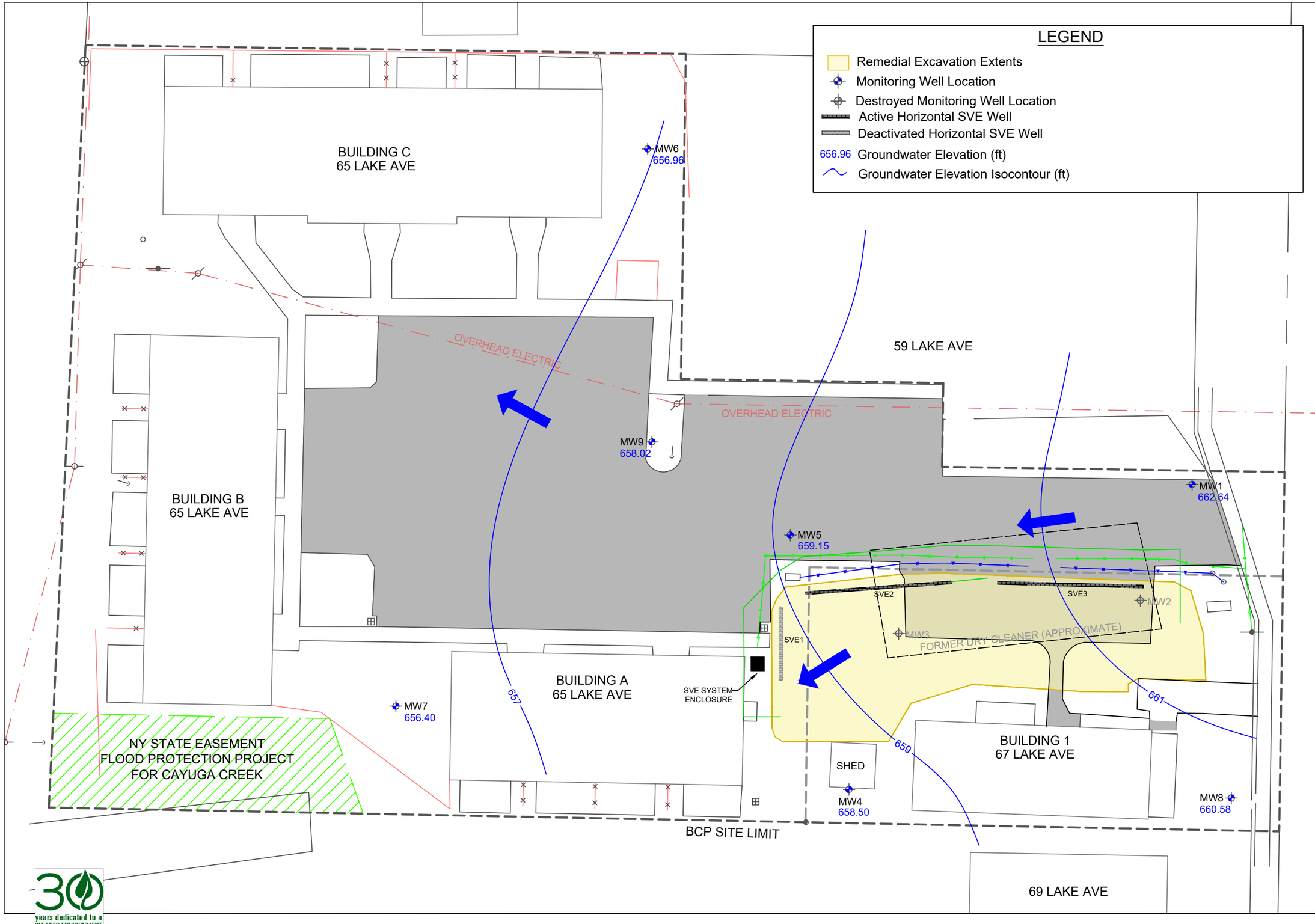
0

TITLE:

GEOLOGIC CROSS SECTIONS B-B'

DATE:

FIGURE: 3B



PREPARED BY:
MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.
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www.matrixbiotech.com

PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE
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65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	10/29/25

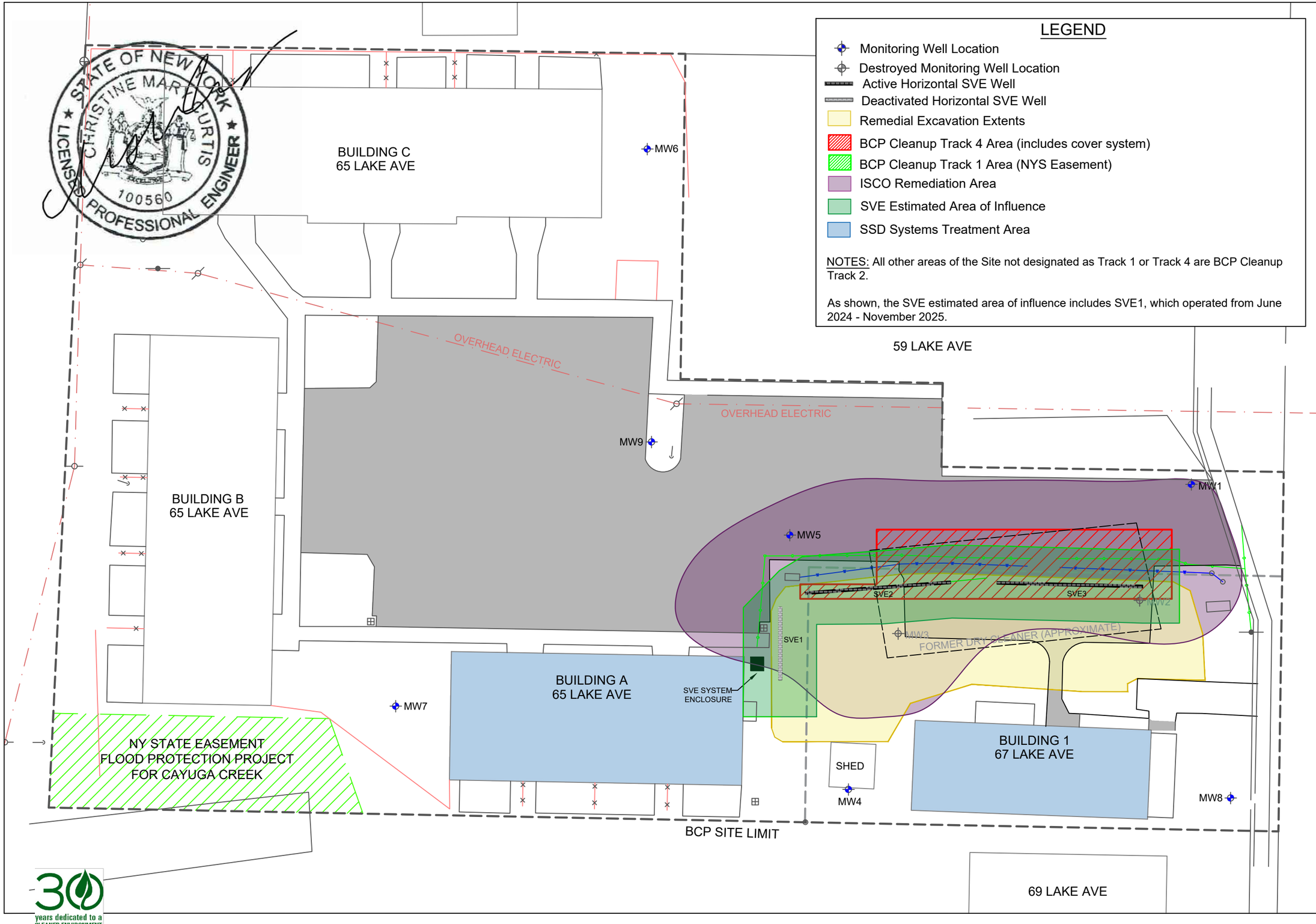
N

1" = 25'
0 25

TITLE:
GROUNDWATER ELEVATION
CONTOUR MAP

DATE: June 17, 2025
FIGURE: 4

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021



STATE OF NEW YORK
CHRISTINE MARIE CURTIS
100560
LICENSED PROFESSIONAL ENGINEER

LEGEND

- Monitoring Well Location
- Destroyed Monitoring Well Location
- Active Horizontal SVE Well
- Deactivated Horizontal SVE Well
- Remedial Excavation Extents
- BCP Cleanup Track 4 Area (includes cover system)
- BCP Cleanup Track 1 Area (NYS Easement)
- ISCO Remediation Area
- SVE Estimated Area of Influence
- SSD Systems Treatment Area

NOTES: All other areas of the Site not designated as Track 1 or Track 4 are BCP Cleanup Track 2.

As shown, the SVE estimated area of influence includes SVE1, which operated from June 2024 - November 2025.

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

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ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	10/29/25

N

1" = 25'
0 25

TITLE:
REMEDIAL ELEMENTS AND BCP CLEANUP TRACK AREAS

DATE:

FIGURE: 5

LEGEND

- Monitoring Well Location
- Destroyed Monitoring Well Location
- Active Horizontal SVE Well
- Deactivated Horizontal SVE Well
- 2020 RI Surface Soil Sample Location
- 2020 RI Soil Boring Location
- 2021 Soil Vapor Boring Sample Location
- 2022 Track 2 Soil Boring Location
- 2022 Excavation Delineation Soil Boring Location
- 2023 Confirmation Soil Sampling Location
- 2024 Soil Boring Location
- 2025 Track 4 Soil Boring Location
- Remedial Excavation Extents
- BCP Cleanup Track 4 Area
- BCP Cleanup Track 1 Area - NYS Easement

Sample ID (ft. bgs)
PCE (mg/kg)
TCE (mg/kg)
cis-1,2-DCE (mg/kg)
trans-1,2-DCE (mg/kg)
Vinyl chloride (mg/kg)

NOTES: Highlighted values exceed the protection of groundwater SCO. PCE - 1.3 mg/kg; TCE - 0.47 mg/kg; cis-1,2-DCE - 0.25 mg/kg; trans-1,2-DCE - 0.19 mg/kg; Vinyl chloride - 0.02 mg/kg.

Samples were collected from SB205 and SB207 prior to implementation of the ISCO remedy; analytical results are not necessarily indicative of current post-remediation conditions. Groundwater contaminant concentrations in this vicinity are used to demonstrate attainment of protection of groundwater SCOs.

SB207 (1-3)	SB202 (2-2.5)	SB202 (6-6.5)	SB301 (6-7)	SB302 (6-6.5)	SB203 (2-2.5)
3.4	8.8	2.9	350	150	1.6
ND	0.18 J	0.71	16	ND	ND
ND	ND	0.21	ND	ND	ND
ND	ND	0.013 J	ND	ND	ND
ND	ND	ND	ND	ND	ND

SB205 (7)
8.1
0.16
ND
ND
ND

EX-6 (6.2)
370
46
16
ND
ND

EX-8 (6.5)	EX-7 (6.5)	EX-10 (6.5)
53	ND	34
3.8	0.082	0.74
ND	0.290	ND
ND	0.016	ND
ND	ND	ND

EX-11 (6.0)
5
0.27
ND
ND
ND

BUILDING C
65 LAKE AVE

BUILDING B
65 LAKE AVE

BUILDING A
65 LAKE AVE

BUILDING 1
67 LAKE AVE

59 LAKE AVE

FORMER DRY CLEANER (APPROXIMATE)

NY STATE EASEMENT
FLOOD PROTECTION PROJECT
FOR CAYUGA CREEK

SVE SYSTEM ENCLOSURE

SHED

OVERHEAD ELECTRIC

LIMIT

SB110, SB115, SB112/ MW9, SB114, SB107, SB205, SB207, MW5 /SB105, SB206, SB202, SB305, SB304, SB203, SB302, SB303, SB301, SB402, SB401, SB204, SB201, SB117, MW4 /SB104, MW7 /SB108, MW1/SB101, SB113, MW2/SB102, MW3/SB103, MW6 /SB106, MW8 /SB111, SB109, SB116

SS1, SS2, SS3, SS4, SS5, SS6, SS7, SS8, SS9

EX1, EX2, EX3, EX4, EX5, EX6, EX7, EX8, EX9, EX10, EX11

SVE1, SVE2, SVE3

VP1, VP2

STATE OF NEW YORK
CHRISTINE MARIE CURTIS
100560
LICENSED PROFESSIONAL ENGINEER

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:
MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK
BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	10/29/25

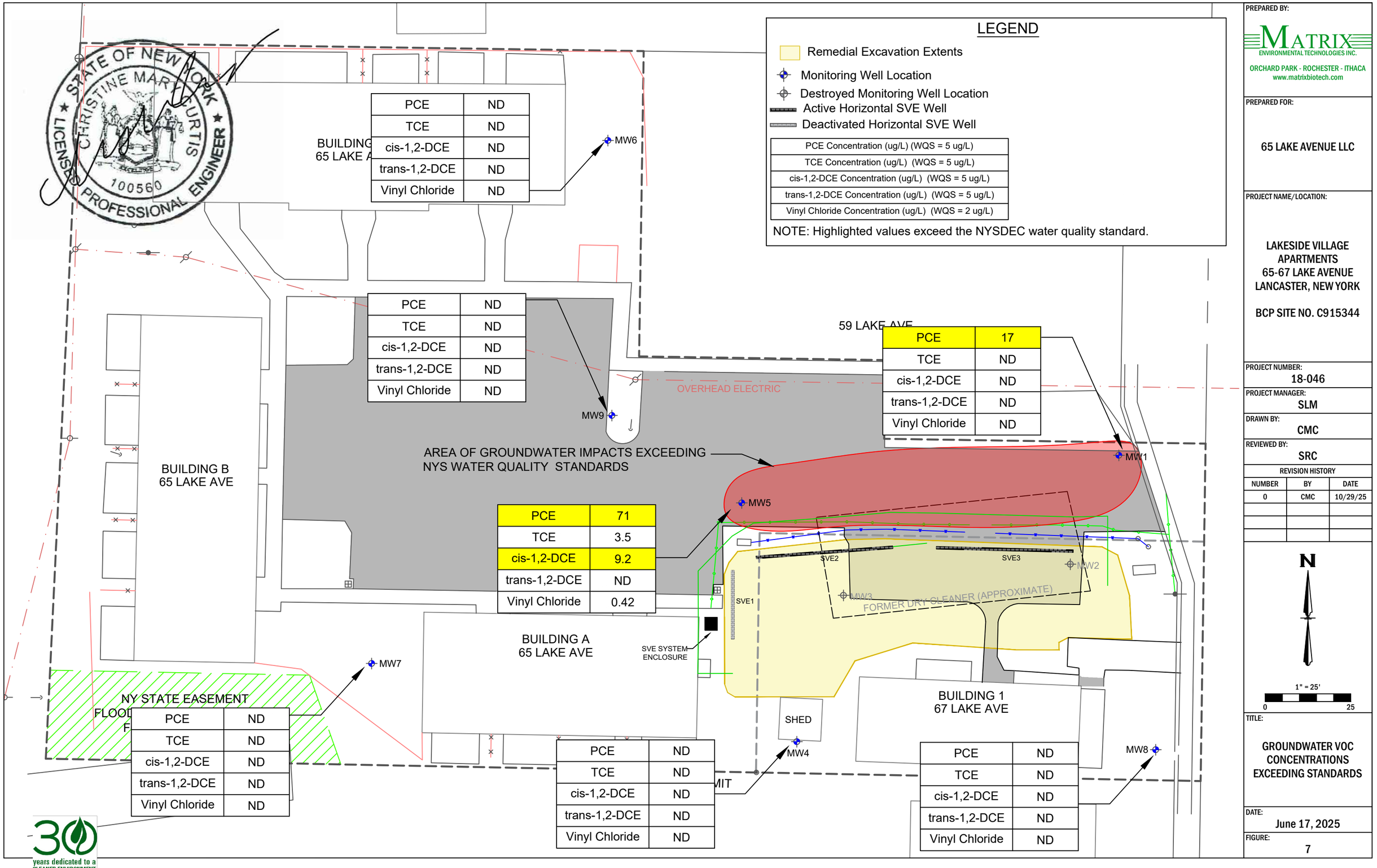
N

1" = 28'
0 28

TITLE:
SOIL BORING LOCATIONS AND POST-REMEDIATION EXCEEDANCES OF PROTECTION OF GROUNDWATER SCOs IN SOIL

DATE: AS NOTED

FIGURE: 6



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PROJECT NAME/LOCATION:
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65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	10/29/25

TITLE:
GROUNDWATER VOC CONCENTRATIONS EXCEEDING STANDARDS

DATE: June 17, 2025
FIGURE: 7

LEGEND

- Monitoring Well Location
- Destroyed Monitoring Well Location
- BCP Cleanup Track 1 Area (NYS Easement)
- IC Boundary (Environmental Easement)

NOTE: All other areas of the Site not designated as Track 1 or Track 4 are BCP Cleanup Track 2.

BUILDING C
65 LAKE AVE

MW6

59 LAKE AVE

OVERHEAD ELECTRIC

OVERHEAD ELECTRIC

MW9

MW1

BUILDING B
65 LAKE AVE

MW5

MW2

MW3

FORMER DRY CLEANER (APPROXIMATE)

BUILDING A
65 LAKE AVE

SVE SYSTEM ENCLOSURE

MW7

NY STATE EASEMENT
FLOOD PROTECTION PROJECT
FOR CAYUGA CREEK

SHED

MW4

BUILDING 1
67 LAKE AVE

MW8

BCP SITE LIMIT

69 LAKE AVE

STATE OF NEW YORK
CHRISTINE MARIE KURTIS
100560
LICENSED PROFESSIONAL ENGINEER

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:
MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	12/2/25

N

1" = 25'
0 25

TITLE:
INSTITUTIONAL CONTROL BOUNDARIES

DATE:

FIGURE: 8

LEGEND

- Monitoring Well Location
- Destroyed Monitoring Well Location
- Active Horizontal SVE Well (EC)
- Deactivated Horizontal SVE Well (EC)
- SVE System Process Piping
- BCP Cleanup Track 1 Area (NYS Easement)
- BCP Cleanup Track 4 Area - Cover System (Asphalt Pavement; approx. 10")
- BCP Cleanup Track 4 Area - Cover System (Min. 24" Clean Soil)
- BCP Cleanup Track 4 Area - Cover System (Excavation Area; 7' Clean Fill)
- SSD Systems Treatment Area (EC)
- SSD System Vapor Extraction Point (EC)
- SSD System Vapor Monitoring Point (EC)

BUILDING C
65 LAKE AVE

MW6

OVERHEAD ELECTRIC

OVERHEAD ELECTRIC

59 LAKE AVE

MW9

MW1

BUILDING B
65 LAKE AVE

MW5

SVE2

SVE3

MW2

SVE1

MW3

FORMER DRY CLEANER (APPROXIMATE)

A4-M1 A3-M1 A2-M1 A1-M1

BUILDING A
65 LAKE AVE

SVE SYSTEM ENCLOSURE

MW7

VP-A4 VP-A3 VP-A2 VP-A1

A4-M2 A4 FAN A3-M2 A3 FAN A2-M2 A2 FAN A1-M2 A1 FAN

NY STATE EASEMENT
FLOOD PROTECTION PROJECT
FOR CAYUGA CREEK

M1 M2

VP-1 FAN
SHED VP-1 FAN
VP-1 FAN

BUILDING 1
67 LAKE AVE

VP-1 VP-2 VP-3

MW4

M3 M4

MW8

BCP SITE LIMIT

69 LAKE AVE

STATE OF NEW YORK
CHRISTINE MARIE URTIS
LICENSED PROFESSIONAL ENGINEER
100560

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

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65 LAKE AVENUE LLC

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BCP SITE NO. C915344

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PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	12/2/25

N

1" = 25'
0 25

TITLE:
ENGINEERING CONTROLS

DATE:

FIGURE: 9

APPENDIX A – ENVIRONMENTAL EASEMENT

THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL EASEMENT HELD BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PURSUANT TO TITLE 36 OF ARTICLE 71 OF THE NEW YORK ENVIRONMENTAL CONSERVATION LAW. THE ENGINEERING AND INSTITUTIONAL CONTROLS FOR THIS EASEMENT ARE SET FORTH IN THE SITE MANAGEMENT PLAN (SMP). A COPY OF THE SMP MUST BE OBTAINED BY ANY PARTY WITH AN INTEREST IN THE PROPERTY. THE SMP CAN BE OBTAINED FROM NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION, DIVISION OF ENVIRONMENTAL REMEDIATION, SITE CONTROL SECTION, 625 BROADWAY, ALBANY, NY 12233 OR AT DERWEB@DEC.NY.GOV.

GENERAL NOTES:

1. HORIZONTAL DATUM IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83) AS ESTABLISHED BY UTILIZING THE NEW YORK STATE DEPARTMENT OF TRANSPORTATIONS REAL TIME NETWORK (NYSnet).
2. VERTICAL DATUM IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD83) AS ESTABLISHED BY UTILIZING NYSnet
3. CURRENT DEEDS OF RECORD:
   -LIBER 11096, PAGE 6981 = 65 LAKE AVENUE
   ABSTRACT No. 81117536 BY STEWART TITLE INSURANCE COMPANY
   DATED AUGUST 27, 2020
   -LIBER 11149, PAGE 3828 = 67 LAKE AVENUE
   ABSTRACT No. 81117534 BY STEWART TITLE INSURANCE COMPANY
   DATED AUGUST 27, 2020
4. ACREAGE:
   -65 LAKE AVENUE = 1.01 ACRES
   -67 LAKE AVENUE = 0.21 ACRES
   -TOTAL ACREAGE = 1.22 ACRES
5. UTILITIES SHOWN FROM EVIDENCE LOCATED IN THE FIELD AND AS MARKED BY OTHERS.
6. LIMITS OF EXCAVATION IS SHOWN FROM EVIDENCE IN THE FIELD AND AS MARKED BY OTHERS.

65 LAKE AVENUE IS SUBJECT TO:

- NEW YORK STATE ELECTRIC & GAS CORPORATION EASEMENT L-4224, P-181
- A NOTICE OF APPROPRIATION; A PERMANENT EASEMENT TO THE PEOPLE OF THE STATE OF NEW YORK (SHOWN HEREON) L-4339, P-386
- NEW YORK STATE ELECTRIC & GAS CORPORATION EASEMENT L-7307, P-367
- IROQUOIS GAS CORPORATION RIGHT-OF-WAY L-8023, P-99
- ERIE COUNTY WATER AUTHORITY PERMANENT EASEMENT L-11100, P-2910
- NATIONAL FUEL GAS DISTRIBUTION CORPORATION RIGHT OF WAY AGREEMENT L-11106, P-8339
- NEW YORK STATE ELECTRIC & GAS CORPORATION EASEMENT L-11107, P-5464

67 LAKE AVENUE IS SUBJECT TO:

- NEW YORK STATE ELECTRIC & GAS CORPORATION EASEMENT L-4224, P-181
- NEW YORK STATE ELECTRIC & GAS CORPORATION EASEMENT L-7307, P-367
- IROQUOIS GAS CORPORATION RIGHT OF WAY L-8023, P-99

PROPOSED LEGAL DESCRIPTION FOR 65 LAKE AVENUE :

ALL THAT TRACT OR PARCEL OF LAND SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 1, SECTION 10, TOWNSHIP 11 AND RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF LOT 1, DISTANT 112.35 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, SAID POINT OF BEGINNING ALSO BEING THE NORTHEAST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3706 OF DEEDS AT PAGE 49;

THENCE WESTERLY AT RIGHT ANGLES WITH THE EAST LINE OF LOT 1, A DISTANCE OF 94.00 FEET, TO A POINT;

THENCE NORTHERLY AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 23.00 FEET, TO A POINT;

THENCE WESTERLY AT RIGHT ANGLES, A DISTANCE OF 72.00 FEET, TO A POINT;

THENCE NORTHERLY AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 89.25 FEET, TO A POINT IN A BOUNDARY LINE ESTABLISHED BY AGREEMENT RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3360 OF DEEDS AT PAGE 376;

THENCE WESTERLY ALONG SAID BOUNDARY LINE, A DISTANCE OF 164.71 FEET, TO A POINT IN THE EAST LINE OF LANDS FORMERLY OWNED BY JOHN DINWOODIE;

THENCE SOUTHERLY ALONG THE EAST LINE OF DINWOODIE, A DISTANCE OF 209.45 FEET, TO A POINT IN THE NORTH LINE OF LANDS FORMERLY OWNED BY EBENEZER BRIGGS, JR., SAID POINT ALSO BEING THE SOUTHWEST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED MENTIONED AFORESAID;

THENCE EASTERLY ALONG THE SOUTH LINE OF LANDS CONVEYED TO YOUNG, AND THE NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, AS AFORESAID, A DISTANCE OF 207.65 FEET, TO A POINT, A DISTANCE OF 130.0 FEET WESTERLY FROM THE EAST LINE OF LOT 1, AS MEASURED ALONG THE SAID NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS;

THENCE NORTHERLY AT AN INTERIOR ANGLE OF 89°-45'-04" AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 70.00 FEET, TO A POINT;

THENCE EASTERLY ON A LINE PARALLEL WITH THE SAID NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, 130.00 FEET TO A POINT ON THE EAST LINE OF LOT 1;

THENCE NORTHERLY ALONG THE EAST LINE OF LOT 1, 28.65 FEET, TO THE POINT OF BEGINNING. CONTAINING 1.01 ACRES OF LAND, MORE OR LESS.

PROPOSED LEGAL DESCRIPTION FOR 67 LAKE AVENUE :

ALL THAT TRACT OR PARCEL OF LAND SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 1, SECTION 10, TOWNSHIP 11 AND RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF LOT 1 AT ITS INTERSECTION WITH THE NORTH LINE OF LANDS CONVEYED TO EBENEZER BRIGGS, JUNIOR BY DEED RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 227 OF DEEDS AT PAGE 45, SAID POINT BEING 211.0 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, AS MEASURED ALONG THE EAST LINE OF LOT 1;

THENCE WESTERLY ALONG THE NORTH LINE OF LAND SO CONVEYED TO BRIGGS, A DISTANCE OF 130.0 FEET, TO A POINT;

THENCE NORTHERLY ON A LINE PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 70.0 FEET, TO A POINT;

THENCE EASTERLY ON A LINE PARALLEL WITH THE NORTH LINE OF LANDS SO CONVEYED TO BRIGGS, A DISTANCE OF 130.0 FEET, TO A POINT IN THE EAST LINE OF LOT 1;

THENCE SOUTHERLY ALONG THE EAST LINE OF LOT 1, A DISTANCE OF 70.0 FEET, TO THE POINT OF BEGINNING. CONTAINING 0.21 ACRES OF LAND, MORE OR LESS.

PROPOSED LEGAL DESCRIPTION FOR TRACK 2 (WHOLE SITE EXCLUDING TRACT 1 & 4):

ALL THAT TRACT OR PARCEL OF LAND SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 1, SECTION 10, TOWNSHIP 11 AND RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF LOT 1, DISTANT 112.35 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, SAID POINT OF BEGINNING ALSO BEING THE NORTHEAST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3706 OF DEEDS AT PAGE 49;

THENCE WESTERLY AT RIGHT ANGLES WITH THE EAST LINE OF LOT 1, A DISTANCE OF 94.00 FEET, TO A POINT;

THENCE NORTHERLY AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 23.00 FEET, TO A POINT;

THENCE WESTERLY AT RIGHT ANGLES, A DISTANCE OF 72.00 FEET, TO A POINT;

THENCE NORTHERLY AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 89.25 FEET, TO A POINT IN A BOUNDARY LINE ESTABLISHED BY AGREEMENT RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3360 OF DEEDS AT PAGE 376;

THENCE, S 89°-10'-20" E, ALONG SAID BOUNDARY LINE, A DISTANCE OF 164.71 FEET, TO A POINT IN THE EAST LINE OF LANDS FORMERLY OWNED BY JOHN DINWOODIE;

THENCE, S 00°-45'-37" E, ALONG THE EAST LINE OF DINWOODIE, A DISTANCE OF 183.54 FEET, TO A POINT;

THENCE, S 88°-53'-19" E, A DISTANCE OF 75.88 FEET, TO A POINT;

THENCE, S 19°-19'-15" E, A DISTANCE OF 27.64 FEET, TO A POINT ON THE NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, AS AFORESAID,

THENCE EASTERLY, A DISTANCE OF 251.37 FEET, ALONG THE NORTH LINE OF LANDS FORMALLY OWNED BY BRIGGS, TO A POINT ON THE EAST LINE OF LOT 1;

THENCE, N 00°-51'-45" E AND ALONG THE EAST LINE OF LOT 1, A DISTANCE OF 98.65 FEET, TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM TRACT 4:

COMMENCING IN THE EAST LINE OF LOT NO. 1 AND 28.65 FEET SOUTH OF THE NORTHEAST CORNER OF ROBERT YOUNG BY DEED RECORDED IN ERIE COUNTY CLERK'S OFFICE IN LIBER 3706 OF DEEDS AT PAGE 49, SAID POINT BEING 141.0 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, AS MEASURED ALONG THE EAST LINE OF LOT NO. 1, SAID POINT ALSO BEING THE NORTH WEST CORNER OF LANDS CONVEYED TO 65 LAKE AVENUE LLC BY DEED AS RECORDED IN ERIE COUNTY CLERK'S OFFICE IN LIBER 11149 OF DEEDS AT PAGE 3828;

THENCE, N 88°-53'-19" W, A DISTANCE OF 30.35 FEET, TO THE POINT OF BEGINNING OF TRACK 4;

THENCE, N 00°-00'-00" W, A DISTANCE OF 12.25 FEET, TO A POINT;

THENCE, N 90°-00'-00" W, A DISTANCE OF 81.00 FEET, TO A POINT;

THENCE, S 00°-00'-00" W, A DISTANCE OF 15.00 FEET, TO A POINT;

THENCE, N 90°-00'-00" E, A DISTANCE OF 21.00 FEET, TO A POINT;

THENCE, S 00°-00'-00" W, A DISTANCE OF 4.00 FEET, TO A POINT;

THENCE, N 90°-00'-00" E, A DISTANCE OF 102.00 FEET, TO A POINT;

THENCE, N 00°-00'-00" W, A DISTANCE OF 6.75 FEET, TO THE POINT OF BEGINNING OF TRACK 4. CONTAINING 1623 SQUARE FEET, ±0.037 AC.

DEED DESCRIPTION - 65 LAKE AVENUE - LANCASTER, NY
BOOK: 11096, PAGE: 6981

ALL THAT TRACT OR PARCEL OF LAND, SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 1, SECTION 10, TOWNSHIP 11 AND RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF LOT NO. 1, DISTANT 112.35 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, SAID POINT OF BEGINNING ALSO BEING THE NORTHEAST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED RECORDED IN ERIE COUNTY CLERK'S OFFICE IN LIBER 3706 OF DEEDS AT PAGE 49; THENCE WESTERLY AT RIGHT ANGLES WITH THE EAST LINE OF LOT NO. 1, 94 FEET TO A POINT; THENCE NORTHERLY AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT NO. 1, 23 FEET TO A POINT; THENCE WESTERLY AT RIGHT ANGLES, 72 FEET TO A POINT; THENCE NORTHERLY AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT NO. 1, 89.25 FEET TO A POINT IN A BOUNDARY LINE ESTABLISHED BY AGREEMENT RECORDED IN ERIE COUNTY CLERK'S OFFICE IN LIBER 3360 OF DEEDS AT PAGE 376; THENCE WESTERLY ALONG SAID BOUNDARY LINE, 164.71 FEET TO A POINT IN THE EAST LINE OF LANDS FORMERLY OWNED BY JOHN DINWOODIE; THENCE SOUTHERLY ALONG THE EAST LINE OF LANDS FORMERLY OWNED BY JOHN DINWOODIE, 208.37 FEET TO THE NORTH LINE OF LANDS FORMERLY OWNED BY EBENEZER BRIGGS, JR., SAID POINT ALSO BEING THE SOUTHWEST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED AFORESAID; THENCE EASTERLY ALONG THE SOUTH LINE OF LANDS SO CONVEYED TO YOUNG AND THE NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, AS AFORESAID, 207.65 FEET A POINT DISTANCE 130 FEET WESTERLY FROM THE EAST LINE OF LOT NO. 1, AS MEASURED ALONG THE SAID NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS; THENCE NORTHERLY AT AN INTERIOR ANGLE OF 89°-45'-03" AND PARALLEL WITH THE EAST LINE OF LOT NO. 1, 70 FEET TO A POINT; THENCE EASTERLY ON A LINE PARALLEL WITH THE SAID NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, 130 FEET TO A POINT IN THE EAST LINE OF LOT NO. 1; THENCE NORTHERLY ALONG THE EAST LINE OF LOT NO. 1, 28.65 FEET TO THE POINT OF BEGINNING.

DEED DESCRIPTION - 67 LAKE AVENUE - LANCASTER, NY
BOOK: 11149, PAGE: 3828

ALL THAT TRACT OR PARCEL OF LAND, SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT NO. 1, SECTION 10, TOWNSHIP 11, RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING IN THE EAST LINE OF LOT NO. 1 AT ITS INTERSECTION WITH THE NORTH LINE OF LANDS CONVEYED TO EBENEZER BRIGGS, JUNIOR BY DEED RECORDED IN ERIE COUNTY CLERK'S OFFICE IN LIBER 227 OF DEEDS AT PAGE 45, SAID POINT BEING 211 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, AS MEASURED ALONG THE EAST LINE OF LOT NO. 1; THENCE WESTERLY ALONG THE NORTH LINE OF LANDS SO CONVEYED TO BRIGGS, 130 FEET; THENCE NORTHERLY ON A LINE PARALLEL WITH THE EAST LINE OF LOT NO. 1, 70 FEET; THENCE EASTERLY ON A LINE PARALLEL WITH THE NORTH LINE OF LANDS SO CONVEYED TO BRIGGS, 130 FEET TO A POINT IN THE EAST LINE OF LOT NO. 1; THENCE SOUTHERLY ALONG THE EAST LINE OF LOT NO. 1, 70.0 FEET TO THE POINT OF BEGINNING.

PROPOSED LEGAL DESCRIPTION "ENVIRONMENTAL EASEMENT AREA":

ALL THAT TRACT OR PARCEL OF LAND SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 1, SECTION 10, TOWNSHIP 11 AND RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF LOT 1, DISTANT 112.35 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, SAID POINT OF BEGINNING ALSO BEING THE NORTHEAST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3706 OF DEEDS AT PAGE 49;

THENCE WESTERLY, AT RIGHT ANGLES WITH THE EAST LINE OF LOT 1, A DISTANCE OF 94.00 FEET, TO A POINT;

THENCE NORTHERLY, AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 23.00 FEET, TO A POINT;

THENCE WESTERLY, AT RIGHT ANGLES, A DISTANCE OF 72.00 FEET, TO A POINT;

THENCE NORTHERLY, AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 89.25 FEET, TO A POINT IN A BOUNDARY LINE ESTABLISHED BY AGREEMENT RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3360 OF DEEDS AT PAGE 376;

THENCE WESTERLY, ALONG SAID BOUNDARY LINE, A DISTANCE OF 164.71 FEET; S 89°-10'-20" E TO A POINT IN THE EAST LINE OF LANDS FORMERLY OWNED BY JOHN DINWOODIE;

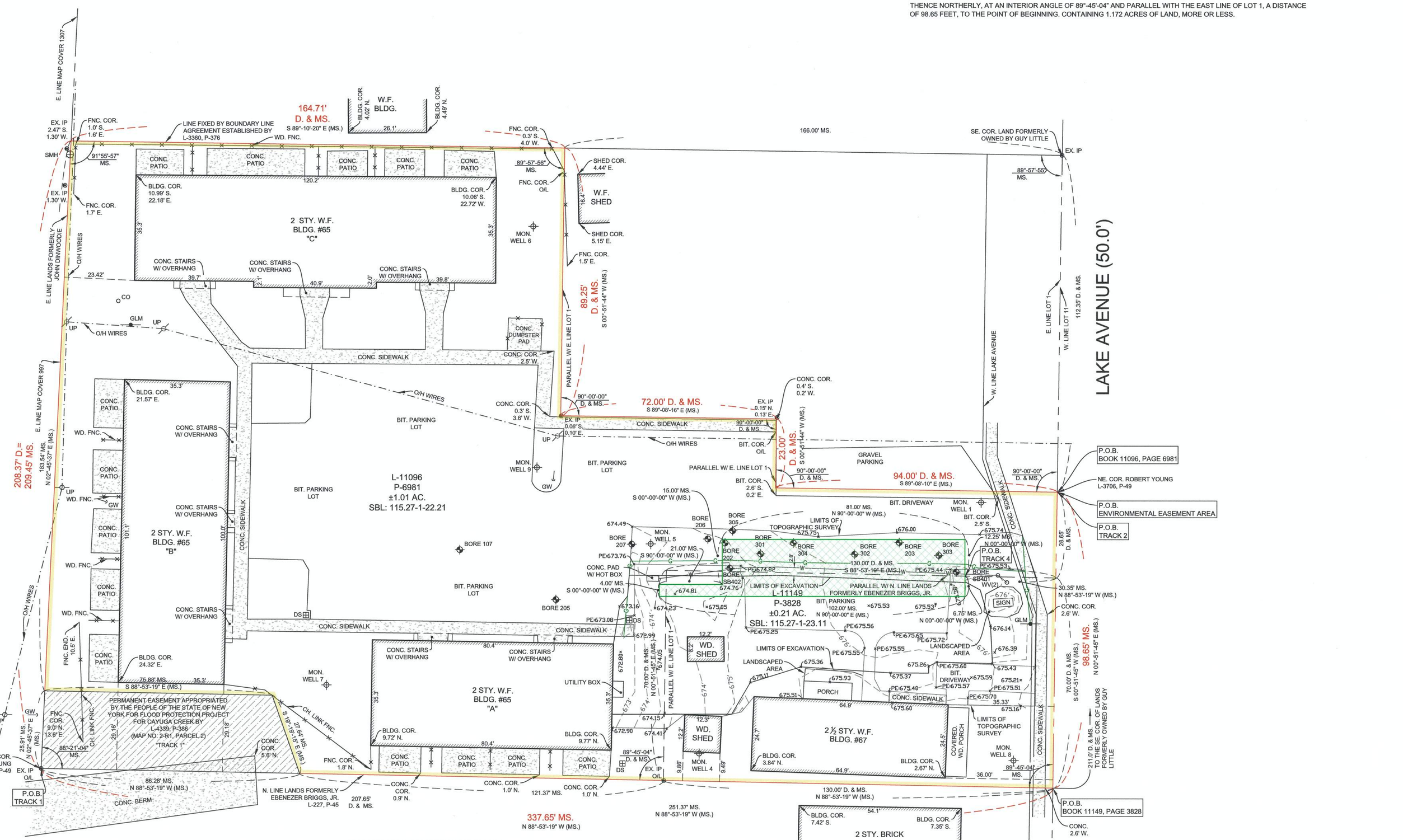
THENCE SOUTHERLY, ALONG THE EAST LINE OF DINWOODIE, A DISTANCE OF 183.54 FEET; S 02°-45'-37" E, TO A POINT;

THENCE EASTERLY A DISTANCE OF 75.88 FEET; S 88°-53'-19" E TO A POINT;

THENCE SOUTHEASTERLY, A DISTANCE OF 27.64 FEET; S 19°-19'-15" E TO A POINT ON THE NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, AS AFORESAID,

THENCE EASTERLY, A DISTANCE OF 251.37 FEET ALONG THE NORTH LINE OF LANDS FORMALLY OWNED BY BRIGGS, TO A POINT ON THE EAST LINE OF LOT 1;

THENCE NORTHERLY, AT AN INTERIOR ANGLE OF 89°-45'-04" AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 98.65 FEET, TO THE POINT OF BEGINNING. CONTAINING 1.172 ACRES OF LAND, MORE OR LESS.


N
E. LINE MAP COVER 1307
EX. IP 2.47' S. 1.30' W.
FNC. COR. 1.0' S. 1.6' E.
SMH
91°55'-57" MS.
EX. IP 1.30' W.
FNC. COR. 1.7' E.
E. LINE LANDS FORMERLY JOHN DINWOODIE
O/H WIRES
164.71' D. & MS. S 89°-10'-20" E (MS.)
BLDG. COR. 4.02' N.
W.F. BLDG.
26.1'
LINE FIXED BY BOUNDARY LINE AGREEMENT ESTABLISHED BY L-3360, P-376
WD. FNC.
CONC. PATIO
120.2'
BLDG. COR. 10.99' S. 22.18' E.
BLDG. COR. 10.06' S. 22.72' W.
2 STY. W.F. BLDG. #65 "C"
35.3'
23.4'Z
CONC. STAIRS W/ OVERHANG
39.7'
40.9'
39.6'
GLM
UP
CONC. SIDEWALK
CONC. DUMPSTER PAD
CONC. COR. 2.9' W.
FNC. COR. 0.3' S. 4.0' W.
SHED COR. 4.44' E.
89°-57'-58" MS.
W.F. SHED
MON. WELL 6
SHED COR. 5.15' E.
FNC. COR. 1.5' E.
89.25' D. & MS. S 00°-51'-44" W (MS.)
PARALLEL W/ E. LINE LOT 1
166.00' MS.
SE. COR. LAND FORMERLY OWNED BY GUY LITTLE
EX. IP
89°-57'-55" MS.
E. LINE LOT 1
W. LINE LOT 11
112.35' D. & MS.
W. LINE LAKE AVENUE
LAKE AVENUE (50.0')
E. LINE MAP COVER 997
208.37' D.= 209.45' MS.
183.54' MS. N 02°-45'-37" E (MS.)
BLDG. COR. 21.57' E.
36.3'
WD. FNC.
CONC. PATIO
CONC. STAIRS W/ OVERHANG
CONC. SIDEWALK
2 STY. W.F. BLDG. #65 "B"
100.1'
BIT. PARKING LOT
L-11096 P-6981 ±1.01 AC. SBL: 115.27-1-22.21
72.00' D. & MS. S 89°-08'-16" E (MS.)
90°-00'-00" D. & MS.
EX. IP 0.15' N. 0.13' E.
CONC. COR. 0.4' S. 0.2' W.
CONC. SIDEWALK
EX. IP 0.06' S. 0.10' E.
CONC. COR. 0.3' S. 3.6' W.
CONC. COR. O/L
BIT. COR. O/L
PARALLEL W/ E. LINE LOT 1
BIT. COR. 2.6' S. 0.2' E.
23.00' D. & MS. S 00°-51'-44" W (MS.)
GRAVEL PARKING
94.00' D. & MS. S 89°-08'-16" E (MS.)
P.O.B. BOOK 11096, PAGE 6981
NE. COR. ROBERT YOUNG L-3706, P-49
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65 Lake Avenue, LLC
Lakeside Village Apartments
32 Central Avenue
Lancaster, New York 14086

PHONE: (716) 432-9532 • FAX: (716) 681-8512

Notice to Municipality

December 30, 2025

Mayor William Schroeder and Village Board of Trustees
Village of Lancaster
5423 Broadway
Lancaster, New York 14086

Re: Amended Environmental Easement

Dear Mayor Schroeder and Village Board:

Attached please find a copy of an amended environmental easement granted to the New York State Department of Environmental Conservation ("Department") on September 17, 2025 by 65 Lake Avenue LLC, for property at 65-67 Lake Avenue, Lancaster, New York 14086 Tax Map No's.115.27-1-22.21 & 115.27-1-23.11, DEC Site No: C915344.

This Environmental Easement restricts future use of the above-referenced property to restricted residential, commercial and/or industrial uses. Any on-site activity must be done in accordance with the Environmental Easement and the Site Management Plan which is incorporated into the Environmental Easement. Department approval is also required prior to any groundwater use.)

Article 71, Section 71-3607 of the New York State Environmental Conservation Law requires that:

1. Whenever the department is granted an environmental easement, it shall provide each affected local government with a copy of such easement and shall also provide a copy of any documents modifying or terminating such environmental easement.

2. Whenever an affected local government receives an application for a building permit or any other application affecting land use or development of land that is subject to an environmental easement and that may relate to or impact such easement, the affected local government shall notify the department and refer such application to the department. The department shall evaluate whether the application is consistent with the environmental easement and shall notify the affected local government of its determination in a timely fashion, considering the

time frame for the local government's review of the application. The affected local government shall not approve the application until it receives approval from the department.

An electronic version of every environmental easement that has been accepted by the Department is available to the public at: http://www.dec.ny.gov/chemical/36045.html. Please forward this notice to your building and/or planning departments, as applicable, to ensure your compliance with these provisions of New York State Environmental Conservation Law. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,

Mark Aquino
Managing Member, 65 Lake Avenue LLC

MICHAEL P. KEARNS, ERIE COUNTY CLERK
REF:

DATE:12/30/2025
TIME:12:24:09 PM
RECEIPT: 25221635

LAW OFFICE OF MARK AQUINO
ACCOUNT #: 9897

ITEM - 01 MTP
RECD: 12/30/2025 12:29:40 PM
FILE: 2025236035 BK/PG D 11455/2779
Deed Sequence: TT2025010605
65 LAKE AVENUE LLC

Recording Fees		75.50
TP584		10.00
Subtotal	85.50	

TOTAL DUE	$85.50
PAID TOTAL	$85.50
PAID CHECK	$85.50

County: Erie Site No.: C915344 Brownfield Cleanup Agreement Index: C915344-11-19

AMENDMENT TO ENVIRONMENTAL EASEMENT

This Amendment to Environmental Easement is made as of this 10th day of December, 2025, by and between The People of the State of New York, acting through their Commissioner of the Department of Environmental Conservation ("NYSDEC" or the "Department") with its headquarters located at 625 Broadway, Albany, New York 12233, and 65 Lake Avenue LLC (the "Grantor") with its offices located at 32 Central Avenue, Lancaster, NY.

RECITALS

1. Grantor, 65 Lake Avenue LLC, is the owner of real property located at the address of 65-67 Lake Avenue in the Village of Lancaster, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel number: Section 115.27 Block 1 Lot 22.21 & 23.11, being the same as that property conveyed to Grantor by deed dated June 13, 2005 and recorded in the Erie County Clerk's Office in Liber and Page 11096/6981.

2. The Department and Grantor entered into that certain Environmental Easement ("Easement Agreement") dated as of September 11, 2025 and recorded in the County Clerk's Office as Liber and Page 11450/7135. Capitalized terms used herein without definition have the meanings ascribed to them in the Environmental Easement Agreement.

3. The Controlled Property under the Environmental Easement referenced above comprises approximately 1.172 +/- acres, and is hereinafter more fully described in Schedule A.

4. Pursuant to Section 1, 2, 3, 4, and 5 of the Easement Agreement, Grantor granted the Department rights and interests that run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of the Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of maintenance, monitoring or operation requirements; and to ensure the potential restriction of future uses of the land that are inconsistent with the stated purpose.

5. The Easement Agreement dated September 11, 2025 erroneously stated in the fourth WHEREAS paragraph and in the Schedule A Easement Description that the acreage of the Controlled Property was 1.01 acres.

6. This Amendment to Environmental Easement is filed solely in order to correct a mutual mistake between the Department and Grantor relating to the acreage of the Controlled Property in the fourth WHEREAS paragraph and in the Schedule A Easement Description of that Environmental Easement dated September 11, 2025 and recorded in the in the County Clerk's Office as Liber and Page 11450/7135.

7. Pursuant to Section 8 of the Easement Agreement, the Department agrees to amend the Easement Agreement in the manner prescribed by Article 9 of the Real Property Law.

AMENDMENT OF ENVIRONMENTAL EASEMENT

A. The above recitals are hereby incorporated into this Amendment of Environmental Easement.

B. The Department and Grantor hereby agree that the fourth WHEREAS paragraph of the Environmental Easement is hereby amended to read as follows:

"**WHEREAS,** Grantor, is the owner of real property located at the address of 65-67 Lake Avenue in the Village of Lancaster, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel number: Section 115.27 Block 1 Lots 22.21 & 23.11, being the same as that property conveyed to Grantor by deed dated June 13, 2005 and recorded in the Erie County Clerk's Office in Liber and Page 11096/6981 and by deed dated August 29, 2008 and recorded in the Erie County Clerk's Office in Liber and Page 11149/3828. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately **1.172 +/- acres**, and is hereinafter more fully described in the Land Title Survey dated June 18, 2024, and last revised December 4, 2025, prepared by Richard Nathan Johnson, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and"

C. The Department and Grantor hereby agree that Schedule A of the Environmental Easement is hereby amended to the attached **Schedule A.**

D. All other terms of the September 11, 2025 Environmental Easement shall remain in effect.

E. This Amendment of Environmental Easement inures to and binds the parties hereto and their respective successors and assigns.

F. This Amendment of Environmental Easement shall be governed by and interpreted in accordance with the laws of the State of New York.

IN WITNESS WHEREOF, Grantor has caused this Amendment to Environmental Easement to be signed in its name.

65 Lake Avenue LLC:

By: _____

Print Name: MARK AQUINO

Title: MEMBER Date: 12-15-2026

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF)

On the 15 day of December, in the year 20 25, before me, the undersigned, personally appeared Mark Aquino, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

Michael Paul Musialowski
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 02MU6416293
Qualified in Erie County
Commission Expires 04/12/2029

County: Erie Site No.: C915344 Brownfield Cleanup Agreement Index: C915344-11-19

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

By: Andrew Guglielmi
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 10th day of December, in the year 2025, before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Cheryl A. Salem
Notary Public - State of New York

Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

SCHEDULE "A" PROPERTY DESCRIPTION

Easement Description

ALL THAT TRACT OR PARCEL OF LAND SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 1, SECTION 10, TOWNSHIP 11 AND RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF LOT 1, DISTANT 112.35 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, SAID POINT OF BEGINNING ALSO BEING THE NORTHEAST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3706 OF DEEDS AT PAGE 49;

THENCE WESTERLY, AT RIGHT ANGLES WITH THE EAST LINE OF LOT 1, A DISTANCE OF 94.00 FEET, TO A POINT;

THENCE NORTHERLY, AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 23.00 FEET, TO A POINT;

THENCE WESTERLY, AT RIGHT ANGLES, A DISTANCE OF 72.00 FEET, TO A POINT;

THENCE NORTHERLY, AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 89.25 FEET, TO A POINT IN A BOUNDARY LINE ESTABLISHED BY AGREEMENT RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3360 OF DEEDS AT PAGE 376;

THENCE WESTERLY, ALONG SAID BOUNDARY LINE, A DISTANCE OF 164.71 FEET; S 89°-10'-20" E TO A POINT IN THE EAST LINE OF LANDS FORMERLY OWNED BY JOHN DINWOODIE;

THENCE SOUTHERLY, ALONG THE EAST LINE OF DINWOODIE, A DISTANCE OF 183.54 FEET; S 02°-45'-37" E, TO A POINT;

THENCE EASTERLY A DISTANCE OF 75.88 FEET; S 88°-53'-19" E TO A POINT;

THENCE SOUTHEASTERLY, A DISTANCE OF 27.64 FEET; S 19°-19'-15" E TO A POINT ON THE NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, AS AFORESAID,

THENCE EASTERLY, A DISTANCE OF 251.37 FEET ALONG THE NORTH LINE OF LANDS FORMALLY OWNED BY BRIGGS, TO A POINT ON THE EAST LINE OF LOT 1;

THENCE NORTHERLY, AT AN INTERIOR ANGLE OF 89°-45'-04" AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 98.65 FEET, TO THE POINT OF BEGINNING. CONTAINING **1.172 ACRES** OF LAND, MORE OR LESS.

Deed Description: Lot 115.27-1-22.21
ALL THAT TRACT OR PARCEL OF LAND situate in the Village and Town of Lancaster, County of Erie and State of New York, being part of Lot No. 1, Section 10, Township 11, Range 6 of the Holland Land Company's Survey, bounded and described as follows:

BEGINNING at a point in the east line of Lot No. 1, distant 112.35 feet southerly from the southeast corner of lands formerly owned by Guy Little, said point of beginning also being the northeast corner of lands conveyed to Robert Young by deed recorded in Erie County Clerk's Office in Liber 3706 of Deeds at page 49; thence westerly at right angles with the east line of Lot No. 1, 94 feet to a point; thence northerly at right angles and parallel with the east line of Lot No. 1, 23 feet to a point; thence westerly at right angles, 72 feet to a point; thence northerly at right angles and parallel with the east line of Lot No. 1, 89.25 feet to a point in a boundary line established by Agreement recorded in Erie County Clerk's Office in Liber 3360 of Deeds at page 376; thence westerly along said boundary line, 164.71 feet to a point in the east line of lands formerly owned by John Dinwoodie; thence southerly along the east line of lands formerly owned by John Dinwoodie, 208.37 feet to the north line of lands formerly owned by Ebenezer Briggs, Jr., said point also being the southwest corner of lands conveyed to Robert Young by deed aforesaid; thence easterly along the south line of lands so conveyed to Young and the north line of lands formerly owned by Briggs, as aforesaid, 207.65 feet to a point distant 130 feet westerly from the east line of Lot No. 1, as measured along the said north line of lands formerly owned by Briggs; thence northerly at an interior angle of 89° 45' 03" and parallel with the east line of Lot No. 1, 70 feet to a point; thence easterly on a line parallel with the said north line of lands formerly owned by Briggs, 130 feet to a point in the east line of Lot No. 1; thence northerly along the east line of Lot No. 1, 28.65 feet to the point of beginning.

Deed Description: Lot 115.27-1-23.11
ALL THAT TRACT OR PARCEL OF LAND situate in the Village and Town of Lancaster, County of Erie and State of New York, being part of Lot No. 1, Section 10, Township 11, Range 6 of the Holland Land Company's Survey, bounded and described as follows:

BEGINNING in the east line of Lot No. 1 at its intersection with the north line of lands conveyed to Ebenezer Briggs, Junior by deed recorded in Erie County Clerk's Office in Liber 227 of Deeds at page 45, said point being 211 feet southerly from the southeast corner of lands formerly owned by Guy Little, as measured along the east line of Lot No. 1; thence westerly along the north line of lands so conveyed to Briggs, 130 feet; thence northerly on a line parallel with the east line of Lot No. 1, 70 feet; thence easterly on a line parallel with the north line of lands so conveyed to Briggs, 130 feet to a point in the east line of Lot No. 1; thence southerly along the east line of Lot No. 1, 70 feet to the point of beginning.

NEW YORK STATE | Department of Environmental Conservation

KATHY HOCHUL
Governor

AMANDA LEFTON
Commissioner

VIA FEDERAL EXPRESS

September 15, 2025

Mark Aquino
Attorney and Counselor at Law
32 Central Avenue
Lancaster, NY 14806

RE: Environmental Easement Package
Site Name: Lakeside Village Apartments
Site No.: C915344

Dear Mr. Aquino,

Enclosed please find a fully executed Environmental Easement and TP-584 tax form required for recording.

Once the Environmental Easement is recorded, the local municipality will need to be notified via Certified Mail, Return Receipt Requested.

Please return to my attention, copies of the recorded easement marked by the County Clerk's Office with the date and location of recording, and a certified copy of the municipal notices. The information from the recorded easement and notices are necessary to process the Certificate of Completion (COC).

A COC will not be issued until copies of the municipal notices are returned to the Office of General Counsel.

If you have any further questions or concerns relating to this matter, please contact our office at (518) 402-8393.

Sincerely,

Cheryl A. Salem
Legal Assistant II
Remediation Bureau
Cheryl.salem@dec.ny.gov

ec: B. Rashkow, NYSDEC

9589 0710 5270 1079 9512 09

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OFFICIAL USE

Certified Mail Fee	$5.30
Extra Services & Fees (check box, add fee as appropriate)	
☐ Return Receipt (hardcopy)	$ $0.00
☐ Return Receipt (electronic)	$ $0.00
☐ Certified Mail Restricted Delivery	$ $0.00
☐ Adult Signature Required	$ $0.00
☐ Adult Signature Restricted Delivery	$
Postage	$2.17
Total Postage and Fees	$11.87

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Postmark Here
10/08/2025

Sent To: VILLAGE OF LANCASTER
Street and Apt. No., or PO Box No.: 5423 BROADWAY
City, State, ZIP+4®: LANCASTER NY 14086

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

POSTAL SERVICE.

LANCASTER
5406 BROADWAY ST
LANCASTER, NY 14086-9998
www.usps.com

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(UP TO 25 ITEMS)

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PURCHASE DETAILS

Product	Qty	Unit Price	Price
#Cardinal#10R Env	1	$1.01	$1.01
First-Class Mail® Large Envelope	1		$2.17
Lancaster, NY 14086			
Weight:0 lb 2.90 oz			
Estimated Delivery Date			
Fri 10/10/2025			
Certified Mail®			$5.30
Tracking #:			
9589 0710 5270 1879 9512 09			
Return Receipt			$4.40
Tracking #:			
9590 9402 8322 4005 9098 47			
Affixed Postage			-$0.78
Affixed Amount: $0.78			
Total			$11.09
Grand Total:			$12.10
Cash			$20.00
Change			-$7.90

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65 Lake Avenue, LLC

Lakeside Village Apartments
32 Central Avenue
Lancaster, New York 14086

PHONE: (716) 432-9532 • FAX: (716) 681-8512

Notice to Municipality

October 7, 2025

Mayor William Schroeder and Village Board of Trustees
Village of Lancaster
5423 Broadway
Lancaster, New York 14086

Re: Environmental Easement

Dear Mayor Schroeder and Village Board:

Attached please find a copy of an environmental easement granted to the New York State Department of Environmental Conservation ("Department") on September 17, 2025 by 65 Lake Avenue LLC, for property at 65-67 Lake Avenue, Lancaster, New York 14086 Tax Map No's.115.27-1-22.21 & 115.27-1-23.11, DEC Site No: C915344.

This Environmental Easement restricts future use of the above-referenced property to restricted residential, commercial and/or industrial uses. Any on-site activity must be done in accordance with the Environmental Easement and the Site Management Plan which is incorporated into the Environmental Easement. Department approval is also required prior to any groundwater use.)

Article 71, Section 71-3607 of the New York State Environmental Conservation Law requires that:

> 1. Whenever the department is granted an environmental easement, it shall provide each affected local government with a copy of such easement and shall also provide a copy of any documents modifying or terminating such environmental easement.
>
> 2. Whenever an affected local government receives an application for a building permit or any other application affecting land use or development of land that is subject to an environmental easement and that may relate to or impact such easement, the affected local government shall notify the department and refer such application to the department. The department shall evaluate whether the application is consistent with the environmental easement and shall notify the affected local government of its determination in a timely fashion, considering the time frame for the local government's review of the application. The affected local government shall not approve the application until it receives approval from the department.

An electronic version of every environmental easement that has been accepted by the Department is available to the public at: http://www.dec.ny.gov/chemical/36045.html. Please forward this notice to your building and/or planning departments, as applicable, to ensure your compliance with these provisions of New York State Environmental Conservation Law. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,

Mark Aquino
Managing Member, 65 Lake Avenue LLC

MICHAEL P. KEARNS, ERIE COUNTY CLERK
REF:

DATE:9/17/2025
TIME:12:37:33 PM
RECEIPT: 25159974 - DUPLICATE -

LAW OFFICE OF MARK AQUINO
ACCOUNT #: 9897

DUPLICATE RECEIPT

ITEM - 01 785
RECD: 9/17/2025 12:51:29 PM
FILE: 2025170639 BK/PG D 11450/7135
Deed Sequence: TT2025003394
65 LAKE AVENUE LLC

Recording Fees		95.50
TP584		10.00
Subtotal	105.50	

TOTAL DUE	$105.50
PAID TOTAL	$105.50
PAID ESCROW	$105.50

REC BY: Lynn L
COUNTY RECORDER

ERIE COUNTY CLERK'S OFFICE

County Clerk's Recording Page

Return to:
BOX 384

Party 1:
65 LAKE AVENUE LLC

Party 2:

Book Type: D Book: 11450 Page: 7135
Page Count: 11
Doc Type: EASEMENT/RTWY
Rec Date: 09/17/2025
Rec Time: 12:51:29 PM
Control #: 2025170639
UserID: Lynn L
Trans #: 25159974
Document Sequence Number
TT2025003394

Recording Fees:

RECORDING	$75.00
COE CO $1 RET	$1.00
COE STATE $14.25 GEN	$14.25
COE STATE $4.75 RM	$4.75
TP584	$10.00
MARKOFF FEE	$0.50

Consideration Amount: 1.00

BASIC MT	$0.00
SONYMA MT	$0.00
ADDL MT/NFTA	$0.00
SP MT/M-RAIL	$0.00
NY STATE TT	$0.00
ROAD FUND TT	$0.00

Total: $105.50

STATE OF NEW YORK
ERIE COUNTY CLERK'S OFFICE

WARNING – THIS SHEET CONSTITUTES THE CLERK'S ENDORSEMENT REQUIRED BY SECTION 319&316-a (5) OF THE REAL PROPERTY LAW OF THE STATE OF NEW YORK. DO NOT DETACH. THIS IS NOT A BILL.

Michael P. Kearns
Erie County Clerk

BOX 384

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

THIS INDENTURE made this 11th day of September, 2025, between Owner, 65 Lake Avenue LLC, having an office at 32 Central Avenue, Lancaster, County of Erie, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

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

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

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

WHEREAS, Grantor, is the owner of real property located at the address of 65-67 Lake Avenue in the Village of Lancaster, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel number: Section 115.27 Block 1 Lots 22.21 & 23.11, being the same as that property conveyed to Grantor by deed dated June 13, 2005 and recorded in the Erie County Clerk's Office in Liber and Page 11096/6981 and by deed dated August 29, 2008 and recorded in the Erie County Clerk's Office in Liber and Page 11149/3828. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.01 +/- acres, and is hereinafter more fully described in the Land Title Survey dated June 18, 2024, and last revised August 7, 2025, prepared by Richard Nathan Johnson, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is

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LAN VLG

extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C915344-11-19, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

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

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

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

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

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

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

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

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

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining

contaminated material must be conducted in accordance with the SMP;

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

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

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

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

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

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

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

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

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation

Law.

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

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

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

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

(i) are in-place;

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

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

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

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

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

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

(7) the information presented is accurate and complete.

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

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

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

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

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against

the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

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

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

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

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

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

Parties shall address correspondence to:

Site Number: C915344
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

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

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

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the

recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

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

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

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

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

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

65 Lake Avenue LLC:

By: _____

Print Name: MARK AQUINO

Title: MANAGER Date: 9/5/2025

Grantor's Acknowledgment

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

On the 5th day of September, in the year 2025, before me, the undersigned, personally appeared MARK AQUINO personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

Michael Paul Musialowski
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 02MU6416293
Qualified in Erie County
Commission Expires 04/12/2029

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

By: _____
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 11th day of September in the year 2025 before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

SCHEDULE "A" PROPERTY DESCRIPTION

Easement Description

ALL THAT TRACT OR PARCEL OF LAND SITUATE IN THE VILLAGE AND TOWN OF LANCASTER, COUNTY OF ERIE AND STATE OF NEW YORK, BEING PART OF LOT 1, SECTION 10, TOWNSHIP 11 AND RANGE 6 OF THE HOLLAND LAND COMPANY'S SURVEY, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE EAST LINE OF LOT 1, DISTANT 112.35 FEET SOUTHERLY FROM THE SOUTHEAST CORNER OF LANDS FORMERLY OWNED BY GUY LITTLE, SAID POINT OF BEGINNING ALSO BEING THE NORTHEAST CORNER OF LANDS CONVEYED TO ROBERT YOUNG BY DEED RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3706 OF DEEDS AT PAGE 49;

THENCE WESTERLY, AT RIGHT ANGLES WITH THE EAST LINE OF LOT 1, A DISTANCE OF 94.00 FEET, TO A POINT;

THENCE NORTHERLY, AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 23.00 FEET, TO A POINT;

THENCE WESTERLY, AT RIGHT ANGLES, A DISTANCE OF 72.00 FEET, TO A POINT;

THENCE NORTHERLY, AT RIGHT ANGLES AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 89.25 FEET, TO A POINT IN A BOUNDARY LINE ESTABLISHED BY AGREEMENT RECORDED IN THE ERIE COUNTY CLERK'S OFFICE IN LIBER 3360 OF DEEDS AT PAGE 376;

THENCE WESTERLY, ALONG SAID BOUNDARY LINE, A DISTANCE OF 164.71 FEET; S 89°-10'-20" E TO A POINT IN THE EAST LINE OF LANDS FORMERLY OWNED BY JOHN DINWOODIE;

THENCE SOUTHERLY, ALONG THE EAST LINE OF DINWOODIE, A DISTANCE OF 183.54 FEET; S 02°-45'-37" E, TO A POINT;

THENCE EASTERLY A DISTANCE OF 75.88 FEET; S 88°-53'-19" E TO A POINT;

THENCE SOUTHEASTERLY, A DISTANCE OF 27.64 FEET; S 19°-19'-15" E TO A POINT ON THE NORTH LINE OF LANDS FORMERLY OWNED BY BRIGGS, AS AFORESAID, THENCE EASTERLY, A DISTANCE OF 251.37 FEET ALONG THE NORTH LINE OF LANDS FORMALLY OWNED BY BRIGGS, TO A POINT ON THE EAST LINE OF LOT 1;

THENCE NORTHERLY, AT AN INTERIOR ANGLE OF 89°-45'-04" AND PARALLEL WITH THE EAST LINE OF LOT 1, A DISTANCE OF 98.65 FEET, TO THE POINT OF BEGINNING. CONTAINING 1.01 ACRES OF LAND, MORE OR LESS.

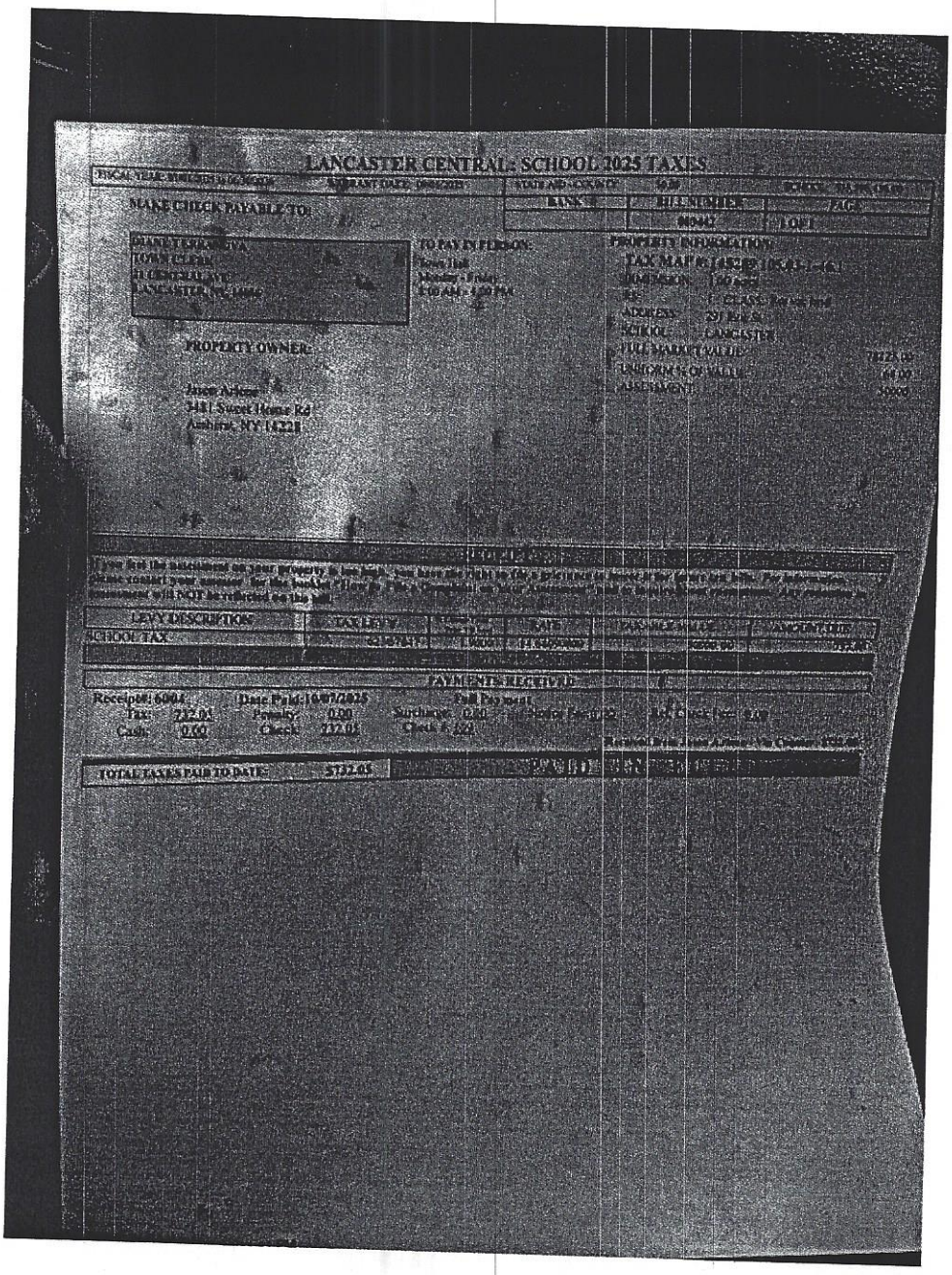
Deed Description: Lot 115.27-1-22.21

ALL THAT TRACT OR PARCEL OF LAND situate in the Village and Town of Lancaster, County of Erie and State of New York, being part of Lot No. 1, Section 10, Township 11, Range 6 of the Holland Land Company's Survey, bounded and described as follows:

BEGINNING at a point in the east line of Lot No. 1, distant 112.35 feet southerly from the southeast corner of lands formerly owned by Guy Little, said point of beginning also being the northeast corner of lands conveyed to Robert Young by deed recorded in Erie County Clerk's Office in Liber 3706 of Deeds at page 49; thence westerly at right angles with the east line of Lot No. 1, 94 feet to a point; thence northerly at right angles and parallel with the east line of Lot No. 1, 23 feet to a point; thence westerly at right angles, 72 feet to a point; thence northerly at right angles and parallel with the east line of Lot No. 1, 89.25 feet to a point in a boundary line established by Agreement recorded in Erie County Clerk's Office in Liber 3360 of Deeds at page 376; thence westerly along said boundary line, 164.71 feet to a point in the east line of lands formerly owned by John Dinwoodie; thence southerly along the east line of lands formerly owned by John Dinwoodie, 208.37 feet to the north line of lands formerly owned by Ebenezer Briggs, Jr., said point also being the southwest corner of lands conveyed to Robert Young by deed aforesaid; thence easterly along the south line of lands so conveyed to Young and the north line of lands formerly owned by Briggs, as aforesaid, 207.65 feet to a point distant 130 feet westerly from the east line of Lot No. 1, as measured along the said north line of lands formerly owned by Briggs; thence northerly at an interior angle of 89° 45' 03" and parallel with the east line of Lot No. 1, 70 feet to a point; thence easterly on a line parallel with the said north line of lands formerly owned by Briggs, 130 feet to a point in the east line of Lot No. 1; thence northerly along the east line of Lot No. 1, 28.65 feet to the point of beginning.

Deed Description: Lot 115.27-1-23.11
ALL THAT TRACT OR PARCEL OF LAND situate in the Village and Town of Lancaster, County of Erie and State of New York, being part of Lot No. 1, Section 10, Township 11, Range 6 of the Holland Land Company's Survey, bounded and described as follows:

BEGINNING in the east line of Lot No. 1 at its intersection with the north line of lands conveyed to Ebenezer Briggs, Junior by deed recorded in Erie County Clerk's Office in Liber 227 of Deeds at page 45, said point being 211 feet southerly from the southeast corner of lands formerly owned by Guy Little, as measured along the east line of Lot No. 1; thence westerly along the north line of lands so conveyed to Briggs, 130 feet; thence northerly on a line parallel with the east line of Lot No. 1, 70 feet; thence easterly on a line parallel with the north line of lands so conveyed to Briggs, 130 feet to a point in the east line of Lot No. 1; thence southerly along the east line of Lot No. 1, 70 feet to the point of beginning.



LANCASTER CENTRAL SCHOOL 2025 TAXES

MAKE CHECK PAYABLE TO:

PROPERTY OWNER:

Jason Arkus
3481 Sweet Home Rd
Amherst, NY 14228

TO PAY IN PERSON:
Town Hall
Normal Hours
8:00 AM - 4:30 PM

PROPERTY INFORMATION:
TAX MAP NUMBER (SBL):
SECTION:
BLOCK:
LOT:
CLASS: Two Family
ADDRESS:
SCHOOL: LANCASTER
FULL MARKET VALUE:
TAXABLE VALUE:
ASSESSMENT:

LEVY DESCRIPTION	TAX LEVY	RATE	PAID TO DATE
SCHOOL TAX			

PAYMENTS RECEIVED

Receipt# 6001 Date Paid: 6/6/2025 Full Payment
Tax: 572.05 Penalty: 0.00 Surcharge: 0.00
Cash: 0.00 Check: 572.05 Check #: 623

TOTAL TAXES PAID TO DATE: 572.05

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Site Owner/Remedial Party	
65 Lake Avenue LLC	716-681-1450
Mark Aquino, Esq.	aquinolaw@gmail.com
Qualified Environmental Professionals/Remedial Engineers	
Matrix Environmental Technologies Inc.	716-662-0745
Sean R. Carter, P.E.	scarter@matrixbiotech.com
Christine M. Curtis, P.E.	ccurtis@matrixbiotech.com
Mary M. Szustak	mszustak@matrixbiotech.com
NYSDEC DER Project Manager	
Jason Kryszak	716-851-7220 jason.kryszak@dec.ny.gov
NYSDEC DER Regional Hazardous Waste Remediation Engineer, Region 9	
Benjamin McPherson, P.E.	(716) 851-7220 benjamin.mcpherson@dec.ny.gov
NYSDEC Site Control	
Kelly Lewandowski, P.E.	(716) 402-9569 kelly.lewandowski@dec.ny.gov
NYSDOH Project Manager	
Ryan Minzloff	518-408-5146 ryan.minzloff@health.ny.gov
Remedial Party Attorney	
Richard Moore, Esq.	rmoore6394@gmail.com

APPENDIX C – SOIL BORING LOGS

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB101 / MW1**
START DATE:	7/21/2020	COMPLETION DATE: 7/21/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 7' DRILLING	GROUNDWATER DEPTH AFTER COMPLETION:	NA
WEATHER:	Sunny 75 - 80°	CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		29	GP	Asphalt over gray, POORLY GRADED GRAVEL (cf) WITH SAND (cf), loose, dry, Quaternary Fill
1			60 +		SM	Brown SILTY SAND (mf) WITH GRAVEL (cf), medium dense, moist, Quaternary Fill
2						
3			15.9			
4			150 +			
5	**2**	**5.0-10.0**		50	SP-SM	Brown POORLY GRADED SAND WITH SILT AND GRAVEL (cf), moist, medium dense, Quaterny Fill or Colluvium
6			16.2			
7					CL,ML	Brown CLAY and gray SILT, laminated, wet, dense, Lacustrine
8			7.5			
9						
10	**3**	**10.0-15.0**		60		
11			0.0		CL, ML	As above
12			0.0			
13					ML	Gray SANDY SILT WITH GRAVEL (cf, sa to a), saturated, soft, Alluvium
14			0.0		ML	Gray SILTY SAND, trace f Gravel, dry, medium dense, Alluvium
15	**4**	**15.0-20.0**		38		
16			9.5		ML	Dark gray SILT WITH SAND, trace Gravel (f, a), wet, very dense, Alluvium.
17			7.6			
18						
19						

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Bottom of borehole 18.4'. Sample from 5' - 7' submitted for laboratory analysis. Monitoring well installed in boring (2" dia.).

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB102 / MW2**
START DATE:	7/21/2020	COMPLETION DATE: 7/21/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 6.5' DRILLING	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Sunny 75 - 80°	CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		32	GP	Asphalt over gravel fill over sand and gravel fill.
1			175 +		GP	Gray POORLY GRADED GRAVEL (cf) WITH SAND (cf), loose, dry, odor of asphalt, Quaternary Fill
2					CL	Reddish brown SILTY CLAY, very stiff, moist, Quaternary Fill
3			18		SP	Brown and gray POORLY GRADED SAND WITH SILT AND GRAVEL, medium dense, moist, Quaternary Fill or Colluvium.
4						
5	**2**	**5.0-10.0**	64.3	60	SW	Brown, tan and brownish gray, WELL GRADED SAND WITH GRAVEL (mf, sr), trace Silt, medium dense, moist, Quaternary Fill or Colluvium.
6			9.3		CL, ML	Reddish brown and olive brown laminated SILTY CLAY, moist to wet, stiff, (6"), overlying olive brown CLAYEY SILT, medium stiff, wet, Lacustrine.
7						
8			5.2		CL,ML	Reddish brown CLAY laminated with Gray SILT, stiff, saturated, Lacustine.
9						
10	**3**	**10.0-15.0**		48		
11			0.4			
12					MH	Gray SILT WITH GRAVEL (cf, sr), trace Sand (f), saturated, medium stiff, Alluvium, sand increases with depth.
13			3.1			
14						
15	**4**	**15.0-20.0**	0.2	60	SM	Gray SILTY SAND (mf) WITH GRAVEL (mf, sa to a), saturated, medium dense, Alluvium.
16						
17			0.0		ML	Dark gray SILT WITH SAND, wet, very dense, Alluvium.
18			0.8			
19			7.2			
			24.4			

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Bottom of borehole 20'. Soil samples from 4.5'-5.5', 9.8'-10.5' and 19.6'-20.0' submitted for laboratory analysis. Monitoring well installed in boring (2" dia.).

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB103 / MW3**
START DATE:	7/22/2020	COMPLETION DATE: 7/22/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 9'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Raining on/off, cloudy, hot, humid	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		46		
1			40		OL/OH, CL	4 inches ORGANIC SOIL (topsoil) over 16 inches reddish brown CLAY, dry, stiff, Quaternary Fill
2						
3			112		OL/OH, CL	Dark brown GRAVELLY ORGANIC SOIL WITH SAND, moist, overy lying 3 inches of reddish brown CLAY overlying 6 inches of bricks with silt and sand, dry, medium dense, Quaternary Fill
4						
5	**2**	**5.0-10.0**	190	57		
6						
7			117		ML, CL	Gray CLAYEY SILT laminated with Brown CLAY, moist, occasional fine Sand lenses (1/8"), density varies from medium stiff in 5' to 6' and where there is sand to very stiff, Lacustrine
8						
9			180		ML, CL	Gray CLAYEY SILT, bedded with brown CLAY, moist to wet, stiff to very stiff, Lacustrine
10	**3**	**10.0-15.0**		60	ML, CL	Grayish brown SILTY CLAY, saturated, stiff, Lacustrine
11			114			
12					ML	Gray SANDY SILT WITH GRAVEL (cf, SA to SR), saturated, stiff, Alluvium
13			190			
14						
			200+		SP	Gray POORLY GRADED SAND WITH GRAVEL, trace (+) Silt, moist to wet, dense, Alluvium
15	**4**	**15.0-20.0**		52		
16					ML	19 " resample over Dark gray SANDY SILT WITH GRAVEL (mf, SA to A), moist, stiff to very stiff (3 inch SILTY SAND (cf) lenses at 16' and 16'5"), Alluvium
17			175			
18					SM	Gray SILTY SAND WITH GRAVEL (cf, sa), moist, dense, more gravel or weathered limestone (saprolite) in bottom of sample, Alluvium
19						
			19.5			

Notes

PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Bottom of borehole 19.5'. Sample from 19.5' submitted for laboratory analysis. Monitoring well installed in boring (2" dia.). Difficult well installation due to running sands.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**
CLIENT: **65 Lake Avenue LLC** WELL/BORING ID: **SB104 / MW4**
START DATE: 7/23/2020 COMPLETION DATE: 7/23/2020 RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING: approx. 7.5' GROUNDWATER DEPTH AFTER DRILLING COMPLETION: not measured
WEATHER: Sunny, 80° CONTRACTOR/DRILLERS: Matrix Environmental Technologies / P. Bliek
DRILL RIG: Geoprobe 6620 DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic
Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
1	**1**	**0.0-5.0**	2.3	26	OL, SM, SP-SM	Topsoil over 9 inches Brown SILTY SAND (cf), with roots, loose, dry over brownish gray POORLY GRADED SAND (mf) with SILT and GRAVEL (mf, a), loose, dry, Quaternary Fill.
2						
3						
4						
5	**2**	**5.0-10.0**	0.0	52	SM	6" resample over Brown SILTY SAND (f), medium dense, moist, Quaternary Fill
6			1.5		SM, CL	Brown SILTY SAND (mf) WITH GRAVEL, medium dense, moist, occasional 2" lenses of reddish brown CLAY, Lacustine
7						
8			2.1		CL, ML	Brown CLAY, varved, stiff, wet, lense of brown SANDY SILT, stiff at 9.7-9.9', Lacustrine
9						
10	**3**	**10.0-15.0**	1.4	58	ML, CL	6" resample over Gray SILT laminated with reddish brown CLAY, very stiff, medium plasticity, saturated, Lacustine
11					ML	Gray SILT, trace CLAY, trace GRAVEL (f), stiff, non-plastic, saturated, Lacustrine
12			5.3		ML	Gray SANDY SILT WITH GRAVEL (cf, a to sa, black), trace CLAY, medium stiff, saturated, Alluvium
13						
14			9.2			
15	**4**	**15.0-20.0**	6.6	52	SM	18" resample over Gray SILTY SAND (mf) WITH GRAVEL (cf, a to sa, black), trace CLAY, medium stiff, saturated, Alluvium.
16			12.6			
17						
18						
19						

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample and borehole refusal at 16.5'. Sample from 16' - 16.5' submitted for laboratory analysis. Monitoring well installed in boring (2" dia.).

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB105 / MW5**
START DATE:	7/23/2020	COMPLETION DATE: 7/23/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	approx. 8' DRILLING	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Rain, 80°, humid	CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		36		
1			2.5		SP	Asphalt over sand and gravel fill overlying tan POORLY GRADED SAND, wet, loose to medium dense, Quaternary Fill.
2					SW	Brown WELL GRADED SAND (cf) WITH GRAVEL, trace Silt, moist, loose, Quaternary Fill.
3			5.0		SW	Grayish Brown WELL GRADED SAND WITH GRAVEL (mf, sr), moist, medium dense, Quaternary Fill or Colluvium.
4					CL	Tan CLAY, dry to moist, very stiff, Lacustrine
			2.8			
5	**2**	**5.0-10.0**		55	CL, ML	10 inches of resample over Reddish brown CLAY laminated with gray SILT, wet, Lacustrine, laminations (1/32" to 1/2") get thicker with depth, some mottling also
6			7.5+			
7						
8			12.5+			
9						
10	**3**	**10.0-15.0**		53	ML, CL	Brown CLAYEY SILT, wet, medium stiff, Lacustine
11			8.1			
12					SW-SM	Gray WELL GRADED SAND WITH SILT AND GRAVEL, saturated, loose, Alluvium
13			13.6			
14					SP-SM	3 inches of gray SANDY SILT, wet, medium dense, over 8 inches gray POORLY GRADED SAND WITH SILT, trace Gravel (mf, sa), Alluvium
			30+			
15	**4**	**15.0-20.0**		26	ML	Gray SILT WITH SAND, trace Gravel (cf), wet, Alluvium
			50+			
16			15.4			
17						
18						
19						

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample refusal 17', borehole refusal 18'. Sample from 15.5' - 17' submitted for laboratory analysis. Monitoring well installed in boring (2" dia.).

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB106 / MW6**
START DATE:	7/27/2020	COMPLETION DATE: 7/27/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	approx. 9'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Partly cloudy, hot, humid, 80+	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		44	OL	Grass over brown ORGANIC SOIL (topsoil), dry
1			3.5		SP	Brown POORLY GRADED SAND WITH GRAVEL, trace Silt, moist, soft to medium dense, Quaternary Fill
					SM	Brown SILTY SAND, moist, medium dense, Quaternary Fill
2			38			Orangish brown SILTY SAND, trace Gravel (mf), moist, Quaternary Fill
					SW	Brown WELL GRADED SAND WITH GRAVEL (cf, sr to sa), moist, Quaternary Fill.
3					CL, ML	Brown CLAY laminated with SILT (1/32"), moist, Lacustrine.
4			0.0			
5	**2**	**5.0-10.0**		64	CL, ML	Gray and reddish brown CLAY with laminations of 1/8", bottom 2' of sample has 1/32" laminations of gray SILT, dry to moist, very stiff, Lacustrine
6			1.1			
7						
8			2.5			
9 oi						
	3	**10.0-15.0**		52	CL, ML	7 inches of resample overyling Reddish brown CLAY with gray SILT laminations (1/2"), wet, medium dense, Lacustrine
11			0.1			
12			2.3			as above, moist, stiff, Lacustrine
13						
14			0.4		SM	Gray POORLY GRADED SILTY SAND WITH GRAVEL (cf, sr to sa), wet, medium dense, Alluvium
15	**4**	**15.0-20.0**		62	SM	6 inches resample then AS ABOVE, wet, loose to mediium dense, Alluvium
16			5.1		SP-SM	Gray POORLY GRADED SAND WITH SILT, saturated, loose, Alluvium
17					SM	Gray POORLY GRADED SILTY SAND WITH GRAVEL (mf, sa to a), dry to moist (4") then dry, very dense, Alluvium
18			5.2			
19						

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample refusal 20', borehole refusal 18.5'. Sample from 19.5' - 20' submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB107**
START DATE:	7/28/2020	COMPLETION DATE: 7/28/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:		GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Partly cloudy, hot, humid, 80+	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	46	36	SP, SM, SP-SM	Asphalt over 12 inches brownish gray POORLY GRADED SAND WITH GRAVEL over 6 inches dark brown SILTY SAND (f) over orangeish brown POORLY GRADED SAND (f) WITH SILT, medium dense, moist, Quaternary Fill.
1						
2			25.6			
3						
4			4.6			
					CL	Reddish brown and brown CLAY (mottled, some laminations), moist, medium stiff, gravel (cf) noted in sample 4.5 to 4.8', Lacustine
5	**2**	**5.0-10.0**		49	SP, ML, CL	6 inches of resample, Olive POORLY GRADED SAND (f) thinnly bedded with reddish brown CLAY, grades to olive brown CLAYEY SILT thinnly bedded with reddish brown CLAY, medium dense, moist to wet, medium dense to dense, Lacustrine
6			9.6			
7						
8			1.6			
9					CL	Brownish olive CLAY thinly bedded with reddish brown CLAY, medium stiff, wet, Lacustrine
	3	**10.0-15.0**	3.0	38	CL	As above, saturated, loose and soft
11					SM	Gray SILTY SAND (f) WITH GRAVEL (sr to sa), medium stiff, saturated, Alluvium
12			4.5		SP	Gray POORLY GRADED SAND (f), trace Silt, wet, loose to medium dense, Alluvium
13						Gray POOLY GRADED SAND (f) WITH GRAVEL (mf, sa to a), wet, very dense, Alluvium
14			5.3			
15	**4**	**15.0-20.0**		58	SP-SM	Gray POORLY GRADED SAND (f) WITH SILT, trace Gravel (f, sr), saturated, soft, overlying 2" weathered limestone, Alluvium
16			1.4		SM	Gray SILTY SAND (mf) WITH GRAVEL (mf, sa to a), wet, medium dense, Alluvium
17			4.0		SP	Light gray POORLY GRADED SAND (mf), trace Silt, trace Gravel (cf, sa to a), occasional lense of silt (1/16"), moist to wet except 3" dry section where there is weathered limestone, medium dense, Alluvium
18			2.9			
19						

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample and borehole refusal 18.5'. Sample from 18.0' - 18.5' submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB108 / MW7**
START DATE:	7/27/2020	COMPLETION DATE: 7/27/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 9'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Partly cloudy, hot, humid, 80+	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		51		
1			2.1		OL, SP-SM	ORGANIC SOIL (Topsoil, 6") overyling 24 inches of Brown, grayish brown and dark brown POORLY GRADED SAND WITH SILT, trace Gravel (cf, sr), dry, medium dense, Quaternary Fill
2			1.1			
3					ML	Brown SANDY SILT, moist, dense, Quaternary Fill
4			0.0			
5	**2**	**5.0-10.0**		57	ML, CL	12" resample overlying Olive brown CLAYEY SILT thinly bedded with reddish brown CLAY, dense, moist, Lacustrine
6			0.0			
7					CL	Olive brown CLAY thinly bedded with reddish brown CLAY, moist, medium stiff
8			0.0		SM, CL	Olive brown SILTY SAND (mf) interbedded with and sometimes mottled with Reddish brown CLAY WITH GRAVEL (cf, sr to sa), moist, soft, Lacustrine
9						
	3	**10.0-15.0**		60	SM, CL	As above
11			0.0		SM	Gray SILTY SAND WITH GRAVEL (sr to sa), medium dense, saturated, Alluvium
12			0.0		SM, ML	Gray SILTY SAND WITH GRAVEL © bedded with gray SANDY SILT WITH GRAVEL (f, a to sa), varies from soft to dense, wet, Alluvium; lense of SAND (2" to 3", mf) at 13' 5"
13						
14			0.0			
15	**4**	**15.0-20.0**		60	SP-SM	Gray POOLY GRADED SAND WITH SILT, trace Gravel (mf), saturated, soft in first 12" then medium dense, Alluvium
16			0.0			
17					SM	Gray SILTY SAND WITH GRAVEL (cf, a to sa), occasional weathered limestone lense, dry to moist, dense to very dense, Alluvium
18			0.0			
19						

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample refusal 18', borehole refusal 19'9". Sample from 17' - 18' submitted for laboratory analysis. Matrix spike and matrix spike duplicate samples also collected at this location. Monitoring well installed in boring (2" dia.).

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB109**
START DATE:	7/28/2020	COMPLETION DATE: 7/28/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 9.5'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Sunny, 75	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	1.9	46	OL	ORGANIC SOIL WITH SAND, moist, medium dense, roots
1					SP-SM	Brown POORLY GRADED SAND WITH SILT, trace Gravel (f), moist, medium dense, Quaternary Fill
2			0.5			
3					SM	Dark Brown SILTY SAND, trace Gravel, moist, medium dense, Quaternary Fill
4			2.1			
5	**2**	**5.0-10.0**		44	SP-SM	Brown POORLY GRADED SAND WITH SILT, trace Gravel (f), wet, medium dense, Quaternary Fill or Colluvium
6			0.7		ML, CL	Reddish brown SILTY CLAY laminated with gray SILT, moist, dense, Lacustrine
7					ML	Brown SANDY SILT WITH GRAVEL (mf, sa), moist, Lacustrine
8			3.0		ML, CL	Reddish brown SILTY CLAY, trace Gravel (f), trace Sand (f), dry to moist, dense, Lacustrine
9						
	3	**10.0-15.0**	0.0	52	ML, CL	As above, saturated, soft
11					SM	Brown SILTY SAND WITH GRAVEL (mf, sa to a), saturated, medium dense, Alluvium
12			0.1		SM	Brown SILTY SAND WITH GRAVEL (mf, sa to a), saturated except for last 5" which is moist, dense, Alluvium
13						
14			0.1			
			1.3			

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample and borehole refusal 15'. Sample from 14.0' - 15.0' submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB110**
START DATE:	7/28/2020	COMPLETION DATE: 7/28/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 9.5'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Partly cloudy, hot, humid, 80+	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		44	OL, SM	8" Brown Organic Soil overlying Brown SILTY SAND (cf) WITH GRAVEL (f), dry to moist, medium dense
1			4.7			
2					ML, CL	Reddish brown CLAY (varved) bedded with gray SILT, dry to moist, Lacustrine
3			11.8			
4						
5	**2**	**5.0-10.0**	7.2	62	ML, CL	Brown, reddish brown and grayish brown CLAY and SILT (laminated) with very thin (1/32") sand lenses, moist, very dense, Lacustrine
6			8.2			
7						
8			5.5			
9						
	3	**10.0-15.0**	5.7	62	ML, CL, SP-SM	As above, overlying 4" brown POORLY GRADED SAND WITH SILT, moist to wet, medium dense, Lacustrine
11						
12			3.5		ML, CL	Reddish brown CLAY laminated with grayish brown SILT, trace Sand, moist to wet, dense, Lacustrine
13						
14			1.3		ML	Gray SANDY SILT WITH GRAVEL (cf), wet, very dense, Alluvium

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample and borehole refusal 15.0'. Sample from 14.0' - 15.0' submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**65 Lake Avenue LLC**	WELL/BORING ID:	**SB111 / MW8**
START DATE:	7/22/2020	COMPLETION DATE: 7/22/2020	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 9.5'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Raining on/off, humid, hot	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	134	39	OL/SM	Brown ORGANIC SOIL (topsoil), moist, medium dense overlying 9" Brown SILTY SAND, trace Gravel (mc), moist, loose, Quaternary Fill
1					OL	Brown ORGANIC SOIL (with roots), trace Sand (f), moist, soft, Quaternary Fill
2			49		SW	Brown WELL GRADED SAND WITH GRAVEL, moist, loose, Quaternary Fill
3						
4			2.4			
5	**2**	**5.0-10.0**		60	SW	As above
6			3.1		ML, CL	Reddish brown CLAY, gray SILT and gray SILTY CLAY, laminated in some sections, not in others, wet, stiff to very stiff, Lacustine
7						
8			1.3			
9						
	3	**10.0-15.0**	33	60	ML, CL	Gray SILTY CLAY, wet, soft to medium stiff, Lacustine
11					SW, ML, CL	3" Brown WELL GRADED SAND WITH GRAVEL (cf, sa to sr) trace Silt, wet, loose to medium dense, overlying brown then gray CLAYEY SILT WITH SAND, trace Gravel (cf), wet soft to medium dense, Alluvium
12			47			
13					SP-SM	Gray POORLY GRADED SAND WITH SILT AND GRAVEL, trace Clay, wet, dense to very dense, Alluvium
14			50+			
15	**4**	**15.0-20.0**		60	SP-SM	30 " of resample overlying Gray POORLY GRADED SAND WITH GRAVEL (cf, sa to a) AND SILT, moist, dense to very dense, Allluvium
16			100+			
17						
18						
19						

Notes: PID reading may have been affected by moisture in sample headspace caused by humid weather conditions. Sample refusal 17.5', borehole refusal 14.5'. Sample from 17.5' submitted for laboratory analysis. Monitoring well installed in boring (2" dia.).

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**Aquino**	WELL/BORING ID:	**SB112 / MW9**
START DATE:	8/16/2021	COMPLETION DATE: 8/16/2021	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	5.5'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Cloudy, moderate winds, 75° F	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / P. Bliek
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	0	36	SW	Grayish brown POORLY GRADED SAND WITH GRAVEL, dry, loose, Quaternary Fill.
1			0		SP	Brown POORLY GRADED SAND, trace Silt, trace Gravel (mf, sf), moist, medium dense, Quaternary Fill.
2			0		CL, ML	Brown, reddish brown and gray CLAY, very thin laminations (1/16 to 1/32"), occasional lense of yellowish brown Silt laminations (1/32"), moist, dense, Lacustrine.
3						
4						
5	**2**	**5.0-10.0**		60	SP, CL, ML	Olive POORLY GRADED SAND (f), thinnly bedded with reddish brown CLAY, grades to olive brown CLAYEY SILT thinnly bedded with reddish brown CLAY, moist, medium dense, Lacustrine
6			0			
7			0		CL, ML	Gray SILTY CLAY laminated with reddish brown CLAY (1/4 to 1/2" laminations), moist, very stiff, Lacustine.
8						
9			0		CL	Gray CLAY laminated with reddish brown CLAY, moist, hard (fine laminations 1/32"), Lacustine
	3	**10.0-15.0**		60	ML	3" resample over Gray SANDY SILT WITH GRAVEL (mf, sa to a), wet, stiff, Alluvium.
11			0			
12			0		SM	Gray SILTY SAND WITH GRAVEL (mf, sr to sa), wet, dense, Alluvium.
13					SP	Gray POORLY GRADED SAND (f), trace Silt, trace f Gravel (a to sa), wet, medium dense, Alluvium.
14			0			
15	**4**	**15.0-20.0**		54	ML	3" resample over Gray SILT WITH SAND (mf), trace f Gravel (a), wet, stiff, Alluvium.
16			0			
17			0		SW	Gray WELL GRADED SAND WITH GRAVEL (mf, sa to a), trace silt, wet, med. dense, Alluvium.
					SM	Gray SILTY SAND, trace f Gravel (sa to a), moist to wet, medium dense, Alluvium.
18					SP	Gray POORLY GRADED SAND WITH GRAVEL, (f,a), trace (+) Silt, moist to wet, cemented, very dense, occasional 1" lenses of weathered dolomite, last 4" is weathered dolomite, Alluvium over Bedrock.
19			0			
20	**5**	**20.0-25.0**				
21						
22						

Notes: Sample and borehole refusal 19.5'. Sample from 5' - 7' submitted for laboratory analysis. Monitoring well installed in boring (2" dia.).

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**
CLIENT: **Aquino** WELL/BORING ID: **SB201**
START DATE: 3/2/2022 COMPLETION DATE: 3/2/2022 RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING: approx. 8' GROUNDWATER DEPTH AFTER DRILLING COMPLETION: not measured
WEATHER: Sunny 32° CONTRACTOR/DRILLERS: Matrix Environmental Technologies / P. Bliek
DRILL RIG: Geoprobe 6620 DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic
Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		51	OL/OH	3" Black, Sandy Organic Soil, wet, loose, Quaternary Fill.
1			0.2		SP	Black, POORLY GRADED SAND WITH GRAVEL (cf, a), trace Silt, wet, loose, pieces of brick and ash, Quaternary Fill.
2			0.1		OL/SP	3" Brown Organic Soil, moist, over 3" brown POOLY GRADED SAND W/GRAVEL (f,r), moist, med den
3					CL	Brown CLAY, moist, very stiff, Lacustrine.
4			0.1			
5	**2**	**5.0-10.0**		60	ML, CL	5" resample over Gray and Tan SILTY CLAY, moist, very stiff, Lacustrine.
6			0.0			
7			0.0			
8					ML, CL	Gray and Tan CLAYEY SILT WITH SAND, moist to wet, stiff, Lacustrine.
9			0.0		CL	Brown and Gray CLAY, laminated, moist, Lacustrine.
10	**3**	**10.0-15.0**		60	CL	Brown SANDY CLAY, wet, stiff, Lacustine.
11			0.0		ML	Gray SANDY SILT, saturated, soft, Alluvium.
12			0.0		CL	Brown CLAY, moist, very stiff, laminated in last 4", Alluvium.
13					SP-SM	Grayish brown POORLY GRADED SAND (f) WITH SILT AND GRAVEL (cf, sr), wet, dense, Alluvium.
14			0.0			
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
Notes						

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**

CLIENT: **Aquino** WELL/BORING ID: **SB202**

START DATE: 3/2/2022 COMPLETION DATE: 3/2/2022 RECORDED BY: C. Zink

GROUNDWATER DEPTH WHILE DRILLING: approx. 7.5' GROUNDWATER DEPTH AFTER COMPLETION: not measured

WEATHER: Sunny 32° DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / P. Bliek

Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	0.4	31	GP	Asphalt over POORLY GRADED GRAVEL WITH SAND, dry, loose to medium dense, Quaternary Fill.
1					SW-SM	Grayish Brown WELL GRADED SAND WITH SILT AND GRAVEL (sr to sa), bricks, concrete in last 3", dry, medium dense, Quaternary Fill.
2			0.4			
3						
4						
5	**2**	**5.0-10.0**		60	CL	2" Fill (as above) over brown CLAY, moist to dry, dense, Lacustrine.
6			0.2		ML, CL	Gray SANDY SILT bedded with CLAY, moist, dense, Lacustrine.
7						
8			0.0		CL	Gray CLAY laminated with brown CLAY, wet,very stiff, occasional sand stringers (1/32" or less in width), Lacustrine.
9			0.0			
10	**3**	**10.0-15.0**		60		
11			0.2		ML, CL	4" resample over Gray and brown SILTY CLAY, wet, very stiff, Lacustrine.
12						
13			0.4			
14			0.0		SP	Gray POORLY GRADED SAND WITH GRAVEL (cf, sr to sa), saturated, loose, Alluvium.
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
Notes						

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**

CLIENT: **Aquino** WELL/BORING ID: **SB203**

START DATE: 3/2/2022 COMPLETION DATE: 3/2/2022 RECORDED BY: C. Zink

GROUNDWATER DEPTH WHILE DRILLING: approx. 9' GROUNDWATER DEPTH AFTER COMPLETION: not measured

WEATHER: Sunny 34° DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / P. Bliek

Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		43	GP	Asphalt over POORLY GRADED GRAVEL WITH SAND, dry, loose, Quaternary Fill.
1			0.3		SW	Brown and orangish brown WELL GRADED SAND, few Gravel (mf), dry to moist, loose to medium dense, 3" brown clay lenses at 1'2" and 2', Quaternary Fill.
2			0.9			
3					SW	Brown WELL GRADED SAND WITH GRAVEL (mf, sr), trace SILT, moist, medium dense, Quaternary Fill.
4						
5	**2**	**5.0-10.0**	0.0	26	CL	Brown CLAY, dry to moist, very stiff, Quaternary Fill.
					SW	Brown WELL GRADED SAND, trace Gravel (mf, sa to sr), trace Silt, dry to moist, Fill.
6			0.5		SW-SM	Brown WELL GRADED SAND WITH SILT AND GRAVEL (mf, sa to sr), most to wet, Quaternary Fill or Alluvium.
7						
8						
9						
10	**3**	**10.0-15.0**	0.2	19	CL	Brown CLAY, moist, stiff, Lacustrine.
					ML, CL	Gray CLAYEY SILT, wet, dense, Lacustrine.
11			0.3		ML	Gray SILT, trace Gravel (f, sr to a), loose, saturated, occasional 1" lense of Clay, Alluvium.
12						
13						
14						
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
Notes						

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**
CLIENT: **Aquino** WELL/BORING ID: **SB204**
START DATE: 3/2/2022 COMPLETION DATE: 3/2/2022 RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING: approx. 10' GROUNDWATER DEPTH AFTER DRILLING COMPLETION: not measured
WEATHER: Sunny 34° CONTRACTOR/DRILLERS: Matrix Environmental Technologies / P. Bliek
DRILL RIG: Geoprobe 6620 DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic
Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		37	OL/OH	Brown ORGANIC SOIL WITH SAND, moist, medium dense, Quaternary Fill.
1			0.0		CL	Brown CLAY, dry, very sitff, Quaternary Fill.
2			0.1		SW-SM	Orange brick over Brown POORLY GRADED SAND WITH SILT AND GRAVEL (f), wet, medium dense, Quaternary Fill.
3						
4						
5	**2**	**5.0-10.0**		54	SW-SM	Brown POORLY GRADED SAND WITH SILT AND GRAVEL (f), moist, medium dense, Fill.
6			0.4			
7			0.3		CL	Gray and brown CLAY, laminated, moist in top 1', dry to moist in remaining, stiff, Lacustine.
8						
9			0.0			
10	**3**	**10.0-15.0**		60		
11			0.1		CL, ML	Grayish brown CLAYEY SILT, trace Sand (f), wet, medium stiff, Lacustine.
12						
13			0.0		SM	Gray SILTY SAND WITH GRAVEL (cf, sa to sr), saturated, loose, Alluvium.
14			0.0			
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
Notes						

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**
CLIENT: **Aquino** WELL/BORING ID: **SB205**
START DATE: 6/20/2022 COMPLETION DATE: 6/20/2022 RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING: Approx. 8' GROUNDWATER DEPTH AFTER COMPLETION: not measured
WEATHER: Partly sunny 60 - 70° DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan
DRILL RIG: Geoprobe 6620 DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic
Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		38	SM	8 inches of asphalt and gravel subbase overlying dark brown SILTY SAND, dry, dense, Quaternary Fill.
1			0		SP-SM	Brown POORLY GRADED SAND WITH SILT, moist then wet last 9 inches, medium dense, Quaternary Fill.
2			0			
3						
4						
5	**2**	**5.0-10.0**		60	SP-SM	Brown POORLY GRADED SAND WITH GRAVEL AND SILT, moist, medium dense, Quaternary Fill.
6			0			
7					CL	Brown CLAY, gray SAND (f) laminations (1/4-inch thickness) every 1 to 2 inches, dry to moist, stiff, Lacustrine
8			0			
9			0		CL	Brown CLAY, trace f Sand, dry to moist, very stiff, Lacustrine
10	**3**	**10.0-15.0**				
11						
12						
13						
14						
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
20	**5**	**20.0-25.0**				
21						
22						

Notes

Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. Samples from 1.5' and 7' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**
CLIENT: **Aquino** WELL/BORING ID: **SB206**
START DATE: 6/20/2022 COMPLETION DATE: 6/20/2022 RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING: approx. 8' GROUNDWATER DEPTH AFTER COMPLETION: not measured
WEATHER: Partly sunny 60 - 70° DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan
DRILL RIG: Geoprobe 6620 DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic
Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	0	30	GW	Asphalt over sand and gravel fill overlying dark brown WELL GRADED GRAVEL WITH SAND, dry, loose to medium dense, Quaternary Fill.
1			0		SP	Brown POORLY GRADED SAND, trace silt, trace Gravel, dry, medium dense.
2					SW	Brown WELL GRADED SAND (cf) WITH GRAVEL, trace Silt, wet, loose, Quaternary Fill.
3						
4						
5	**2**	**5.0-10.0**		60		
6			0			
7					CL	Brown and reddish brown CLAY, laminated, occasional brown f SAND lenses (<1/8 inches), dry to moist, stiff to very stiff.
8			0			
9			0			
10	**3**	**10.0-15.0**				
11						
12						
13						
14						
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
20	**5**	**20.0-25.0**				
21						
22						

Notes: Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. Samples from 2' and 6' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**
CLIENT: **Aquino** WELL/BORING ID: **SB207**
START DATE: 6/20/2022 COMPLETION DATE: 6/20/2022 RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING: approx. 8' GROUNDWATER DEPTH AFTER COMPLETION: not measured
WEATHER: Partly sunny 60 - 70° DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan
DRILL RIG: Geoprobe 6620 DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic
Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	0	39	ML	Asphalt over sand and gravel fill overlying dark brown SANDY SILT, dry, loose to medium dense, Quaternary Fill.
1						
			0		SP	Brown POORLY GRADED SAND WITH GRAVEL (sa to sr), dry, medium dense.
2						
3						
4						
5	**2**	**5.0-10.0**		52		
6			0		CL	Gray CLAY, dry to moist, stiff to very stiff.
7						
8			0		CL	Brown CLAY, dry to moist, stiff to very stiff.
9						
10	**3**	**10.0-15.0**				
11						
12						
13						
14						
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
20	**5**	**20.0-25.0**				
21						
22						

Notes: Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. Samples from 1' - 3' and 6' - 8' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**Aquino**	WELL/BORING ID:	**SB113**
START DATE:	6/20/2022	COMPLETION DATE: 6/20/2022	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 7' DRILLING	GROUNDWATER DEPTH AFTER COMPLETION:	NA
WEATHER:	Partly sunny 60 - 70°	CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / R. Reagan
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	0.0	39	GP	Asphalt overlying gray, POORLY GRADED GRAVEL (cf) WITH SAND (cf), loose, dry, Quaternary Fill
1					SM	Brown SILTY SAND (mf) WITH GRAVEL (cf), medium dense, moist, Quaternary Fill
2			0.0			
3						
4						
5	**2**	**5.0-10.0**	0	60	SP-SM	Brown POORLY GRADED SAND WITH SILT AND GRAVEL (cf), moist, medium dense, Quaterny Fill or Colluvium
6			0		CL,ML	Brown CLAY and gray SILT, laminated, wet, dense, Lacustrine
7						
8			0			
9						
10	**3**	**10.0-15.0**	0.0	60	CL, ML	As above
11						
12			0.0			
13						
14			0.0		ML	Gray SANDY SILT WITH GRAVEL (cf, sa to a), saturated, soft, Lacustine or possibly Alluvium
					ML	Gray SILTY SAND, trace f Gravel, dry, medium dense, Lacustrine or possibly Alluvium
15	**4**	**15.0-20.0**		60	ML, CL	Tan CLAYEY SILT, dry to moist, medium dense, Lacustrine or possibly Alluvium
			0		ML, CL	Dark Gray SILT AND CLAY, trace Gravel (f, a), wet, medium dense, Lacustrine or Alluvium
16					ML	Dark gray SILT WITH SAND, trace Gravel (f, a), wet, very dense, Alluvium.
17			0			
18						
19			0			
20	**5**	**20.0-25.0**				
21						
22						

Notes

Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. Samples from 1' - 5' and 15' - 18' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**Aquino**	WELL/BORING ID:	**SB114**
START DATE:	6/20/2022	COMPLETION DATE: 6/20/2022	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	5.5'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Partly sunny 60 - 70°	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / R. Reagan
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	0	30	SP	Grayish brown POORLY GRADED SAND WITH GRAVEL, dry, loose, Quaternary Fill.
1			0		SP	Brown POORLY GRADED SAND, trace Silt, trace Gravel (mf, sf), moist, medium dense, Quaternary Fill.
2			0		CL, ML	Brown, reddish brown and gray CLAY, very thin laminations (1/16 to 1/32"), occasional yellowish brown Silt laminations (1/32"), moist, dense, Lacustrine.
3						
4						
5	**2**	**5.0-10.0**		40		
6			0		SP, CL, ML	Olive POORLY GRADED SAND (f), thinnly bedded with reddish brown CLAY, grades to olive brown CLAYEY SILT thinnly bedded with reddish brown CLAY, moist, medium dense, Lacustrine
7					CL, ML	Gray SILTY CLAY laminated with reddish brown CLAY (1/4 to 1/2" laminations), moist, very stiff, Lacustine.
8			0			
9			0			
10	**3**	**10.0-15.0**		35	CL, ML	Gray SILTY CLAY laminated with reddish brown CLAY (1/4 to 1/2" laminations), moist, very stiff, Lacustine.
11			0		ML	Gray SANDY SILT WITH GRAVEL (mf, sa to a), wet, stiff, Alluvium.
12						
13						
14						
15	**4**	**15.0-20.0**	0	32	ML	3" resample over Gray SILT WITH SAND (mf), trace f Gravel (a), wet, stiff, Alluvium.
16					ML	Light gray SANDY SILT WITH GRAVEL, dry, stiff, Alluvium.
17			0		SW	Gray WELL GRADED SAND WITH GRAVEL (mf, sa to a), trace silt, wet, med. dense, Alluvium.
18						
19						
20	**5**	**20.0-25.0**				
21						
22						

Notes: Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. Samples from 0.5' - 2', 6' - 10' and 12' - 16' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**Aquino**	WELL/BORING ID:	**SB115**
START DATE:	6/20/2022	COMPLETION DATE: 6/20/2022	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 9.5'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Partly sunny 60 - 70°	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / R. Reagan
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		50		
1			0		OL, SM	8" Brown Organic Soil overlying Brown SILTY SAND (cf) WITH GRAVEL (f), dry to moist, medium dense, Quaternary Fill.
2						
3			0			
					ML, CL	Reddish brown CLAY (varved) bedded with gray SILT, dry to moist, Lacustrine.
4						
			0			
5	**2**	**5.0-10.0**		60		Resample
6						
			0		ML, CL	Brown, reddish brown and grayish brown CLAY and SILT (laminated) with very thin (1/32") sand lenses, moist, very dense, Lacustrine
7						
8			0			
9						
	3	**10.0-15.0**				
11						
12						
13						
14						
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
20	**5**	**20.0-25.0**				
21						
22						

Notes

Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. Samples from 0' - 3' and 6' - 8' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION:	**65-67 Lake Ave., Lancaster, NY**	PROJECT No.	**18-046**
CLIENT:	**Aquino**	WELL/BORING ID:	**SB116**
START DATE:	6/20/2022	COMPLETION DATE: 6/20/2022	RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING:	Approx. 9.5'	GROUNDWATER DEPTH AFTER COMPLETION:	not measured
WEATHER:	Partly sunny 60 - 70°	DRILLING CONTRACTOR/DRILLERS:	Matrix Environmental Technologies / R. Reagan
DRILL RIG:	Geoprobe 6620 DT	DRILL SIZE & TYPE: Direct Push 2 1/2" NPT	HAMMER Type: Hydraulic
		Sampler Type:	macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		52	OL	ORGANIC SOIL WITH SAND, moist, medium dense, roots
			0			
1					SP-SM	Brown POORLY GRADED SAND WITH SILT, trace Gravel (f), moist, medium dense, Quaternary Fill
2			0			
3					SM	Dark Brown SILTY SAND, trace Gravel, moist, medium dense, Quaternary Fill
4						
5	**2**	**5.0-10.0**		60	SP-SM	Brown POORLY GRADED SAND WITH SILT, trace Gravel (f), wet, medium dense, Quaternary Fill or Colluvium
			0.0			
6					ML, CL	Reddish brown SILTY CLAY laminated with gray SILT, moist, dense, Lacustrine
7					ML	Brown SANDY SILT WITH GRAVEL (mf, sa), moist, Lacustrine
			0.0			
8					ML, CL	Reddish brown SILTY CLAY, trace Gravel (f), trace Sand (f), dry to moist, dense, Lacustrine
9			0.0			
10	**3**	**10.0-15.0**				
11						
12						
13						
14						
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
20	**5**	**20.0-25.0**				
21						
22						

Notes

Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. Samples from 0.5' - 2.5' and 6' - 7.5' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. — SUBSURFACE LOG

PROJECT & LOCATION: **65-67 Lake Ave., Lancaster, NY** PROJECT No. **18-046**
CLIENT: **Aquino** WELL/BORING ID: **SB117**
START DATE: 6/20/2022 COMPLETION DATE: 6/20/2022 RECORDED BY: C. Zink
GROUNDWATER DEPTH WHILE DRILLING: approx. 7.5' GROUNDWATER DEPTH AFTER COMPLETION: not measured
WEATHER: Partly sunny 60 - 70° DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan
DRILL RIG: Geoprobe 6620 DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic
Sampler Type: macrocore (L=60", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**	0	36	OL, SM	Topsoil over 9 inches Brown SILTY SAND (cf), with roots, loose, dry.
1			0		SP-SM	Brownish gray POORLY GRADED SAND (mf) with SILT and GRAVEL (mf, a), loose, dry Quaternary Fill.
2						
3						
4						
5	**2**	**5.0-10.0**	0.0	54	SM	6" resample over Brown SILTY SAND (f), medium dense, moist, Quaternary Fill
6			0		SM, CL	Brown SILTY SAND (mf) WITH GRAVEL, medium dense, moist, occasional 2" lenses of reddish brown CLAY, Lacustine
7						
8			0		CL, ML	Brown CLAY, varved, stiff, wet, lense of brown SANDY SILT at 9.7-9.9', Lacustrine
9						
10	**3**	**10.0-15.0**				
11						
12						
13						
14						
15	**4**	**15.0-20.0**				
16						
17						
18						
19						
20	**5**	**20.0-25.0**				
21						
22						

Notes: Soil samples screened with Mini Rae 3000 PID with 11.7 eV lamp. SampleS from 0.5' - 3.0' and 8' - 10' below grade submitted for laboratory analysis.

Matrix Environmental Technologies Inc. **SUBSURFACE LOG**

PROJECT & LOCATION: 65-67 Lake Ave., Lancaster, NY PROJECT No. 18-046

CLIENT: Aquino WELL/BORING ID: **SB301**

START DATE: 9/3/2024 COMPLETION DATE: 9/3/2024 RECORDED BY: N Ander

GROUNDWATER DEPTH WHILE DRILLING: approx. 6 feet GROUNDWATER DEPTH AFTER COMPLETION: not measured

WEATHER: partly cloudy, 70 F DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan

DRILL RIG: Geoprobe 7728DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic

Sampler Type: macrocore (L=48", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	0-4	0.0	48	GP-GM	Asphalt (6") over gray, WELL GRADED GRAVEL WITH SILT, dry, medium dense, Quaternary Fill.
1			0.0		ML, CL	Brown SILTY CLAY, some Gravel (mf), dry, medium dense.
2			2.2		SW-SM	Dark brown WELL GRADED SAND WITH SILT AND GRAVEL, moist at 3.5 feet, medium dense, Quaternary Fill.
3						
4	2	4.0 - 7.0	2.9	36	SP	Brown, POORLY GRADED SAND (mf) WITH SILT AND GRAVEL (cf), wet at 5 feet (moist above), medium dense, Quaternary Fill.
5			4.8		ML, CL	Brown SILTY CLAY, trace Gravel, moist, dense, Lacustrine.
6			55.9		ML, CL	Grey SILT and CLAY, trace Gravel (mf, r), moist, dense, Lacustrine.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

Notes

Boring terminated at 7 feet bgs. To prevent damage to utility lines, the boring was cleared with hand tools from grade to 4 feet bgs. Samples from those depths were collected with a stainless steel spade. The soil sample from 6'-7' was placed in laboratory-supplied containers for analysis.

Matrix Environmental Technologies Inc. **SUBSURFACE LOG**

PROJECT & LOCATION: 65-67 Lake Ave., Lancaster, NY PROJECT No. 18-046

CLIENT: Aquino WELL/BORING ID: **SB302**

START DATE: 9/3/2024 COMPLETION DATE: 9/3/2024 RECORDED BY: N Ander

GROUNDWATER DEPTH WHILE DRILLING: approx. 6 feet GROUNDWATER DEPTH AFTER COMPLETION: not measured

WEATHER: partly cloudy, 70 F DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan

DRILL RIG: Geoprobe 7728DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic

Sampler Type: macrocore (L=48", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	0-4	0.0	48	GP-GM	Asphalt (6") over gray, POORLY GRADED GRAVEL (cf) WITH SILT, dry, medium dense, Quaternary Fill.
1			0.7		ML, CL	Brown SILTY CLAY, some Gravel (mf), dry, medium dense, Quarternay Fill.
2			3.5		SW-SM	Dark brown WELL GRADED SAND WITH SILT AND GRAVEL, moist at 3.5 feet, dense, Quaternary Fill.
3						
4	2	4.0 - 7.0	1.2	26	SP-SM	Brown, POORLY GRADED SAND (mf) WITH SILT AND GRAVEL (cf), wet at 6 feet (moist above), medium dense, Quaternary Fill.
5						
6			64		ML, CL	Brown SILTY CLAY, moist, dense, Lacustrine.
			4.2			Grey SILT and CLAY, moist to wet, dense, Lacustrine.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

Notes: Boring terminated at 7 feet bgs. To prevent damage to utility lines, the boring was cleared with hand tools from grade to 4 feet bgs. Samples from those depths were collected with a stainless steel spade. The soil sample from 6'-6.5' was placed in laboratory-supplied containers for analysis.

Matrix Environmental Technologies Inc. **SUBSURFACE LOG**

PROJECT & LOCATION: 65-67 Lake Ave., Lancaster, NY PROJECT No. 18-046

CLIENT: Aquino WELL/BORING ID: **SB303**

START DATE: 9/3/2024 COMPLETION DATE: 9/3/2024 RECORDED BY: N Ander

GROUNDWATER DEPTH WHILE DRILLING: approx. 4.5 feet GROUNDWATER DEPTH AFTER COMPLETION: not measured

WEATHER: partly cloudy, 70 F DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan

DRILL RIG: Geoprobe 7728DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic

Sampler Type: macrocore (L=48", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	0-4	0.0	48	GP-GM	Asphalt (6") over gray, POORLY GRADED GRAVEL (cf) WITH SILT, dry, medium dense, Quaternary Fill
1			0.4		GC	Brown CLAYEY GRAVEL, dry, medium dense, Quaternary Fill.
2			1.8		SW-SM	Dark brown WELL GRADED SAND WITH SILT AND GRAVEL, moist at 4 feet, dense, Quaternary Fill.
3						
4	2	4.0 - 7.0	0.6	32	SP	Brown, WELL GRADED SAND (mf) WITH SILT AND GRAVEL (cf), wet at 4.5 feet (moist above), medium dense, Quaternary Fill.
5			0.6		ML, CL	Brown SILTY CLAY, moist, dense, Lacustrine.
6			0.8		ML, CL	Grey SILT and CLAY, moist, dense, Lacustrine.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

Notes

Boring terminated at 7 feet bgs. To prevent damage to utility lines, the boring was cleared with hand tools from grade to 4 feet bgs. Samples from those depths were collected with a stainless steel spade. The soil sample from 6'-7' was placed in laboratory-supplied containers for analysis.

Matrix Environmental Technologies Inc. **SUBSURFACE LOG**

PROJECT & LOCATION: 65-67 Lake Ave., Lancaster, NY PROJECT No. 18-046

CLIENT: Aquino WELL/BORING ID: **SB304**

START DATE: 9/3/2024 COMPLETION DATE: 9/3/2024 RECORDED BY: N Ander

GROUNDWATER DEPTH WHILE DRILLING: approx. 5.5 feet GROUNDWATER DEPTH AFTER DRILLING COMPLETION: not measured

WEATHER: partly cloudy, 70 F CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan

DRILL RIG: Geoprobe 7728DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic

Sampler Type: macrocore (L=48", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		40	GP-GM	Asphalt (6") over gray, WELL GRADED GRAVEL (cf) WITH SILT, dry, medium dense, Quaternary Fill.
1			0.0		SM	Dark brown SILTY SAND WITH GRAVEL, moist, medium dense, Quaternary Fill.
2						
3			0.0		ML	Brown SANDY SILT WITH GRAVEL, moist, medium dense, Quaternary Fill.
4						
5	**2**	**5.0-7.0**		24	ML	As above, wet at 5.5', medium dense, Quaternary Fill.
6			0.0		ML, CL	Brown changing to gray SILT AND CLAY, wet at 6.5', dense, Lacustrine.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

Notes: Boring terminated at 7 feet bgs. The soil sample from 6'-7' was placed in laboratory-supplied containers for analysis.

Matrix Environmental Technologies Inc. **SUBSURFACE LOG**

PROJECT & LOCATION: 65-67 Lake Ave., Lancaster, NY PROJECT No. 18-046

CLIENT: Aquino WELL/BORING ID: **SB305**

START DATE: 9/3/2024 COMPLETION DATE: 9/3/2024 RECORDED BY: N Ander

GROUNDWATER DEPTH WHILE DRILLING: perched at 2 feet GROUNDWATER DEPTH AFTER COMPLETION: not measured

WEATHER: partly cloudy, 70 F DRILLING CONTRACTOR/DRILLERS: Matrix Environmental Technologies / R. Reagan

DRILL RIG: Geoprobe 7728DT DRILL SIZE & TYPE: Direct Push 2 1/2" NPT HAMMER Type: Hydraulic

Sampler Type: macrocore (L=48", OD=2.125")

Sample Depth (ft)	Sample No.	Sample Interval (feet)	OVM Reading (ppm)	Recovery (inches)	USCS Group Symbol	SOIL DESCRIPTION AND DRILLING COMMENTS Unified Soil Classification System f-fine m-medium c-coarse sr - subrounded, r - rounded, sa - subangular, a - angular
	1	**0.0-5.0**		40	GP-GM	Asphalt (6") over gray, WELL GRADED GRAVEL (cf) WITH SILT, dry, medium dense, Quaternary Fill.
1			0.0		SP	Brown POORLY GRADED SAND WITH GRAVEL, wet at 2', medium dense, Quarternary Fill.
2						
3			0.0			
4					ML	SANDY SILT WITH GRAVEL, moist, medium dense, Quaternary Fill.
5	**2**	**5.0-7.0**		24	ML	As above, moist, medium dense, Quaternary Fill.
6			0.0		ML, CL	Brown changing to gray SILTY CLAY, moist, dense, Lacustrine.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

Notes: Boring terminated at 7 feet bgs. The soil sample from 6'-7' was placed in laboratory-supplied containers for analysis.

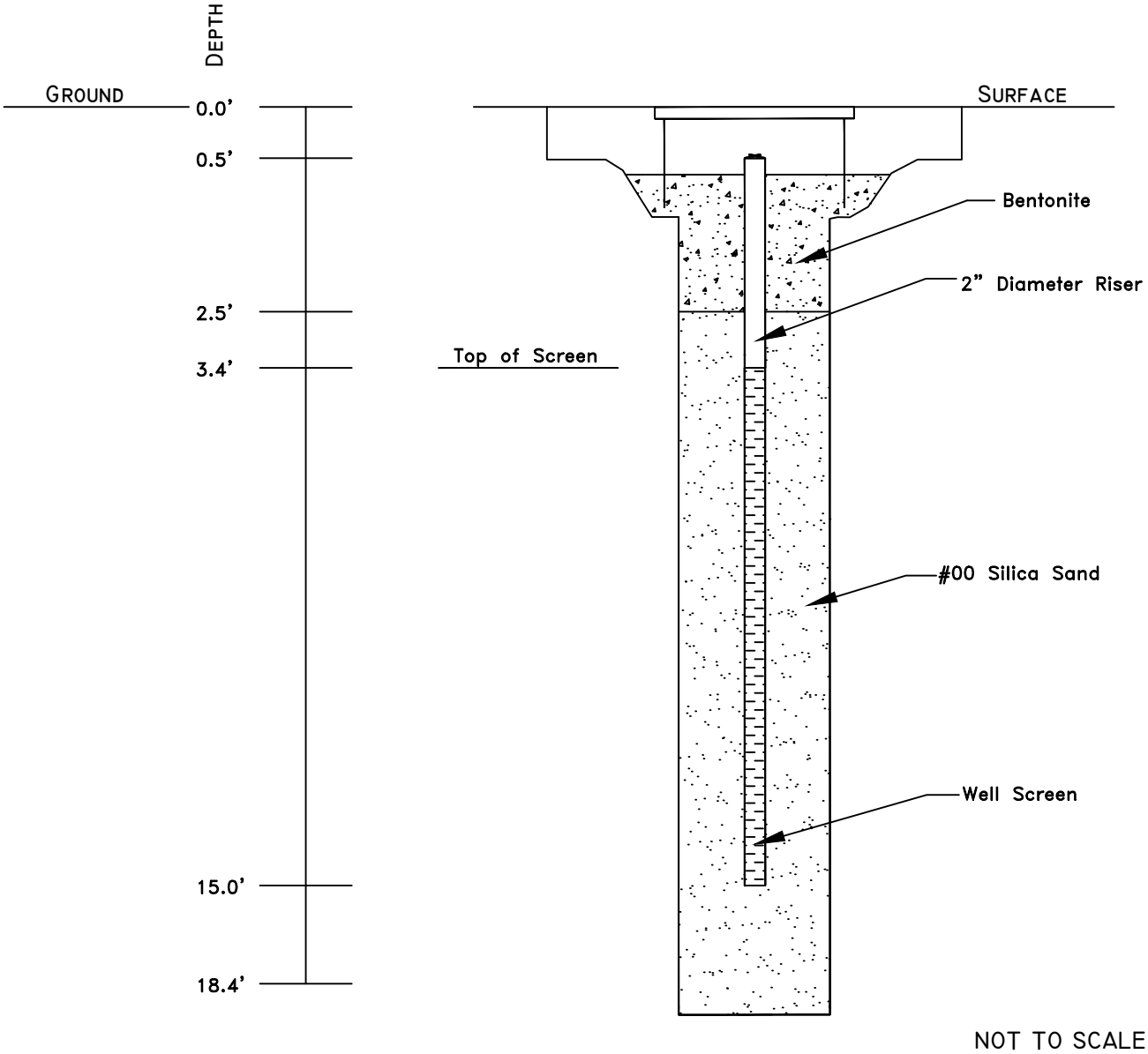
APPENDIX D – MONITORING WELL CONSTRUCTION DETAILS

MATRIX
Environmental Technologies

MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York
WELL NUMBER: MW1
DATE COMPLETED: 07/21/2020
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC
DRILLING COMPANY: Matrix Environmental Technologies Inc.
SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC
BOREHOLE SIZE: 6" Diameter



NOT TO SCALE

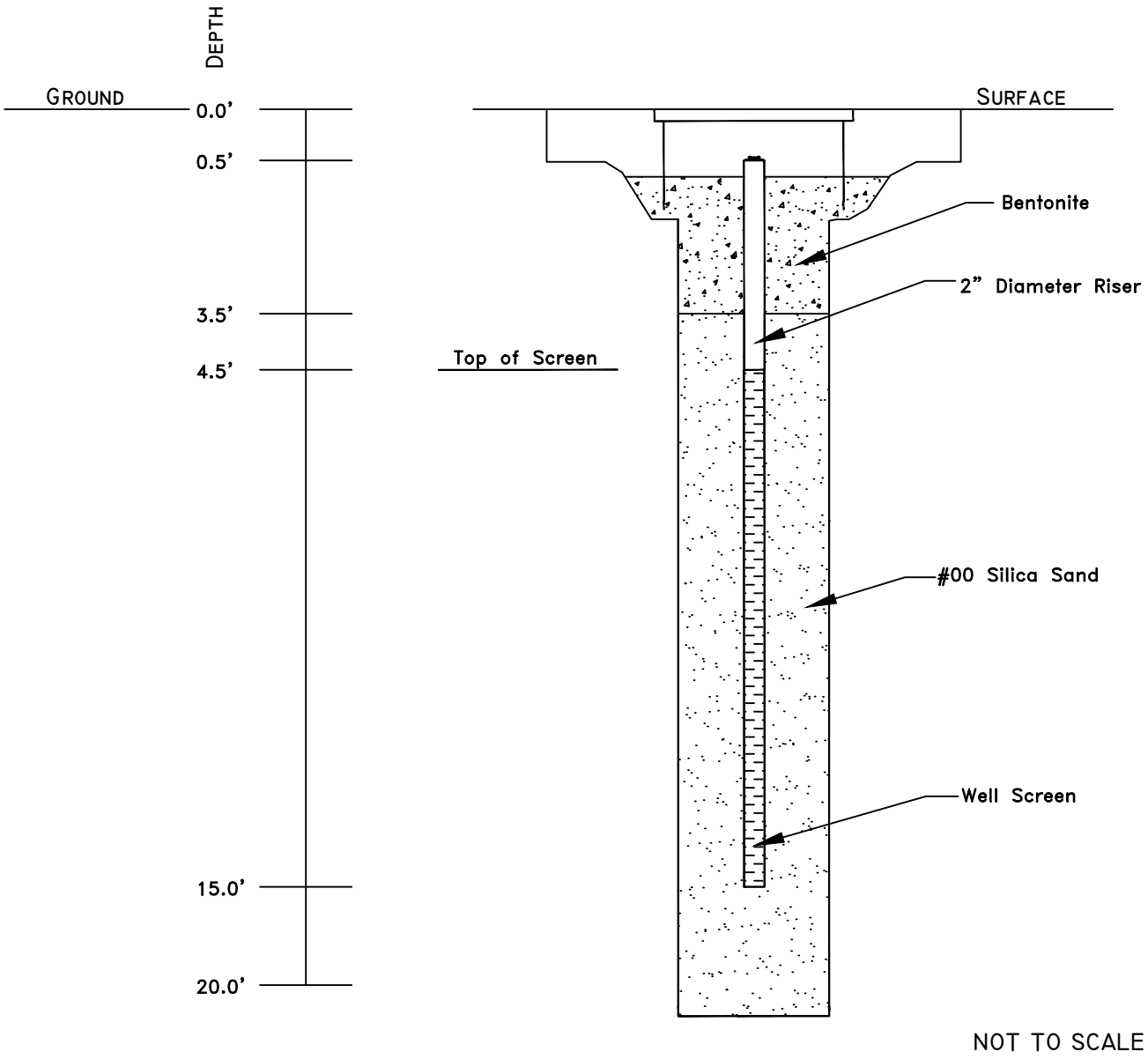
MATRIX
Environmental Technologies

MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York
WELL NUMBER: MW2
DATE COMPLETED: 07/21/2020
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC
DRILLING COMPANY: Matrix Environmental Technologies Inc.
SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC
BOREHOLE SIZE: 6" Diameter

NOTE: Monitoring well was destroyed during excavation activities on September 27, 2023.



NOT TO SCALE

MATRIX
Environmental Technologies

MONITORING WELL CONSTRUCTION DETAIL

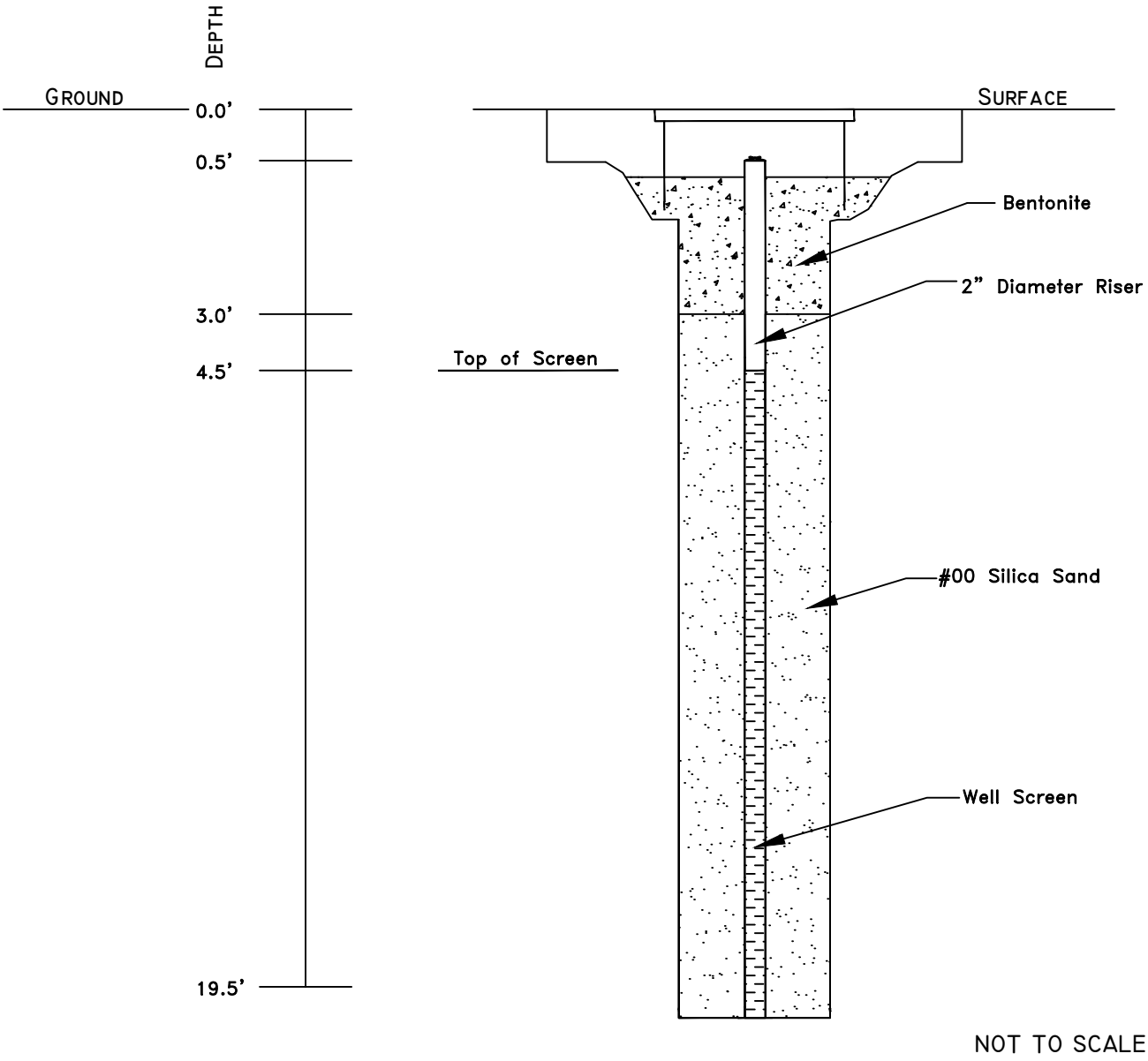
PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York
WELL NUMBER: MW3

DATE COMPLETED: 07/22/2020
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC
DRILLING COMPANY: Matrix Environmental Technologies Inc.

SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC
BOREHOLE SIZE: 6" Diameter

NOTE: Monitoring well was destroyed during excavation activities on September 26, 2023.



NOT TO SCALE

MATRIX
Environmental Technologies

MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York

WELL NUMBER: MW4

DATE COMPLETED: 07/23/2020

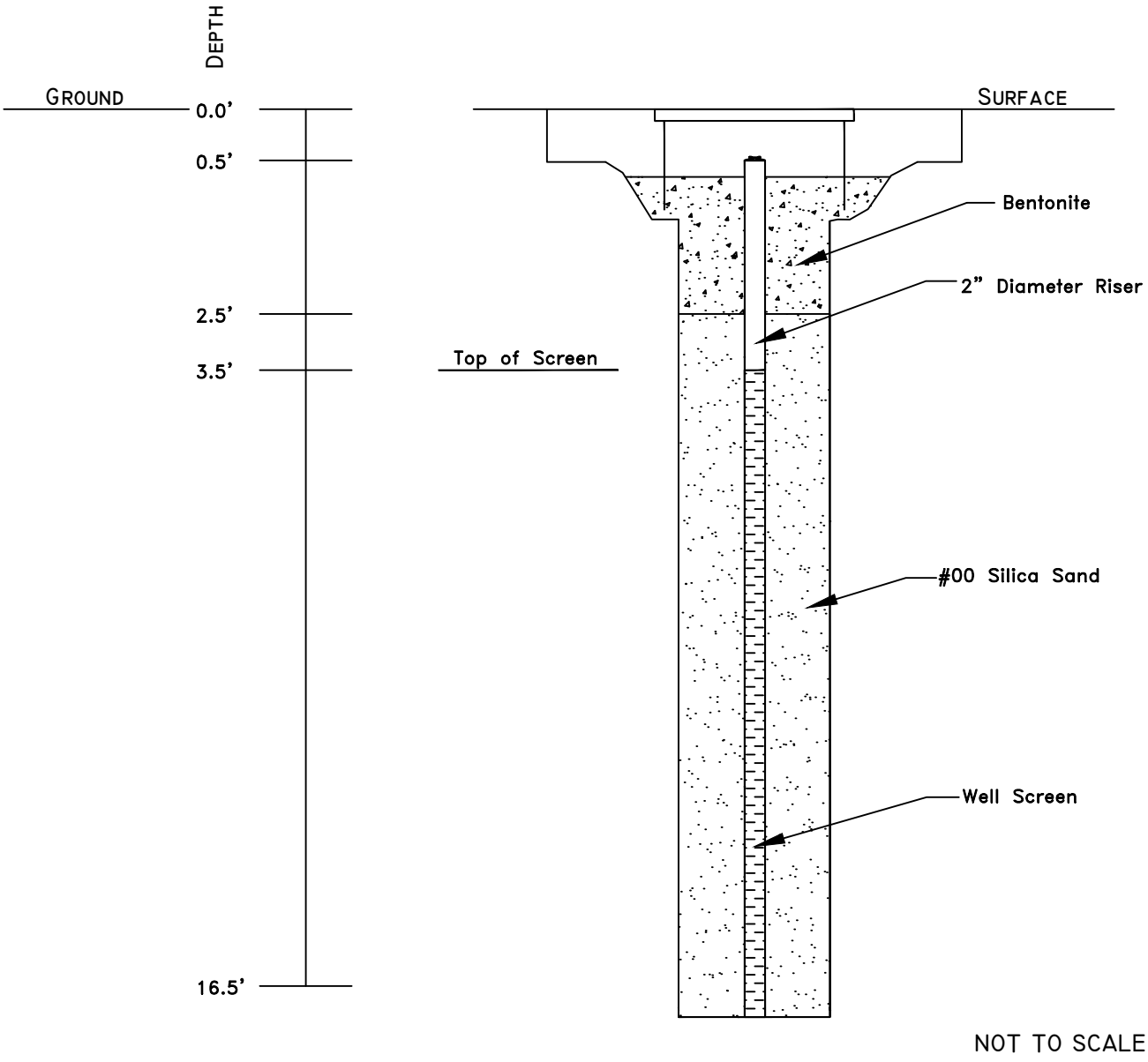
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC

DRILLING COMPANY: Matrix Environmental Technologies Inc.

SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC

BOREHOLE SIZE: 6" Diameter



NOT TO SCALE

MATRIX
Environmental Technologies

MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York

WELL NUMBER: MW5

DATE COMPLETED: 07/23/2020

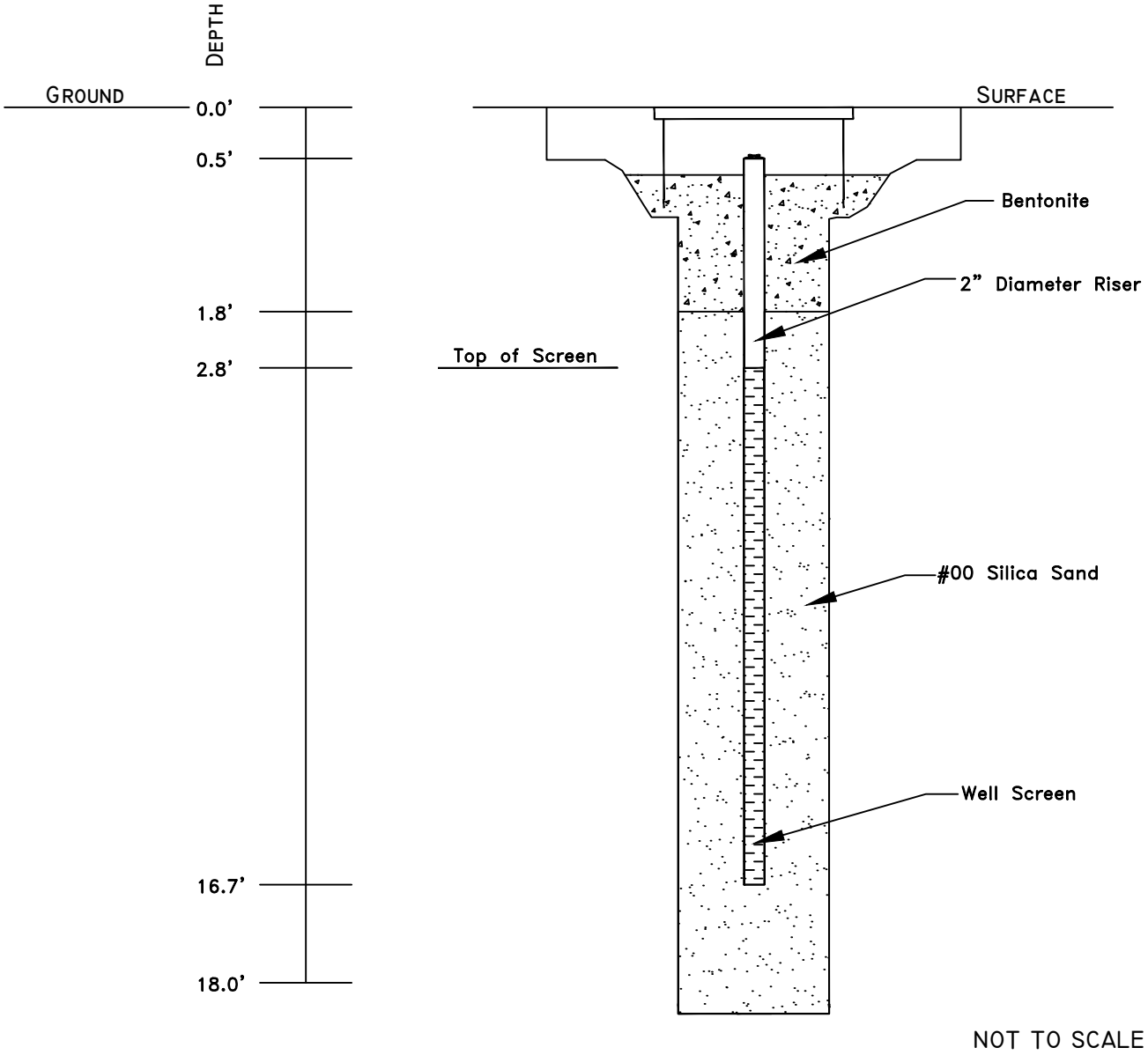
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC

DRILLING COMPANY: Matrix Environmental Technologies Inc.

SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC

BOREHOLE SIZE: 6" Diameter



NOT TO SCALE

MATRIX
Environmental Technologies

MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York

WELL NUMBER: MW6

DATE COMPLETED: 07/27/2020

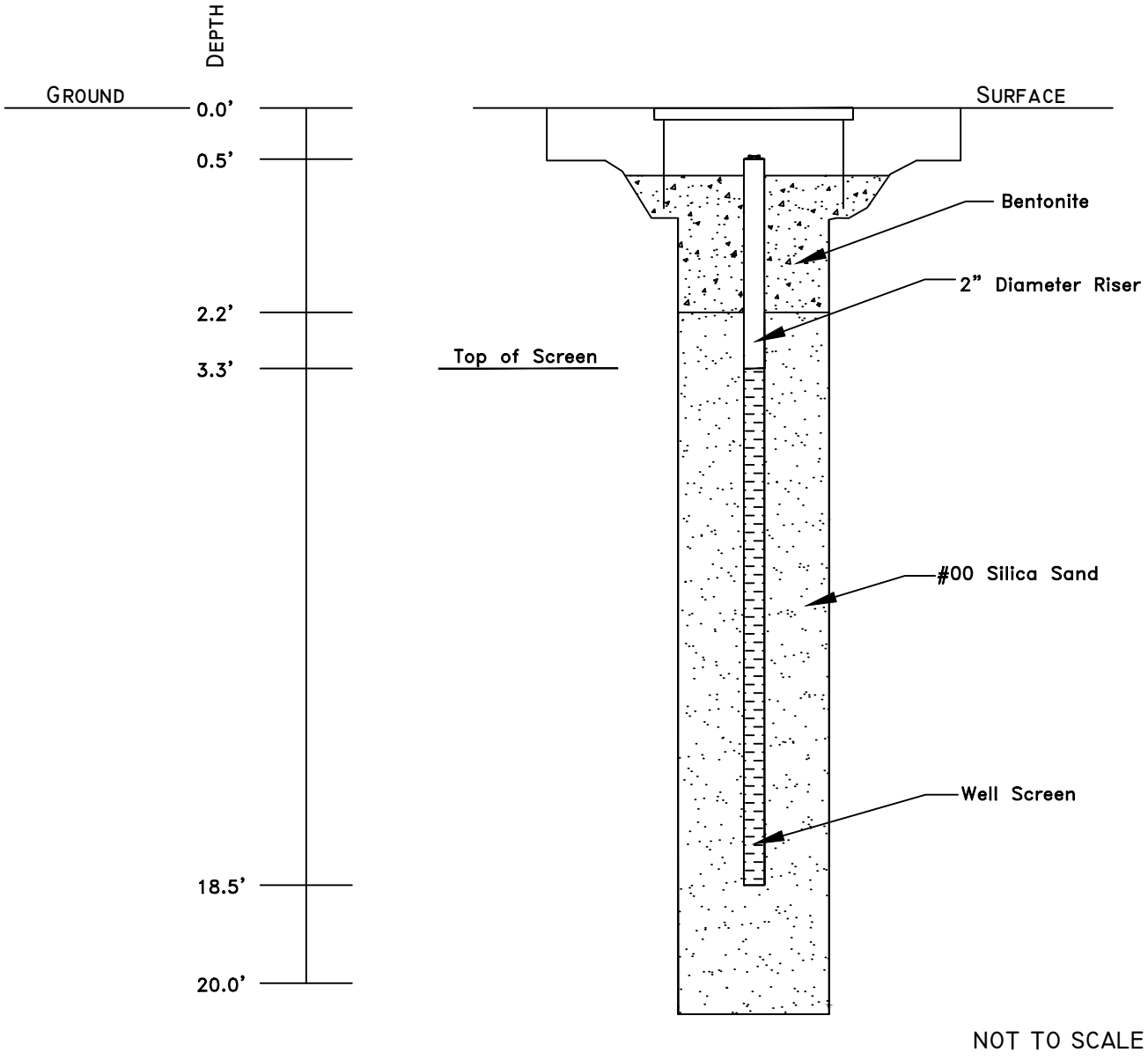
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC

DRILLING COMPANY: Matrix Environmental Technologies Inc.

SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC

BOREHOLE SIZE: 6" Diameter



NOT TO SCALE

MATRIX
Environmental Technologies

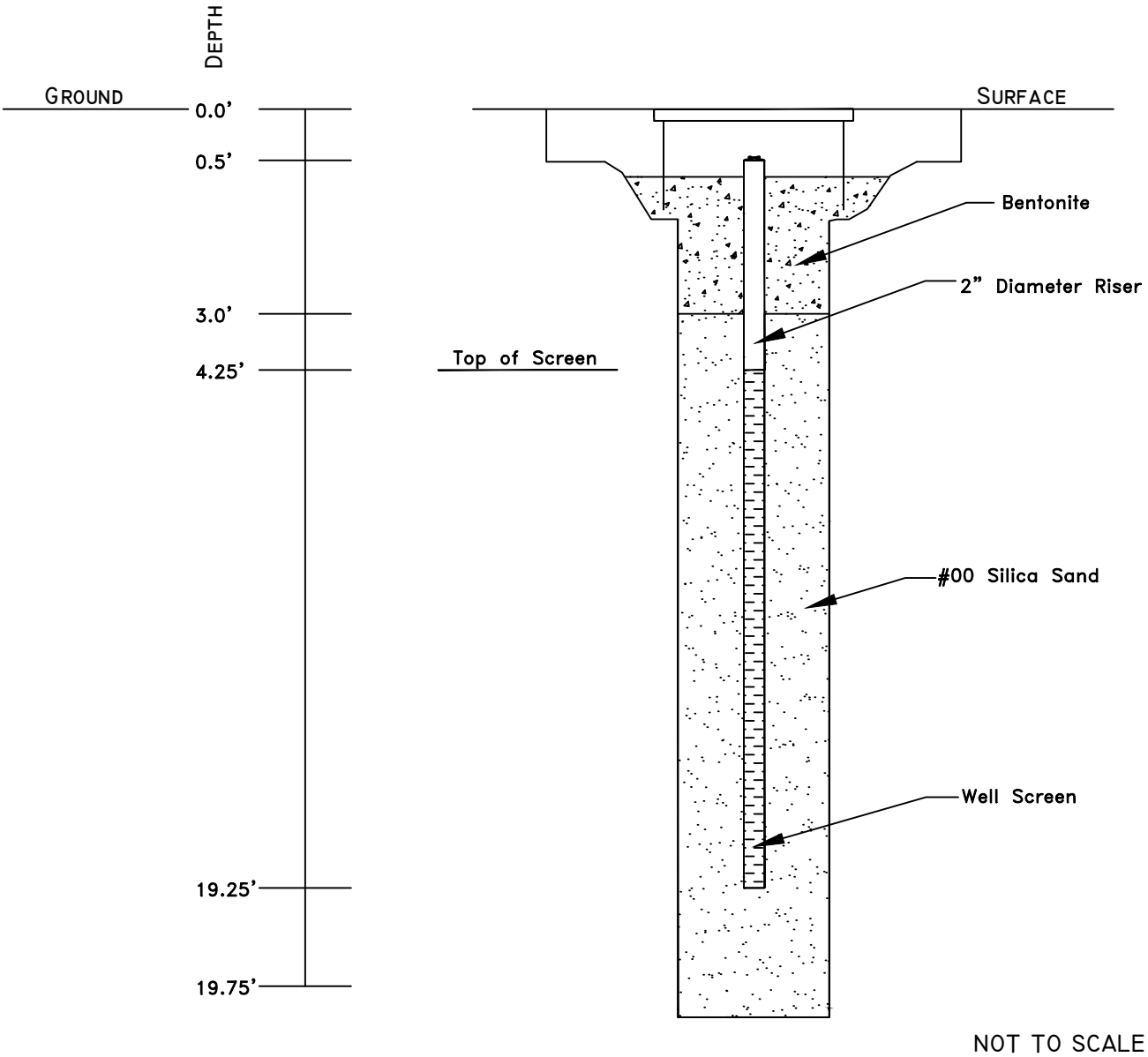
MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York
WELL NUMBER: MW7

DATE COMPLETED: 07/27/2020
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC
DRILLING COMPANY: Matrix Environmental Technologies Inc.

SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC
BOREHOLE SIZE: 6" Diameter



NOT TO SCALE

MATRIX
Environmental Technologies

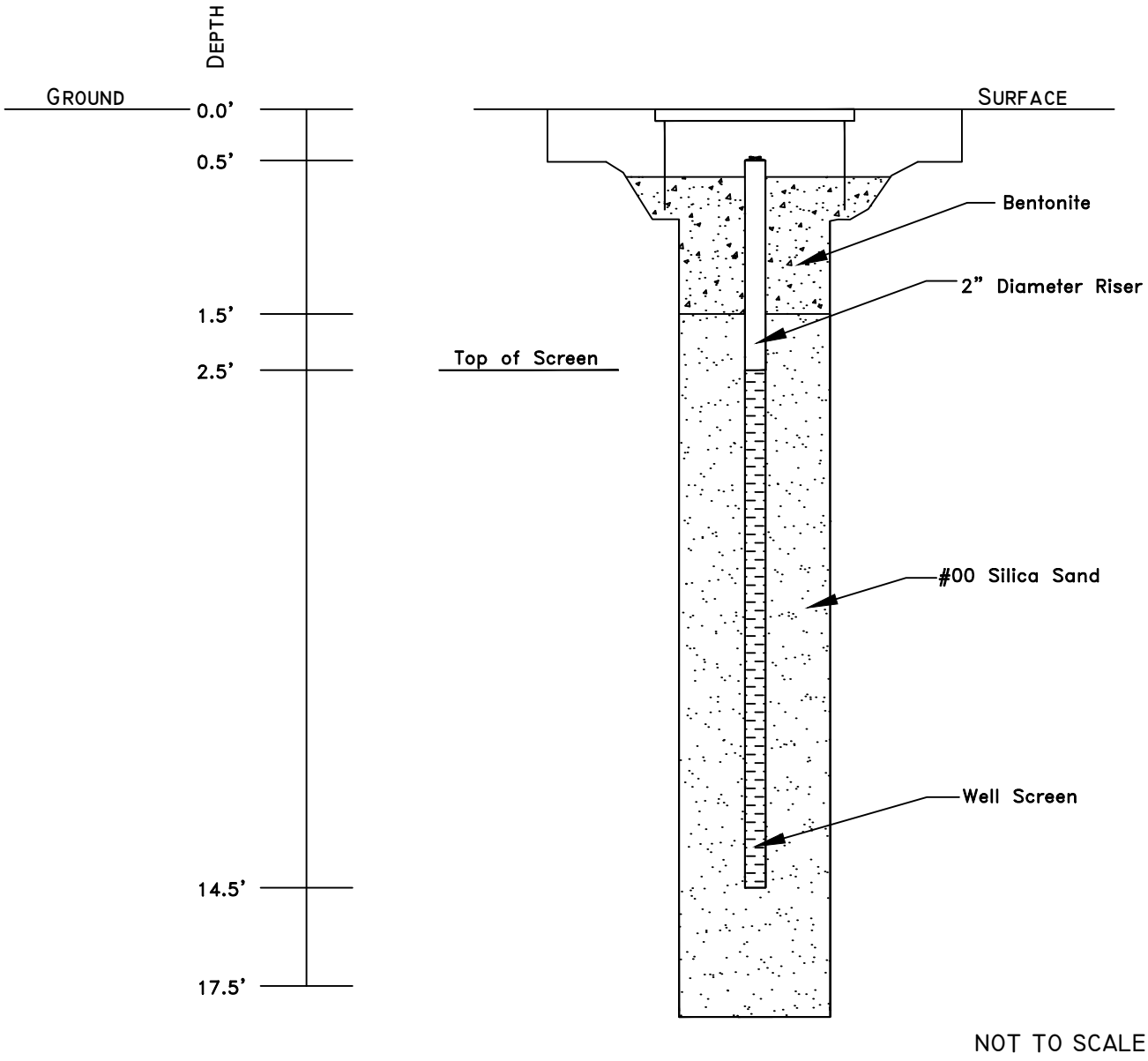
MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York
WELL NUMBER: MW8

DATE COMPLETED: 07/22/2020
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC
DRILLING COMPANY: Matrix Environmental Technologies Inc.

SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC
BOREHOLE SIZE: 6" Diameter



NOT TO SCALE

MATRIX
Environmental Technologies

MONITORING WELL CONSTRUCTION DETAIL

PROJECT LOCATION: 65-67 Lake Avenue, Lancaster, New York

WELL NUMBER: MW9

DATE COMPLETED: 08/16/2021

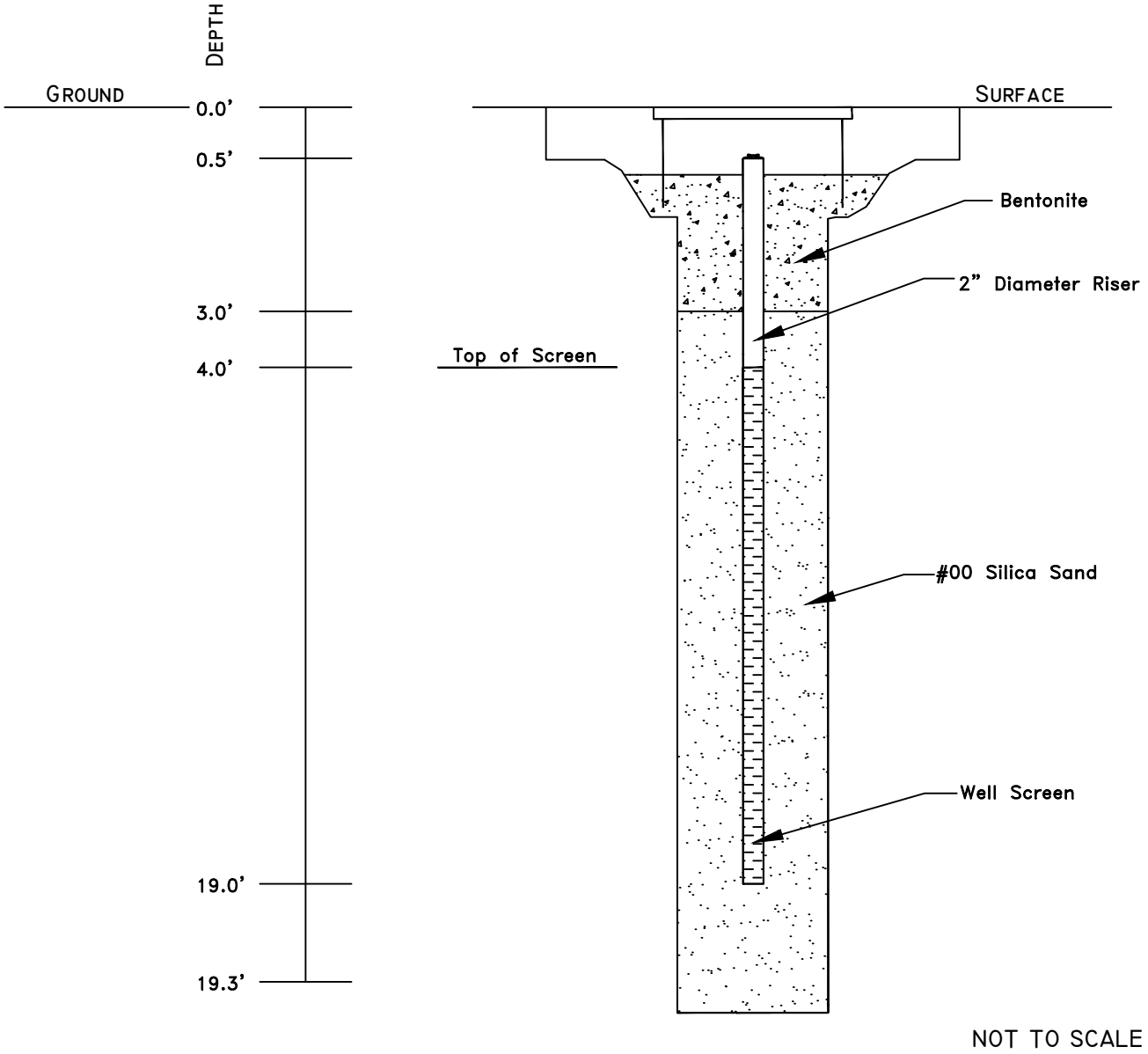
SUPERVISED BY: C. Zink

POINT SIZE AND TYPE: 2" ID SCH 40 PVC

DRILLING COMPANY: Matrix Environmental Technologies Inc.

SCREEN SIZE AND TYPE: 0.010" Slot SCH 40 PVC

BOREHOLE SIZE: 6" Diameter



NOT TO SCALE

APPENDIX E – EXCAVATION WORK PLAN (EWP)

E-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the Site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table E.1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix B**.

Table E.1: Notifications*

Name	Contact Information
Jason Kryszak	716-851-7220 / jason.kryszak@dec.ny.gov
Benjamin McPherson, P.E.	716-851-7220 / benjamin.mcpherson@dec.ny.gov
Kelly Lewandowski, P.E.	716-402-9569 / kelly.lewandowski@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work, and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work;

- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in **Appendix F** of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

5-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section E-6 and Section E-7 of this Appendix.

E-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

E-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). Trucks transporting contaminated soil must

have either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

If a truck wash area is not appropriate, a decontamination area of sufficient size to accommodate all equipment involved in the excavation activities may be established. All equipment will enter the decontamination area prior to exiting the Site. The equipment will have all soil/fill material removed from the equipment. At the end of the excavation activities, the decontamination area and all material accumulated will be removed and disposed of off-site in accordance with all applicable local, state, and federal regulations.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

E-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes will generally follow Lake Avenue north to U.S. Route 20, heading either east or west depending on the selected landfill or disposal facility. All trucks loaded with site materials will exit the vicinity of the site using only the approved truck routes. The most appropriate route takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; (f) overall safety in transport; and (g) community input where necessary.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

E-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 361-5 registered or permitted facility).

E-7 MATERIALS REUSE ON-SITE

The qualified environmental professional, as defined in 6 NYCRR Part 375, will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency:

Table 5.4(e)10 Recommended Number of Soil Samples for Soil Imported To or Exported From a Site			
Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

The analytical results of soil/fill material testing must meet the site use criteria (restricted residential use or unrestricted use for the New York State Flood Control Easement area only) presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (April 2023) guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections E-2 and E-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site may only be reused on-site with written approval from the NYSDEC project manager.

E-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, state, and federal regulations. Decontamination and purge water will be containerized in a 55-gallon drum on Site and sampled for TCL VOCs by EPA Method 8260 to confirm that the applicable water quality standards are not exceeded prior to discharge to ground surface with the approval of NYSDEC. If the applicable water quality standards are exceeded, the drum will be transported for off-site disposal.

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

E-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities, the cover system will be restored in a manner that complies with the decision document and/or or Record of Decision. The existing cover system is comprised of asphalt pavement and a minimum of 24 inches of clean soil in two small areas that are unpaved as shown in **Figure 1**. A demarcation layer, consisting of orange snow fencing material, white geotextile or equivalent material, etc. will be placed to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. Because the cover was in place prior to discovery of the contamination, there is currently no demarcation layer in place.

If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP. The alteration,

restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

E-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of five business days for review. A copy of the form is presented in **Appendix M** of the SMP.

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

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for restricted residential use or for the New York State Environmental Easement for Flood Control for Cayuga Creek, unrestricted use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 1. Protection of groundwater standards apply for PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride only. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

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

E-11 STORMWATER POLLUTION PREVENTION

If future Site activities include large excavations, a Stormwater Pollution Prevention Plan that conforms to the requirements of the NYSDEC Division of Water guidelines and NYS regulations will be included in the applicable notification provided to NYSDEC. Any future excavation activities should include erosion controls as appropriate for good construction practices.

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

E-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be

suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery. Any tanks or container that are discovered will be emptied of fluids if needed and closed as per NYSDEC regulations and guidance.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

E-13 COMMUNITY AIR MONITORING PLAN (CAMP)

A CAMP is included as **Appendix G** of the SMP. Generic CAMP monitoring will be performed during non-intrusive activities, such as the collection of surface soil and groundwater samples from pre-existing monitoring wells, and during intrusive activities not taking place within 20 feet of potentially exposed populations or structures.

VOCs will be monitored at the upwind and downwind perimeters of the work area on a continuous basis during intrusive activities and periodically during non-intrusive activities. The upwind and downwind locations will be determined based on observed wind conditions during ground intrusive work. MiniRAE 3000 organic vapor meters (OVMs) equipped with a photoionization detector (PID) with an 11.7 eV lamp will be used provide real-time recordable air monitoring data. The meters will be capable of calculating 15-minute running average concentrations for comparison to the action levels and will be equipped with an audible and/or visual alarm to indicate exceedance of the action level.

Generic CAMP VOC monitoring action levels as per DER-10 Technical Guidance for Site Investigations and Remediation are as follows:

- 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 (as measured at the upwind perimeter of the work area) for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If the organic vapor level at the perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions take to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less; but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.

Dust and particulate monitoring will be conducted continuously at upwind and downwind perimeters of the work area during ground intrusive activities. If visual evidence of dust is apparent in other locations, monitoring equipment will be placed where necessary. Particulate air monitoring will be done with a DataRAM-4 (or similar), which will be capable of reading particles less than 10 micrometers in size (PM-10). The meters will be capable of calculating 15-minute running average concentrations for comparison to the action levels and will be equipped with an audible and/or visual alarm to indicate exceedance of the action level. Particulate monitoring action levels for general CAMP monitoring are as follows:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (µg/m3) greater than background for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not

exceed 150 µg/m3 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 µg/m3 above the upwind level, work must be stopped and a reevaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m3 of the upwind level and in preventing visible dust migration.

A figure showing the location of air sampling stations based on generally prevailing wind conditions is shown in Figure 1 of the CAMP. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

E-13A: Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 part-per-million, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate

pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 micrograms per cubic meter, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 micrograms per cubic meter or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

E-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-site. Specific odor control methods to be used on a routine basis will include the elements described below.

- Performing activities that may generate odors during normal working hours.
- Covering vehicles transporting materials on-site when possible and in accordance with Department of Transportation requirements when transporting materials offsite.
- Maintaining covered/tarped stockpiles on site with covering at the end of each work shift, at a minimum.
- Loading trucks such that material will not be dropped from heights above the truck body.
- Cleaning excavated material spills immediately.
- Reporting and addressing odor complaints accordingly with appropriate follow- up.

If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

E-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the CAMP provided in Section E-13. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

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

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.

- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.
- Material in open trucks will be secured and covered while hauling excavated material. Covers may be reused.
- Excavated areas will be revegetated as quickly as possible.
- Vehicle speeds will be limited to 10 miles per hour on site.
- The number and/or size of excavation will be reduced where possible.

E-16 OTHER NUISANCES

If appropriate, a plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

If appropriate, a plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

Table 1: Soil Cleanup Objectives (ppm)

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

PARAMETER	Track 1 Area Only: Unrestricted Use SCO	Track 2 & 4 Areas: Restricted-Residential Use SCO	Track 2 & 4 Areas: Protection of Groundwater SCO
Metals			
Arsenic	13	16	
Barium	350	400	
Beryllium	7.2	72	
Cadmium	2.5	4.3	
Chromium, hexavalent	1	110	
Chromium, trivalent	30	180	
Copper	50	270	
Total Cyanide	27	27	
Lead	63	400	
Manganese	1600	2,000	
Total Mercury	0.18	0.81	
Nickel	30	310	
Selenium	3.9	180	
Silver	2	180	
Zinc	109	10,000	
PCBs/Pesticides			
2,4,5-TP Acid (Silvex)	3.8	100	
4,4'-DDE	0.0033	8.9	
4,4'-DDT	0.0033	7.9	
4,4'-DDD	0.0033	13	
Aldrin	0.005	0.097	
alpha-BHC	0.02	0.48	
beta-BHC	0.036	0.36	
Chlordane (alpha)	0.094	4.2	
delta-BHC	0.04	100	
Dibenzofuran	7	59	
Dieldrin	0.005	0.2	
Endosulfan I	2.4	24	
Endosulfan II	2.4	24	
Endosulfan sulfate	2.4	24	
Endrin	0.014	11	
Heptachlor	0.042	2.1	
Lindane	0.1	1.3	
Polychlorinated biphenyls	0.1	1	
Semivolatile organic compounds			
Acenaphthene	20	100	
Acenapthylene	100	100	
Anthracene	100	100	
Benz(a)anthracene	1	1	
Benzo(a)pyrene	1	1	
Benzo(b)fluoranthene	1	1	
Benzo(g,h,i)perylene	100	100	
Benzo(k)fluoranthene	0.8	3.9	
Chrysene	1	3.9	
Dibenz(a,h)anthracene	0.33	0.33	
Fluoranthene	100	100	
Fluorene	30	100	
Indeno(1,2,3-cd)pyrene	0.5	0.5	

Table 1: Soil Cleanup Objectives (ppm)

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, New York
BCP Site No. C915344

PARAMETER	Track 1 Area Only: Unrestricted Use SCO	Track 2 & 4 Areas: Restricted-Residential Use SCO	Track 2 & 4 Areas: Protection of Groundwater SCO
m-Cresol	0.33	100	
Naphthalene	12	100	
o-Cresol	0.33	100	
p-Cresol	0.33	100	
Pentachlorophenol	0.8	6.7	
Phenanthrene	100	100	
Phenol	0.33	100	
Pyrene	100	100	
Volatile organic compounds			
1,1,1-Trichloroethane	0.68	100	
1,1-Dichloroethane	0.27	26	
1,1-Dichloroethene	0.33	100	
1,2-Dichlorobenzene	1.1	100	
1,2-Dichloroethane	0.02	3.1	
cis -1,2-Dichloroethene	0.25		0.25
trans-1,2-Dichloroethene	0.19		0.19
1,3-Dichlorobenzene	2.4	49	
1,4-Dichlorobenzene	1.8	13	
1,4-Dioxane	0.1	13	
Acetone	0.05	100	
Benzene	0.06	4.8	
n-Butylbenzene	12	100	
Carbon tetrachloride	0.76	2.4	
Chlorobenzene	1.1	100	
Chloroform	0.37	49	
Ethylbenzene	1	41	
Hexachlorobenzene	0.33	1.2	
Methyl ethyl ketone	0.12	100	
Methyl tert-butyl ether	0.93	100	
Methylene chloride	0.05	100	
n - Propylbenzene	3.9	100	
sec-Butylbenzene	11	100	
tert-Butylbenzene	5.9	100	
Tetrachloroethene	1.3		1.3
Toluene	0.7	100	
Trichloroethene	0.47		0.47
1,2,4-Trimethylbenzene	3.6	52	
1,3,5-Trimethylbenzene	8.4	52	
Vinyl chloride	0.02		0.02
Xylene (mixed)	0.26	100	

LEGEND

- Monitoring Well Location
- Destroyed Monitoring Well Location
- Active Horizontal SVE Well
- Deactivated Horizontal SVE Well
- Remedial Excavation Extents
- BCP Cleanup Track 1 Area (NYS Easement)
- BCP Cleanup Track 4 Area - Cover System (Asphalt Pavement; approx. 10")
- BCP Cleanup Track 4 Area - Cover System (Min. 24" Clean Soil)
- BCP Cleanup Track 4 Area - Cover System (Excavation Area; 7' Clean Fill)

BUILDING C
65 LAKE AVE

MW6

59 LAKE AVE

OVERHEAD ELECTRIC

OVERHEAD ELECTRIC

MW9

MW1

BUILDING B
65 LAKE AVE

MW5

SVE2

SVE3

MW2

SVE1

MW3

FORMER DRY CLEANER (APPROXIMATE)

BUILDING A
65 LAKE AVE

SVE SYSTEM ENCLOSURE

MW7

NY STATE EASEMENT
FLOOD PROTECTION PROJECT
FOR CAYUGA CREEK

SHED

MW4

BUILDING 1
67 LAKE AVE

MW8

BCP SITE LIMIT

69 LAKE AVE

STATE OF NEW YORK
CHRISTINE MARIE KURTIS
LICENSED PROFESSIONAL ENGINEER
100560

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

N

1" = 25'
0 25

PREPARED BY:
MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	12/2/25

TITLE:
COVER SYSTEM

DATE:

FIGURE:
1

APPENDIX F – HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

for

BROWNFIELD CLEANUP PROGRAM

REVISED: October 2025

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York
Site #C915344

Prepared For:
65 Lake Avenue LLC

Prepared By:

MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.

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FIGURES

APPENDICES

1.0 INTRODUCTION

This Health & Safety Plan (HASP) has been developed for the remedial work to be completed by Matrix Environmental Technologies Inc. (METI) on behalf of 65 Lake Avenue LLC as part of the Brownfield Cleanup Program (BCP). The proposed work will include remedial excavation, SVE well and system installation, injection of permanganate for *in situ* chemical oxidation (ISCO), soil and groundwater sampling, and report preparation. Such activities mandate the performance of tasks with a potential to expose remediation workers to various environmental contaminants previously identified on-site, primarily involving chlorinated volatile organic compounds (VOCs). Limited exposure potential may be related to commercial substances used for equipment decontamination as well oxidant (potassium permanganate). A general listing of the work tasks to be completed is as follows:

1. Remedial excavation of 680 cubic yards (1,090 tons) of soil to a maximum depth of 7 feet below grade;
2. Soil sample collection and analysis;
3. Installation of horizontal SVE wells and SVE system;
4. ISCO injection; and
5. Groundwater sampling using disposable bailers.

The intent of this HASP is to identify and present appropriate safety procedures to be followed by Site workers involved with project activities. Such procedures are designed to reduce the risk of remediation worker exposure to the primary substances of concern.

The procedures also address several other physical hazards that may be encountered during remedial activities. Recommended safety procedures presented herein may be modified as the work proceeds based upon conditions encountered at the Site with the mutual agreement of METI, the New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH), and the property owner. A copy of this HASP (including any modifications) will be maintained on-site throughout field work to be used as a reference by METI and their subcontractors. An initial safety meeting will be conducted at the Site prior to the initiation of the remedial activities to inform all affected remediation workers of potential exposures and hazards.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Description

The site is addressed as 65-67 Lake Avenue in the Town of Lancaster, Erie County, New York and consists of two parcels totaling approximately 1.18 acres of land. Onsite structures include a one-story apartment building constructed in 1903 on the 67 Lake Avenue parcel and three (3) two-story townhomes constructed in 2006 on the 65 Lake Avenue parcel. The Site is bordered by undeveloped land to the south, residences to the north and west, and Lake Avenue to the east. Cayuga Creek is located approximately 200 feet to the southwest. A Site location map showing the BCP Site boundaries is included as **Figure 1**.

2.2 Site History

Historically, the eastern portion of the Site was utilized as a dry cleaner from at least 1949 through 1980. The former dry-cleaning building was located on the eastern portion of 65 Lake Avenue and the northern portion of 67 Lake Avenue and was removed or demolished by at least 1995. The current Site buildings were constructed in 1903 (67 Lake Avenue) and 2006 (65 Lake Avenue).

Multiple subsurface investigations have been completed at the Site prior to and following the Site's acceptance into the BCP. Chlorinated solvents were identified in soil and groundwater samples associated with past on-site dry cleaning operations. Due to the detections of chlorinated solvents, vapor intrusion studies were completed in February and April 2019 within the four (4) residential buildings. Vapor intrusion testing results identified chlorinated solvents, specifically tetrachloroethene (PCE) and trichloroethene (TCE), within both sub-slab and indoor air samples. Based on guidance from the New York State Department of Health (NYSDOH), the concentrations of these solvents required mitigation in Building A on 65 Lake Avenue and Building 1 on 67 Lake Avenue. Mitigation was not required in Building B or Building C. As a result, sub-slab depressurization systems (SSDS) were installed within Building A and Building 1 in November and December 2019 to mitigate vapor intrusion.

3.0 ASSIGNED RESPONSIBILITIES

Specific safety responsibilities have been established for the remedial work as indicated below:

3.1 Environmental Health & Safety Manager

The Environmental Health & Safety Manager (EHSM) has the authority to commit any resources necessary to implement an effective safety program, thereby protecting the health of affected site workers. The EHSM will delegate responsibilities, as necessary, to the Project Manager (PM) in order to facilitate various aspects of this HASP. The resolution of any on-site safety issues encountered during remedial work will be coordinated by the EHSM.

3.2 Project Manager

The Project Manager (PM) will be responsible for the overall project including implementation of the HASP. The PM will coordinate with the Site Safety Officer (SSO) to ensure that project goals of the project are met in a manner consistent with the HASP requirements.

3.3 Site Safety Officer

The Site Safety Officer (SSO) will be responsible for ensuring that the recommended safety procedures are followed during sampling activities. The SSO will supervise METI employees and subcontractors during field work. The SSO is knowledgeable of general construction safety practices and remediation worker protection techniques. Responsibilities will include:

- Ensuring day to day compliance with HASP safety procedures;
- Requiring any person entering the work site to read, sign and fully understand the contents of the HASP;

- Maintaining adequate PPE supplies;
- Calibration and maintenance of monitoring instruments;
- Authority to stop work activities any time unsafe work conditions are identified;
- Implementing personnel decontamination procedures;
- Initiating emergency response procedures;
- Maintaining a diary of activities with safety relevance; and
- Establishing and assuring adequate records of all:
  - Occupational injuries and illnesses;
  - Accident investigations;
  - Reports to insurance carrier or state compensation agencies;
  - Records and reports required by local, state and/or federal agencies; and
  - Property or equipment damage.

Visitors to the site such as regulators and those performing non-intrusive tasks will be required to review the HASP only and will not be required to complete waste site training and medical surveillance. Refer to **Appendix C** for visitor policy.

3.4 Site Workers

Affected Site workers will include METI employees and subcontractor employees. Site workers must comply with aspects of the HASP and its safety procedures. Personnel entering the Site will have completed training requirements for hazardous waste site operations in accordance with OSHA 29CFR 1910.120 (c); 29CRF 1910.146 (d) and 29CFR 1910.147 (c). Site workers and SSO must have completed appropriate medical surveillance as required by OSHA 29CRF 1910.120(f).

3.5 Subcontractors

Subcontractors are responsible for development of their own HASP that is at least as stringent. A copy of this HASP will be provided to the subcontractors for information purposes. Subcontractors will be informed of potential health and safety hazards as well as environmental monitoring data collected during field activities.

4.0 TRAINING and SAFTETY MEETINGS

4.1 Training

Personnel assigned to the Site will be in compliance with the training requirements of 29 CFR 1910 and 1926 as listed below. Site personnel will have met one of the following requirements prior to the start of on-site activities.

- A 40 hour minimum hazardous materials safety and health course, as stipulated in 29 CFR 1926.65 e(3); and
- An 8-hour minimum refresher course per year after the 40-hour minimum training has occurred (29 CFR 1926.65.e[8]).

On-site managers and supervisors must be in compliance with the additional supervisory training requirements of 29 CFR 1926.65.e(4). Emergency responders must be in compliance with the additional training requirements of 29 CFR 1926.65.e(7). Appropriate certificates of participating in training programs will be maintained by METI.

4.2 Safety Meetings

Site workers and subcontractors will be familiar with the Site layout and have an understanding of known and potential hazards as detailed within this HASP. On-site safety meetings will occur daily or as needed to assist Site workers and subcontractors in conducting activities safely. Attending personnel must sign the attendance sheet included as **Appendix A**. Site workers must attend a safety meeting prior to being allowed to work on-site.

5.0 PERSONAL PROTECTIVE EQUIPMENT

An important aspect for Site worker safety is correct selection of personal protective equipment (PPE). The levels of protection listed below are based on 29 CFR 1910.120. The majority of Site activities will be conducted in Level D protection. This level of protection was selected based on the types and measured concentrations of the hazardous substances in the samples previously collected and their associated hazards and/or toxicity; and on potential or measured exposure to substances in air, splashes of liquids or others indirect contact with material due to the task being performed.

- Level D will generally consist of the following:
  - Coveralls; or long pants and long sleeve shirt to provide protection from dermal contact with soil
  - High visibility safety vest
  - Steel toe work boots
  - Safety glasses
  - Hard hat
  - Chemical-resistant gloves

  Additional equipment can be donned at SSO requirements, including disposable boots, hearing protection, safety vest, or disposable outer chemical coveralls (Tyvek suits).

- Level C will generally consist of the following:
  - Full or half face air purifying respirator (APR) equipped with appropriate organic vapor canisters and/or other chemical cartridges.
  - Chemical resistant clothing, such as Tyvek suit. Suits will be one piece with booties, hood, and elastic wristbands.
  - High visibility safety vest (disposable)
  - Outer chemical-resistant gloves (i.e. nitrile or neoprene) and inner latex gloves
  - Steel toe work boots
  - Hard hat

- Level B will generally consist of the following:

- Self-contained breathing apparatus (SCBA) in a pressure demand mode or supplied air with escape SCBA.
- Chemical resistant closing, such as Tyvek suit. Suits will be one piece with booties, hood, and elastic wristbands.
- High visibility safety vest (disposable)
- Outer chemical-resistant gloves (i.e. nitrile or neoprene) and inner latex gloves
- Chemical resistant tape over PPE as needed (i.e. at glove/Tyvek location)
- Steel toe work boots
- Hard hat

6.0 HAZARD ANALYSIS

Many hazards are associated with environmental work on a Site. The hazards listed below deal specifically with those associated with the management of potentially contaminated soil, air, and groundwater; physical hazards; and environmental hazards.

6.1 Chemical Hazards

The primary contaminants of concern in soil and groundwater are chlorinated VOCs including PCE, TCE, cis-1,2-dichloroethene (cis-DCE), vinyl chloride, and acetone. A summary of hazards associated with these chemicals is include in **Table 1**. The list has been developed based on planned activities and potential Site conditions.

Chemical hazards are also associated with the mixing and application of oxidant (potassium permanganate) on site. An MSDS for potassium permanganate is included in **Appendix G**, and a detailed Job Safety Analysis (JSA) is included in **Appendix B.**

The most likely routes of chemical exposure during Site work include absorption through the skin and inhalation of airborne particles. The information was used to develop the levels of personal protective equipment (PPE) to be used for the duration of remedial work.

6.2 Physical/General Hazards

Based on the proposed scope of work, the following potential physical hazards have been identified:

- Slip/Trip/Fall – Good housekeeping practices, such as cleaning up garbage and stored materials from the work area, are essential to reduce the occurrence of trips and falls.

- Vehicle and machinery in motion hazards – A drill rig will be utilized for soil sample collection. To minimize potential hazards, the drilling subcontractor will be responsible for health and safety of its personnel, equipment, and operations. Utilities must be called in via Dig Safely New York. Cones and flags will be set up around each work area as necessary. Workers must be aware of pinch points when setting the rig and lowering mast/pull rods. PPE must be worn to prevent eye injury. All body parts, clothing, and manual tools must be kept 3-5 feet from moving equipment when possible. Gloves and

PPE must be worn when working with rods and cleaning equipment. Monitoring of the breathing zone will be conducted as necessary to ensure vapors are below action levels. Each worker must have an awareness of muscle strain. All sampling liners must be opened in a motion away from body and hands. The rig cannot be moved with the mast in a raised position.

- Electrical – Heavy equipment (e.g., excavator, backhoe, drill rig) shall not be operated within 10 feet of high voltage lines. Working near wet areas should also be taken into consideration when working with electrical equipment; surge protectors and ground fault protectors must be used in such conditions.

- Noise – Heavy machinery creates excessive and loud noise levels. Overexposure can result in hearing damage or loss. Proper hearing protection shall be worn during exposure to noise from heavy equipment.

- Underground utilities– The proper utility clearance will be obtained before conducting any digging or drilling operations.

- Soil sampling through use of heavy equipment – Personal protective equipment (PPE), including steel-toed boots, safety glasses, hard hats, and high-visibility clothing, must be worn. Personnel should not walk directly in back of, or to the side of, heavy equipment without the operator's knowledge. Engineering controls can be implemented such as water for particulate control.

- Cold Stress –Frostbite and hypothermia can occur quickly and the signs and symptoms of such should be known. Signs of hypothermia include slurred speech, confusion, and an overall warm sensation. Frostbite can be identified by red/frozen skin, numbness, and lack of sensation on the skin. In each case, the victim should be moved to a warm place. With frostbite, the affected area should be placed in warm water and wrapped with a warm towel. Medical attention is necessary after initial treatment. Heat and cold stress are discussed in further detail in **Appendix I**.

- Heat stress - Heat stress is a severe hazard that can result in heat fatigue or even heat stroke. Signs and symptoms of heat stroke include red, dry, and hot skin as well as confusion, a rapid pulse, and nausea. Adequate shade and drinking liquids should be provided to personnel working in hot weather conditions. If a person is suspected to be suffering from heat fatigue or stroke, transport to a cool place and place cold compresses on the neck and armpits; call 911 immediately. Heat and cold stress are discussed in further detail in **Appendix I.**

- Weather (i.e. lightning storms) – On-site personnel shall cease operation at the first sign of a thunderstorm or lightning strike. Workers should seek shelter within a permanent building and stay away from tall structures trees, telephone poles, and drill rigs/equipment.

6.3 Biological Hazards

Biological hazards can be caused by contact with land animals, birds, insects, and plants. Irritation, illness, and, in extreme cases, permanent disability or death, can occur. The Site is

located in a suburban area within the Town of Lancaster and field work will occur in spring through late fall. Contact with rodents, more specifically rats, shall be avoided. If bitten or scratched by any type of rodent or fur-bearing animal, medical treatment should be sought immediately. Insect bites and stings are not considered a serious threat due to time of year. Insect bites and stings can cause irritation and transmit disease. If stung by an insect, apply cold water and soap and immediately apply a cold compress to the area to limit swelling. If the victim is allergic to such bite or sting, immediate medical care may be necessary.

7.0 SITE MONITORING

Air monitoring will be performed on-site in order to track contamination levels. By knowing these levels, safety is insured for personnel working on-site. A photoionization detector (PID) equipped with an 11.7 eV lamp will be utilized during field monitoring.

7.1 Excavation, Soil Borings, Test Pits and Monitoring Wells

On-site monitoring will be completed by the SSO or Site worker assigned to oversee remedial excavation, drilling operations, soil sampling, and/or monitoring well installation/sampling. The PID will be utilized to monitor the breathing zone, the borehole, and subsurface samples for the presence of VOCs. Auger spoils will also be monitored. Fluids produced from monitoring well development and sampling will also be monitored with the PID.

7.2 Action Levels

Work area ambient air monitoring for VOCs will be completed periodically within the breathing zone. Action levels will be based on the PID readings. The action level assumes that background level of organics is close to non-detect. Background VOC readings will be recorded daily. Action levels are listed below.

Sustained PID Reading	Action	Minimum Respiratory Protection
0 to 10 ppm	None	None – Level D
10 to 25 ppm	Monitor for 15 minutes; if concentration does not decrease to under 10 ppm, upgrade PPE; consider venting area	Full-face Air-purifying respirator with organic vapor cartridges – Level C
>25 ppm	Monitor for 15 minutes; Consider venting area, upgrade PPE	Suspend work or supplied-air full face respirator – Level B

7.3 Particulate Monitoring

Monitoring for particulates will be completed periodically in the Site worker breathing zone. The decision to upgrade levels of PPE will be made in conjunction with consideration for weather conditions, wind conditions, and anticipated duration of field activity. Background particulate concentrations will be measured and recorded on a daily basis.

8.0 COMMUNITY AIR MONITORING PLAN

A Community Air Monitoring Program (CAMP) requires monitoring of VOCs and particulates at downwind locations and is intended to provide a level of protection for neighboring residences and businesses. Generic (periodic) CAMP monitoring will be performed during non-intrusive actions, such as the collection of surface soil samples or groundwater from existing wells, and during intrusive activities not taking place within 20 feet of a potentially exposed individual or structure. Special requirements CAMP monitoring will be conducted during ground intrusive activities taking place within 20 feet of a potentially exposed individual or structure. Refer to the CAMP (METI, March 2020) for detailed monitoring requirements and action levels.

9.0 SITE ACTIVITY AREAS AND ACCESS CONTROL

Prior to the initiation of remedial work, three work zones will be established to facilitate the implementation of the HASP. Prior to commencement of field work, a further definition of where these zones will be set up will be established. Guidelines for establishing work areas follows.

- Exclusion Zone (EZ) – Primary exclusion zones will be established around each intrusive field activity, such as soil boring or excavation area. Locations will be identified by the placement of orange cones. Site workers in these areas must wear appropriate PPE. Upon leaving Work Zone, if PPE becomes contaminated, site workers must remove and dispose of gloves and any other disposable PPE. After removing the PPE, site workers should thoroughly wash their hands. Access to the EZ will be limited to Site workers only for both safety and data integrity purposes.

- Contamination Reduction Zone (CRZ) – A CRZ will be established between the EZ and property limit. The CRZ provides an area for decontamination of Site equipment. The specific location of this pad will be determined in the field. It will be located out of the way of Site activities and sampling activities. An Alconox solution will be available to decontaminate equipment used in the sampling locations. The SSO will monitor equipment cleaning procedures to ensure their effectiveness. Equipment will be adequately cleaned and Site workers will remove contaminated PPE prior to either entering the Support Zone or leaving the site for the day once sampling activities have been completed. A fire extinguisher and first aid kit will be located in this area.

- Support Zone (SZ) – The SZ is considered to be clean, and PPE are not required. The SZ will be an area on-site adjacent to the CRZ in which supplies or equipment are stored and maintained. PPE is donned in the SZ prior to entering the CRZ.

10.0 DECONTAMINATION PROCEDURES

Decontamination procedures for personal and equipment will be implemented when exiting the work area. Decontamination involves physically removing contaminants and in general include removal of any contamination, avoiding spreading contamination from the work zone, and avoiding exposure of unprotected personnel outside the work zone to contaminants.

10.1 Prevention of Contamination

The first step in decontamination is to establish standard operating procedures that minimize contact with hazardous substances and thereby the potential for contamination. Site workers should be aware of the importance of minimizing contact with hazardous substances and the use of appropriate practices and procedures for Site operations. METI utilizes this approach by ensuring site workers:

- Stress work practices that minimize contact with hazardous substances (e.g., do not walk through areas of obvious contamination, do not directly touch potentially hazardous substances, etc.);

- Protect sampling instruments from gross contamination by bagging and making openings in the bag for sample ports and sensors that contact site materials;

- Wear disposable outer garments and use disposable equipment where appropriate.

10.2 Personal Decontamination

The degree of contamination exposure is a function of both a particular task and the physical environment in which it takes place. The following decontamination procedures will remain flexible, thereby allowing the decontamination crew to respond appropriately to changing conditions at the Site. It is expected that Site workers will be exposed to soil or fill material that is potentially contaminated with chlorinated solvents, and to chemical oxidant during mixing and application. On-site sampling activities will be carried out in such a manner as to avoid gross contamination of Site workers, personal protective equipment, machinery, and equipment.

Between sampling locations (or sometimes between samples at one sampling location), and upon the completion of the daily field activities, site workers will proceed to the CRZ. Equipment (e.g., sampling tubes, shovels, tools, etc.) will be decontaminated in this area. Prior to leaving the site for breaks, at the end of the work shift, or when PPE has been grossly contaminated, disposable boot covers, gloves, and suits will be removed and placed in a drum designated for the disposal of these materials.

10.3 Decontamination during Medical Emergencies

In the event of a minor, non-life-threatening injury or medical problem, Site workers should follow the decontamination procedures as defined above and then administer first aid. If prompt, lifesaving first aid is required, decontamination procedures should be omitted and immediate first aid should be administered, unless the environmental conditions are considered immediately dangerous to Life or Health (IDLH). In this case, the victim should be moved to a clean area and lifesaving care should be instituted immediately without considering decontamination.

Outside garments can be removed (depending on the weather) if they do not cause delays, interfere with treatment or aggravate the problem. Respirators and backpacks must always be removed. Chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual should be wrapped in plastic, rubber or blankets to help prevent

contaminating the insides of ambulances and medical personnel. Outside garments will then be removed at the medical facility. No attempt should be made to wash or rinse the victim at the site. One exception would be if it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life.

10.4 Decontamination of Equipment

Decontamination efforts will be conducted in the CRZ. Gross contamination will first be removed with plastic scrapers or other appropriate tools. The equipment will be decontaminated at a temporary equipment decontamination pad in the CRZ via hand washing or pressure washing, as needed. Alconox and water will then be used to wash the equipment with a cleaning brush. The equipment will then be rinsed with deionized water. The equipment will then be allowed to air dry for a sufficient time prior to reuse or removal from the site. Downhole tools and augers can be hand washed or pressure washed.

The decontamination of the drilling rig will be undertaken if necessary when all on-site activities have been completed. Initially, scraping of the equipment will remove heavily caked materials prior to washing. Washing will then be accomplished using Alconox and water or pressure washing. Water generated during decontamination activities will be collected, stored, and profiled for future off-site disposal.

10.5 Disposal of the Contaminated Materials

Potentially contaminated materials (gloves, clothing, sample sleeves, etc.) will be bagged and segregated for proper disposal. Investigation-derived waste will be managed in accordance with NYSDEC guidance regulations. Any drill cuttings that are generated will be containerized for off-site disposal. All fluids collected during groundwater sampling will be containerized and managed appropriately subsequent to field activities.

11.0 EMERGENCY RESPONSE

In the event of an emergency, the SSO will coordinate on-site emergency response activities. Appropriate authorities will be immediately notified of the nature and extent of the emergency. Emergency contact list is included in **Table 2**. The route and directions to the hospital are included as **Figure 2**.

11.1 Response Procedures

In the event of an emergency or acute exposure symptom, workers will signal distress to the SSO. The SSO will be responsible for the response to emergencies and must:

- Have available a summary of the associated risk potential of the project so that it can be provided to any authorities or response personnel in the event of an emergency;
- Maintain an Emergency Contact List (**Table 2**) and post in a visible location a map with directions to the nearest hospital (**Figure 2**); and
- Ensure appropriate safety equipment is available at the Site.

11.2 Communications

Cell phones will be the primary means of communicating with emergency support services/facilities.

11.3 Evacuation

In the event of an emergency situation, such as fire, explosion, etc., all personnel will evacuate and assemble in a designated assembly area. The SSO will contact outside services (i.e. police, fire, etc.) as required. Under no circumstances will personnel be allowed to re-enter the area once the emergency signal has been given. The SSO must see that emergency equipment is available and emergency personnel notified.

11.4 Fire or Explosion

Immediately evaluate the Site. The Lancaster Fire Department will be immediately advised of the situation and the identification of any hazardous materials involved.

11.5 Personal Injury

Only basic emergency first aid will be applied on-site as deemed necessary. The SSO will supply available chemical specific information to appropriate medical personnel, as requested. First Aid kits supplied by METI and its subcontractors will conform to Red Cross and other applicable good health standards and will consist of a weatherproof container with individually sealed packages for each type of item. First Aid kits will be fully equipped before being sent to the Site.

11.6 Adverse Weather Conditions

In the event of adverse weather conditions, the SSO will determine if work can continue without sacrificing the safety of Site workers. Some of the factors to be considered prior to determining if work should continue are the potential for heat stress, inclement weather-related working conditions, and the operation of field instruments.

11.7 Traffic, Heavy Equipment & Machinery

Site workers must remain aware of the heavy equipment and machinery being used during RI activities. Site workers will be required to wear a high visibility safety vest during on-site work activities.

11.8 Utilities

Prior to the beginning site activities, all available drawings of the facility will be examined to determine the presence of underground or utilities.

11.9 Emergency Contingency Plan

In the case of a spill emergency (e.g., tank/drum release, spill, fire, etc.), this section will describe the procedures to be followed during the event.

11.9.1 Contamination Emergency

It is unlikely that a contamination emergency will occur; however, if such an emergency does occur, the specific work area shall be shut down and immediately secured. The area in which the contamination occurred shall not be entered until the arrival of trained personnel who are properly equipped with the appropriate PPE and monitoring instrumentation.

11.9.2 Spill/Air Release

In the event of a spill or air release of hazardous materials on-site, the specific area of the spill or release shall be shut down and immediately secured. The area in which the spill or release occurred shall not be entered until the cause can be determined and Site safety can be evaluated. The NYSDEC Spill Response unit shall be notified immediately. The spilled material shall be immediately contained.

11.9.3 Unknown Drums or USTs

In the event that unidentified containerized substances, including USTs, are discovered during soil sampling or soil excavation, work will be ceased immediately until hazards are addressed. The SSO will then visually assess the situation and identify any leaks or releases from the container. If leaking is identified, the spilled material shall be immediately contained. Upon visual assessment of releases and safety, properly trained personnel will then sample and remove or dispose of the waste and/or container.

11.10 Additional Safety Practices

The following are important safety precautions and practices that will be enforced during the field activities.

- Eating, drinking, smoking, chewing gum or tobacco, or any activity that increases the probability of hand-to mouth transfer and ingestion of hazardous substances is prohibited during the RI activities.
- Remediation worker hands and face must be thoroughly washed before leaving the CRZ or before eating, drinking or other activity.
- Contact with potentially contaminated surfaces should be avoided whenever possible.
- The number of remediation workers and the amount of equipment should be minimized.
- Alcoholic beverages will not be consumed during work hours by site personnel; Personnel using prescription drugs may be limited in performing specific task (i.e. operating heavy equipment) without written authorization from physician.

12.0 RECORDS AND REPORTING

The SSO will be responsible for establishing and maintaining adequate records of activities which take place at the site. The records will pertain to site workers involved in the project, regardless of their employer, as well as any agency personnel. A basic list of the information to be maintained is as follows:

- Occupational injuries or illnesses.
- Accident investigations.
- Reports to insurance carrier or State Compensation agencies.
- Records and reports required by local, state and federal agencies.
- Property or equipment damage.
- Third party injury or damage claims.
- Environmental testing logs.
- Explosive and hazardous substances inventories and records.
- Records of inspections and citations.
- Related correspondence.
- Safety training level.

An Accident/Incident Report Form is included in **Appendix F**.

TABLES

Table 1
Hazard Characteristics of Potential Contaminants of Concern

Contaminant	Potentially Impacted Media	Carcinogenicity/Symptoms of Acute Exposure	Occupational Exposure Values* ACGIH TLV OSHA PEL NIOSH IDLH
Benzene	Soil, Groundwater	Confirmed human carcinogen. Symptoms include irritation to eyes, skin, nose, respiratory system; headache; nausea; giddiness, fatigue.	PEL - 10 ppm; IDLH - 500 ppm; TLV - 0.5 ppm; STEL - 2.5 ppm
Chlorinated Organic Compounds	Soil, Groundwater, Soil vapor	Exposure to the vapors of many chlorinated organic compounds such as vinyl chloride, tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene and 1,2-dichloroethylene and other chlorinated hydrocarbons may result in various symptoms including irritation of the eyes, nose and throat, drowsiness, dizziness, headache, blurred vision, uncoordination, mental confusion, flushed skin, tremors, nausea, vomiting, fatigue and cardiac arrhythmia. The liquid if splashed in the eyes, may cause burning irritation and damage. Repeated or prolonged skin contact with the liquid may cause dermatitis. Some of these compounds are considered to be potential human car-cinogens.	Refer to 29 CFR 1910.1017 for exposure values
Toluene	Soil, Groundwater	Insufficient data from carcinogenic studies to classify substance as a potential carcinogen. Symptoms include irritation to eyes, nose; fatigue; weakness; euphoria; headache; lacrimation.	PEL - 10 ppm; IDLH - 500 ppm; TLV - 20 ppm; STEL - 150 ppm
Ethyl Benzene	Soil, Groundwater	Confirmed animal carcinogen with unknown relevance to humans. Symptoms include irritation to eyes, skin, mucous membranes; headache; narcosis.	PEL - 5 ppm; IDLH - 800 ppm; TLV - 20 ppm; STEL - 30 ppm
o-, m-, and p-Xylenes	Soil, Groundwater	Insufficient data from carcinogenic studies to classify substance as a potential carcinogen. Symptoms include irritation to eyes, nose, throat; dizziness; excitement; drowsiness; nausea; vomiting.	PEL - 100 ppm; IDLH - 900 ppm; TLV - 100 ppm; STEL - 150 ppm
Polynuclear Aromatic Hydrocarbons (PAH's)	Soil, Groundwater	Many PAH's found in fuel oil and coal tar pitch volatiles (creosote) are confirmed human carcinogens. Symptoms include dermatitis and bronchitis.	Some PAH's have no established exposure values. Others considered coal tar pitch volatiles have an ACGIH TLV and OSHA PEL value of 0.2 mg/m^3.
Cadmium	Soil	Suspected human carcinogen. Symptoms include pulmonary edema; difficulty breathing; cough; tightness in chest; substernal pain; headache; chills; nausea; vomiting; diarrhea; asnosmia.	PEL - 0.2 mg/m3; IDLH - 50 mg/m3; TLV - 0.01 mg/m3 (these limits are expressed for Cd dust)
Chromium	Soil	Hexavalent chromium compounds are confirmed human carcinogens. Symptoms include irritation to the respiratory system; nasal septum perforation; sensitization dermatitis (hexavalents). Irritation to the eyes; sensitization dermatitis (trivalents).	PEL - 0.5 mg/m3; IDLH - 250 mg/m3; TLV - mg/m3 (insoluable)
Lead	Soil	Confirmed animal carcinogen with unknown relevance to humans. Symptoms include weakness; tremor; irritation to eye; constipation; abdominal pain.	PEL - 0.05 mg/m3; IDLH - 100 mg/m3; TLV - 0.5 mg/m3
Mercury	Soil	Insufficient data from carcinogenic studies to classify substance as a potential carcinogen. Symptoms include irritation to eyes, skin; cough; chest pain; difficulty breathing; irritability; indecision; headache; fatigue; weakness; salivation.	PEL - 0.025 mg/m3 (acceptable ceiling concentration); IDLH - 2 mg/m3; TLV - 0.025 mg/m3 (elemental/inorganic)
Polychlorinated Biphenyl (PCBs)	Soil	Confirmed human carcinogen. Symptoms include dermal and ocular lesions, irregular menstrual cycles and a lowered immune response. Other symptoms included fatigue, headache, cough, and unusual skin sores	PEL - 1 mg/m3; IDLH - 5 mg/m3; TLV - 1 mg/m3

ACGIH TLV – American Conference of Governmental Industrial Hygienists Threshold Limit Value; Concentrations in ppm of mg/m3 based on an 8-hour TWA

OSHA PEL – Occupational Safety and Health Admiration Permissible Exposure Limits; Concentrations are shown in parts per million (ppm) or milligrams per cubic meter (mg/m3) based on an 8-hour time weighted average (TWA)

NIOSH IDLH – National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health; Concentrations in ppm or mg/m3

OSHA STEL - Short Term Exposure Limit

Table 2
Emergency Contacts

Agency	Contact	Phone Number
Lancaster Police	Emergency	911
Lancaster Fire/First Aid	Emergency	911
Ambulance	Emergency	911
Poison Control Center	Emergency	911
Hospital	Sisters of Charity Hospital, St. Joseph Campus 2605 Harlem Road Cheektowaga, NY 14225	(716) 891-2400
NYSDOH	Ryan Minzloff Empire State Plaza, Corning Tower Room 1787 Albany, NY 12237	(518) 402-7860
NYSDEC	Jason Kryszak 700 Delaware Avenue Buffalo, NY 14209	(716) 851-7220
NYSDEC	SPILL Hotline	(800) 457-7362
Matrix Environmental Technologies, Inc.	3730 California Road PO Box 427 Orchard Park, NY 14127	(716) 662-0946
65 Lake Avenue, LLC (Owner)	Mark Aquino 32 Central Avenue Lancaster, NY 14086	(716) 681-1450

FIGURES

Notes:

1. Base maps adapted from Erie County Department of Environment Planning Office of GIS
2. Site boundaries correspond with tax boundaries for SBL #115.27-1-22.21 at 65 Lake Ave. and #115.27-1-23.11 at 67 Lake Ave.

25 years dedicated to a CLEANER ENVIRONMENT 1991-2016

PREPARED BY:

MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.
3730 California Road
P.O. Box 427
Orchard Park, NY 14127
p:716.662.0745
www.matrixbiotech.com

PREPARED FOR:

65 Lake Avenue LLC

PROJECT MGR: SLM

DESIGNED BY: CMC

REVIEWED BY: SRC

DRAWN BY: CMC

REVISION

BY	DATE
CMC	1/23/20

SCALE IN FEET: NOT TO SCALE

0

PROJECT NAME / LOCATION:

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York

BCP Site No. C915344

TITLE:

BCP Site Limits

DATE: NA

PROJECT NO.: 18-046

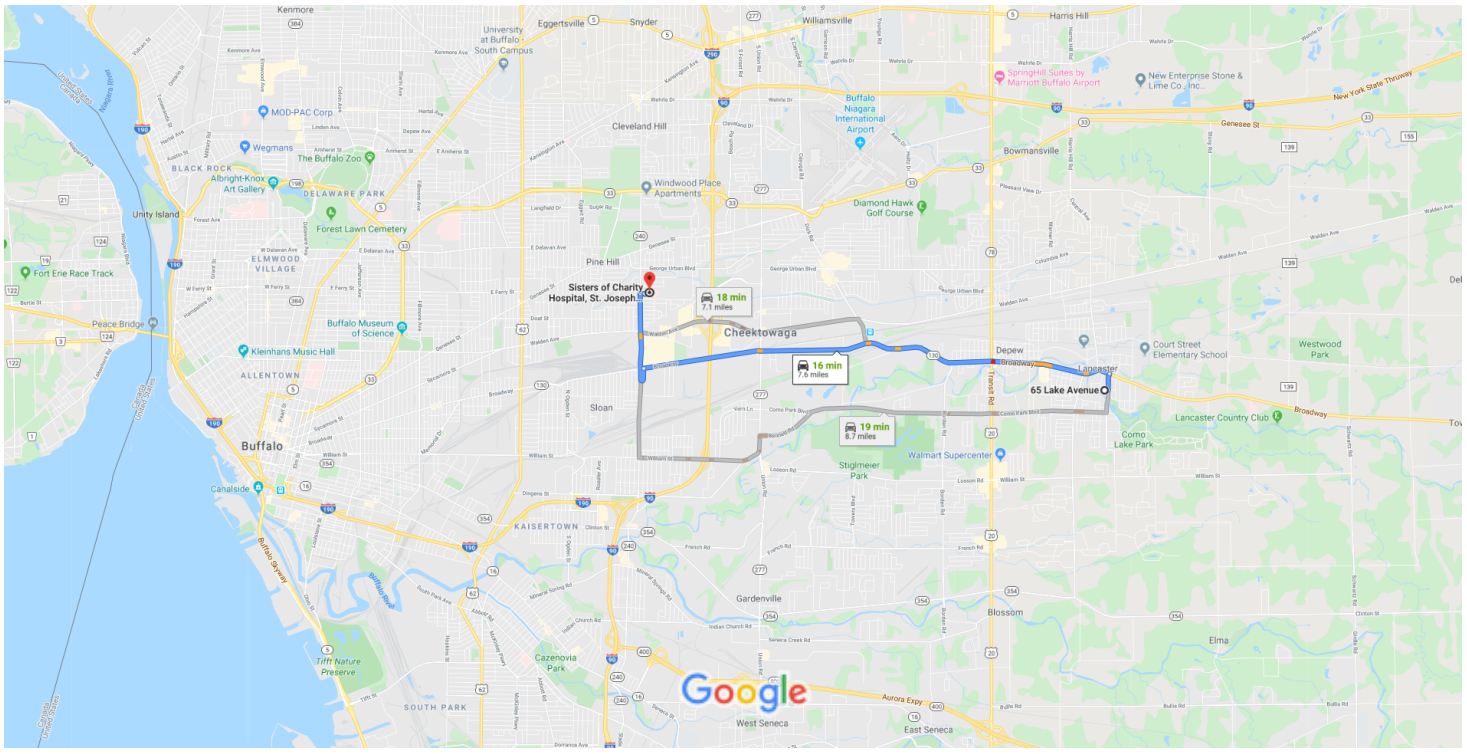
FIGURE: 1

Figure 2: Map/Directions to Hospital

Google Maps

65 Lake Avenue, Lancaster, NY to Sisters of Charity Hospital, St. Joseph Campus

Drive 7.6 miles, 16 min



Map data ©2020 Google 1 mi

65 Lake Ave

Lancaster, NY 14086

1. Head east toward Lake Ave — 223 ft
2. Turn left onto Lake Ave — 0.2 mi
3. Turn left onto Broadway — 6.0 mi
   - Pass by Dairy Queen (on the right in 1.1 mi)
4. Turn left to merge onto Harlem Rd — 1.3 mi
5. Turn right — 285 ft
6. Turn right — 52 ft
   - Destination will be on the left

Sisters of Charity Hospital, St. Joseph Campus

2605 Harlem Rd, Cheektowaga, NY 14225

APPENDIX A

AGREEMENT AND ACKNOWLEDGMENT STATEMENT

- **I HAVE READ AND FULLY UNDERSTAND THE SITE HEALTH AND SAFETY PLAN, AND MY ASSOCIATED RESPONSIBILITIES AS A PARTICIPANT IN ACTIVITIES ON THIS SITE AND,**
- **I AGREE TO ABIDE BY THE PROVISIONS OF THE SITE HEALTH AND SAFETY PLAN.**

NAME	**SIGNATURE**
COMPANY	**DATE**

NAME	**SIGNATURE**
COMPANY	**DATE**

NAME	**SIGNATURE**
COMPANY	**DATE**

NAME	**SIGNATURE**
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NAME	**SIGNATURE**
COMPANY	**DATE**

NAME	**SIGNATURE**
COMPANY	**DATE**

APPENDIX B

JOB SAFETY ANALYSIS (JSA)

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE 2/08/2011	_X__ NEW _X__ REVISED
Matrix Environmental Technologies			

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (DISCRIPTION)	JSA#
Active/ Inactive sites	Sampling	Groundwater Gauging & Sampling	

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
David Kreinheder	Project Scientist	Craig Zink	Health & Safety Officer
Marc R Havens	Remediation Technician		

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

_ LIFE VEST	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	_X__ GLOVES
___ HARD HAT	___ FACE SHIELD	___ SUPPLIED RESPIRATOR	__X_ OTHER _____
___ LIFELINE / BODY HARNESS	___ HEARING PROTECTION	___ PPE CLOTHING	Hi Vis vest, shirt or coat Hi Vis Cones or Blockades
_x__ SAFETY GLASSES	__x_ SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1) Interface probe/water level indicator	**2) Sockets/impact wrench/screwdriver/hammer**	**3) Bailer and/or Whale® pump**	**4) Metal Detector**

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Set up a minimum of 2 high visibility marker cones and don high visibility clothing	1a-Traffic/struck by	1a-Always scan the area you are working in or walking through for vehicles and be aware of your surrounding. If possible, park sample vehicle so it blocks sampling area from oncoming traffic.
2. Remove roadbox lid and well plug, Gauge water depth	2a- Contact with 2b- Caught by, Pinch Points 2c- Physical strain 2d- Property damage/ loss	2a-Use Appropriate tools for the job and proper PPE to protect hands and eyes. 2b- Use caution opening tops on vaults and boxes not to drop on fingers, wear gloves to prevent damage to fingers and hands 2c- Bend down using knees not back. Use knee pads to take strain off knees from repetitive squatting 2d- Keep items (tools, cell phone, etc.) in a secure loction to prevent them from falling down well.
3. Purging the Well	3a- Contact/ cuts/ burns 3b- Exposure	3a- Wear gloves when lowering cables, twine, bailers, pumps down the well to prevent injury to hands. If purging with Whale® pump wear gloves when connecting the clips to the battery. Be cautious of moving parts in the engine if using battery when vehicle is operating. If purging with bailer, use proper lifting techniques (using leg muscles and having good back posture) to prevent strain to back or other muscles. 3b- Wear proper chemical resistant gloves to protect hands from contaminated water or other fluids.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
4. Sampling ground water	4a- Contact/ cuts/ burns 4b- Exposure	4a- Use caution when handling sample containers to prevent cuts or bruises to hands, have secure contact with containers and plenty of space to work. 4b. Wear PPE that will prevent impacts from contaminants and preservatives.
5. Replace well plug and well box cover.	5a- Contact/ Pinch Points 5b- trip/ fall	5a- Use appropriate tools and PPE to protect hands and eyes. 5b- Always replace well cover before moving on to next well as an open well could be a dangerous trip or fall hazzard to other workers and general public.

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE	X NEW / ___ REVISED
Matrix Environmental Technologies Inc. 65-67 Lake Ave., Lancaster, NY		12/5/2014	
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DISCRIPTION)** *Hydraulic Lock-out Tag-out*	**JSA#**
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Steven Marchetti	Sr. Project Manager		

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

x SAFETY VEST	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	x GLOVES
x HARD HAT	___ FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
___ LIFELINE / BODY HARNESS	x HEARING PROTECTION	___ PPE CLOTHING	
x SAFETY GLASSES	x SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1. Lock-out Tag-out Kit applicable for hydraulic equipment that is being worked on	**2. Cones or caution tape to mark work zone**		

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Set-up work area.	1a. Traffic, struck by.	1a. Wear safety vest, define work zone with cones or caution tape or both.
	1b. Slip, trip, fall	1b. Look for un-even ground and trip hazards when traversing site, use alternate route to circumvent trip
2. Identify Hydraulic valving/equipment to be Locked/Tagged Out. Identify personnel that must be notified of lock-out/tag-out.	2a. Splashed/flooding of, damage to equipment.	2b. Before locking/tagging out, confirm the lock-out/tag-out kit is applicable. If not, get appropriate materials to fit. Determine location of all shut-down, valves and other devices, confirm that these devices work. Notify all workers that will use the equipment that it will be locked/tagged out (including for what duration), the color of the tag and type of locking device that will be used.
3. Turn off any associated equipment and deenergize the power source to nearby equipment that could be splashed by hydraulic fluids. Apply lock and tag with date and time. *Note: only qualified personnel that have been provided a lock-out/tag-out kit are allowed to perform this task.*	3a. Struck by, pinch points	3a. Inpsect the power source and equipment. Be aware of pinch points, moving parts, loose wires or potential hazards prior to shutting down. Close any valves, switches or breakers that are required before shutting down power.
	3b. Electrocution, contact by	3b. Use insulated tools and equipment (if required) when shutting down equpiment and power source. Keep any wet clothing, tools or materials away from electrical components.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
4.Turn valving back on and activate equipment	4a. Splash by, Flooding of area, Drowning	4a. Verify no personel is located downstream of piping in confined space areas connected to valving that is locked out. Turn valving on slowley and verify there are no leaks or spraying of hydraulic's.

Work Activity (Description) - Hydraulic Lock-out Tag-out

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION	DATE		
Matrix Environmental Technologies 65-67 Lake Ave., Lancaster, NY	2012, Rev 10/28/13	__x__ NEW ___ REVISED	
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DISCRIPTION)**	**JSA#**
		Proper lifting techniques	13008

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Pat Bliek	Sr. Technician	C. Zink	Sr. Project Manager
M. Wittman	Sr. Project Manager		

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

___ LIFE VEST	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	__x__ GLOVES
___ HARD HAT	___ FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
___ LIFELINE / BODY HARNESS	___ HEARING PROTECTION	___ PPE CLOTHING	
___ SAFETY GLASSES	__x__ SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

	2	3	4
PPE: Steel toe shoes and gloves.			

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Determine Weight of Load	1a. Injury to Back	1a. Plan ahead and get help if load is heavy. Personal Protective Equipment: Steel toe shoes and gloves
2. Bending Down	2a. Injury to Back	2a. Bend with your knees not your Back. DO NOT bend over with legs straight or twist while lifting.
3. Lifting Load	3a. Injury to Back	3a. Lift with your legs and hold objects only chest high. Avoid trying to lift above shoulder level.
4. Stand on a solid level surface	4a. Slip or Fall	4a. ALWAYS be sure of footing
5. Moving the load	5a. Injury to Back	5a. Never twist your body to move a load. Turn your feet.

Work Activity (Description) - Proper Lifting Techniques #13008

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE	
Matrix Environmental Technologies Inc. 65-67 Lake Ave., Lancaster, NY		2012, rev 10/28/13	__x__ NEW ___ REVISED
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DISCRIPTION)**	**JSA#**
		Traffic Control	13009

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Pat Bliek	Sr. Technician	C. Zink	Sr. Project Manager
M. Wittman	Sr. Project Manager		

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

___ LIFE VEST	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	___ GLOVES
___ HARD HAT	___ FACE SHIELD	___ SUPPLIED RESPIRATOR	__X__ OTHER _Safety Vest
___ LIFELINE / BODY HARNESS	___ HEARING PROTECTION	___ PPE CLOTHING	
___ SAFETY GLASSES	__X__ SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1	2	3	4

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Get request for Traffic Control for Customers	1a. Getting inaccurate information from Customers	1a. Make a site visit and sketch out drawing for a traffic control plan
2. Create a traffic control plan drawing	2a. Traffic control plan need to be accurate to job site	2a. Make sure to have all the right equipment to do the job safety.
3. Loading of trucks	3a. Lifting, falling, tripping.	3a. Wear proper safety gear.
4. Travel time: from yard to job site	4a. Highway traffic, unsafe loads, tire blow out, road hazards	4b. Pre trip trucks, make sure load are secure, make sure to Driving statues.
5. Removing or set up work zone for nighttime used.	5a. Potential of getting hit, lifting while removing of traffic control and set up barricades for over night.	4b. Removal of work zone in accordance to Proper lifting; good communication between operationak crews and traffic control crew..
6. Travel time back to yard from job suite	6a. Traffic, unsafe loads, tire blow outs, Road hazards	6a. Make sure load are secure, and obey state statues.

Work Activity (Description) - Traffic Control #13009

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION	DATE	X NEW / __ REVISED
Matrix Environmental Technologies,Inc. 65-67 Lake Ave., Lancaster, NY	12/3/2007/ Rev. 10/28/13	

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)	JSA#
All Work Locations	Assessment and Remediation	General Site Activities - Health & Safety Contingency Plan	001

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Jeffrey S. Hall	Environmental Engineer	Steven Marchetti	Vice President
Sarah Weeks	Executive Assistant	C. Zink	Sr.Project Manager

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PROTECTIVE EQUIPMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

__ AIR PURIFYING RESPIRATOR	__ HARD HAT	_X_ SAFETY GLASSES	___ SUPPLIED RESPIRATOR
__ FACE SHIELD	___ LIFELINE / HARNESS	_X_ SAFETY SHOES steel-toed	_&_ HEARING PROTECTION
_X_ GLOVES leather; nitrile	_X_ PPE CLOTHING o	___ GOGGLES	__ OTHER

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1. Insect repellent with DEET (recommended)	2. Sunscreen (recommended)	3. Wheel chocks	

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
A. Travel to and Arrive Onsite		
1. Complete JSA/HASP/ safety checklist/ tailgate meeting	1a. Parking vehicles, Traffic flow/control, access difficulties	1a. Park in a secure area where vehicle is out of traffic pattern so that tailgate safety meeting can be performed safely. **ALL personnel electronic devices (i.e., cell phones) are not to be used where the potential for an explosive environment exists or where cell phone use can distract from surrounding hazards.**
2. Establish/set up site control (traffic control)	2a. Contact with vehicles 2b. Pedestrian contact	2a. Wear highly visible clothing. • Utilize cones/barricades/safety fence to establish work zones. 2b. Establish assess points in the work zone to keep pedestrians and unintentional traffic out. • Inform facility personnel of work (restricted) area and do not permit unauthorized individuals (i.e., those not properly trained or wearing appropriate PPE) access to the exclusion zone.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
	2c. Backing, moving vehicles	2c. A spotter must be utilized when vehicles. • Prior to moving any vehicle, all racks, doors, and toolboxes must be closed to prevent contact with objects and to prevent items from falling out in transport. • If there is no spotter, the driver must go out and walk around the vehicle prior to backing. • Look up to ensure the overhead wires or structures can be safely cleared. • Look down to identify unusual depressions, holes, or debris that may interfere with backing. • Observe fixed objects or parked, unoccupied vehicles. • Back slowly using rear view mirrors frequently. • If backing vision is obscured, stop the vehicle every few feet to exit and recheck the backing route. • Remain constantly alert at all times while backing a vehicle for the potential for other vehicles or pedestrians to appear unexpectedly in the path of travel. • Vehicle tailgate must be in up/closed position when vehicle is in motion. • When parked and unhooked from a vehicle, trailers must have a wheel chock placed behind each wheel. • Wheel chocks must also be used for drill rigs or other larger vehicles when parked or positioned on uneven surfaces (terrain).
3. Remove/load equipment from vehicle	3a. Muscle strain	3a. Utilize proper lifting procedure (keep your back straight) when loading equipment into truck. Bend down at the knees and lift with your legs rather than bending and lifting with your back. • Utilize material handling devices when possible to move equipment (i.e., lift gates, pallet jacks, dollies, etc.). • If necessary, utilize a ramp for loading and unloading wheeled devices, ensuring the ramp is properly supported prior to use.
4. Exposure	4a. Weather related issues	4a. Staff should understand and be able to recognize the signs and/or symptoms of cold and hot weather related illnesses. • Personnel should dress appropriately for ambient temperatures which would include but not limited to dry layered clothing.
	4b. Cold related injury	4b. For Cold weather, work schedules should be adjusted to provide sufficient break periods in a heated area.
	4c. Heat related injury	4c. For cold weather, work schedules should be adjusted to provide time intervals for replenishing fluids and which is free of contamination.
	4d. Exposure to site contaminants	4d. Review and understand action levels noted in the HASP. • Monitor (elevated) breathing zone of workers with PID. • Monitor (elevated) any enclosure with a PID. • Ensure that Level C PPE is available for a potential upgrade. Note: Matrix and/or subcontractor personnel are required to wear fire retardant clothing or protection when operating cutting tools that may generate sparks or generate conditions that act as ignition sources.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
B. Biological Hazards		
1. Exposure	1a. Exposure to hazards	1a. Wear appropriate PPE (i.e., eye protection, long pants, nitrile sampling gloves, shirt with sleeves, steel-toed boots).
	1b. Poisonous plants	1b. Do not touch or contact poisonous plants, such as poison ivy and poison oak. • If available, apply an over-the-counter barrier cream, such as Ivy Block® to prevent contact with plant oils. • Wash hands and arms immediately with soap and water if skin contacts the plants. • Wear long pants with socks pulled over legs to prevent skin contact with plants and insects.
	1c. Insects	1c. Spray any wasp/hornet nests with an insect repellent from a safe distance recommended by the product's manufacturer. • Ensure that long sleeve shirts and pants are worn at all times to prevent

Work Activity (Description) - General Site Activities - #001

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION	DATE	
Matrix Environmental Technologies Inc. 65-67 Lake Ave., Lancaster, NY	12/3/2007, Rev. 10/28/13	X NEW __ REVISED

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)	JSA#
		Cutting Tool Use	003

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Jeffrey S. Hall	Environmental Engineer	Steven Marchetti	Vice President
		C. Zink	Sr. Project Manager

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PROTECTIVE EQUIPMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

___ AIR PURIFYING RESPIRATOR	_X_ HARD HAT	_X_ SAFETY GLASSES	___ SUPPLIED RESPIRATOR
___ FACE SHIELD	___ LIFELINE / HARNESS	_X_ SAFETY SHOES steel-toed	_X_ HEARING PROTECTION
_X_ GLOVES leather; nitrile; Kevlar (cutting activities)	_X_ PPE CLOTHING highly visible clothing such as orange coveralls; reflective safety vest	___ GOGGLES	_X_ OTHER RESPIRATORS - DUST MASK - If dust is generated during cutting activities.

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1. Lockout/tag out kit	2. Extra blades (if applicable)	3. Hot work Permit	

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Use of hand tools (i.e., pocket knife, Geoprobe cutter, hand saw, poly line cutter, etc.)	1a. Cuts to the skin from tool blade	1a. Wear appropriate PPE. • Inspect the cutting equipment prior to start of cut. • Make sure blades are sharp and any guards are in place. • Cut away from your body and keep hands out of the path of cutting tools. • Have bystanders maintain a 3 foot distance at all times. • Use of proper cutting tool for the job (i.e., pipe cutters for cutting poly pipe). • The material being cut must not interfere with the operator's vision.
Power Tool Use		
1. Power equipment, cutters	1a. Cuts to the skin from tool blade	1a. Wear appropriate PPE (i.e., hard hat, long pants, steel-toed boots, hearing protection). • Wear a face shield in addition to safety glasses when flying particles have the chance to strike the operator in the face. • Have bystanders maintain a 3 foot distance from the operation at all times. • The material being cut must not interfere with the operator's vision. • Equipment must be turned off and allowed to cool prior to refueling.
	1b. Spark/dust reduction	1b. When possible perform wet cuts to reduce the explosion and dust hazard.
	1c. Excessive noise	1c. Wear proper hearing protection

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
2. Contact with damage to utilities	2a. Electrocution/contact with energized equipment	2a. Obtain up-to-date as built plan to identify and subsurface utilities or obstructions. • Identify all above ground utilities and obstructions prior start. • Use LO/TO when sources of energy can be de-energized.
3. Hot work Permit	3a. Fire/explosion	3a. If sparks are generated within 35 feet of a vapor source (i.e., an operating pump island) a Hot work Permit must be furnished and air monitoring must take place.

Work Activity (Description) - Cutting Tool Use - #003

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE	X NEW / ___ REVISED
Matrix Environmental Technologies Inc. 65-67 Lake Ave., Lancaster, New York		12/5/2014	
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DISCRIPTION)** *Lock-out Tag-out*	**JSA#**
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Craig Zink	Sr. Project Manager	Steve Marchetti	Sr. Project Manager

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

x SAFETY VEST	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	x GLOVES
x HARD HAT	____ FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
___ LIFELINE / BODY HARNESS	x HEARING PROTECTION	___ PPE CLOTHING	
x SAFETY GLASSES	x SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1. Lock-out Tag-out Kit applicable for power source & equipment that is being worked on	**2. Cones or caution tape to mark work zone**		

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Set-up work area.	1a. Traffic, struck by.	1a. Wear safety vest, define work zone with cones or caution tape or both.
	1b. Slip, trip, fall	1b. Look for un-even ground and trip hazards when traversing site, use alternate route to circumvent trip
2. Identify Power Source and Equipment to be Locked/Tagged Out. Identify personnel that must be notified of lock-out/tag-out.	2b. Caught by, Electrocution, damage to equipment	2a. Before locking/tagging out, confirm the lock-out/tag-out kit is applicable. If not, get appropriate materials to fit. Determine if power source and equipment are grounded, if not, provide grounding device or connection to ground. Determine location of all shut-down switches, valves and other devices, confirm that these devices work. Notify all workers that will use the power source or equipment that it will be locked/tagged out (including for what duration), the color of the tag and type of locking device that will be used.
3. Turn off any associated equipment and deenergize the power source, apply lock and tag with date and time. *Note: only qualified personnel that have been provided a lock-out/tag-out kit are allowed to perform this task.*	3a. Struck by, pinch points	3a. Inpsect the power source and equipment. Be aware of pinch points, moving parts, loose wires or potential hazards prior to shutting down. Close any valves, switches or breakers that are required before shutting down power.
	3b. Electrocution, contact by	3b. Use insulated tools and equipment (if required) when shutting down equpiment and power source. Keep any wet clothing, tools or materials away from electrical components.
4. Reenergive power source and activate equipment	4a. Electrocution, struck by, contact by	4a. Identify where stored or residual energy is located on equipment and power source (e.g. capacitors, springs, elevated components, rotating flywheels or other parts, hydraulic systems, air, gas and water pressure, etc.) Release residual energy before reactivating the equipment or power source (e.g. grounding, repositioning, bleeding, blocking, etc.). Check area to confirm other workers are clear. Remove lock and tag. Reactivate power and equipment; confirm all are in operating order.

Work Activity (Description) - Lock-out Tag-out

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE	__X_ NEW
Matrix Environmental Technologies		2/21/2012	___ REVISED
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DISCRIPTION)**	**JSA#**
Active/ Inactive Sites	Operation/ Maintenance	Operation and maintenance of Vapor Recovery system	
Development Team	**Position/ Title**	**Reviewed By:**	**Position/ Title**
Marc Havens	Remediation Technician		

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

___ LIFE VEST	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	___& GLOVES
___ HARD HAT	___ FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
___ LIFELINE / BODY HARNESS	X HEARING PROTECTION	__x_ PPE CLOTHING	
X SAFETY GLASSES	X SAFETY SHOES		

REQUIRED AND/ OR RECOMMENDED TOOLS AND EQUIPMENT

1. Proper PPE	2. Hand Tools	3. PID/ Air Velocity meter. Hi vis cones

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1.Check out side of trailer or shed	1a- trips, slips & falls	1a- Inspect for damage to shell or blocking system observe enterance for slippery or obstructed walkways.
2.Open doors and pin back	2a-Caught by pinch points 2b Slips, Trips, Falls	2a- Open fully and pin back doors with caution. 2b- Observe walkway for equipment and other trip hazzards
3. Observe system for proper operation.	3a- Noise 3b- Pinch Points	3a- Recommended hearing protection 3b- Observe a safe distance from moving parts
5. Manual drain of water knockout tank(if applicable)	5a- Exposure	5a- Keep feet and equipment away from drain area
6. Restart system	6a- Noise 6b- Pinch Points	6a- Hearing protection recommended 6b- Use care while closing access panels.
7. Verify proper operation and clean work area. Exit and close doors.	7a- Contact 7b- Pinch points	7a- Watch for low overhaed in doorway 7b- Use caution while closing doors
8. Take PID and Air velocity readings	8a- Exposure to dust particles from effluent	8a- Wear safety glasses

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
ADDITIONAL TASKS		
8. Changing filters in Vacuum blower	8a- Pinch Points 8b- Cuts, contact 8c- Exposure	8a- Deenergize equipment being serviced. 8b- Use care while loosening fasteners and bolts. 8c- Wear gloves and safety glasses due to dust and other residue on spent filters
9. Clearing vent lines of water	9a- Struck by/ Traffic 9b-contact, cuts 9c- Exposure 9d- physical stress	9a- Wear hi-vis vest or coat and set up hi-vis cones around work area. Use service vehicle as barricade if possible. 9b- wear gloves and eye protection and proper tools for opening curbbox covers. Use caution removing well plugs. 9c- Wear proper gloves and eye protection due to possible contact with water and water containing high concentrations of volitiles or dirt. 9d- Use proper form while bending down to access wells. Wear proper clothing and use caution in extreme weather conditions.

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE 8/11/2016	_X__ NEW _X__ REVISED
Matrix Environmental Technologies			

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (DISCRIPTION)	JSA#
Active/ Inactive sites	Sampling	Groundwater Monitoring During Oxidant Injection	

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Craig D. Zink	Health & Safety Officer	Nick Minute	Senior Project Manager

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

_ LIFE VEST	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	_X__ GLOVES
___ HARD HAT	___ FACE SHIELD	___ SUPPLIED RESPIRATOR	__X_ OTHER _____ Hi Vis vest, shirt or coat Hi Vis Cones or Blockades
___ LIFELINE / BODY HARNESS	___ HEARING PROTECTION	___ PPE CLOTHING	
_x__ SAFETY GLASSES	__x_ SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1) Interface probe/Water level indicator/Multimeter	**3) Bailer and/or Whale® pump**		

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Set up area for monitoring/sampling in vicinty of injection well	1a-Traffic/struck by	1a-Always scan the area you are working in or walking through for vehicles and be aware of your surrounding. If possible, park sample vehicle so it blocks sampling area from oncoming traffic. Be aware of the room you have to work around the drilling and injection equipment, set up area so as to not be impacted by injecting fluids.
2. Collecting sample	2a- Exposure 2b Struck by/Caught by	2a- Use caution when collecting sample from the injection point. Wear appropriate PPE to prevent exposure from injection fluids and contaminants. 2b Be aware of operating equipment, keep hands and body away from moving parts when getting samples. Be aware of overhead obstructions.
3. Field sample measurements	3a- Contact/ cuts/ burns 3b- Exposure 3c Slip/Trip/Fall	3a- Use caution when handling sample containers to prevent cuts or bruises to hands, have secure contact with containers and plenty of space to work. 3b. Wear PPE that will prevent impacts from injection fluids, contaminants and preservatives. 3c. Maintain good housekeeping with equipment and sample containers.

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE	__X_ NEW ___ REVISED
Matrix Environmental Technologies Inc.		10/11/2013	
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DISCRIPTION)**	**JSA#**
All Work Locations	Remediation	Remedial Excavation	JSA02

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Pat Bliek	Sr. Technician	Craig Zink	Operations Manager

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PROTECTIVE EQUIPMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

_x__ Reflective VEST or Hi VIS Shirt	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	_x__ GLOVES
_x_ HARD HAT	_&_ FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
_x_ LIFELINE / BODY HARNESS	_x_ HEARING PROTECTION	___ PPE CLOTHING	
_x__ SAFETY GLASSES	_x_ SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1 Pre-construction safety meeting		All employees assigned to this task will attend a pre-construction safety meeting, which will include standard operating procedures, types of potential hazards, and actual hazards present and controls for those hazards
2 Location and setup of equipment and safe work area	Damage to utilities, exposure to energy from utilities	Underground utilities, where possible, should be marked out before digging begins. Use facility maps/as-build's and local utilities to identify lines. Observe overhead lines, tree limbs or other objects before setting up and raising the bucket. Anticipate the radius of the suing up and down and plan appropriately
3 Excavation	3a. Struck by, contact with	a. Avoid moving parts of machinery. Keep fingers, hands, and arms away from bucket and other pinch points. Spoils need to be kept back from the edge of all trenches or excavation at least 3 foot.
	personnel on the ground in the vicinity of the heavy equipment	personnel on the ground should keep away from the work area unless they are required for a task such as spotting , they should keep in sight of the operator and notify when they leave the work zone
4 Sampling of excavation	Slipping or falling into excavation	Wearing of boots with treaded soles and steel toe. Avoid walking on liners or plastic that are wet and or icy. Never lean over or stand near the edge of an excavation to collect samples or observe. Never enter the excavation if it is deeper than four foot. Use the backhoe bucket to collect samples.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
5 Clean up of area	Removable contamination on equipment creates a potential health and environmental hazard by spreading	Decontaminate large equipment by power washing all exterior surfaces to remove visible dust and mud. Complete contamination surveys on the hands and feet of site workers before they eat or leave the site at the end of the day. The site in general should be cleaned of rocks and or debris to remove slip, trips and fall hazards

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE 2/27/12 Rev. 5/25/12	___ NEW _X__ REVISED
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DISCRIPTION)** Installing above grade piping & equipment for remedial systems	**JSA# 017**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Mark Janus	Remediation Technician	Craig D. Zink	Sr. PM / Geologist

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

__x_ Saftey VEST	___& GOGGLES	___ AIR PURIFYING RESPIRATOR	_x__ GLOVES
_x__ HARD HAT	_&__ FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
___ LIFELINE / BODY HARNESS	__&_ HEARING PROTECTION	___& PPE CLOTHING	
__x_ SAFETY GLASSES	__x_ SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1. Hand tools,(Saws, nut drivers, etc.)	**2. PVC glue**	**3. HDPE or PVC pipe/ fittings**	**4. Hose clamps**

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Inspect work area to ensure pipiping will have no obstructions.	1. Slips, trips, falls.	1. Look for eneven ground and trip hazards when traversing site.
2. Lay out blocks for piping routes.	2a. Slips, trips, falls. 2b. Exertion	2a. Look for eneven ground and trip hazards when traversing site. 2b. Use proper lifting techniques while handeling blocks.
	3c. Cuts	3c. Wear leather gloves.
3. Route piping from header vault to point.	4a. Exertion	4a. Use proper ergonomics while un-coiling pipe.
5. Cut pipe to length	4a. Cuts 4b. Contact by, pinch points.	4a. Wear leather gloves. 4b. Wear appropriate PPE. Use the proper tool for the material to be cut.
6. Cut well, sump or pipe @ grade.	6a. Cuts 6b. Contact by, pinch points.	4a. Wear leather gloves. 6b. Wear appropriate PPE. Be aware of placement of hands with material to be cut and placed around well.
7. Glue fittings and piping to well head and process lines	7a. Exposure to fumes and liquid chemicals 7b. Contact by, pinch points, cuts.	7a. Make sure aware is ventilated. Wear gloves when handling glues and primers. 7b. Be aware of pinch points and wear gloves to prevent abrasions to hands and arms.

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE	X NEW / __ REVISED
65-67 Lake Ave, Lancaster NY		12/4/2007	
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (Description)**	**JSA#**
	Assessment and Remediation	Skid Loading Operations (Snow Removal, Moving Gravel, Soil Removal)	6

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Jeffrey S. Hall	Environmental Engineer	Steven Marchetti	Vice President
Sarah Weeks	Executive Assistant		

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PROTECTIVE EQUIPMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

___ AIR PURIFYING RESPIRATOR	_X_ HARD HAT	_X_ SAFETY GLASSES	___ SUPPLIED RESPIRATOR
___ FACE SHIELD	___ LIFELINE / HARNESS	_X_ SAFETY SHOES steel-toed	___ OTHER
_X_ GLOVES leather; nitrile; Kevlar (cutting activities)	_X_ PPE CLOTHING highly visible clothing such as orange coveralls; reflective safety vest	_&_ HEARING PROTECTION. *If noise levels exceed 90 dB.*	

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1. Orange flags to direct vehicle travel	2. Lockout/Tagout Kit		

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
A. Review "General Site Activities" JSA		
1. Inspect heavy equipment	1a. Equipment failure	1a. Inspect equipment for leaks, damaged components, integrity of tracks/tires. • Check the operation of all safety/kill switches and safety equipment.
	1b. Unsafe operation	1b. All personnel must be properly trained (and licensed for some vehicles) to operate the equipment per the manufacturer's requirements.
B. Perform loading activities		
	1a. Equipment failure, unsafe operation	1a. Inspect the skid loading equipment prior to start of work. • Only trained operators are permitted to operate the skid loader. • Operators will follow the manufacturer's operating guidelines and will not make any modifications to the skid loader.
	1b. Contact with objects and personnel	1b. Bystanders must maintain a 15 foot distance from the skid loader at all times. • The load being carried must not interfere with the operator's line of sight. • Spotters will be used when the skid loader is operating in tight quarters.
	1c. Amputation, cuts	1c. Do not place any part of your body between vehicle parts (i.e., tailgate and bed of dump truck, stabilizing arms, etc.).
	1d. Fire/explosion	1d. Equipment must be turned off during refueling.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
2. Damage to utilities	2a. Electrocution/Contact with energized electrical lines	2a. Locate all sources of electricity to site parking lights, air compressor, vacuum, car wash, ID sign and deenergize lines by using locks and tags or a tag a minimum. • Notify all Affected employees on-site of the deenergized conditions.
3. Elevated Loads	3a. Falling material/ equipment	3a. Never stand/travel below elevated loads! • Maintain a 15 foot distance away from all associated equipment (counterweight swing radius, mechanical superstructure radius, vehicle travel lanes).
4. Backing equipment	4a. Contact with fixed/ moving objects	4a. Never back a vehicle without a spotter. • Utilize a spotter when entering/exiting heavily trafficked areas/roadways. • While loading vehicles, employ the use of a spotter to protect personnel working around heavy equipment. • Keep a distance of 15 feet away from the vehicle while acting as a spotter. • Keep eye contact with the spotter at all times. • Discuss any hand or verbal signals with the operator prior to moving the vehicle.

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION	DATE	__x_ NEW ___ REVISED
Matrix Environmental	2/14/2012	

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (DISCRIPTION)	JSA#
		Injection with geoprobe	7

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Mark Janus	Remediation Technician		

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

___ LIFE VEST	__&_ GOGGLES	_&__ AIR PURIFYING RESPIRATOR	_x__ GLOVES
__x_ HARD HAT	___& FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
___ LIFELINE / BODY HARNESS	_x__ HEARING PROTECTION	__x_ PPE CLOTHING	
__x_ SAFETY GLASSES	_x__ SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1 Geoprobe and geoprobe tooling	**2 Air compressor/injection pump**	**3**	**4**

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
Review locations of underground utilities across the site.	1a. Damage to underground utilities.	1a. Review site plans and UFPO mark-outs.
	1b. Fall	1b. Look for uneven ground and trip hazard when traversing the site.
Set-up work area.	2a. Traffic, struck by.	2a. Wear safety vest, define workzone with cones.
	2b. Fall	2b. Look for uneven ground and trip hazard when traversing the site.
Un-load Geoprobe.	3a. Exertion	3a. Use proper lifting techniques (bend knees, keep back straight, lift only what you can lift safely.)
	3b. Caught by, pinch points	3b. Keep hands and fingers away from liftgates and close spases, wear leather gloves.
Prepare for injection by threading tooling togother.	4a. Caught by, pinch points	4a. Keep hands and fingers away from threads and close spases, wear leather gloves.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
	4b. Cuts by	4b. Wear leather gloves and eye protection.
Drive tooling to desired depth.	5a. Caught by	5a. Keep body and hands free from equipment and parts that are moving.
	5b. Noise	5b. Wear ear plugs and or muffs when advancing tooling.
Attach injection equipment to geoprobe tooling.	6a. Caught by, pinch points	6a. Keep hands and fingers away from threads and close spases, wear leather gloves.
	6b. Cuts by	6b. Wear leather gloves and eye protection.
Start injection with pump	7a. Exposure to / spill/ spray.	7a. Wear face shield and PPE and or nitrill gloves.
	7b. Slips	7b. Use caution if product injecting is spilled on the ground.
Remove injection equipment from Geoprobe tooling.	8a. Caught by, pinch points	8a. Keep hands and fingers away from threads and close spases, wear leather gloves.
	8b. Exposure to / spill/ spray.	8b. Wear face shield and PPE and or nitrill gloves.
	8c. Cuts by	8c. Wear leather gloves and eye protection.
Backfill bore hole.	9a. Exertion back strain	9a. Use proper lifting techniques, use proper tools and techniques.
Load geoprobe for transportation.	10a. Caught by, pinch points	10a. Keep hands and fingers away from liftgates and close spases, wear leather gloves.
	10b. Exertion	10b. Use proper lifting techniques (bend knees, keep back straight, lift only what you can lift safely.)
Breakdown work zone	11a. Traffic, struck by.	11a. Wear safety vest, remove cones starting from area closest to workzone.
	11b. Fall	11b. Look for uneven ground and trip hazard when traversing the site.

JOB SAFETY ANALYSIS

COMPANY/PROJECT/LOCATION		DATE	___ NEW
Matrix Environmental Technologies		6/20/2022	_x__ REVISED
JSA TYPE CATEGORY	**WORK TYPE**	**WORK ACTIVITY (DESCRIPTION)**	**JSA#**
60 Mechanics Street, Prattsburgh, NY	Environmental	Well Decommissioning	22
	POSITION / TITLE	**REVIEWED BY:**	**POSITION / TITLE**
Craig D. Zink	Sr. Geologist & Safety Manager	Pat Bliek	Sr. Technician & Field Safety Officer

MINIMUM REQUIRED (use an "X") & RECOMMENDED (use an "&") PERSONAL PRETECTIVE EQUIMENT.
Place appropriate symbol on corresponding line(s).
(SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

___ LIFE VEST (if within 10 feet of water)	___ GOGGLES	___ AIR PURIFYING RESPIRATOR	x GLOVES
x HARD HAT	___ FACE SHIELD	___ SUPPLIED RESPIRATOR	___ OTHER _____
___ LIFELINE / BODY HARNESS	x HEARING PROTECTION (as [illegible])	x PPE CLOTHING (Level D)	
x SAFETY GLASSES	x SAFETY SHOES		

REQUIRED AND/OR RECOMMENDED TOOLS AND EQUIPMENT

1 Safety cones and barricades **2 PID or LEL/O2 meter** **3 Grout pump** **4** **Fresh water transfer pump**	**4 Mechanical concrete mixer** **5 Poly water tank (1,000 gal)** **6 Flat-bed trailer** **7 Buckets, alconox and clean water to decon equipment**	**8 Lock-out, Tag-out Equipment (if working near overhead electric lines)**	**9 Hand tools**

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
1. Moving to and from well locations.	1a. Struck by traffic.	1a. The Site is residential but working and/or parking on or near the roadway may be necessary. Wear high visibility clothing. Establish work area with traffic cones, and other materials to keep traffic and other workers at least 10 feet from work area.
	1b. Slip, trip and fall	1b. The Site and work area is generally unpaved. Be aware of uneven ground and surface obstructions. Walk on paved surfaces where possible.
2. Setting up/taking down equipment and materials at well locations.	2a. Caught by/struck by/roll over.	3a. Be aware of pinch points when connecting hoses and placing equipment in area for use. Wear leather or tear-resistant gloves and steel toe shoes. Check to see that equipment is level and stable and there are no unlatched doors or other parts that can move when equipment is activated. Install wheel chocks on trailer tires and other equipment as needed.
	2b. Housekeeping.	2a. Establish walkways in work area and keep hoses, tremie pipes and materials out of these areas. Clear any empty bags and other waste materials out of work area to prevent slip, trip and fall hazards.
3. Remove bolts, lock and well cover	3a. Pinch points	3a. Be aware of pinch points when removing cover and opening well. Wear gloves to protect hands.
4. Prepare the grout mixture.	4a. Muscle strain.	4a. Use proper techniques when lifting bags of concrete, other materials and equipment. Get assistance if the load is too much to handle for one person.
	4b. Caught by rotating parts and flying debris.	4b. Inspect mixing equpment prior to use. Use caution when operating equipment. Wear gloves and eye protection to prevent injury.

JOB SAFETY ANALYSIS

JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS
	4c. Inhalation of dust.	4c. Avoid breathing cement dust. Wear mask or use engineering control to reduce dust.
5. Pump the grout into the borehole using the tremie method	5a. Muscle strain, struck by.	4a. Use proper lifting techniques when handling/using hoses and tremie rods. Use caution when handling any hoses or rods that are pressurized.
	5b. Cuts, pinch points, flying debris.	5b. Keep body parts tools and clothing away from moving equipment. Be aware of pinch areas and sharp metal points when putting hoses and tremie rods in the borehole and well. Connect and disconnect hoses with caution, wear gloves to protect hands.
	5c. Contact with contaminants.	5c. Wear chemically resistant gloves when handling/using any tools that come in contact with contaminated groundwater, gasoline, oil or unknown liquid.
	5d. Inhalation of vapors.	5d. Monitor the breathing zone to ensure vapors are below action levels. Don appropriate PPE if vapors accumulate above action levels.
6. Break down equipment and clean-up work area.	6a. Pinchpoints.	6a. Be cautious of pinch points when disconnecting pipes, hoses and removing tremie pipe from borehole, etc. Wear leather or tear-resistant gloves.
	6b. Muscle strain.	6b. Use proper lifting techniques when handling/using tools and equipment. Injury is more likely at end of day when muscles are fatigued.

APPENDIX C

VISITOR POLICY

MATRIX ENVIRONMENTAL TECHNOLOGIES INC.

VISITORS AND/OR TRAINEES ON SITE

Matrix Environmental Technologies Inc. is committed to providing a safe environment on all work sites for visitors, trainees, employees, and/or passersby. To accomplish this, the following guidelines must be adhered to:

1.0 VISITORS

A visitor is any person(s) who is (are) not actively participating in the work activities at the site. Visitors must be accompanied by a Matrix Environmental representative while on site.

All sites must have adequate signs, placards, barricades, etc. designating hazardous boundaries. Visitors shall not be allowed on any site that is not adequately marked. The **HASP** must define boundaries and be available on site for reference.

2.0 TRAINEES

Trainees are those employees of Matrix Environmental who have not yet completed the safety training required by the company. New hires and in-house company transfers will be considered trainees until criteria are met.

Trainees shall be informed of restrictions by their supervisor and must agree to abide by them prior to visiting active sites.

Trainees will be permitted to visit Matrix Environmental sites as observers providing the following conditions are met:

- All trainees are supervised by a qualified Matrix Environmental manager at all times while observing on site.
- Trainees perform no work functions of any type while on site.
- Trainees do not handle any equipment, tools, and/or supplies while on site.
- Trainees do not enter any hazardous or hot zone, or confined space areas while on site.

Supervisors will be responsible for informing all trainees of the above, and for insuring that conditions are adhered to, and also for insuring that trainees will not be asked to violate the conditions outlined above.

Documentation in the form of a signed agreement by both parties must be maintained in the **HASP**.

Infractions of the above agreement will be viewed as extremely serious, and will be subject to disciplinary action up to and including termination for either the trainee and/or the supervisor.

MATRIX ENVIRONMENTAL TECHNOLOGIES INC.

VISITORS/TRAINEES ON SITE

Matrix Environmental Technologies Inc. is committed to providing a safe working environment for all employees, trainees, subcontractors, and visitors. In addition, **Matrix Environmental** will comply with OSHA requirements for employee safety training prior to permitting them to participate in work activities on any hazardous site.

(This section to be filled out by visitor/trainee)

Agreement between _____
Name (Print or Type)

_____
Social Security Number

and **Matrix Environmental Technologies Inc.**

Because we have your safety in mind, you will be considered a visitor/trainee until all training criteria are met. This means you must meet training requirements prior to performing work activities on-site. Until such training requirements are met, it is critical that you agree to the following conditions:

- As a visitor/trainee, you may be asked to visit **Matrix Environmental** sites as an observer. You must be supervised on all of these site visits.

- As a visitor/trainee, your signature on this document indicates that you agree to:

  1. Perform no work functions of any type.
  2. Not handle any equipment and/or supplies of any type.
  3. Not enter any hazardous or hot zone areas.

I agree to adhere to the above conditions in all instances while on site as a visitor/trainee.

_____ _____
Signature Date

_____
(This section to be filled out by supervisor)

As supervisor to the above named visitor/trainee, I agree to the above restrictions and agree not to request him/her to perform activities contrary to the above.

_____ _____
Signature Date

APPENDIX D

HEALTH AND SAFETY PLAN AMENDMENTS

PROJECT NAME: Lakeside Village Apartments

PROJECT NUMBER: 18-025

LOCATION: 65-67 Lake Ave., Lancaster, NY

PROPOSED CHANGES IN FIELD ACTIVITIES AND/OR HAZARDS:

SUBMITTED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____

SITE SAFETY OFFICER: _____

APPENDIX E

OSHA TRAINING PROGRAM

(Information is included in the Company Safety Program Manual)

Components of Waste Site Worker Training – OSHA 40 Hour

Introduction to Program
Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)
Chemical and Physical Hazards
Toxicology
Personal Protective Equipment (PPE)
Respiratory Protection Principles
Air Purifying Respirators (APR's)
APR Inspection, Donning, Doffing, Maintenance
Self-Contained Breathing Apparatus (SCBA)
SCBA Inspection, Donning, Doffing, Maintenance
APR Fit Test and Certification
Site Safety
Site Control
Decontamination Procedures
Air Monitoring Equipment
Confined Spaces
Entry Permit Development
Material Handling and Spill Containment
Risk Assessment
Health and Safety Plans
Emergency Response Plans
Medical Monitoring
Hazard Communication

Components of Waste Site Worker Training – OSHA Annual 8 Hour Refresher

OSHA Requirements
Hazardous Wastes
Toxicology
Exposure Limits
Chemical and Physical Hazards
Temperature Stress
Site Control
PPE
Decontamination Procedures

APPENDIX F

ACCIDENT/INCIDENT REPORT

MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ACCIDENT/INCIDENT REPORT

Employee Section 1

Employee Name:_____ Date of Birth:_____
Address: _____
_____

Job Title _____ Supervisor:_____
Location at time of Incident:_____

Employee Section 2

Was Incident Physical_____ Chemical_____
Body parts affected:_____
Exposure Type: Dermal:_____ Inhalation_____
Ingestion:_____ Injection_____

Clearly describe the incident and its cause (if determined); turn to back of page if additional space is required.

_____
_____
_____
_____
_____

Witnesses: 1)_____ 2)_____

Manager Section

Was injury inspected by physician?_____
If Yes; Physician Name:_____
Location:_____
Date/Time:_____

Was employee hospitalized? _____
If Yes; Hospital Name:_____
Location:_____
Date/Time:_____

WHAT SPECIFIC CORRECTIVE ACTIONS HAVE BEEN TAKEN TO PREVENT A RECURRANCE: _____

_____

EMPLOYEE SIGNATURE DATE MANAGER SIGNATURE

DATE COMPLETE AND RETURN THIS FORM TO YOUR OPERATIONS MANAGER WITHIN 24 HOURS. OPERATIONS MANAGER TO FORWARD COPY TO ORCHARD PARK OFFICE ASAP.

APPENDIX G

MSDS/CONTAMINANT PROFILES

(Additional information is included in the Company MSDS binder)

SAFETY DATA SHEET

1. Identification

Product identifier	CAIROX® potassium permanganate
Other means of identification	
SDS number	-
Recommended use	Potassium Permanganate is an oxidant recommended for applications that require a strong oxidant.
Recommended restrictions	Use in accordance with supplier's recommendations.

Manufacturer / Importer / Supplier / Distributor information

Manufacturer/Supplier	CARUS CORPORATION
Address	315 Fifth Street, Peru, IL 61354, USA
Telephone	815 223-1500 - All other non-emergency inquiries about the product should be directed to the company
E-mail	salesmkt@caruscorporation.com
Website	www.caruscorporation.com
Contact person	Dr. Chithambarathanu Pillai
Emergency Telephone	For Hazardous Materials [or Dangerous Goods] Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC at CHEMTREC®, USA: 001 (800) 424-9300 CHEMTREC®, Mexico (Toll-Free - must be dialed from within country): 01-800-681-9531 CHEMTREC®, Other countries: 001 (703) 527-3887

2. Hazard(s) identification

Physical hazards	Oxidizing solids	Category 2
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1B
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 1 (Respiratory System)
	Specific target organ toxicity, repeated exposure	Category 1 (Respiratory System, Central Nervous System)
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May intensify fire; oxidizer. Harmful if swallowed. Causes severe skin burns and eye damage. Causes damage to organs (Respiratory System). Causes damage to organs (Respiratory System, Central Nervous System) through prolonged or repeated exposure.
Precautionary statement	
Prevention	Keep away from heat. Keep/Store away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Do not breathe dust. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Do not eat, drink or smoke when using this product.
Response	In case of fire: Use water for extinction. If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor. If exposed: Call a poison center/doctor.
Storage	Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)	Not classified.	
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1

Supplemental information

Hazard symbol

Hazard statement: Very toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention: Avoid release to the environment.

Response: Collect spillage.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
Potassium permanganate		7722-64-7	> 97.5

Composition comments: All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation

Remove victim to fresh air and keep at rest in a position comfortable for breathing. For breathing difficulties, oxygen may be necessary. Get medical attention immediately.

Skin contact

Take off immediately all contaminated clothing. Immediately flush skin with plenty of water. Get medical attention immediately. Wash contaminated clothing before reuse.

Contact with skin may leave a brown stain of insoluble manganese dioxide. This can be easily removed by washing with a mixture of equal volume of household vinegar and 3% hydrogen peroxide, followed by washing with soap and water.

Eye contact

Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids wide apart. Continue rinsing. Get medical attention immediately.

Ingestion

Immediately rinse mouth and drink plenty of water. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Decomposition products are alkaline. Brown stain is insoluble manganese dioxide.

General information

In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. For personal protection, see Section 8 of the SDS. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media

Flood with water from a distance, water spray or fog.

Unsuitable extinguishing media

The following extinguishing media are ineffective: Dry chemical. Foam. Carbon dioxide (CO2). Halogenated materials.

Specific hazards arising from the chemical

May intensify fire; oxidizer. May ignite combustibles (wood, paper, oil, clothing, etc.). Contact with incompatible materials or heat (135 °C / 275 °F) could result in violent exothermic chemical reaction. Oxidizing agent, may cause spontaneous ignition of combustible materials. By heating and fire, corrosive vapors/gases may be formed.

Special protective equipment and precautions for firefighters

Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Fire-fighting equipment/instructions	Move container from fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Dike fire control water for later disposal. Water runoff can cause environmental damage.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep upwind. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid inhalation of vapors and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	Keep combustibles (wood, paper, oil, etc.) away from spilled material. Should not be released into the environment. This product is miscible in water. Stop leak if possible without any risk. Dike the spilled material, where this is possible. Clean up spills immediately by sweeping or shoveling up the material. Do not return spilled material to the original container; transfer to a clean metal or plastic drum. To clean up potassium permanganate solutions, follow either of the following two options: Option # 1: Dilute to approximately 6% with water, and then reduce with sodium thiosulfate, a bisulfite or ferrous salt solution. The bisulfite or ferrous salt may require some dilute sulfuric acid (10% w/w) to promote reduction. Neutralize with sodium carbonate to neutral pH, if acid was used. Decant or filter and deposit sludge in approved landfill. Where permitted, the sludge may be drained into sewer with large quantities of water. Option # 2: Absorb with inert media like diatomaceous earth or inert floor dry, collect into a drum and dispose of properly. Do not use saw dust or other incompatible media. Disposal of all materials shall be in full and strict compliance with all federal, state, and local regulations pertaining to permanganates. To clean contaminated floors, flush with abundant quantities of water into sewer, if permitted by federal, state, and local regulations. If not, collect water and treat as described above. Never return spills in original containers for re-use. For waste disposal, see Section 13 of the SDS.
Environmental precautions	Do not allow to enter drains, sewers or watercourses. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and storage

Precautions for safe handling	Take any precaution to avoid mixing with combustibles. Do not get this material in your eyes, on your skin, or on your clothing. Do not breathe dust or mist or vapor of the solution. Use personal protection as recommended in Section 8 of the SDS. If clothing becomes contaminated, remove and wash off immediately. When using, do not eat, drink or smoke. Good personal hygiene is necessary. Wash hands and contaminated areas with water and soap before leaving the work site. Avoid release to the environment.
Conditions for safe storage, including any incompatibilities	Store locked up. Keep container tightly closed and in a well-ventilated place. Store in a cool, dry place. Store away from incompatible materials (See Section 10). Store in accordance with NFPA 430 requirements for Class II oxidizers.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Potassium permanganate (CAS 7722-64-7)	Ceiling	5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Potassium permanganate (CAS 7722-64-7)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.

US NIOSH Pocket Guide to Chemical Hazards: Recommended exposure limit (REL)

Components	Type	Value	Form
Potassium permanganate (CAS 7722-64-7)	TWA	1 mg/m3	Fume.

US NIOSH Pocket Guide to Chemical Hazards: Short Term Exposure Limit (STEL)

Components	Type	Value	Form
Potassium permanganate (CAS 7722-64-7)	STEL	3 mg/m3	Fume.

Biological limit values	No biological exposure limits noted for the ingredient(s).
Exposure guidelines	Follow standard monitoring procedures.
Appropriate engineering controls	Provide adequate general and local exhaust ventilation. An eye wash and safety shower must be available in the immediate work area.
Individual protection measures, such as personal protective equipment	
Eye/face protection	Wear safety glasses with side shields (or goggles). Wear face shield if there is risk of splashes.
Skin protection	
Hand protection	Wear chemical-resistant, impervious gloves. Use protective gloves made of: Rubber or plastic. Suitable gloves can be recommended by the glove supplier.
Other	Wear appropriate chemical resistant clothing. Rubber or plastic apron.
Respiratory protection	In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134. Measurement Element: Manganese (Mn) 10 mg/m3 Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100 or P100. Any supplied-air respirator. 25 mg/m3 Any supplied-air respirator operated in a continuous-flow mode. Any powered, air-purifying respirator with a high-efficiency particulate filter. 50 mg/m3 Any air-purifying, full-face piece respirator equipped with an N100, R100, or P100 filter. Any supplied-air respirator with a tight-fitting face piece that is operated in a continuous-flow mode. Any powered, air-purifying respirator with a tight-fitting face piece and a high-efficiency particulate filter. Any self-contained breathing apparatus with a full face piece. Any supplied-air respirator with a full face piece. 500 mg/m3 Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode. Emergency or planned entry into unknown concentrations or IDLH conditions - Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode. Escape Any air-purifying, full-face piece respirator equipped with an N100, R100, or P100 filter. Any appropriate escape-type, self-contained breathing apparatus.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	When using, do not eat, drink or smoke. Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance	Dark purple solid with metallic luster.
Physical state	Solid.
Form	Solid.
Color	Dark purple.
Odor	Odorless.
Odor threshold	Not available.
pH	Not applicable.
Melting point/freezing point	Starts to decompose with evolution of oxygen (O2) at temperatures above 150 °C. Once initiated, the decomposition is exothermic and self sustaining.
Initial boiling point and boiling range	Not applicable.
Flash point	Not applicable.
Evaporation rate	Not applicable.
Flammability (solid, gas)	Non flammable.

Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not applicable.
Flammability limit - upper (%)	Not applicable.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not applicable.
Vapor density	Not applicable.
Relative density	2.7 (20 °C) (Water = 1)
Solubility(ies)	6 % (20 °C) 20 % (65 °C)
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not applicable.
Other information	
Explosive properties	Not explosive. Can explode in contact with sulfuric acid, peroxides and metal powders.
Molecular weight	158.03
Oxidizing properties	Strong oxidizing agent.

10. Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable at normal conditions.
Possibility of hazardous reactions	Contact with combustible material may cause fire. Can explode in contact with sulfuric acid, peroxides and metal powders. Starts to decompose with evolution of oxygen (O2) at temperatures above 150 °C. Once initiated, the decomposition is exothermic and self sustaining.
Conditions to avoid	Contact with incompatible materials or heat (135 °C / 275 °F) could result in violent exothermic chemical reaction.
Incompatible materials	Acids. Peroxides. Reducing agents. Combustible material. Metal powders. Contact with hydrochloric acid liberates chlorine gas.
Hazardous decomposition products	By heating and fire, corrosive vapors/gases may be formed.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Harmful if swallowed.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Symptoms related to the physical, chemical and toxicological characteristics	Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity	Harmful if swallowed.

Components	Species	Test Results
Potassium permanganate (CAS 7722-64-7)		
Acute		
Dermal		
LD50	Rat	2000 mg/kg
Oral		
LD50	Rat	2000 mg/kg

Skin corrosion/irritation	Causes severe skin burns.
Serious eye damage/eye irritation	Causes serious eye damage.

Respiratory sensitization	Not classified.
Skin sensitization	Not classified.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Not classified.
Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	Causes damage to organs (respiratory system).
Specific target organ toxicity - repeated exposure	Causes damage to organs (respiratory system, central nervous system) through prolonged or repeated exposure.
Aspiration hazard	Not classified.
Chronic effects	May cause damage to respiratory system. Prolonged exposure, usually over many years, to manganese oxide fume/dust can lead to chronic manganese poisoning, chiefly affecting the central nervous system.

12. Ecological information

Ecotoxicity: Very toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Potassium permanganate (CAS 7722-64-7)			
Aquatic			
Fish	LC50	Bluegill (Lepomis macrochirus)	2.7 mg/l, 96 hours, static
			2.3 mg/l, 96 hours, flow through
			2.3 mg/l, 96 hours
			1.8 - 5.6 mg/l
		Carp (Cyprinus carpio)	3.16 - 3.77 mg/l, 96 hours
			2.97 - 3.11 mg/l, 96 hours
		Goldfish (Carassius auratus)	3.3 - 3.93 mg/l, 96 hours, static
		Milkfish, salmon-herring (Chanos chanos)	> 1.4 mg/l, 96 hours
		Rainbow trout (Oncorhynchus mykiss)	1.8 mg/l, 96 hours
			1.08 - 1.38 mg/l, 96 hours
			0.77 - 1.27 mg/l, 96 hours
		Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.275 - 0.339 mg/l, 96 hours

Persistence and degradability	Expected to be readily converted by oxidizable materials to insoluble manganese oxide.
Bioaccumulative potential	Potential to bioaccumulate is low.
Mobility in soil	The product is miscible with water. May spread in water systems.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazardous waste code	D001: Ignitable waste The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Do not allow this material to drain into sewers/water supplies.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Rinse container at least three times to an absence of pink color before disposing. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number	UN1490
UN proper shipping name	Potassium permanganate
Transport hazard class(es)	5.1
Subsidiary class(es)	-
Packing group	II
Environmental hazards	
Marine pollutant	Yes

Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	IB8, IP2, IP4, T3, TP33
Packaging exceptions	152
Packaging non bulk	212
Packaging bulk	240

IATA

UN number	UN1490
UN proper shipping name	Potassium permanganate
Transport hazard class(es)	5.1
Subsidiary class(es)	-
Packaging group	II
Environmental hazards	Yes
Labels required	5.1
ERG Code	5L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN1490
UN proper shipping name	POTASSIUM PERMANGANATE
Transport hazard class(es)	5.1
Subsidiary class(es)	-
Packaging group	II
Environmental hazards	
Marine pollutant	Yes
Labels required	5.1
EmS	F-H, S-Q
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable.

15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA/SARA Hazardous Substances - Not applicable.

Drug Enforcement Administration (DEA) (21 CFR 1310.02 (b) 8: List II chemical.

Department of Homeland Security (DHS) Chemical Facility Anti-Terrorism Standards (6 CFR 27, Appendix A): Listed.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - Yes Pressure Hazard - No Reactivity Hazard - No
SARA 302 Extremely hazardous substance	No
SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Potassium permanganate	7722-64-7	> 97.5

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Clean Water Act (CWA) Section 112(r) (40 CFR 68.130)	Hazardous substance
Safe Drinking Water Act (SDWA)	Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Potassium permanganate (CAS 7722-64-7)	6579

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Potassium permanganate (CAS 7722-64-7)	15 % wt

DEA Exempt Chemical Mixtures Code Number

Potassium permanganate (CAS 7722-64-7)	6579

Food and Drug Administration (FDA)	Not regulated.
US state regulations	This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm. California OSH Hazardous Substance List: Listed.

US. Massachusetts RTK - Substance List

Potassium permanganate (CAS 7722-64-7)

US. New Jersey Worker and Community Right-to-Know Act

Potassium permanganate (CAS 7722-64-7)	500 lbs

US. Pennsylvania RTK - Hazardous Substances

Potassium permanganate (CAS 7722-64-7)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	27-November-2013
Revision date	-
Version #	01

NFPA Ratings

List of abbreviations

GHS: Globally Harmonized System of Classification and Labeling of hazardous properties of Chemicals.
TWA: Time weighted average.
LD50: Lethal Dose, 50%.
LC50: Lethal Concentration, 50%.
IMDG: International Maritime Dangerous Goods.
IATA: International Air Transport Association.
MARPOL: International Convention for the Prevention of Pollution from Ships.

References

HSDB® - Hazardous Substances Data Bank
Registry of Toxic Effects of Chemical Substances (RTECS)
IARC Monographs. Overall Evaluation of Carcinogenicity
National Toxicology Program (NTP) Report on Carcinogens
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

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This SDS contains revisions in the following section(s):

This safety data sheet contains revisions in the following section(s):

SAFETY DATA SHEET

Version 4.11
Revision Date 06/28/2017
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Tetrachloroethylene

Product Number : 371696
Brand : Sigma-Aldrich
Index-No. : 602-028-00-4

CAS-No. : 127-18-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Perchloroethylene PCE
Formula	:	C_2Cl_4
Molecular weight	:	165.83 g/mol
CAS-No.	:	127-18-4
EC-No.	:	204-825-9
Index-No.	:	602-028-00-4

Hazardous components

Component	Classification	Concentration
Tetrachloroethylene		
	Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 2; STOT SE 3; Aquatic Acute 2; Aquatic Chronic 2; H315, H317, H319, H336, H351, H411	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Tetrachloroethylene	127-18-4	TWA	25.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	100.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Potential Occupational Carcinogen Minimize workplace exposure concentrations. See Appendix A		
		See Table Z-2		
		TWA	100.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	300.000000 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		STEL	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Potential Occupational Carcinogen Minimize workplace exposure concentrations. See Appendix A		
		See Table Z-2		

		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	25 ppm 170 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	100 ppm 685 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	300 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	25 ppm 170 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Tetrachloroethylene	127-18-4	Tetrachloroethylene	3ppm	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	0.5000 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	3ppm	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours after exposure ceases)			
		Tetrachloroethylene	0.5 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		Prior to shift (16 hours after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm

Break through time: 49 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -22 °C (-8 °F) - lit.
f)	Initial boiling point and boiling range	121 °C (250 °F) - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	25.3 hPa (19.0 mmHg) at 25.0 °C (77.0 °F) 17.3 hPa (13.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.623 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.15 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.53 at 23 °C (73 °F)
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available

t) Oxidizing properties No data available

9.2 Other safety information

Surface tension 32.1 mN/m at 20 °C (68 °F)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Strong bases

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - 3,385 mg/kg
(OECD Test Guideline 401)

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h

Respiratory or skin sensitisation
- Mouse
Result: May cause sensitisation by skin contact.
(OECD Test Guideline 429)

Germ cell mutagenicity
Hamster
ovary
Result: negative

OECD Test Guideline 474
Mouse - male
Result: negative

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC: 2A - Group 2A: Probably carcinogenic to humans (Tetrachloroethylene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Tetrachloroethylene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information

Repeated dose toxicity	Mouse - female - Oral - LOAEL : 390 mg/kg

RTECS: KX3850000

narcosis, Liver injury may occur., Kidney injury may occur.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 5 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 7.50 mg/l - 48 h
Toxicity to algae	static test EC50 - Skeletonema costatum - > 16 mg/l - 7 h

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 11 % - Not readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 0.00343 mg/l Bioconcentration factor (BCF): 49

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene
Reportable Quantity (RQ): 100 lbsReportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1897 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TETRACHLOROETHYLENE
Marine pollutant: yes

IATA
UN number: 1897 Class: 6.1 Packing group: III
Proper shipping name: Tetrachloroethylene

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

:

Reportable Quantity D039 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Tetrachloroethylene	127-18-4	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Tetrachloroethylene	127-18-4	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity

Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H401	Toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.11 Revision Date: 06/28/2017 Print Date: 06/22/2019

APPENDIX H

CONTINGENCY PLANS

1. CONTINGENCY PLAN FOR EVACUATION

Should evacuation be deemed necessary, the Site Safety Officer will notify the Project Manager and an appropriate signal will be given for evacuation. The Site Safety Officer shall insure that the evacuation is carried out in a calm, controlled fashion. All personnel shall exit the site and shall reassemble in a predestinated area. Evacuation routes will be dependent upon wind direction, severity, and type of incident. The Site Safety Officer shall insure that all personnel are accounted for. If any personnel cannot be accounted for, the Site Safety Officer will alert emergency services personnel.

Site Safety Officer will contact the Project Manager, and/or Operations Manager as soon as possible, after evacuation procedures are instituted.

2. CONTINGENCY PLAN FOR MEDICAL EMERGENCY

The following procedures should be instituted IMMEDIATELY in the event of a medical emergency involving illness or injury to any personnel while on site:

α The site should be shut-down and immediately secured. The area in which the injury or illness occurred should be considered off-limits until the cause of injury or illness is identified. In the event of a non-trauma related incident, instantaneous real-time air monitoring by FID or PID should be acquired to determine if the incident was caused by potential exposure to hazardous materials. Monitoring should be done both up, and downwind of the incident site.

- Assess the victim's condition for the nature of injury or illness. Pay close attention to the level of consciousness and any cardiac or respiratory involvement. If the victim appears to be critically injured (i.e., unconsciousness, cardiac or respiratory abnormalities, stroke, seizures, etc.) support the victim's vital functions. Administer **CPR** if needed. Notify police, fire department, and EMS units immediately. The victim should be decontaminated as soon as possible after removal from the contaminated environment. This should be done in non-contaminated workspace, well away from the source of the problem.

- If the victim appears to be critically injured, he/she should be transported to the nearest Emergency Room by an EMS unit staffed by qualified personnel. If the victim's condition appears to be non-critical, but is more severe than minor cuts or bruises, he/she should be transported to the nearest hospital. Under no circumstances should the victim be transported to the hospital in anything other than an EMS unit staffed by qualified personnel. If the victim has sustained extremely minor injuries or a minor illness, it will be left to the discretion of the Site Safety Officer whether or not the victim should be treated on-site. If the Site Safety Officer determines that the victim may not return to work, the victim should be decontaminated, relieved of duty for the day, and returned to the office if during normal working hours. An occupational physician from the current medical surveillance contractor or the victim's family physician should be contacted.

- Contact the Project Manager and/or the Health and Safety Officer as soon as possible after attending to the needs of the victim. The incident should be reported both in the project file and on the Matrix Environmental Accident/Incident Report found in this document.

APPENDIX I

HEAT AND COLD STRESS

HEAT and COLD STRESS

1.0 HEAT STRESS

Factors that contribute to heat related disorders include high temperature and humidity, clothing, workload, and individual characteristics. Wearing personal protective equipment (PPE), particularly the higher levels, greatly increases the risk of heat stress. PPE adds weight to the individual, reduces visibility and mobility, retards the body's natural cooling processes, and causes greater consumption of energy.

Forms of heat stress, in increasing severity, are listed below. The causes, symptoms, and treatment procedures for each are discussed in Section 1.3.

- Heat rash
- Heat syncope (fainting)
- Heat cramps
- Heat exhaustion
- Heat stroke

1.1 Risk Reduction

The risk of heat stress disorders can be minimized by employing preventative measures such as maintaining fluid balance and adjusting the work schedule. Depending on the degree of risk, the following will or may be provided at the discretion of the Site HSO:

- **Fluid replacement** - Fresh drinking water will be available in the support trailer and the Contaminant Reduction Zone. Workers will also maintain a supply of fluids at each work site using appropriate safety practices such as proper storage and handling.

- **Sunscreen** - Topical application of sunscreen with a high protection factor will be applied to all exposed areas

- **Cooling mechanisms** - Sprayers or misters will be available in the Contaminant Reduction Zone to reduce body temperature. If conditions warrant, cooling vests will be made available.

- **Adjustment of work schedule** - The most labor-intensive tasks may be performed during the morning or late afternoon hours on a clear day.

- **Alcohol intake** - Advise workers that heavy consumption of alcohol the evening before the work day increases the risk of heat stroke due to dehydration.

- **Maintain constant weight** - Advise workers to weigh themselves before and after each work session. Significant weight loss may indicate serious reduction in body fluids.

1.2 Monitoring

The most effective means of preventing heat stress is using common sense. Comprehensive monitoring programs are most certainly beneficial, but cannot always be adhered to when operating with finite resources. Frequent rest periods under these circumstances can jeopardize the overall quality and usefulness of the project. That is not to say that the success of a project should be accomplished at the cost of health and safety, but rather the monitoring protocol can be simplified if the Site HSO and individual personnel ensure that the established risk reduction measures are being carried out.

There will be three (3) components of the heat stress monitoring program: periodic measurement of heart rate, self-monitoring of physical state, and awareness of physical state of one's work partners. The frequency of heart rate monitoring will depend on climatic conditions and the level of PPE. Table K-1 outlines a schedule of monitoring as suggested by the American Congress of Governmental Industrial Hygienists (ACGIH). The schedule will be used initially and adjusted appropriately.

The worker will measure his heart rate via radial pulse for 30 seconds after performing no physical labor for no more than one minute. If the heart rate exceeds 110 beats per minute, the Site HSO must be notified. The Site HSO will then create or modify the existing work-rest schedule for that individual.

It is incumbent on each worker to rest if he believes he is beginning to succumb to heat related factors and to convey that to his work partners. Conversely, an individual may not know he is succumbing to heat stress and each worker in the party should watch one another for signs of heat stress and take appropriate action. The Site HSO should be notified immediately if treatment has been administered.

Table K-1

Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers

Adjusted Temperature Calculation	Normal Work Clothing	Impermeable Work Clothing
above 90ºF	After each 45 minutes of work	After each 15 minutes of work
87.5-90ºF	After each 60 minutes of work	After each 30 minutes of work
82.5-87.5ºF	After each 90 minutes of work	After each 60 minutes of work
77.5-82.5ºF	After each 120 minutes of work	After each 90 minutes of work
72.5-77.5ºF	After each 120 minutes of work	After each 90 minutes of work

1.3 Symptoms and Treatment

All project personnel must understand the causes, symptoms, and treatment of heat related illnesses prior to any field work. With the exception of simple heat rash, the Site HSO must be notified if any heat stress disorders.

1.3.1 Heat Rash

Cause:	Continuous exposure to heat or humid air aggravated by friction from clothing.
Symptoms:	Small red pimples on the skin, particularly at points of friction. Prickly sensation.
Treatment:	Remove source of irritation and cool the affected area water or wet cloth.

1.3.2 Heat Syncope

Cause:	Direct exposure of ultraviolet rays and a prolonged upright position can lead to dehydration and contraction of the blood vessels resulting in a temporary deficiency of blood to the brain thereby causing fainting.
Symptoms:	Self-explanatory
Treatment:	Place victim in shade and elevate legs. Apply wet towel to head or forehead. When victim regains consciousness, rehydrate with cool water.

1.3.3 Heat Cramps

Cause:	Heavy perspiration and inadequate replenishment of bodily fluids and electrolytes.
Symptoms:	Muscle spasms and pain in the extremities and abdomen.
Treatment:	If practical, move the victim to the support trailer. Remove protective clothing and rehydrate with cool water. Decrease body temperature with cool water or wet cloths and allow period of rest in a cool location.

1.3.4 Heat Exhaustion

Cause: Increase stress on various parts of the body including inadequate blood circulation due to cardiovascular insufficiency or dehydration.

Symptoms: Heavy perspiration, dizziness, nausea, fainting, skin which is pale, cool and moist.

Treatment: Make arrangements for transport to a medical facility. If practical, transport the victim to the support trailer. Remove protective clothing. Lie the worker down on his or her back in a cool place and raise the feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt water solution using 1 teaspoon salt in 12 ounces of water. Transport the worker to a medical facility.

1.3.5 Heat Stroke

THIS IS A LIFE-THREATENING MEDICAL EMERGENCY REQUIRING IMMEDIATE ACTION. SUMMON EMERGENCY MEDICAL PERSONNEL IMMEDIATELY.

Cause: Same as heat exhaustion.

Symptoms: Dry, red, hot skin, dry mouth, lack of or reduced perspiration, dizziness, nausea, headache, rapid pulse. Temperature continues to rise unless treatment is implemented.

Treatment: The basic principle is to lower the body temperature rapidly. SUMMON EMERGENCY MEDICAL PERSONNEL. In the meantime:

- Move the victim out of the sun
- Remove clothes
- DO NOT administer any drugs or medication
- Submerge victim in water

- Place victim in front of a fan or breeze, if possible.
- If ice is available, apply directly to the victim, especially under the arms and on the head. Rub skin briskly during cool down.
- Monitor body temperature with thermometers. Body temperature should begin to decrease within minutes. Any seizure activity will stop as the body cools.
- As temperature approaches 101°F, stop cooling measures and initiate transport to a hospital or declare an emergency response. The temperature should continue to fall, often to subnormal, during this period.

2.0 COLD STRESS

During the cold months, workers can be susceptible to illness or injury caused by prolonged exposure to cold temperatures. Ambient air temperature and wind velocity are the two dominant weather factors which contribute to cold stress injury. When evaluating safeguards against cold stress conditions, temperature and wind velocity must both be factored into the process. Since wind velocity decreases the temperature at points of contact, there is a direct relationship between ambient temperature and wind velocity. The higher the wind speed, the colder the apparent temperature and the higher the risk for cold stress. The wind chill index calculates the apparent, or equivalent, temperature for given wind speeds at given ambient temperatures. The wind chill index is included as Table K-2.

Contact with or immersion in cold water, snow, or ice also contributes to cold stress conditions and will be addressed in the following sections.

Forms of cold stress disorders, in increasing severity are listed below. The symptoms and treatments for each are discussed in Section 2.3.

- Frost nip
- Frost bite
- Mild hypothermia
- Moderate hypothermia
- Severe hypothermia

2.1 Risk Reduction

The risk of cold stress disorders can be minimized by applying controls and preventative measures such as wearing appropriate clothing, providing warm shelter, and having extra dry clothing available. Specific measures are listed below. Assume risk for cold stress is imminent, i.e. it is not summer.

- **Clothing** - Dead air space between the warm body, clothing, and outside air is essential. Multiple layers of light clothing with an outer shell of windproof material is optimum. Hats, insulated gloves, wool socks, etc. will be worn as appropriate. All workers will keep emergency clothing and footwear either in the service vehicles or in the support trailer.

- **Heated shelter** - The support trailer will be heated to a temperature of at least 70ºF. Workers can also use service vehicles in the Exclusion Zone. Unless under emergency response, personnel must proceed with the standard decontamination process. Service vehicles must be decontaminated prior to leaving the site.

- **Dehydration** - Like heat related conditions, cold conditions can cause dehydration. Fresh drinking water will be available in the support trailer and the Contamination Reduction Zone. Workers will also maintain a supply of fluids at each work site using appropriate safety practices such as proper storage and handling.

- **Warm drinks** - A supply of hot drinking water with tea, coffee, and hot chocolate mix will be available at the support trailer. Field personnel will be encouraged to have a supply of hot beverage at the work sites using appropriate safety practices such as proper storage and handling.

- **Minimization of perspiration** - Field personnel shall adjust the amount or type of clothing worn such that he is comfortable and protected, but is not perspiring to the point that clothing becomes damp or wet.

- **Windbreaks** - If practical and safe, install a windbreak to minimize exposure to high winds and to raise the equivalent temperature.

- **Education** - Personnel will be trained to recognize the symptoms of cold stress and how to respond.

- **Buddy system** - Work partners shall be aware of the physical condition of each other relative to cold stress.

- **Work duration** - If the ambient temperature is less than 0ºF, the maximum work duration is four hours per eight hour work day with alternating one hour on-off periods in the cold work zone.

2.2 Monitoring

Physiological monitoring will not be required since the human response to cold stress is more direct than that of heat stress. A worker can often succumb to any level of heat stress and not necessarily be aware of it. A worker suffering from cold stress will more likely seek comfort without the aid of physiological indicators. Severe cases of cold stress such as hypothermia are typically the result of a situation for which the worker had little or no control such as breaking through an ice covered body of water.

Monitoring weather conditions will be the primary mechanism evaluating and responding to risk for cold stress conditions. Thermometers and wind velocity gauges will be installed at the support trailer and at strategic areas in the Exclusion Zone. Measurements will be taken at periodic intervals and recorded in the meteorological log by the Site HSO. The corresponding equivalent temperature will be obtained from Table K-2. Drastic changes in weather conditions, predicted or measured, will be relayed to the field teams so that actions can be taken to protect health and safety.

Work may be stopped or the work schedule may be amended by the Site HSO if weather conditions deteriorate significantly. The decision to enact such measures will be based on the ability of the field personnel to work efficiently in such conditions without undue risk to health and safety. Recommendations and concerns of the field personnel will be included in the decision-making process.

2.3 Symptoms and Treatment

All project personnel must understand the causes, symptoms, and treatment of heat related illnesses prior to any field work. The Site HSO must be notified immediately if frost bite or hypothermia is confirmed or suspected.

2.3.1 Frost Nip

General Information: First sign of frost bite.

Symptoms: A whitened area of the skin that burns or throbs.

Treatment: Warm the affected area until the symptoms disappear.

2.3.2 Frost Bite

General Information: Ice crystals form superficially or deeply in the fluids and underlying soft tissue.

Symptoms: Skin is cold, hard, white, and numb. Blisters may appear. Affected areas will feel cold, but there may be no pain. Skin will eventually turn black after prolonged exposure and may result in permanent damage.

Treatment: Transport victim to protected area. Prevent further heat loss with warmer clothing or blankets. Transport to medical facility or summon emergency medical personnel.

Do not:

- Walk on a thawed feet or use thawed hands
- Allow victim to smoke or drink alcohol
- Rub affected area with anything
- Break any blisters
- Apply heat of any kind

2.3.3 Mild Hypothermia

General Information: Hypothermia affects the central nervous system. Although impaired, victims of mild hypothermia can communicate.

Symptoms: Change in behavior, notable decrease in work efficiency, sluggishness, forgetfulness, poor judgment, poor motor skills, shivering, victim knows he is cold.

Treatment: The victim should be moved indoors or into a heated vehicle. Remove all wet or damp clothing, dry skin, and apply dry clothing. The head should be covered with a hat or blanket. Cover victim with blankets. Consume hot beverage. Transport to medical facility or summon emergency medical personnel.

Do not consume alcoholic beverages.

2.3.4 Moderate Hypothermia

MODERATE HYPOTHERMIA IS A LIFE-THREATENING CONDITION. SUMMON EMERGENCY MEDICAL PERSONNEL IMMEDIATELY.

General Information: For field purposes, this may be defined as the stage at which the patient is clearly incapable of functioning effectively, but is conscious.

Symptoms: Body temperature well below normal, disorientation, hallucination, unusual behavior, absence of shivering and does not feel cold, heart rate diminishes.

Treatment: SUMMON EMERGENCY MEDICAL PERSONNEL. In the interim, proceed with treatment for mild hypothermia and apply heat with mechanical heaters or body contact.

2.3.5 Severe Hypothermia

SEVERE HYPOTHERMIA IS A LIFE-THREATENING CONDITION. SUMMON EMERGENCY MEDICAL PERSONNEL IMMEDIATELY.

General Information:	Vital signs are weak. Victim is not able to respond.
Symptoms:	Characterized by a decrease in the body temperature which results in a deep coma where vital signs become very weak or undetectable.
Treatment:	Do not consider the victim to be dead. SUMMON EMERGENCY MEDICAL PERSONNEL. In the interim, remove wet clothes, dry skin, and apply dry clothes. Perform CPR, if necessary. Initiate warming with mechanical or body heat. Handle the victim carefully and minimally because of extreme reaction to even minor trauma.

Table K-2

Wind Chill Index

ESTIMATED WIND SPEED (mph)	ACTUAL TEMPERATURE READING (°F)											
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
	EQUIVALENT CHILL TEMPERATURE (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect)	LITTLE DANGER In <1 hr with dry skin Max. danger = false sense of security				INCREASING DANGER Freezing of exposed flesh within one minute			GREAT DANGER Flesh may freeze within 30 seconds				
	Trenchfoot and immersion foot may occur at any point on this chart											

Developed by the US Army Research Institute of Environmental Medicine, Natick, MA

APPENDIX J

Respirator Inspection Check List

Respirator Inspection Checklist

Type of Respirator:	Location:
Respirator Issued to:	Type of Hazard:
Face piece	**_____ Cracks, tears, or holes** **_____ Face mask distortion** **_____ Cracked or loose lenses/face shield**
Head straps	**_____ Breaks or tears** **_____ Broken buckles**
Valves:	**_____ Residue or dirt** **_____ Cracks or tears in valve material**
Filters/Cartridges:	**_____ Approval designation** **_____ Gaskets** **_____ Cracks or dents in housing** **_____ Proper cartridge for hazard**
Air Supply Systems	**_____ Breathing air quality/grade** **_____ Condition of supply hoses** **_____ Hose connections** **_____ Settings on regulators and valves** **_____ Compressor in working condition** **_____ Air supply tanks working and full**
Rubber/Elastomer Parts	**_____ Pliability** **_____ Deterioration**

Inspected by:	**Date:**
Action Taken:	

APPENDIX G – COMMUNITY AIR MONITORING PLAN

COMMUNITY AIR MONITORING PLAN

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York
Site #C915344

Prepared For:

65 Lake Avenue LLC
32 Central Avenue
Lancaster, New York 14086

Prepared By:

MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.

95 Brown Road, M/S 1052
Ithaca, New York 14850

Revised September 2025

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FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This document presents a Community Air Monitoring Plan (CAMP) to be implemented during remedial activities at the Lakeside Village Apartments Site in Lancaster, New York. Matrix Environmental Technologies Inc. (METI) has prepared this CAMP on behalf of 65 Lake Avenue LLC.

Generic CAMP monitoring will be performed during non-intrusive activities, such as the collection of surface soil and groundwater samples from pre-existing monitoring wells, and during intrusive activities not taking place within 20 feet of potentially exposed populations or structures. Additional special requirements CAMP monitoring will be conducted during remedial activities taking place within 20 feet of potentially exposed populations or structures.

This CAMP will be completed in general accordance with NYSDEC DER-10 Appendix 1A, which is included in **Attachment A**, and the "Special CAMP Requirements for Work In or Near Buildings" provided by NYSDEC, included in **Attachment B**, where applicable.

2.0 VOLATILE ORGANIC COMPOUND AIR MONITORING

VOCs will be monitored at the upwind and downwind perimeters of the work area on a continuous basis during intrusive activities and periodically during non-intrusive activities. The upwind and downwind locations will be determined based on observed wind conditions during ground intrusive work. Air monitoring stations based on the general prevailing wind direction are shown in the attached **Figure 1**. MiniRAE 3000 organic vapor meters (OVMs) equipped with a photoionization detector (PID) with an 11.7 eV lamp will be used provide real-time recordable air monitoring data. The meters will be capable of calculating 15-minute running average concentrations for comparison to the action levels and will be equipped with an audible and/or visual alarm to indicate exceedance of the action level.

Generic CAMP VOC monitoring action levels as per DER-10 Technical Guidance for Site Investigations and Remediation are as follows:

- 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 (as measured at the upwind perimeter of the work area) for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

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

residential/commercial structure, whichever is less; but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.

Additional special requirements CAMP VOC monitoring action levels as per NYSDEC guidance are as follows:

- If total VOC concentrations next to the nearest air intake for the occupied building nearest the work area exceed 1 ppm, monitoring will occur within the occupied structure. Background readings in the occupied spaces will be taken prior to the commencement of the planned work assuming access is granted by the lessee.

3.0 PARTICULATE AIR MONITORING

The remediation crew will make all efforts to suppress dust and particulate matter during the handling of contaminated soil. Fugitive dust and particulate monitoring will be completed in accordance with the Special CAMP Requirements, if applicable, and DER-10 Appendix 1B, as included in **Attachment C**. The following techniques have been shown to be effective for the controlling the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and/or
(g) Reducing the excavation size and/or number of excavations.

Care will be taken not to use excess water, which can result in unacceptably wet site conditions.

Weather conditions will be evaluated during remedial work. When extreme wind conditions make dust control ineffective, remedial actions may need to be suspended as a last resort.

Dust and particulate monitoring will be conducted continuously at upwind and downwind perimeters of the work area during ground intrusive activities. If visual evidence of dust is apparent in other locations, monitoring equipment will be placed where necessary. Air monitoring stations based on the general prevailing wind direction are shown in the attached **Figure 1**.

Particulate air monitoring will be done with a DataRAM-4 (or similar), which will be capable of reading particles less than 10 micrometers in size (PM-10). The meters will be capable of calculating 15-minute running average concentrations for comparison to the action levels and will be equipped with an audible and/or visual alarm to indicate exceedance of the action level. Particulate monitoring action levels for general CAMP monitoring are as follows:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ 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 $\mu g/m^3$ above the upwind level, work must be stopped and a reevaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

Additional special requirements CAMP particulate monitoring action levels as per NYSDEC guidance are as follows:

- If total particulate concentrations next to the nearest air intake for the occupied building nearest the work area exceed 150 $\mu g/m^3$, work activities will be suspended until controls are implemented and are successful in reducing the total particulate concentrations to 150 $\mu g/m^3$ or less at the monitoring point.

4.0 DOCUMENTATION

All 15-minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Such personnel will be notified of any exceedances within 24 hours via email. Instantaneous readings, if any, used for decision purposes should also be recorded.

5.0 WIND DIRECTION

Prevailing wind direction will be recorded at the beginning of each work day by visual observations of an on-site windsock. As wind direction may change throughout the work day, direction will be reestablished if a significant change in direction is observed. The wind direction results will be utilized to determine the placement of the monitoring equipment.

FIGURE

Prevailing Wind Direction

STATE OF NEW YORK
CHRISTINE MARIE CURTIS
100560
LICENSED PROFESSIONAL ENGINEER

BUILDING C
65 LAKE AVE

MW6

OVERHEAD ELECTRIC

59 LAKE AVE

MW9

OVERHEAD ELECTRIC

MW1

BUILDING B
65 LAKE AVE

MW5

SVE2

SVE3

MW2

MW3

FORMER DRY CLEANER (APPROXIMATE)

SVE1

BUILDING A
65 LAKE AVE

SVE SYSTEM ENCLOSURE

MW7

NY STATE EASEMENT
FLOOD PROTECTION PROJECT
FOR CAYUGA CREEK

SHED

MW4

BUILDING 1
67 LAKE AVE

MW8

BCP SITE LIMIT

69 LAKE AVE

LEGEND

- Remedial Excavation Extents
- Monitoring Well Location
- Destroyed Monitoring Well Location
- Active Horizontal SVE Well
- Deactivated Horizontal SVE Well
- Air Monitoring Location
- Air Monitoring Location (Special Requirements for Work In or Near Buildings)

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:
MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	10/29/25

N

1" = 25'
0 25

TITLE:
Potential Locations of Air Monitoring Stations Based on Prevailing Wind Direction

DATE:

FIGURE: 1

ATTACHMENT A

NYSDEC DER-10 Appendix 1A New York State Department of Health Generic Community Air Monitoring Plan

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

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

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

VOC Monitoring, Response Levels, and Actions

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

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

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

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

December 2009

ATTACHMENT B

Special CAMP Requirements for Work in or Near Buildings

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work With Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

ATTACHMENT C

NYSDEC DER-10 Appendix 1B Fugitive Dust and Particulate Monitoring

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

Appendix 1C
DEC Permits Subject to Exemption

In accordance with section 1.10, exemptions from the following permit programs may be granted to the person responsible for conducting the remedial programs undertaken pursuant to section 1.2:

Air - Title 5 permits
Air - State permits
Air - Registrations
Ballast Discharge
Chemical Control
Coastal Erosion Hazard Areas
Construction of Hazardous Waste Management Facilities
Construction of Solid Waste Management Facilities
Dams
Excavation and Fill in Navigatable Waters (Article 15)
Flood Hazard Area Development
Freshwater Wetland
Hazardous Waste
Long Island Wells
Mined Land Reclamation
Navigation Law - Docks
Navigation Law - Floating Objects
Navigation Law - Marinas
Non-Industrial Waste Transport
Operation of Solid Waste Management Facilities
Operation of Hazardous Waste Management Facilities
State Pollution Discharge Elimination Systems (SPDES)
Stream Disturbance
Tidal Wetlands
Water Quality Certification
Water Supply
Wild, Scenic and Recreational Rivers

APPENDIX H – OPERATION & MAINTENANCE PLAN

OPERATION, MONITORING, AND MAINTENANCE PLAN FOR SVE and SSD SYSTEMS

Revised November 2025

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York
BCP Site #C915344

Prepared For:
65 Lake Avenue LLC

Prepared By:

MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.

TABLE OF CONTENTS

1.0 INTRODUCTION

This Operation, Monitoring, and Maintenance (OM&M) Plan has been developed by Matrix Environmental Technologies Inc. (METI) on behalf of 65 Lake Avenue LLC. The Plan describes operation, monitoring, and maintenance procedures for the soil vapor extraction (SVE) system and the sub-slab depressurization (SSD) systems installed in the basement areas of Building 1 and Building A at Lakeside Village Apartments located at 65-67 Lake Avenue, Lancaster, New York.

2.0 SSD SYSTEMS EQUIPMENT

To complete the design objective, seven (7) separate SSD systems were installed in the following basement areas:

- Building 1 West
- Building 1 Central
- Building 1 East
- Building A, Apartment 1
- Building A, Apartment 2
- Building A, Apartment 3
- Building A, Apartment 4

Locations of the basement treatment areas and associated system piping, extraction points and monitoring points are shown in **Figure 1**.

The SSD systems create negative pressure under the building floor slab relative to the indoor air pressure, thereby minimizing the potential for soil gas to migrate into the building. The systems use a fan to apply vacuum to vapor extraction points installed throughout the building floor slab. The systems were designed to create a minimum negative pressure of at least 0.004 inches WC in the sub-slab in each area.

2.1 SSD System Components

The primary components of each SSD system are summarized below.

- **Extraction Wells:** Each SSD system recovers sub-slab vapors from a single extraction well. Each vapor extraction point is constructed of four-inch I.D. Schedule 40 PVC pipe with screen extending to just below the concrete slab. The annular space is filled with clean gravel and sealed with non-shrinking grout. A construction detail is included as **Figure 2**.

- **System Process Piping:** Four-inch diameter Schedule 40 PVC vent pipes were installed to convey the vapor to the wall-mounted fans located outside of the buildings. The riser pipes from the vapor extraction points extend vertically up to the basement ceiling, and the vent pipes are routed through the southern basement wall (Building A) and the western basement wall (Building 1) to the outside of the building. Piping from the extraction points terminates at wall-mounted fans located outside the building. Each extraction point line is equipped with

a Dwyer differential pressure vacuum gauge (0-20 inches WC for Building 1 and 0-5 inches WC for Building A) at the blower.

- **SSD Fans:** Each SSD system includes a fan to recover sub-slab vapors. Specification sheets are included in **Appendix A**.

2.2 SSD System Operation

Each system applies a low vacuum to the sub-slab via a single extraction well to induce a negative pressure gradient beneath the building in order to prevent vapor intrusion to indoor air. The systems are designed to operate on a continuous basis. The systems will not be intentionally turned off or decommissioned without notification and approval from the New York State Department of Environmental Conservation and New York State Department of Health.

The minimum target differential pressure for each vapor mitigation area is 0.004 inches of water column (in w.c.). Sub-slab vacuum measurements are to be taken at each monitoring point to verify that this vacuum is achieved.

A process and instrumentation diagram for the SSD systems is included in **Figure 3**. Refer to **Figures 4A** and **4B** for profile views of each treatment area.

3.0 SSD SYSTEMS MONITORING AND SAMPLING

Routine system inspections are scheduled to be completed quarterly by trained apartment maintenance personnel and by METI on an alternating basis. In addition, full system inspections are to be completed on an annual basis by METI and will include the identification and repair of any leaks, operational status checks of fans, vacuum at each vapor extraction point, and documentation of vacuum at each monitoring point. If determined necessary, site checks may be completed more frequently in the future. A copy of the blank field sheet used to record data is included in **Appendix B**.

4.0 SVE SYSTEM EQUIPMENT

An SVE system was installed to extract residual soil contaminant concentrations in the unsaturated zone and utility corridors that were inaccessible for excavation.

4.1 SVE System Components

The primary components of the SVE system are summarized below:

- **Horizontal Extraction Wells:** The SVE system recovers soil vapors from three (3) 2-inch inner diameter (ID) horizontal wells consisting of 0.030-inch slot well screen installed at a depth of 4 to 5 feet bgs along the western and northern boundaries of the excavation as shown in **Figure 1**. The SVE wells include SVE1, deactivated in November 2025 by closing the ball valve and removing the handle, and SVE2 and SVE3, which are currently active. The surrounding area is backfilled with approximately 6 inches of washed peastone under and around the screen. Geotextile fabric is installed on top of the peastone.

- **System Process Piping:** Each well is connected to solid 2-inch ID PVC pipe extending towards a manifold for connection to the regenerative blower. The manifold includes a ball valve, vacuum gauge, and air sample port for each well. The ball valve for SVE1 is removed as the well is indefinitely deactivated due to low VOC recovery.

- **Extraction and Treatment Equipment:** An AIRTECH 3BA1500 regenerative blower is utilized to extract vapors. The blower is equipped with an inlet filter, pre- and post-filter vacuum gauges, an air dilution valve, post-blower pressure gauge and an air sample port. A vapor-liquid separator is installed in line before the blower; however, it is anticipated that liquid recovery will be low due to asphalt cover over the SVE wells and the depth of the water table. A blower specification sheet is included in **Appendix A**.

4.2 SVE System Operation

The SVE system applies vacuum to unsaturated zone soils via horizontal extraction wells. The horizontal screens provide greater surface area in contact with contaminated soil, allowing for more effective treatment over a relatively large area and resulting in rapid decreases in soil gas contaminant concentrations as well as back diffusion of sorbed contaminants out of the soil matrix. The system is designed to operate on a continuous basis. The system will not be intentionally turned off or decommissioned without notification and approval from the New York State Department of Environmental Conservation and New York State Department of Health. Deactivation will be proposed when asymptotic low-level VOC concentrations are attained in the system effluent.

A process and instrumentation diagram for the SVE system is included in **Figure 5**.

5.0 SVE SYSTEM MONITORING AND SAMPLING

Routine system inspections are scheduled to be completed quarterly by trained apartment maintenance personnel and by METI on an alternating basis. In addition, full system inspections are to be completed on an annual basis by METI and will include the identification and repair of any leaks, operational status checks of the blower, and documentation of vacuum levels. Air samples are collected and submitted for laboratory analysis of TCL VOCs on a semi-annual basis in association with the routine system inspections completed by METI. If determined necessary, site checks may be completed more frequently in the future. A copy of the blank field sheet used to record data is included in **Appendix B**.

6.0 SVE AND SSD SYSTEMS OPERATIONS AND MAINTENANCE

6.1 Routine Maintenance of Systems Components

Routine maintenance of systems components will be completed to ensure that the SVE and SSD systems are operating as designed. Operation and Maintenance Manuals for the fans and blower are included in **Appendix C**. Visual inspection of the extraction wells, piping, and fittings will also be completed.

6.2 Parts Replacement

System components will only require replacement when the part is damaged or malfunctions. Vacuum gauges will be replaced when the gauge stops recording or the dial becomes "stuck". The replacement gauge will be scaled for the full vacuum range of the fan or blower.

If signs of deterioration or damage to the extraction wells, piping, or fittings such as warping or cracking are observed, the component will be replaced.

6.3 Potential Operating Problems

Potential operating problems are identified below:

- **Obstruction or blockage in system.** The fans and blower may experience low flow and/or high exhaust temperature if an obstruction develops in the vacuum or discharge piping. High blower inlet vacuum is indicative of a blockage or obstruction, such as a completely closed control valve, a clogged filter, condensate, debris, or ice buildup.

- **Break or leak in system piping.** A break or leak in the extraction piping will cause ambient air to be drawn into the system, resulting in higher than normal flows or lower than normal vacuum levels. Vacuum influence in the sub-slab or subsurface may be diminished, potentially resulting in insufficient vapor mitigation or contaminant recovery. The cause of the low vacuum condition should be promptly investigated and repaired, and vacuum and system operational data subsequently monitored to ensure they are within the normal range.

- **Fan or blower malfunction.** A fan or blower that is operating outside of its performance curve should be inspected to determine if repairs are needed. Excessive noise, vibrations, or operating temperature may also be indications that a fan or blower is malfunctioning.

- **Low sub-slab differential pressure.** A sub-slab differential pressure less than the target of 0.004 in w.c. may result in insufficient vapor mitigation.

- **Power loss.** The cause of a power loss should be investigated and repaired as quickly as possible.

6.4 Alternate O&M

Should the SVE or SSD systems fail to operate as intended due to the potential operating problems detailed in Section 6.3 or if unanticipated conditions are encountered, the following procedures should be employed. If any of the SSD systems fail to sufficiently depressurize the building slab or are otherwise damaged or rendered ineffective, NYSDEC and NYSDOH will be notified within 48 hours of the failure and be provided with a corrective measures work plan.

- **Sub-slab differential pressure below target.** If the target sub-slab differential pressure of 0.004 in w.c. cannot be achieved, alternative measures to ensure effective vapor mitigation may include:

1. Additional data collection, such as targeted indoor air sampling or smoke testing;
2. Installation of addition extraction wells;
3. Repair or replacement of extraction wells;
4. Repair of any cracks in the floor causing short-circuiting;
5. Upsizing the SSD system fan.

- **Excessive moisture buildup.** The extraction piping is sloped such that any entrained moisture should drain back to the extraction points. However, if excessive moisture is encountered, the extraction piping will be modified to include moisture collection tanks and/or a moisture knockout tank upstream of the fan or blower.

- **Indoor air concentration exceedances.** If indoor air concentrations exceeding the applicable regulatory standards are detected, the following measures may be implemented:

  1. Conduct additional investigations to identify if an indoor air source may be the cause of the exceedance;
  2. Conduct additional SSD systems inspections and maintenance to ensure the systems are operating as designed;
  3. Enhance vacuum coverage via the methods detailed above.

6.5 Restart Procedures

In the event that the systems are shut off for maintenance or unanticipated power interruptions, the fan or blower will be restarted as soon as possible. Vacuum at each SSD system fan as measured by the Dwyer differential pressure vacuum gauge installed on each vapor extraction line will be recorded, and sub-slab differential pressure readings at each vapor monitoring point will be measured using a hand-held digital micromanometer. If the system was shut off for the completion of major building modifications or structural repairs, restart procedures will include the additional steps outlined in Section 6.6.

Prior to restart of the SVE, each system component and all system alarms will be tested according to the manufacturer's instructions. At least one SVE well will be partially opened and the air filter dilution valve for the blower will be opened. During normal startup, the blower will be started and vacuum measurements and temperature will be recorded. With the dilution valve open, the extraction well flow control valve(s) will be slowly opened and the vacuum for each horizontal well will be recorded. The air dilution valve will be adjusted as necessary as vacuum is established and the system will be monitored for proper operation. The system effluent PID reading will also be recorded, and an air sample will be collected from the system effluent within 30 days of startup.

The system testing described above will be conducted if, in the course of the SVE system lifetime, the system goes down or significant changes are made to the system and the system must be restarted. During a restart, the valves for each horizontal well be adjusted to the settings (closed or % open) recorded during the previous site check or as directed by the Remedial Engineer.

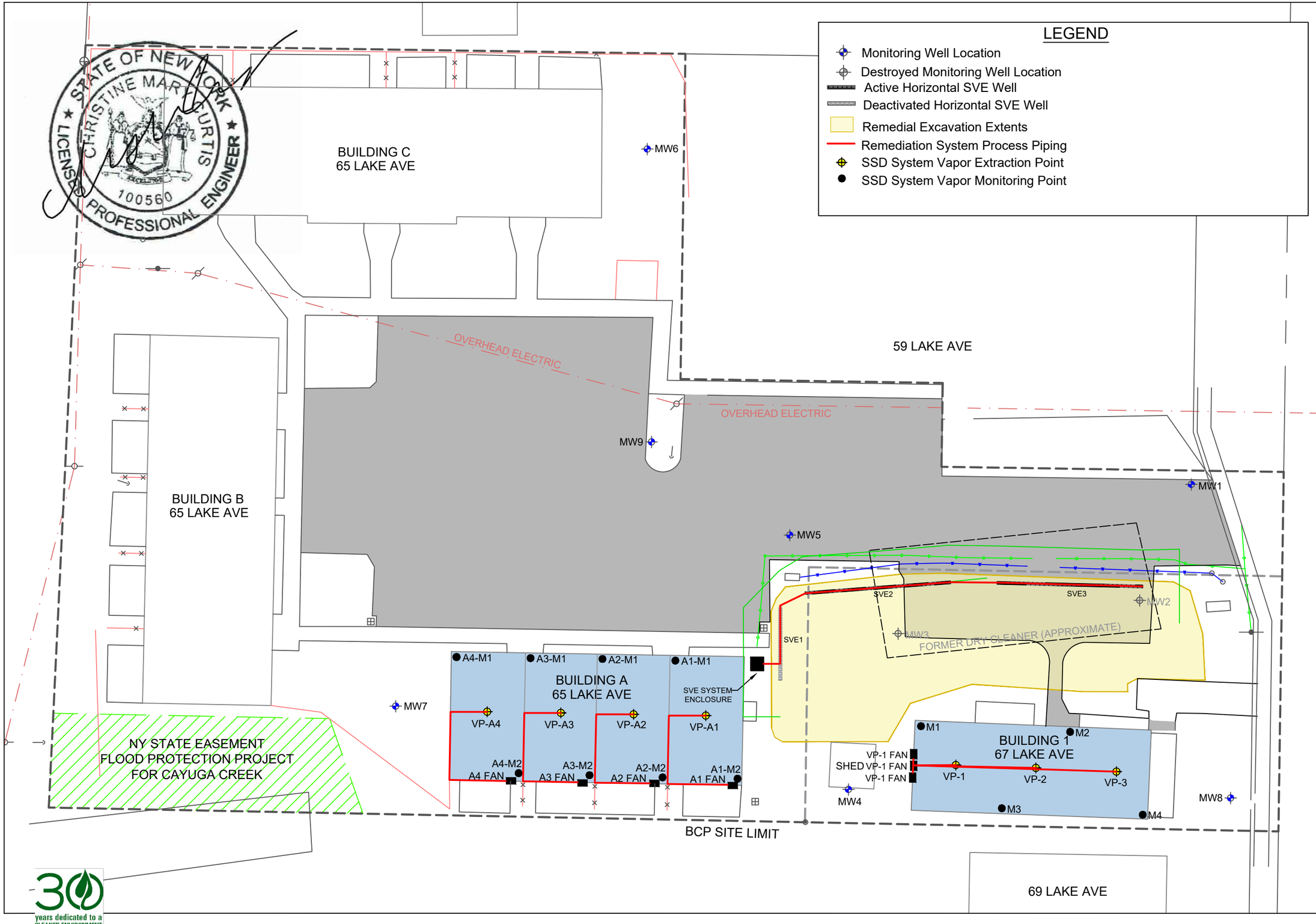
6.6 Change in Building Use

In the event of a significant change in building use, such as if the building becomes unoccupied with the intention of no longer being used for residential purposes, the Site owner may propose that an indoor air sampling event be completed with the SSD systems shut off to assess the ongoing need for system operation. No changes will be made without prior approval from NYSDEC and NYSDOH. In the event of building modifications, such as major structural changes or modifications to the HVAC system, vacuum will be monitored in the vapor extraction points and monitoring points to ensure that a vacuum differential of 0.004 inches w.c. is maintained in the sub-slab. If necessary, additional monitoring points may be installed. An indoor air monitoring event will be scheduled following completion of the modifications. Consistent with the regular annual air monitoring events, the air monitoring event will be completed in accordance with the procedures outlined in NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.

7.0 RECORD KEEPING AND REPORTING

Field sheets completed during each site visit by apartment maintenance personnel and METI will be recorded to document system monitoring, inspections, and maintenance. An OM&M form should also be completed during unanticipated site visits in response to a system malfunction. The cause of the system malfunction and any corrective actions taken should be detailed.

FIGURES



30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:
MATRIX ENVIRONMENTAL TECHNOLOGIES INC.
ORCHARD PARK - ROCHESTER - ITHACA
www.matrixbiotech.com

PREPARED FOR:
65 LAKE AVENUE LLC

PROJECT NAME/LOCATION:
LAKESIDE VILLAGE APARTMENTS
65-67 LAKE AVENUE
LANCASTER, NEW YORK

BCP SITE NO. C915344

PROJECT NUMBER: 18-046
PROJECT MANAGER: SLM
DRAWN BY: CMC
REVIEWED BY: SRC

REVISION HISTORY

NUMBER	BY	DATE
0	CMC	10/29/25

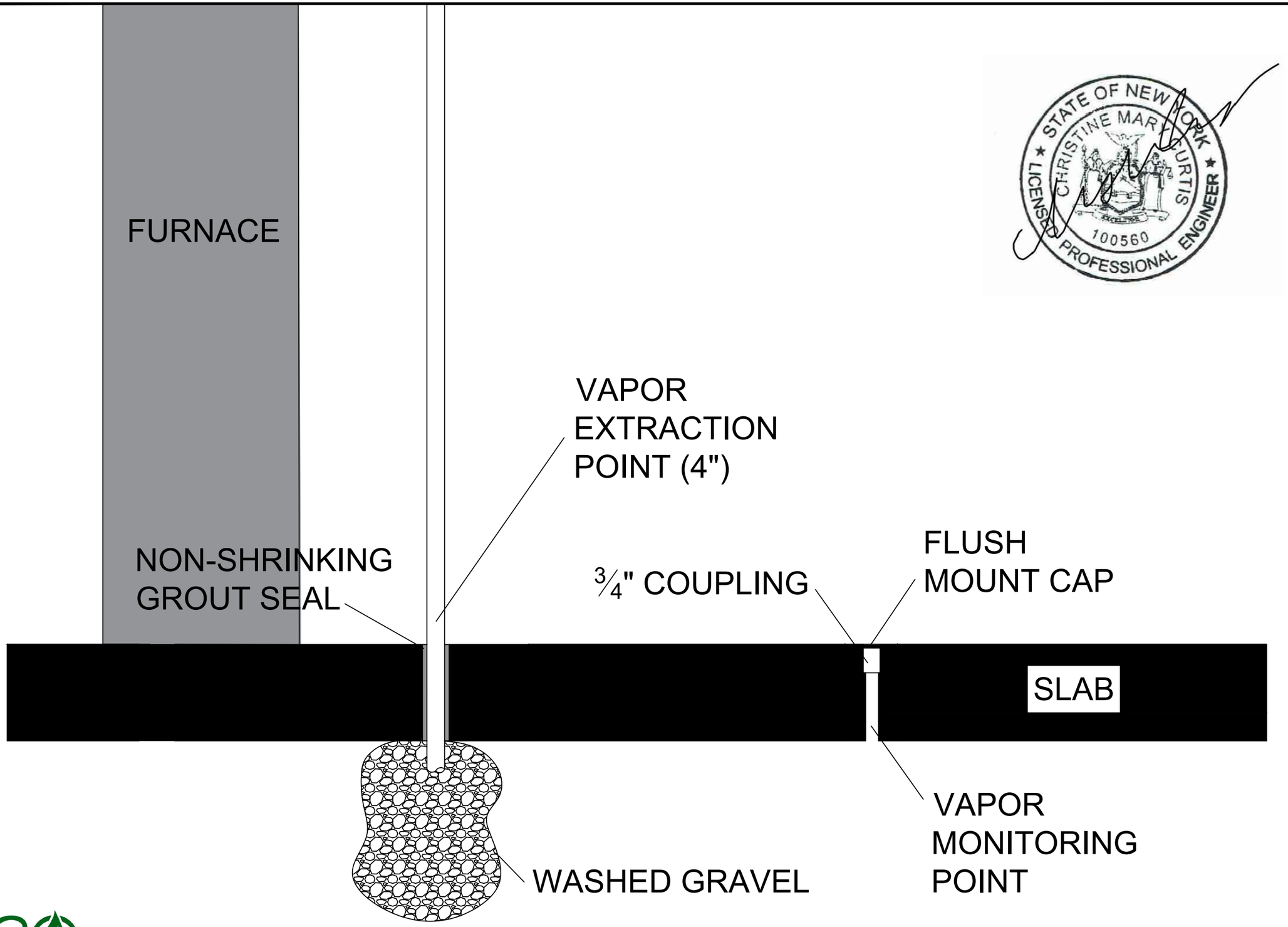
N

1" = 25'
0 25

TITLE:
SVE AND SSD SYSTEMS LAYOUT AND PIPING DIAGRAM

DATE:

FIGURE: 1



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PREPARED FOR:

65 Lake Avenue LLC

PROJECT MGR: SLM

DESIGNED BY: CMC

REVIEWED BY: SRC

DRAWN BY: CMC

REVISION	
BY	DATE
CMC	6/4/21

SCALE IN FEET: NA

0

PROJECT NAME / LOCATION:

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York

BCP Site No. 915344

TITLE:

VAPOR EXTRACTION POINT AND VAPOR MONITORING POINT CONSTRUCTION DETAILS (TYPICAL)

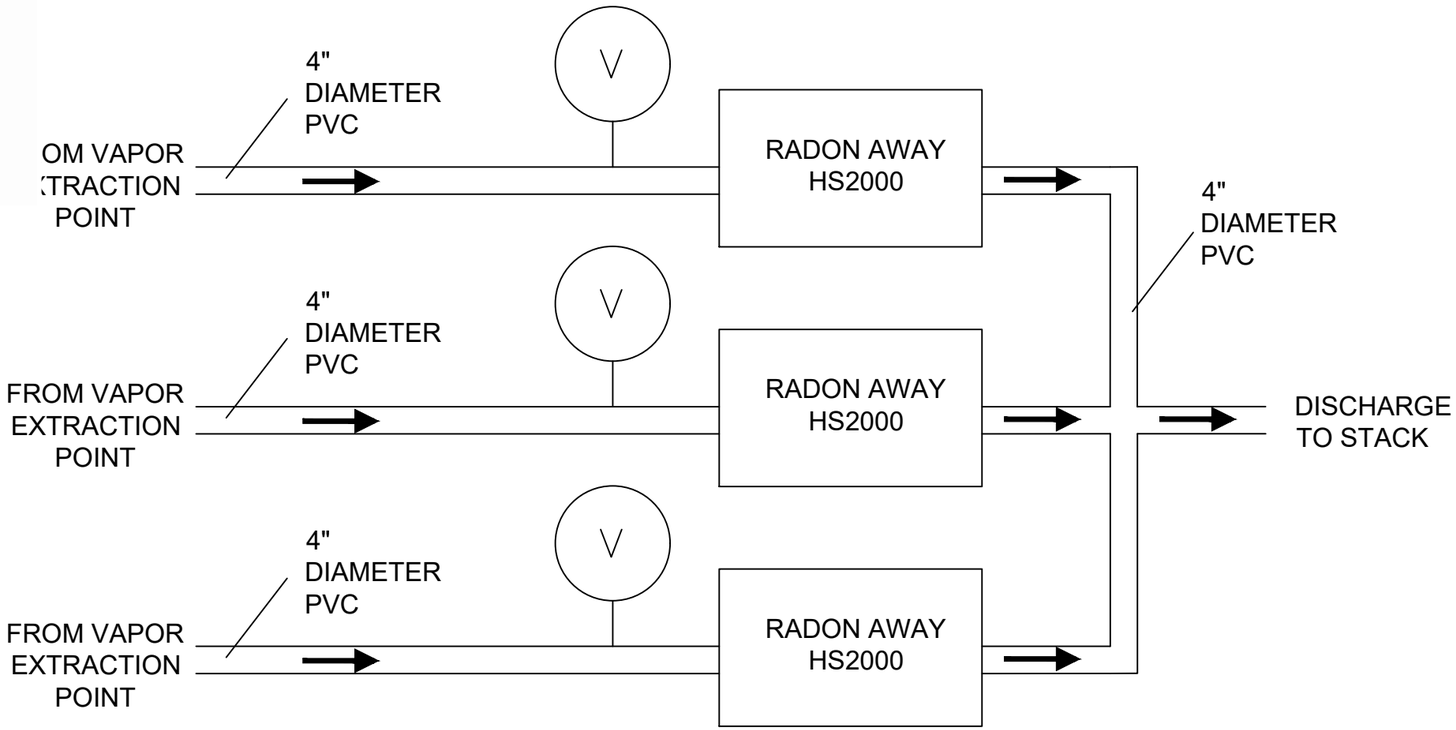
DATE: NA

PROJECT NO.: 18-046

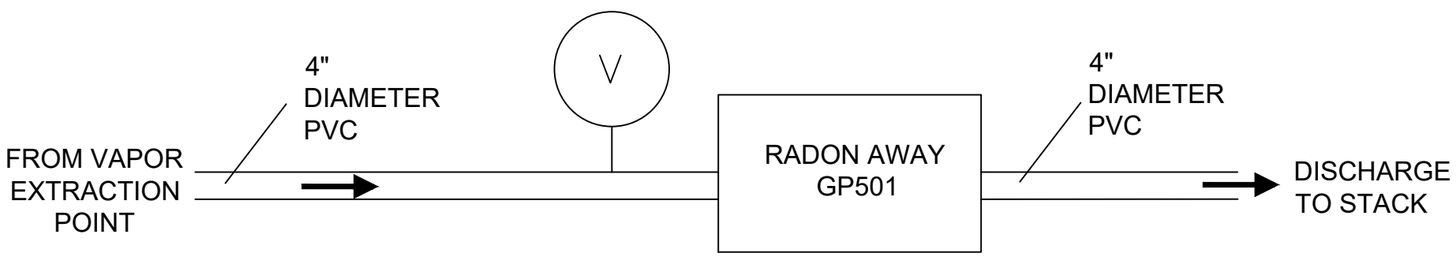
FIGURE: 2

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

BUILDING 1



BUILDING A (EACH APARTMENT, 4 TOTAL)



30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

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PREPARED FOR:

65 Lake Avenue LLC

PROJECT MGR: SLM

DESIGNED BY: CMC

REVIEWED BY: SRC

DRAWN BY: CMC

REVISION	
BY	DATE
CMC	6/4/21

SCALE IN FEET: NA

0

PROJECT NAME / LOCATION:

Lakeside Village
Apartments
65-67 Lake Avenue
Lancaster, New York

BCP Site No. C915344

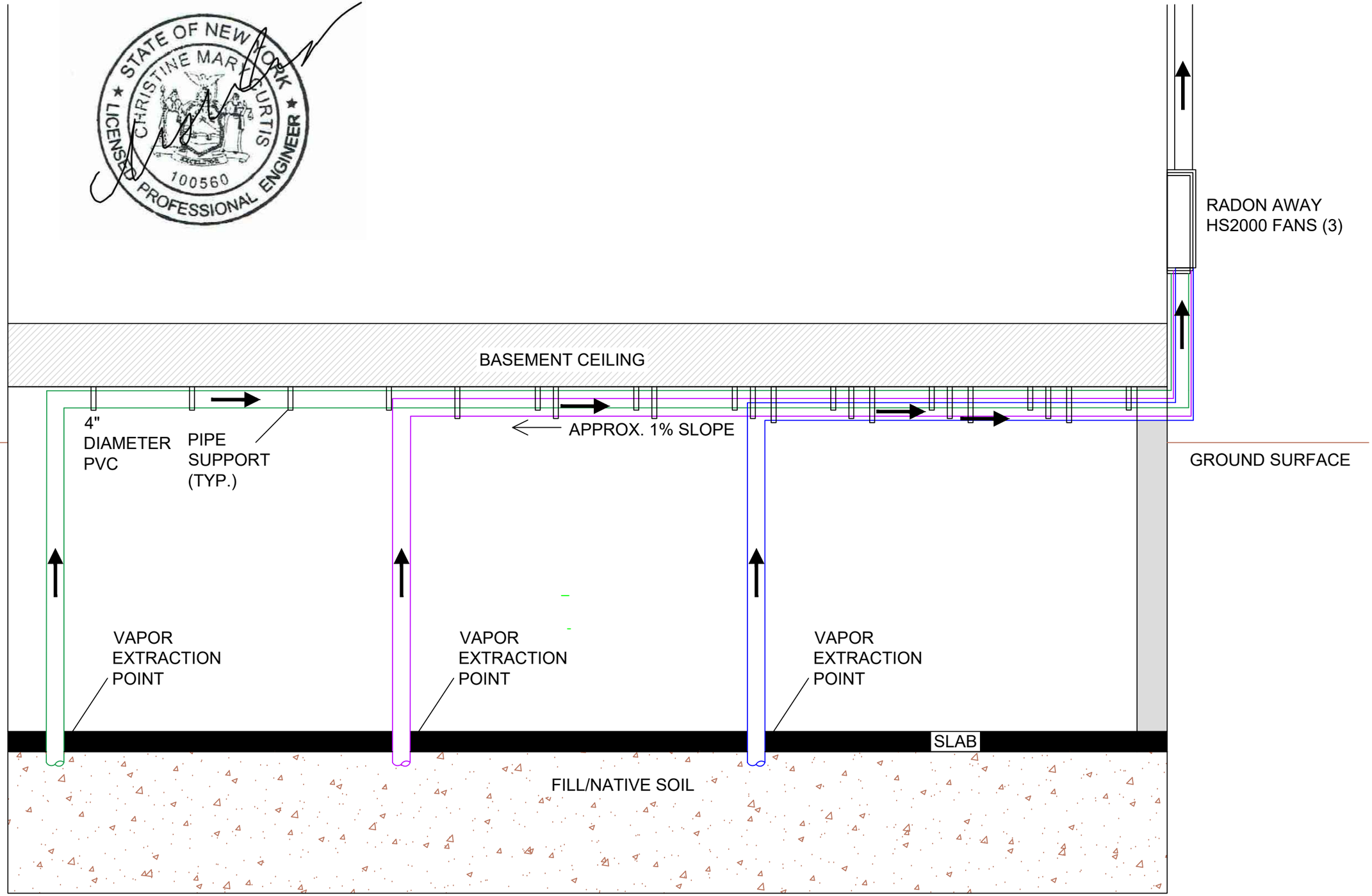
TITLE:

Process and
Instrumentation
Diagram

DATE: NA

PROJECT NO.: 18-046

FIGURE: 3



PREPARED BY:

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PREPARED FOR:

65 Lake Avenue LLC

PROJECT MGR: SLM

DESIGNED BY: CMC

REVIEWED BY: SRC

DRAWN BY: CMC

REVISION	
BY	DATE
CMC	6/4/21

SCALE IN FEET: NA

0

PROJECT NAME / LOCATION:

Lakeside Village
Apartments
65-67 Lake Avenue
Lancaster, New York

BCP Site No. C915344

TITLE:

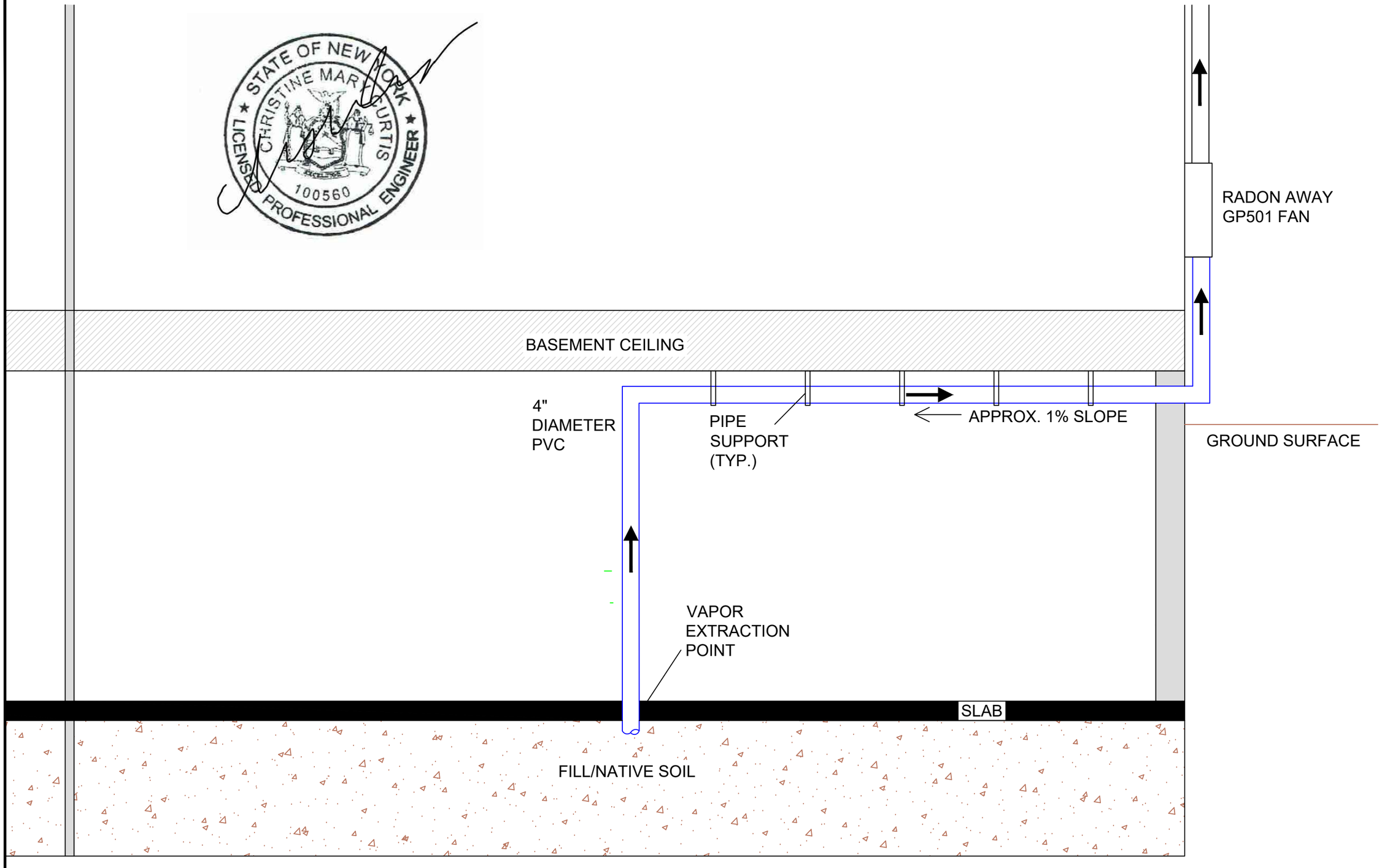
BUILDING 1
SSD SYSTEM LAYOUT -
PROFILE VIEW

DATE: NA

PROJECT NO.: 18-046

FIGURE: 4A

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021



30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

PREPARED BY:

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www.matrixbiotech.com

PREPARED FOR:

65 Lake Avenue LLC

PROJECT MGR: SLM

DESIGNED BY: CMC

REVIEWED BY: SRC

DRAWN BY: CMC

REVISION	
BY	DATE
CMC	6/4/21

SCALE IN FEET: NA

0

PROJECT NAME / LOCATION:

Lakeside Village
Apartments
65-67 Lake Avenue
Lancaster, New York

BCP Site No. C915344

TITLE:

BUILDING A APARTMENT
SSD SYSTEM LAYOUT -
PROFILE VIEW

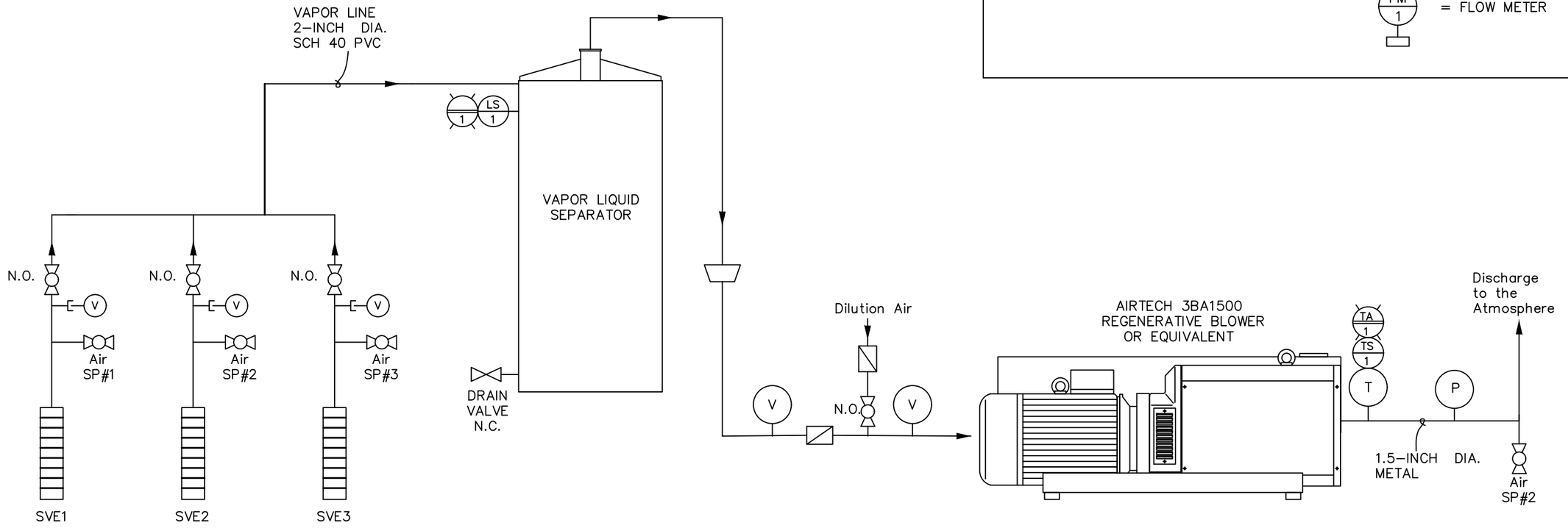
DATE: NA

PROJECT NO.: 18-046

FIGURE: 4B

LEGEND

- = GATE VALVE
- = BALL VALVE
- = QUICK DISCONNECT
- = REDUCER
- = FILTER
- T = TEMPERATURE GAUGE
- V = VACUUM GAUGE
- P = PRESSURE GAUGE
- TS 1 = SWITCH
- TA 1 = ALARM
- FM 1 = FLOW METER



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PREPARED FOR:

65 Lake Avenue LLC

PROJECT MGR: **SLM**

DESIGNED BY: **CMC**

REVIEWED BY: **SRC**

DRAWN BY: **CMC**

REVISION

BY	DATE
CMC	1/19/23
CMC	9/8/25

SCALE IN FEET: N/A

0

PROJECT NAME / LOCATION:

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York

BCP Site No. C915344

TITLE:

SVE SYSTEM PROCESS & INSTRUMENTATION DIAGRAM

DATE:

PROJECT NO.: **18-046**

FIGURE: **5**

APPENDIX A

Equipment Specification Sheets

RadonAway
The world's leading radon fan manufacturer

GP PRO SERIES

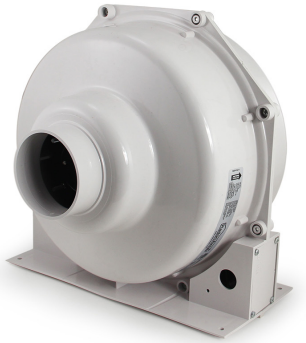
INSTALLS WHITE, STAYS WHITE

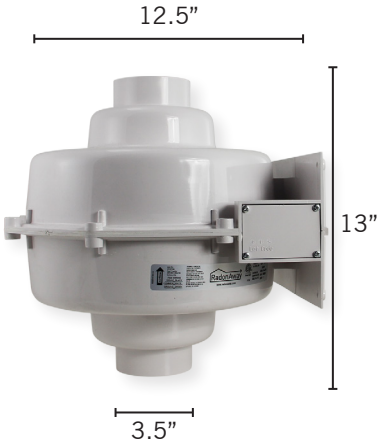
Radon Mitigation Fan

All RadonAway® fans are specifically designed for radon mitigation. GP Series Fans offer a wide range of performance options that make them ideal for most sub-slab radon mitigation systems.

Features

- NEW Stay-White™ housing
- Quiet operation
- Water-hardened motor
- Seams sealed under negative pressure (to inhibit radon leakage)
- Mounts on duct pipe or with integral flange
- 3" diameter ducts for use with 3" or 4" pipe
- Electrical box for hard wire or plug in
- ETL Listed - for indoor or outdoor use
- 4 interchangeable GP models





MODEL	P/N	FAN DUCT DIAMETER	WATTS	RECOM. MAX. OP. PRESSURE "WC	TYPICAL CFM vs. STATIC PRESSURE WC						
					1.0"	1.5"	2.0"	2.5"	3.0"	3.5"	4.0"
GP201	28465	3"	31-65	1.8	54	42	11	-	-	-	-
GP301	28466	3"	56-100	2.3	64	54	41	4	-	-	-
GP401	28467	3"	62-128	3.0	-	61	52	44	22	-	-
GP501	28468	3"	68-146	3.8	-	-	66	58	50	27	4

Made in USA with U.S. and imported parts.

ETL Listed

All RadonAway® inline radon fans are covered by our 5-year, hassle-free warranty.

For Further Information, Contact Your Radon Professional:

Rev D 0517
P/N 02045

RadonAway®
The world's leading radon fan manufacturer

HS Series

Radon Mitigation Fan

HS fans offer a proven solution for tough radon mitigation jobs, providing up to 25 times the suction of inline tube fans to deal with sand, tight soil or clay sub-slab material.

Features

- Internal condensate bypass
- Brackets for vertical mounting indoors and outdoors
- Inlet: 3.0" PVC / Outlet: 2.0" PVC
- Weight: 18 lbs.
- Size: 15.5"W x 13.3"H x 8.2"D
- Warranty: 1 year (3-year option available)

MODEL	WATTS	SOUND RATING (dBA)			RECOM. MAX. OP. PRESSURE "WC	TYPICAL CFM* vs. STATIC PRESSURE WC					
		OPEN	1/2	CLOSED		0"	10"	15"	20"	25"	35"
HS2000 with cord	174-307	56.5	56.2	51.9	14	63	37	12	-	-	-
HS3000 with cord	120-250	47.9	48.0	46.2	21	39	30	25	19	-	-
HS5000 with cord	223-385	56.0	55.3	53.1	35	44	37	33	29	25	16
HS2000E with switch box	174-307	56.5	56.2	51.9	14	63	37	12	-	-	-
HS3000E with switch box	120-250	47.9	48.0	46.2	21	39	30	25	19	-	-
HS5000E with switch box	223-385	56.0	55.3	53.1	35	44	37	33	29	25	16

* Made in the USA with U.S. and imported parts.

* CFM measured through suction.

For Further Information, Contact Your Radon Professional:

Rev C 0517
P/N 02002

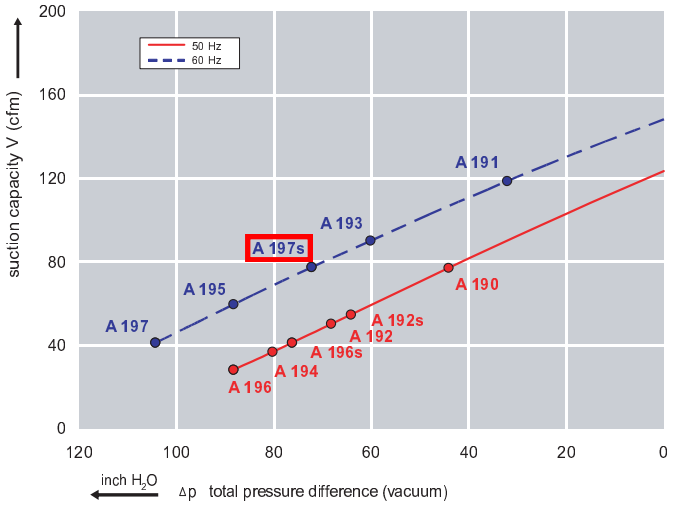
3BA1500

Vacuum/Pressure Regenerative Blower

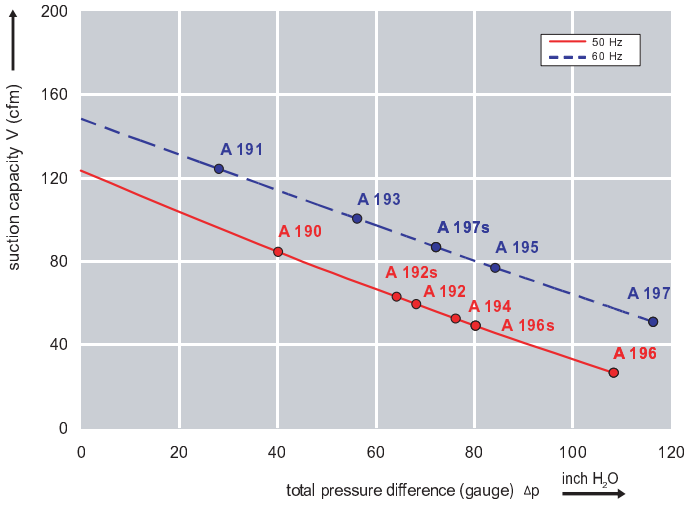
Features:

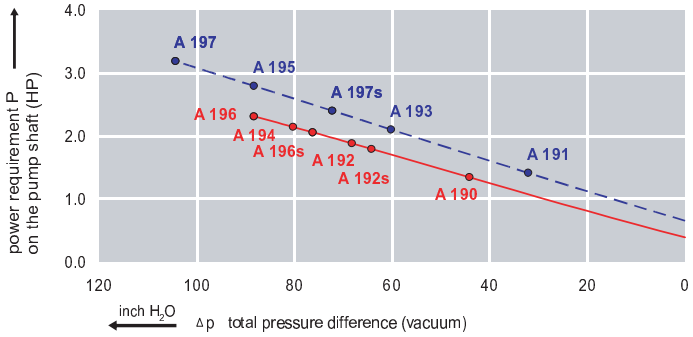
- Cooler running, outboard bearing provides maintenance-free operation
- Environmentally friendly oil-free technology
- Extremely quiet operation
- All motors are standard TEFC with Class F insulation, UL recognized, CE Compliant
  Explosion-Proof motors available
- Custom construction blowers are available
- Rugged die cast aluminum construction

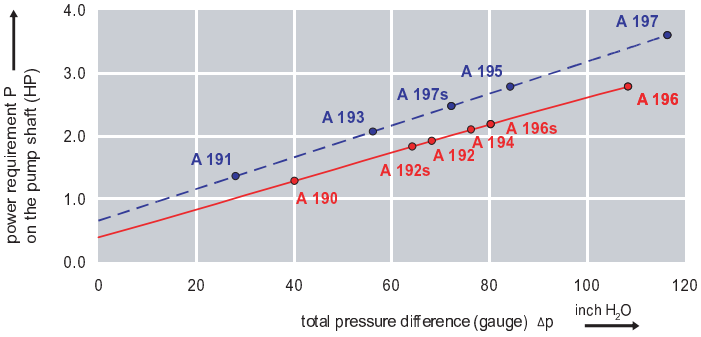
Performance curve for Vacuum pump

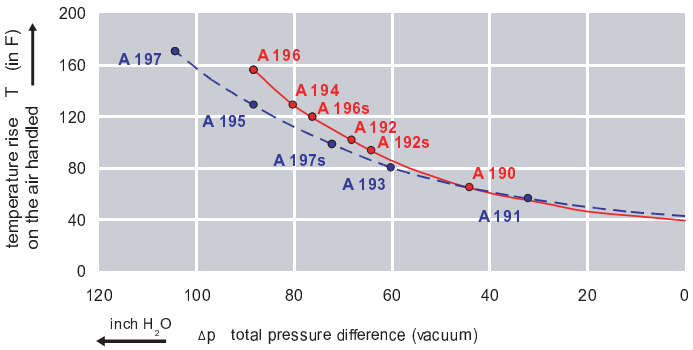


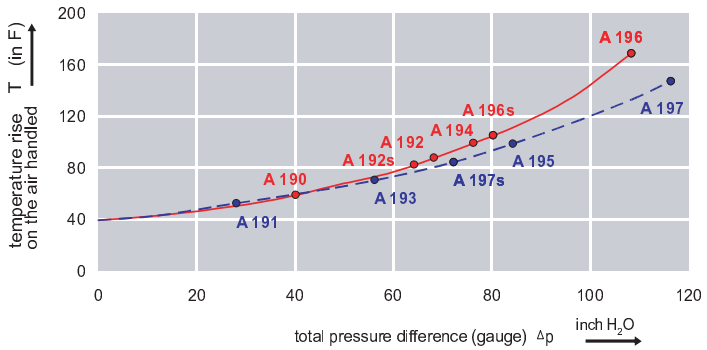
Performance curve for Compressor









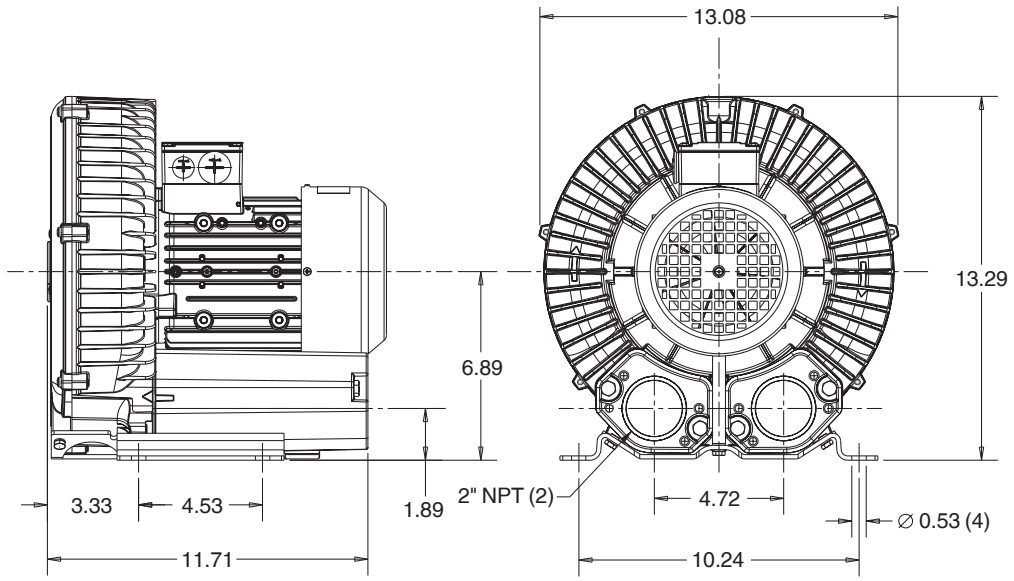


AIRTECH VACUUM

3BA1500

Vacuum/Pressure Regenerative Blower

Dimensions: (inches)



Recommended Accessories:

Relief valve:

VC61Z (Vacuum)

PC61Z (Pressure)

Filter:

ATF-200-15124/1 (Vacuum)

AFS-30-200-10 (Pressure)

Specifications subject to change without notice. Please contact factory for specification updates.

Selection & Ordering Data - Type 3BA1500

Curve No.	Order No.	Frequency Hz	Rated power HP	Input voltage V		Input current A		Permissible total differential pressure Vacuum inch H2O	Permissible total differential pressure Compressor inch H2O	Sound pressure level dB(A)	Weight lbs
3~ 50/60 Hz IP55 insulation material class F											
A 190	3BA1500-7AT06	50	1.14	200D ... 240D	345Y ... 415Y	4.2D	2.4Y	-44	40	64	40
A 191	3BA1500-7AT06	60	1.27	220D ... 250D	415Y ... 460Y	4.35D	2.5Y	-32	28	70	40
A 192	3BA1500-7AT16	50	1.74	200D ... 240D	345Y ... 415Y	5.7D	3.3Y	-68	68	64	44
A 193	3BA1500-7AT16	60	2.0	220D ... 250D	415Y ... 460Y	5.5D	3.2Y	-60	56	70	44
A 194	3BA1500-7AT26	50	2.14	200D ... 240D	345Y ... 415Y	7.5D	4.3Y	-80	76	64	46
A 195	3BA1500-7AT26	60	2.75	220D ... 250D	415Y ... 460Y	7.5D	4.4Y	-88	84	70	46
A 196	3BA1500-7AT36	50	2.95	200D ... 240D	345Y ... 415Y	9.7D	5.6Y	-88	108	64	55
A 197	3BA1500-7AT36	60	3.42	220D ... 250D	415Y ... 460Y	9.0D	5.3Y	-104	116	70	55
1~ 50/60 Hz IP55 with attached capacitor for continuous operation											
A 196s	3BA1500-7AS35	50	2.0	115	230	22.0	11.0	-76	80	64	48
A 197s	3BA1500-7AS35	60	2.35	115	230	24.0	12.0	-72	72	70	48

Suitable for 208 Volt Operation

All curves are rated at 14.7 psia and 68° F ambient conditions and are reported in SCFM referenced to 68° F and 14.696 psia sea level conditions. Curve values are nominal, actual performance may vary by up to 10% of the values indicated. For inlet temperatures above approximately 80 °F or for handling gases other than air, please contact your Airtech sales representative for assistance.

APPENDIX B

Field Data Sheets

Lakeside Village Apartments **DATE: _____**
65-67 Lake Avenue, Lancaster, NY
METI Project #18-046 **COMPLETED BY: _____**

SEMI-ANNUAL AND ANNUAL INSPECTION SHEET – SSD SYSTEMS

Building A

Vapor Extraction Well:	VP-A1	VP-A2	VP-A3	VP-A4
Pressure Gauge Reading (in. H2O)				

Building 1

Vapor Extraction Well:	VP-1	VP-2	VP-3
Pressure Gauge Reading (in. H2O)			

Building A

Monitoring Point	A1-M1	A1-M2	A2-M1	A2-M2	A3-M1	A3-M2
Pressure Gauge Reading (in. H2O)						

Building 1

Monitoring Point	A4-M1	A4-M2	M1	M2	M3	M4
Pressure Gauge Reading (in. H2O)						

Are systems operational? _____

Any damage to exterior components (i.e. discharge stack) or interior components? _____

Any structural changes to the buildings? _____

Any new cracks in basement walls or floors? _____

ADDITIONAL COMMENTS:

_____

_____

NOTES:

1. The target pressure differential in the vapor monitoring points is 0.004 in. H2O.
2. During semi-annual inspections, only exterior observations will be made. Vacuum data will not be collected from the vapor monitoring points.
3. The NYSDEC project manager must be notified of any problems within 3 days of the inspection.

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, NY

DATE: _____

COMPLETED BY: _____

QUARTERLY INSPECTION SHEET – SSD and SVE SYSTEMS

SSD Systems - Vacuum Reading (in. H2O)						
Building A				Building 1		
VP-A1	VP-A2	VP-A3	VP-A4	VP-1	VP-2	VP-3

SVE SYSTEM OPERATIONAL (YES/NO): _____

VACUUM READING (in. H2O): _____

ADDITIONAL COMMENTS:

_____

_____

_____

_____

_____

_____

_____

NOTE: Copies of these field sheets must be submitted to the Remedial Engineer within 24 hours of the inspection.

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, NY
METI Project #18-046

DATE: _____

COMPLETED BY: _____

SEMI-ANNUAL AND ANNUAL INSPECTION SHEET – SVE SYSTEM

System Status (ON/OFF)	Pre/Post Filter Vac. (in. WC)	Temp. (°F)	Effluent PID (ppm)

Well ID	PID Measurement (ppm)	Vacuum (in. WC)	Valve (% Open)
SVE1			
SVE2			
SVE3			

Effluent Air Sample Collection Time: _____

Any damage to exterior components (i.e. discharge stack) or interior components? _____

COMMENTS/MAINTENANCE PERFORMED:

_____

_____

_____

_____

_____

_____

_____

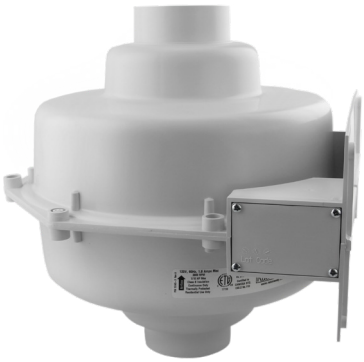
NOTE: The NYSDEC project manager must be notified of any problems within 3 days of the inspection.

APPENDIX C

Operation and Maintenance Manuals

RadonAway®

The world's leading radon fan manufacturer



RP, GP, XP Pro Series Installation Instructions

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** For General Ventilating Use Only. Do Not Use to Exhaust Hazardous, Corrosive or Explosive Materials, Gases or Vapors. See Vapor Intrusion Application Note #AN001 for important information on VI Applications. RadonAway.com/vapor-intrusion

2. **NOTE:** Fan is suitable for use with solid state speed controls; however, use of speed controls is not generally recommended.

2. **WARNING!** Check voltage at the fan to insure it corresponds with nameplate.

3. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.

4. **NOTICE!** There are no user serviceable parts located inside the fan unit.
   Do NOT attempt to open. Return unit to the factory. (See Warranty, p. 8, for details.)

5. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.

6. **WARNING!** TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

   a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer. (See p. 8.)

   b) Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

   c) Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire rated construction.

   d) Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment to prevent backdrafting. Follow the heating equipment manufacturers' guidelines and safety standards such as those published by any National Fire Protection Association, and the American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), and the local code authorities.

   e) When cutting or drilling into a wall or ceiling, do not damage electrical wiring and other hidden utilities.

   f) Ducted fans must always be vented to outdoors.

   g) If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application and be connected to a GFCI (Ground Fault Circuit Interrupter) protected branch circuit.

RP Pro Series	GP Pro Series	XP Pro Series
RP140 | P/N 28460	GP201 | P/N 28465	XP151 | P/N 28469
RP145 | P/N 28461	GP301 | P/N 28466	XP201 | P/N 28470
RP260 | P/N 28462	GP401 | P/N 28467	
RP265 | P/N 28463	GP501 | P/N 28468	
RP380 | P/N 28464		

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The RP, GP and XP Pro Series Radon Fans are intended for use by trained, professional, certified/licensed radon mitigators. The purpose of these instructions is to provide additional guidance for the most effective use of RP, GP and XP Series Fans. These instructions should be considered supplemental to EPA/radon industry standard practices, state and local building codes and regulations. In the event of a conflict, those codes, practices and regulations take precedence over these instructions.

1.2 FAN SEALING

The RP, GP and XP Pro Series Fans are factory sealed; no additional caulk or other materials are required to inhibit air leakage.

1.3 ENVIRONMENTALS

The RP, GP and XP Pro Series Fans are designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the fan should be stored in an area where the temperature is never less than 32 degrees F or more than 100 degrees F.

1.4 ACOUSTICS

The RP, GP and XP Pro Series Fans, when installed properly, operate with little or no noticeable noise to the building occupants. The velocity of the outgoing air should be considered in the overall system design. In some cases the "rushing" sound of the outlet air may be disturbing. In these instances, the use of a RadonAway Exhaust Muffler is recommended.

(To ensure quiet operation of inline and remote fans, each fan shall be installed using sound attenuation techniques appropriate for the installation. For bathroom and general ventilation applications, at least 8 feet of insulated flexible duct shall be installed between the exhaust or supply grille(s) and the fan(s). RP, GP and XP Pro Series Fans are not suitable for kitchen range hood remote ventilation applications.)

1.5 GROUND WATER

In the event that a temporary high water table results in water at or above slab level, water may be drawn into the riser pipes, thus blocking air flow to the RP, GP and XP Pro Series Fan. The lack of cooling air may result in the fan cycling on and off as the internal temperature rises above the thermal cutoff. Should this condition arise, it is recommended that the fan be turned off until the water recedes, allowing for return to normal operation.

1.6 SLAB COVERAGE

The RP, GP and XP Pro Series Fans can provide coverage up to 2000+ sq. ft. per slab penetration. This will primarily depend on the sub-slab material in any particular installation. In general, the tighter the material, the smaller the area covered per penetration. Appropriate selection of the RP, GP and XP Pro Series Fan best suited for the sub-slab material can improve the slab coverage. The RP, GP and XP Pro Series have a wide range of models to choose from to cover a wide range of sub-slab materials. The RP140 and 145 are best suited for general purpose use. The RP 260 can be used where additional airflow is required, and the RP265 and RP 380 are best suited for large slab, high airflow applications. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size) be created below the slab at each suction hole.

1.7 CONDENSATION & DRAINAGE

Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation. The RP, GP and XP Pro Series Fan MUST be mounted vertically plumb and level, with the outlet pointing up for proper drainage through the fan. Avoid mounting the fan in any orientation that will allow water to accumulate inside the fan housing. The RP, GP and XP Pro Series Fans are NOT suitable for underground burial.

For RP, GP and XP Pro Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Diameter	Minimum Rise per Ft of Run*		
	@25 CFM	@50 CFM	@100 CFM
4”	1/8”	1/4”	3/8”
3”	1/4”	3/8”	1 1/2”

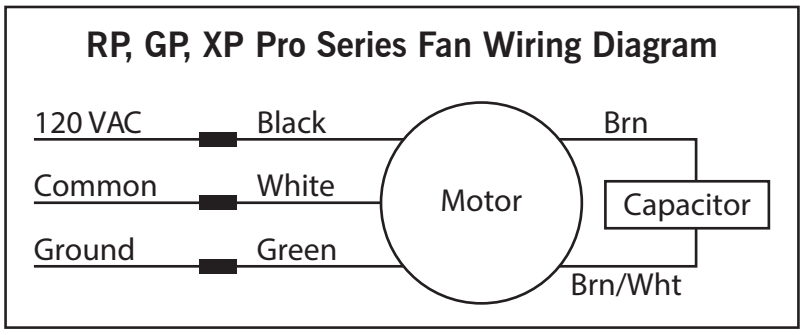
See p. 7 for detailed specifications.

1.8 SYSTEM MONITOR & LABEL

A System Monitor, such as a manometer (P/N 50017) or audible alarm (P/N 28001-2, 28001-4 or 28421), is required to notify the occupants of a fan system malfunction. A System Label (provided with Manometer P/N 50017) with instructions for contacting the installing contractor for service and identifying the necessity for regular radon tests to be conducted by the building occupants must be conspicuously placed in a location where the occupants frequent and can see the label.

1.9 ELECTRICAL WIRING

The RP, GP and XP Pro Series Fans operate on standard 120V, 60Hz AC. All wiring must be performed in accordance with National Fire Protection (NFPA) National Electrical Code, Standard #70, current edition, for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a UL Listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly sealed to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.



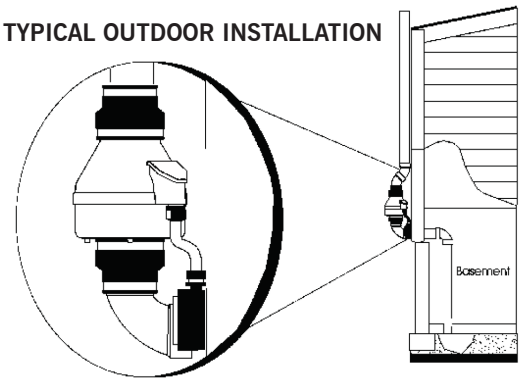
1.10 SPEED CONTROLS

The RP, GP and XP Pro Series Fans are rated for use with electronic speed controls; however, speed controls are generally not recommended. If used, the recommended speed control is Pass & Seymour Solid State Speed Control (Cat. No. 94601-1).

2.0 INSTALLATION

The RP, GP and XP Pro Series Fans can be mounted indoors or outdoors. (It is suggested that EPA and radon mitigation standards recommendations be followed in choosing the fan location.) The GP fans have an integrated mounting bracket; RP and XP Pro Series Fans may be mounted directly on the system piping or fastened to a supporting structure by means of an optional mounting bracket.
The ducting from the fan to the outside of the building has a strong effect on noise and fan energy use. Use the shortest, straightest duct routing possible for best performance, and avoid installing the fan with smaller ducts than recommended. Insulation around the ducts can reduce energy loss and inhibit mold growth. Fans installed with existing ducts may not achieve their rated airflow.

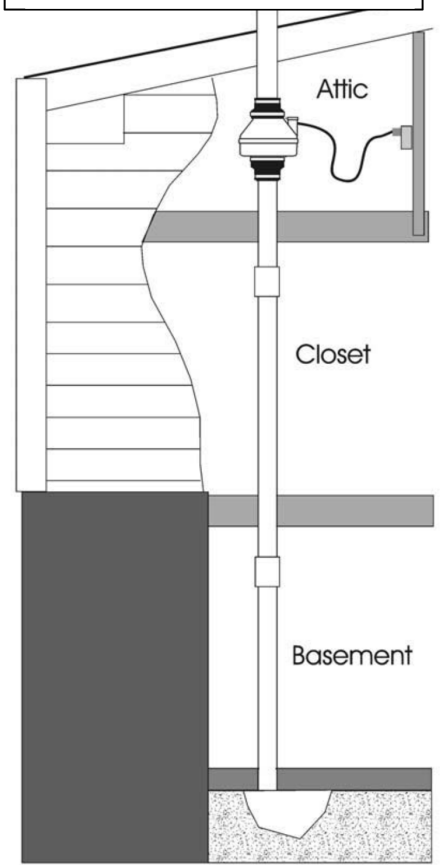
TYPICAL OUTDOOR INSTALLATION



2.1 MOUNTING

Mount the RP, GP and XP Pro Series Fan vertically with outlet up. Insure the unit is plumb and level. When mounting directly on the system piping assure that the fan does not contact any building surface to avoid vibration noise.

TYPICAL INDOOR INSTALLATION



2.2 MOUNTING BRACKET (optional)

The RP and XP Pro Series Fans may be optionally secured with the RadonAway P/N 25007 mounting bracket. Foam or rubber grommets may also be used between the bracket and mounting surface for vibration isolation.

2.3 SYSTEM PIPING

Complete piping run, using flexible couplings as a means of disconnect for servicing the unit and for vibration isolation. As the fan is typically outside of the building thermal boundary and is venting to the outside, installation of insulation around the fan is not required.

2.4 ELECTRICAL CONNECTION

Connect wiring with wire nuts provided, observing proper connections (See Section 1.9). Note that the fan is not intended for connection to rigid metal conduit.

2.5 VENT MUFFLER (optional)

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed at the end of the vent pipe.

2.6 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

_____ **Verify** all connections are tight and **leak-free**.

_____ **Ensure** the RP, GP and XP Pro Series Fan and all ducting are **secure and vibration-free**.

_____ **Verify system vacuum pressure** with manometer. **Insure** vacuum pressure is within normal operating range and **less than** the maximum recommended operating pressure.
(Based on sea-level operation, at higher altitudes reduce by about 4% per 1000 feet)
(Further reduce Maximum Operating Pressure by 10% for High Temperature environments.)
See Product Specifications. If this is exceeded, increase the number of suction points.

_____ **Verify Radon levels** by testing to EPA Protocol and applicable testing standards.

THE FOLLOWING CHARTS SHOW THE PERFORMANCE OF THE RP, GP and XP PRO SERIES FANS

RP Pro Series Product Specifications

Typical CFM Vs. Static Pressure "WC									
Model	**0"**	**.25"**	**.5"**	**.75"**	**1.0"**	**1.25"**	**1.5"**	**1.75"**	**2.0"**
RP140	135	103	70	14	-	-	-	-	
RP145	166	146	126	104	82	61	41	21	3
RP260	251	209	157	117	70	26	-	-	-
RP265	375	330	282	238	204	170	140	108	70
RP380	531	490	415	340	268	200	139	84	41

Model	Power Consumption 120VAC, 60Hz, 1.5 Amp Maximum	Maximum Recommended Operation Pressure* (Sea Level Operation)**
RP140	15 - 21 watts	0.7" WC
RP145	41 - 72 watts	1.7" WC
RP260	47-65 watts	1.3" WC
RP265	95 - 139 watts	2.3" WC
RP380	96 - 138 watts	2.0" WC

**Reduce by 10% for High Temperature Operation **Reduce by 4% per 1000 ft. of altitude.*

Model	Size	Weight	Inlet/Outlet	L.2
RP140	8.5"H x 9.7" Dia.	5.5 lbs	4.5"OD (4.0" PVC Sched 40 size compatible)	25
RP145	8.5"H x 9.7" Dia.	5.5 lbs	4,5" OD	15
RP260	8.6"H x 11.75" Dia.	5.5 lbs	6.0" OD	48
RP265	8.6"H x 11.75" Dia.	6.5 lbs	6.0" OD	30
RP380	10.53"H x 13.41" Dia.	11.5 lbs	8.0" OD	57

L.2 = Estimated Equivalent Length of Rigid Metal Ducting resulting in .2" WC pressure loss for Duct Size listed. Longer Equivalent Lengths can be accommodated at Flows Lower than that at .2" WC pressure loss (see CFM Vs Static Pressure "WC Table).

XP Pro Series Product Specifications

Typical CFM Vs. Static Pressure "WC						
	0"	**.5"**	**1.0"**	**1.5"**	**1.75"**	**2.0"**
XP151	167	127	77	-	-	-
XP201	126	98	66	26	-	-

Model	Power Consumption 120VAC, 60Hz, 1.5 Amp Maximum	Maximum Recommended Operation Pressure* (Sea Level Operation)**
XP151	53-70 watts	1.4" WC
XP201	38-74 watts	1.6" WC

**Reduce by 10% for High Temperature Operation **Reduce by 4% per 1000 ft. of altitude.*

Model	Size	Weight	Inlet/Outlet
XP151	9.5"H x 8.5" Dia.	6 lbs	4.5"OD (4.0" PVC Sched 40 size compatible)
XP201	9.5"H x 8.5" Dia.	6 lbs	4.5" OD

GP Pro Series Product Specifications

Typical CFM Vs. Static Pressure "WC							
	1.0"	**1.5"**	**2.0"**	**2.5"**	**3.0"**	**3.5"**	**4.0"**
GP201	54	42	11	-	-	-	-
GP301	64	54	41	4	-	-	-
GP401	-	61	52	44	22	-	-
GP501	-	-	66	58	50	27	4

Model	Power Consumption 120VAC, 60Hz, 1.5 Amp Maximum	Maximum Recommended Operation Pressure* (Sea Level Operation)**
GP201	31-67 watts	1.8" WC
GP301	56-100 watts	2.3" WC
GP401	62-128 watts	3.0" WC
GP501	68 - 146 watts	3.8" WC

**Reduce by 10% for High Temperature Operation **Reduce by 4% per 1000 ft. of altitude.*

Model	Size	Weight	Inlet/Outlet
GP201	13"H x 12.5" Dia.	12 lbs	3.5"OD (3.0" PVC Sched 40 size compatible)
GP301	13"H x 12.5" Dia.	12 lbs	3.5" OD
GP401	13"H x 12.5" Dia.	12 lbs	3.5" OD
GP501	13"H x 12.5" Dia.	12 lbs	3.5" OD

RP, XP and GP Pro Series Additional Specifications

Model	Recommended Duct	PVC Pipe Mounting	Thermal Cutout	Insulation Class
RP140	3" or 4" Schedule 20/40 PVC	Mount on the duct pipe or with optional mounting bracket. For Ventilation: 4", 6" or 8" Rigid or Flexible Ducting.	130°C/266°F	Class B Insulation
RP145			130°C/266°F	Class F Insulation
RP260			150°C/302°F	
RP265			150°C/302°F	
RP380	6" Schedule 20/40 PVC Pipe		150°C/302°F	
XP151	3" or 4" Schedule 20/40 PVC	Fan may be mounted on the duct pipe or with integral flanges.	120°C/248°F	Class B Insulation
XP201				
GP201	3" or 4" Schedule 20/40 PVC	Fan may be mounted on the duct pipe or with integral flanges.	120°C/248°F	Class B Insulation
GP301				
GP401				
GP501				

Continuous Duty
3000 RPM
Thermally Protected
RP, GP Residential and Commercial
XP Residential Only
Rated for Indoor or Outdoor Use

Most Efficient 2019 ENERGY STAR www.energystar.gov
RP140 Only

LISTED Electric Fan

Intertek 77728

Conforms to UL STD. 507
Certified to CAN/CSA STD. C22.2 No.113

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the RadonAway® RP, GP and XP Pro Series Fan for shipping damage within 15 days of receipt. **Notify RadonAway of any damages immediately.** RadonAway is not responsible for damages incurred during shipping. However, for your benefit, RadonAway does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open the housing.** Return unit to factory. (See Warranty below).

Install the RP, GP and XP Pro Series Fan in accordance with all EPA, ANSI/AARST standard practices, and state and local building codes and regulations.

Provide a copy of this instruction or comparable radon system and testing information to the building occupants after completing system installation.

Warranty

RadonAway® warrants that the RP, GP (excluding GP500) and XP Pro Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of 12 months from the date of purchase or 18 months from the date of manufacture, whichever is sooner (the "Warranty Term").

RadonAway® will replace any fan which fails due to defects in materials or workmanship during the Warranty Term. This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not cover damage in shipment unless the damage is due to the negligence of RadonAway®.

The Fan must be returned (at Owner's cost) to the RadonAway® factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the Fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

5-YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway® will extend the Warranty Term of the fan to 60 months (5 years) from date of purchase or 66 months from date of manufacture, whichever is sooner, provided that the fan is installed by a professional radon mitigation contractor. Proof of purchase and/or proof of professional installation may be required for service under this warranty. No extended warranty is offered outside the Continental United States and Canada beyond the standard 12 months from the date of purchase or18 months from the date of manufacture, whichever is sooner.

RadonAway® is not responsible for installation, removal or delivery costs associated with this Warranty.

LIMITATION OF WARRANTY

EXCEPT AS STATED ABOVE, THE RP, GP (excluding GP500) and XP PRO SERIES FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULARPURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping costs, including insurance, to and from factory.

RadonAway® 3 Saber Way
Ward Hill, MA 01835 USA TEL (978) 521-3703
FAX (978) 521-3964
Email to: Returns@RadonAway.com

Record the following information for your records:

Serial Number: _____ Purchase Date: _____

RadonAway®

The world's leading radon fan manufacturer

HS Series Installation & Operating Instructions

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** Do not use fan in hazardous environments where fan electrical system could provide ignition to combustible or flammable materials.

2. **WARNING!** Check voltage at the fan to ensure it corresponds with nameplate. See Vapor Intrusion Application Note #AN001 for important information on VI Applications. RadonAway.com/vapor-intrusion

3. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.

4. **NOTICE!** There are no user serviceable parts located inside the fan unit.
   Do NOT attempt to open. Return unit to the factory for service.

5. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA) "National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician.

6. **WARNING!** In the event that the fan is immersed in water, return unit to factory for service before operating.

7. **WARNING!** Do not twist or torque fan inlet or outlet piping as leakage may result.

8. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.

9. **WARNING!** TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

   a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.

   b) Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1 INTRODUCTION

The HS Series Fan is intended for use by trained, certified/licensed, professional radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of the HS Series Fan. This instruction should be considered as a supplement to EPA/Radon Industry standard practices, state and local building codes and state regulations. In the event of a conflict, those codes, practices and regulations take precedence over this instruction.

1.2 ENVIRONMENTALS

The HS Series Fan is designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the HS Series Fan should be stored in an area where the temperature is always greater than 32°F or less than 100°F. The HS Series Fan is thermally protected such that it will shut off when the internal temperature is above 194°F +/- 9°F (90°C +/- 5°C). If the HS Series Fan is idle in an area where the ambient temperature exceeds this shut off, it will not restart until the internal temperature falls below 104°F.

1.3 ACOUSTICS

The HS Series Fan, when installed properly, operates with little or no noticeable noise to the building occupants. Recommended system design and installation considerations to minimize noise: When installing the HS Series Fan above sleeping areas, select a location for mounting at the farthest possible distance. Avoid mounting near doors, fold-down stairs or other uninsulated structures which may transmit sound. Ensure a solid mounting for the HS Series Fan to avoid structure-borne vibration or noise.

The velocity of the outgoing air must also be considered in the overall system design. With small diameter piping, the “rushing” sound of the outlet air can be disturbing. The system design should incorporate a means to slow and quiet the outlet air. The use of the RadonAway Exhaust Muffler, p/n 24002, is strongly recommended.

1.4 GROUND WATER

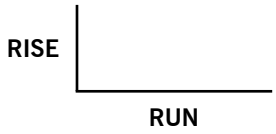
Under no circumstances should water be allowed to be drawn into the inlet of the HS Series Fan as this may result in damage to the unit. The HS Series Fan should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the HS Series Fan with water in installations with occasional high water tables.

In the event that a temporary high water table results in water at or above slab level, water will be drawn into the riser pipes thus blocking air flow to the HS Series Fan. The lack of cooling air will result in the HS Series Fan cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, power down and disconnect the HS Series Fan until the water recedes allowing for return to normal operation; then reconnect and power on to turn the fan back on.

1.5 CONDENSATION & DRAINAGE

WARNING!: Failure to provide adequate drainage for condensation can result in system failure and damage the HS Series Fan.
Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation.

The use of small diameter piping in a system increases the speed at which the air moves. The speed of the air can pull water uphill and, at sufficient velocity, it can actually move water vertically up the side walls of the pipe. This has the potential of creating a problem in the negative pressure (inlet) side piping. For HS Series Fan inlet piping, the following table provides the minimum recommended pipe diameters as well as minimum pitch under several system conditions. Use this chart to size piping for a system.



Pipe Diameter	Minimum Rise per 1 Foot of Run*		
	@ 25 CFM	@ 50 CFM	@ 100 CFM
4”	1/32”	3/32”	3/8”
3”	1/8”	3/8”	1 1/2”

*Typical operational flow rates:

HS2000 12 - 63 CFM
HS3000 19 - 39 CFM
HS5000 16 - 44 CFM

All exhaust piping should be 2” PVC.

1.6 SYSTEM MONITOR & LABEL

A properly designed system should incorporate a “System On” indicator for affirmation of system operation. A Magnehelic pressure gauge is recommended for this purpose. The indicator should be mounted at least 5 feet above the slab penetration to minimize the risk of filling the gauge with water in installations with occasional high water tables. A System Label (P/N 15022) with instructions for contacting the installing contractor for service and also identifying the necessity for regular radon tests to be conducted by the building occupants, must be conspicuously placed where the occupants frequent and can see the label.

1.7 SLAB COVERAGE

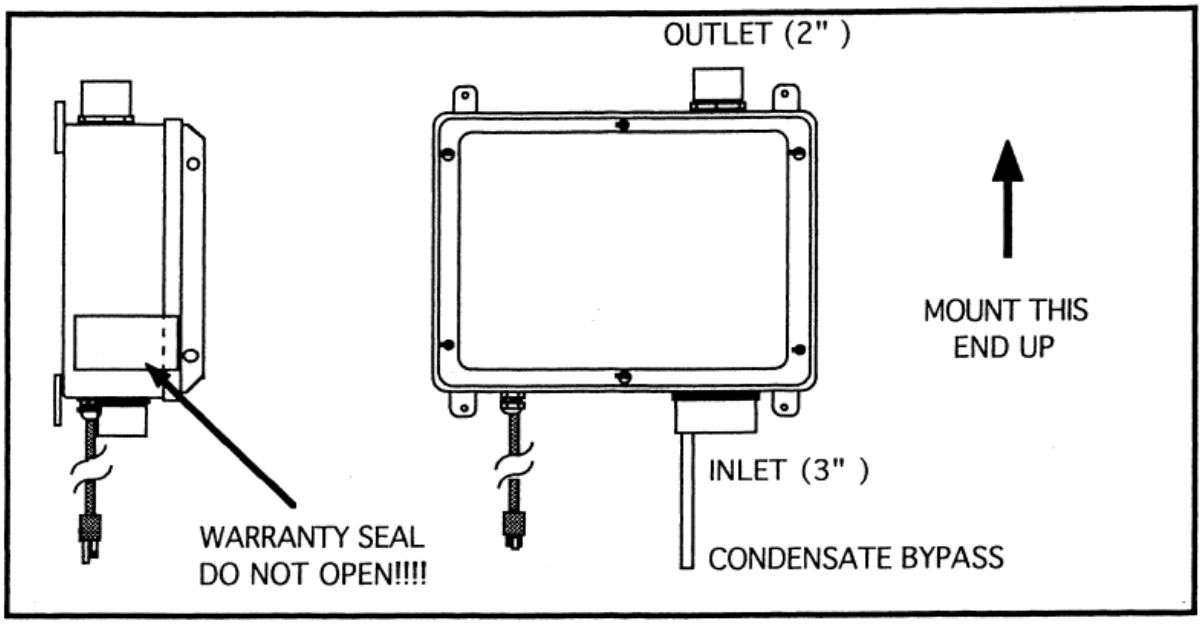
The HS Series Fan can provide coverage of well over 1000 sq. ft. per slab penetration. This will, of course, depend on the sub-slab aggregate in any particular installation and the diagnostic results. In general, sand and gravel are much looser aggregates than dirt and clay. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size; larger as needed) be created below the slab at each suction hole. When fine sand or dirt is present it is recommended that the pit be lined with a material such as clean gravel, size 4, 5, 56, or 6 as classified (ASTM C33).

1.8 ELECTRICAL WIRING

For models with a cord, the HS Series Fan plugs into a standard 120V outlet. The switch box models are hardwired. All wiring must be performed in accordance with the National Fire Protection Association’s (NFPA)”National Electrical Code, Standard #70”-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a UL listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly caulked to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.9 SPEED CONTROLS

Electronic speed controls can **NOT** be used on HS Series units.



2.0 INSTALLATION

2.1 MOUNTING

Mount the HS Series Fan to the wall studs, or similar structure, in the selected location with (4) 1/4" x 1 1/2" lag screws (not provided). Ensure the HS Series Fan is both plumb and level.

2.2 DUCTING CONNECTIONS

Make final ducting connection to HS Series Fan with flexible couplings. Ensure all connections are tight. Do not twist or torque inlet and outlet piping on HS Series Fan or leaks may result.

NOTE: Do NOT solvent weld fittings to unit hubs.

2.3 VENT MUFFLER INSTALLATION

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed above the roofline at the end of the vent pipe.

2.4 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

_____ **Verify** all connections are tight and **leak-free**.

_____ **Ensure** the HS Series Fan and all ducting is secure and vibration-free.

_____ **Verify** system vacuum pressure with Magnehelic. **Ensure** vacuum pressure is within normal operating range and **less than** the maximum recommended as shown below:

HS2000 14" WC
HS3000 21" WC
HS5000 35" WC

(Above are based on sea-level operation, at higher altitudes reduce above by about 4% per 1000 Feet.)
If these are exceeded, increase number of suction points.

_____ **Verify Radon levels** by testing to EPA Protocol and applicable testing standards.

Addendum

Product Specifications

Model	Maximum Static Suction	Recommended Maximum Static Suction	Typical CFM vs Static Suction WC (Recommended Operating Range)						Power* Watts @ 115VAC
			0"	10"	15"	20"	25"	35"	
HS2000	16"	14"	62	40	23	-	-	-	153-314
HS3000	24"	21"	39	30	25	19	-	-	120-250
HS5000	41"	35"	43	35	32	28	24	18	349-381
HS2000E	16"	14"	62	40	23	-	-	-	153-314
HS3000E	24"	21"	39	30	25	19	-	-	120-250
HS5000E	41"	35"	43	35	32	28	24	18	349-381

**Power consumption varies with actual load conditions*

Inlet: 3.0" PVC

Outlet: 2.0" PVC

Mounting: Brackets for vertical mount

Weight: Approximately 18 lbs

Size: Approximately 15"W x 13"H x 8"D

Minimum recommended inlet ducting (greater diameter may always be used):

HS3000, HS5000 --- 2.0" PVC Pipe

HS2000 --- Main feeder line of 3.0" or greater PVC Pipe

Branch lines (if 3 or more) may be 2.0" PVC Pipe

Outlet ducting: 2.0" PVC

Storage Temperature Range: 32°F-100°F

Thermal Cutout: 194°F +/- 9°F (90°C +/- 5°C)

Locked rotor protection

Internal condensate bypass

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the RadonAway® HS Series Fan for shipping damage within 15 days of receipt. **Notify RadonAway® of any damages immediately.** RadonAway® is not responsible for damages incurred during shipping.

There are no user serviceable parts inside the fan. **Do not attempt to open the housing.** Return unit to factory for service.

Install the HS Series Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

Provide a copy of this instruction or comparable radon system and testing information to the building occupants after completing system installation.

Warranty

RadonAway® warrants that the HS Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of 90 days from the date of purchase (the "Warranty Term").

RadonAway® will repair or replace any Fan which fails due to defects in materials or workmanship during the Warranty Term. The Fan must be returned (at Owner's cost) to the RadonAway® factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the Fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not cover damage in shipment unless the damage is due to the negligence of RadonAway®.

1 YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION

RadonAway® will extend the Warranty Term of the fan to twelve (12) months from date of installation or fifteen (15) months from the date of manufacture, whichever is sooner, if the Fan is installed in a professionally designed and professionally installed active soil depressurization system or installed as a replacement fan in a professionally designed and professionally installed active soil depressurization system. Proof of purchase and/or proof of professional installation may be required for service under this warranty. RadonAway® is not responsible for installation, removal or delivery costs associated with this Warranty.

EXCEPT AS STATED ABOVE, THE HS SERIES FAN IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY® BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway® for a Return Material Authorization (RMA) Number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping costs to and from factory.

RadonAway®
3 Saber Way
Ward Hill, MA 01835 USA
TEL (978) 521-3703
FAX (978) 521-3964
Email to: Returns@RadonAway.com

Record the following information for your records:

Serial No. _____

Purchase Date: _____

AIRTECH®
VACUUM

Operating and Maintenance Instructions

3BA Regenerative Blowers

INSTALLATION & OPERATING MANUAL
3BA REGENERATIVE BLOWERS

Table of Contents

1. Safety

1.1 General Safety Precautions

WARNING: Improper operation of 3BA units can result in serious or even fatal injuries. Please make sure all personnel have read and understood this manual before operating the unit.

All personnel should familiarize themselves with the units' specifications and be careful not to exceed the unit's capacity.

Transport, installation, operation, shut-down, maintenance and disposal of 3BA units should be carried out by qualified professionals.

Do not attempt to start or run the unit unless it has been completely assembled. Particular attention should be paid to: the vacuum pump/compressor cover, the muffler on the inlet and discharge connections, and the fan guard.

The standard 3BA unit must never come into contact with flammable substances.

1.2 Clothing and Protective Gear

It is recommended that all personnel wear proper protective gear while operating the unit. This may include eye protection, gloves and helmets.

Please be aware that it is possible for hair and clothing to be pulled into the unit. Avoid wearing loose-fitting clothing near the unit while it is operating and wear a hairnet if necessary.

1.3 Electrical Safety

Electrical installation should only be done by qualified electricians. Before doing any electrical work on a 3BA unit, please ensure that **power to the unit has been disconnected.** Do not attempt to open the unit's terminal box until you have made certain that the unit is not connected to a power source.

The terminal box must be kept free of dirt and moisture at all times. Make sure the terminal box cover and cable entries are tightly sealed so they remain dustproof and waterproof. Check the terminal box regularly to make sure it is sealed and free of debris and moisture.

1.4 Vacuum and Gauge Pressure Safety

In order to avoid dangerous situations associated with vacuum and gauge pressure, please utilize secure mounting elements, connections, lines, fittings, and containers. Pipes/hoses must be securely connected to the inlet and discharge connections. The inlet and discharge connections and the pipes/hoses connected to them must not be closed, clogged, or soiled. Check regularly to ensure that these connections and mountings are not becoming unseated. If necessary, support pipes and hoses to ensure that there is no tension on the connections. **Failure to observe these precautions can lead to sudden evacuation of hazardous fluids or dangerous suction that can pull hair or clothing into the unit.**

1.5 Installation/Start-up

The unit and any lines connected to it must be securely installed. In particular, the feed pipes must be securely routed, e.g. in cable ducts, in the floor, etc.

If a separate control panel or other such interface will be used to start and stop the unit, it should be installed in an area with an unobstructed view of the unit to ensure that it is not switched on while being serviced.

Excess vibration can cause damage to the unit and/or unsafe conditions. Install the unit on a solid foundation or a solid mounting surface. Check screw glands/unions for strength and firm seating.

Cables and pipes should be installed in a recess in the floor or duct so they do not present a tripping hazard.

To ensure sufficient cooling of the unit, ventilation screens and openings must remain clear. Ensure that discharge air from other units cannot be pulled into the unit.

Make sure that the inlet and pressure lines are clearly marked to avoid confusion. **Interchanged inlet and pressure lines can lead to damage to the unit and/or serious injury.**

Install a filter in the inlet pipe and replace it regularly. If particulates or debris enter the unit, the blades of the impellers can be damaged and blades could potentially break off, potentially creating a hazardous situation.

If re-starting the unit after it has been idle for a long period of time, measure the insulation resistance of the motor. If values are less than 1 k Ω per volt of nominal voltage, the winding may be too dry.

If the unit is installed or stored in an environment with a temperature of over 104°F (40°C) be aware that the winding may be damaged and the grease might need to be changed more often.

1.6 Maintenance Procedures

Before beginning work on the pump-motor unit, please take the following precautions:

- Make sure power has been completely disconnected
- Wait for the unit to come to a complete stop.
- Allow the unit time to cool.
- Shut off lines and release pressure
- Make certain that no vacuum or gauge pressure is present in the lines/tanks to be opened.
- Make sure that no fluids can escape

Please note that the rotating impeller is accessible when the inlet and discharge connections are open. Do not reach into the unit through open connections or insert objects into the unit through any openings. Serious injury could occur. If the unit is running without piping or tubing, provide the inlet and discharge of the unit with either additional mufflers or piping of a sufficient length to prevent access to the impeller.

Check regularly to ensure the terminal box is free of any dirt or foreign substances and there is no moisture or humidity present. Make certain the terminal box cover and cable entries are tightly closed.

1.7 Hot Surfaces

During operation, the surface of the unit can reach temperatures of 320° F (160° C). It is advisable to cover the unit with suitable touch protection (e.g. a perforated plate or wire cover). Do not touch the unit during operation, and allow time to cool after shut-down. Temperature-sensitive parts such as lines or electronic components should not come into contact with the surface of the unit.

1.8 Hearing Protection

Make certain any missing or defective silencers are replaced. Noise emitted by the unit can cause serious hearing damage. Conduct a noise measurement test while the unit is running. If the unit operates over 90 dB(A), please place a warning sign in the area where the unit has been installed and make certain that

any personnel working in the vicinity wear ear protection at all times while the unit is running.

1.9 Safety Guidelines for Transport of the unit:

Prior to transport and handling, please make sure that all components are properly assembled and secure. Any machinery used to transport these units must have the proper lifting capacity. Please consult the table on page 27 to find the weight of the unit being handled. Do not stand or walk under suspended loads.

If a 3BA unit has come in contact with any dangerous substances, it must be decontaminated before being sent to Airtech for repair evaluation.

2 Technical Data

These operating instructions cover the Airtech 3BA side channel vacuum pumps and compressors supplied with standard TEFC motors. Other configurations are available including V-belt driven units, units with explosion proof motors, mechanical seals, magnetic drives, coatings and modifications for high pressure service. Airtech can provide any combination of modifications to meet your application requirements. Such blowers, however, are outside the scope of this manual.

Description

All regenerative blowers are dynamic compression devices and utilize a non-contacting impeller to accelerate the gas and a specially designed housing to compress the gas. Cooling is accomplished by using the motor fan to blow air over the housing. In larger models, the housing is specially designed with cooling fins to allow a wider range of operation. Both the inlet and outlet ports have built-in silencers and mesh screens. Both the inlet and outlet have an inside connection thread corresponding to DIN ISO 228. On larger units, multiple suction and discharge connection configurations may be available.

The wetted parts are constructed of Aluminum on all models. The blower shares a bearing with the motor. The seal between the bearing and the motor is not gas tight in most models, therefore these blowers are not recommended for handling of toxic or explosive gases. (Contact Airtech Vacuum, Inc. for additional options if explosive or toxic gases will be handled.)

A full range of accessory items are available, including vacuum or pressure relief valves, check valves, suction filters, motor starters, vacuum/pressure cross-over valves, and in-line filters.

Application/Installation Environment

CAUTION! These blowers are designed for use in general industry. Suitable personnel protection according to OSHA requirements is provided, but the equipment should not be operated in residential settings.

Airtech blowers can be operated as either vacuum pumps or compressors. They are suitable for use with air having a relative humidity up to 90 percent, but not generally suitable for handling corrosive or erosive gases. Special versions for toxic or aggressive gases may be available. Use of the standard blower in aggressive environments may cause damage to the blower or exposure to gases being handled in the local environment.

CAUTION! Dangerous (flammable or explosive) or aggressive (corrosive) gases should not be handled by the standard blower.

Handling of flammable or aggressive gases and vapors may be possible by using a specially configured or modified blower. Contact factory for additional information. The standard blower is not suitable for operation in explosive environments as defined by NFPA 70. Contact factory for assistance.

CAUTION! The ambient and suction temperatures should be between 40 and 105 F. For temperatures outside this region, please contact the factory.

The maximum permissible pressure difference for vacuum or pressure is dependent on the motor rating (See Tables 1 to 4 for detailed information by model number.) and power supply frequency. The figures in Tables 1 to 4 are computed assuming an ambient temperature of 77 F (25 C) and a local barometric pressure of 1013 mbar (sea level). Operation at an ambient temperature of 104 F (40C) is the maximum permissible, and will result in a reduction of 10 percent on maximum vacuum or pressure attainable by the unit. For temperatures between 77 F and 104 F, reduce the maximum pressure reduction is a linear function of temperature.

Table 1. Three-phase, Single Stage, 50 Hertz

Model	Rated Power HP/kW	Voltage	Motor Current (Amps)	Open Flow Capacity CFM/m3/hr	Maximum Pressure (mbar)	Sound Pressure Level (dBA)
3BA1300-7AT06	.33/.25	200-240/345-415	2.1/1.2	48/82	-100/100	53
2BA1300-7AT16	.54/.4	200-240/345-415	2.6/1.5	48/82	-120/130	53
3BA1400-7AT06	.94/.7	200-240/345-415	3.8/2.2	84/142	-120/120	63
2BA1400-7AT16	1.15/.85	200-240/345-415	4.2/2.4	84/142	-160/160	63
3BA1400-7AT26	1.75/1.3	200-240/345-415	5.7/3.3	84/142	-170/200	63
3BA1500-7AT06	1.15/.85	200-240/345-415	4.2/2.4	120/204	-100/100	64
3BA1500-7AT16	1.75/1.3	200-240/345-415	5.7/3.3	120/204	-170/170	64
3BA1500-7AT26	2.15/1.6	220-250/415-460	7.5/4.3	120/204	-200/190	64
3BA1500-7AT36	2.96/2.2	200-240/345-415	9.7/5.6	120/204	-220/270	64
3BA1530-7AT16	1.75/1.3	200-240/345-415	5.7/3.3	165/280	-120/110	65
3BA1530-7AT26	2.15/1.6	200-240/345-415	7.5/4.3	165/280	-160/150	65
3BA1530-7AT36	2.96/2.2	200-240/345-415	9.7/5.6	165/280	-220/230	65
3BA1600-7AT06	2.15/1.6	200-240/345-415	8.5/4.9	188/320	-160/150	69
3BA1600-7AT16	2.96/2.2	200-240/345-415	9.7/5.6	188/320	-190/190	69
3BA1600-7AT26	4.04/3.0	200-240/345-415	12.5/7.2	188/320	-260/270	69
3BA1600-7AT36	5.4/4.0	200-240/345-415	13.0/7.5	188/320	-290/360	69
3BA1630-7AT06	2.15/1.6	200-240/345-415	8.5/4.9	240/408	-160/150	69
3BA1630-7AT16	2.96/2.2	200-240/345-415	9.7/5.6	240/408	-190/190	69
3BA1630-7AT26	4.04/3.0	200-240/345-415	12.5/7.2	240/408	-260/270	69
3BA1630-7AT36	5.4/4.0	200-240/345-415	15.6/9.0	240/408	-260/290	69
3BA1800-7AT06	5.4/4.0	200-240/345-415	15.6/9.0	280/476	-200/200	70
3BA1800-7AT16	7.4/5.5	200-240/345-415	23/13.3	280/476	-300/300	70
3BA1800-7AT26	10/7.5	200-240/345-415	29/16.7	280/476	-320/430	70
3BA1830-7AT06	5.4/4	200-240/345-415	15.6/9	400/680	-150/140	76
3BA1830-7AT16	7.4/5.5	200-240/345-415	23/13.3	400/680	-200/190	76
3BA1830-7AT26	10/7.5	200-240/345-415	29/16.7	400/680	-270/260	76
3BA1900-7AT06	10.8/8	200-240/345-415	31.5/18.2	568/965	-190/190	74
3BA1900-7AT16	16.8/12.5	200-240/345-415	48.5/28	568/965	-290/280	74
3BA1900-7AT36	25/18.5	200-240/345-415	64.5/37	568/965	-362/462	74
3BA1930-7AT16	16.8/12.5	200-240/345-415	48.5/28	744/1264	-290/280	71
3BA1930-7AT36	25/18.5	200-240/345-415	64.5/37	744/1264	-310/310	71
3BA1930-7AT36	25/18.5	200-240/345-415	64.5/37	744/1264	-310/310	71
3BA7310-0AT167	.75/.55	200-240/345-415	2.8/1.6	40/68	-250/250	57
3BA7410-0AT167	1.5/1.1	200-240/345-415	5.4/3.1	50/84	-300/380	58
3BA7510-0AT168	2/1.5	200-240/345-415	7.5/4.3	70/120	-370/650	64
3BA7510-0AT268	3/2.2	200-240/345-415	9.7/5.6	70/120	-310/430	64
3BA7610-0AT168	3/2.2	200-240/345-415	9.7/5.6	96/163	-310/430	65
3BA7610-0AT368	4.4/3.3	200-240/345-415	13/7.5	96/163	-500/750	65

Table 2. Three-phase, Single-stage, 60 Hz

Model	Rated Power HP/kW	Voltage	Motor Current (Amps)	Open Flow Capacity CFM/m3/hr	Maximum Pressure (mbar)	Sound Pressure Level (dBA)
3BA1300-7AT06	.39/.29	220-250/415-460	1.74/1.0	60/102	-100/100	56
2BA1300-7AT16	.67/.5	220-250/415-460	2.6/1.5	60/102	-150/160	56
3BA1400-7AT06	1.12/.83	220-250/415-460	3.75/2.15	105/179	-130/130	64
3BA1400-7AT16	1.28/.95	220-250/415-460	4.35/2.5	105/179	-160/160	64
3BA1400-7AT26	2/1.5	220-250/415-460	5.5/3.2	105/179	-210/200	64
3BA1500-7AT06	1.28/.95	220-250/415-460	4.35/2.5	150/255	-80/70	70
3BA1500-7AT16	2/1.5	220-250/415-460	5.5/3.2	150/255	-150/140	70
3BA1500-7AT26	2.7/2.05	220-250/415-460	7.5/4.4	150/255	-220/210	70
3BA1500-7AT36	3.4/2.55	220-250/415-460	9.0/5.3	150/255	-260/290	70
3BA1530-7AT16	2/1.5	220-250/415-460	5.7/3.3	200/340	-90/80	71
3BA1530-7AT26	2.7/2.05	220-250/415-460	7.6/4.4	200/340	-260/270	70
3BA1530-7AT36	3.4/2.55	220-250/415-460	10.3/6.0	200/340	-260/250	70
3BA1600-7AT06	2.7/2.05	220-250/415-460	7.5/4.4	235/400	-160/150	72
3BA1600-7AT16	3.4/2.55	220-250/415-460	9.0/5.3	235/400	-190/190	72
3BA1600-7AT26	4.6/3.45	220-250/415-460	12.0/6.5	235/400	-240/230	72
3BA1600-7AT36	6.1/4.6	220-250/415-460	15.2/8.5	235/400	-320/310	72
3BA1630-7AT06	2.7/2.05	220-250/415-460	7.5/4.4	300/510	-160/150	72
3BA1630-7AT16	3.4/2.55	220-250/415-460	9.0/5.3	300/510	-190/190	72
3BA1630-7AT26	4.6/3.45	220-250/415-460	12.0/6.5	300/510	-240/230	72
3BA1630-7AT36	6.1/4.6	220-250/415-460	15.2/8.5	300/510	-260/260	72
3BA1800-7AT06	6.1/4.6	220-250/415-460	15.2/8.5	350/595	-160/160	74
3BA1800-7AT16	8.4/6.3	220-250/415-460	20/11.2	350/595	-300/280	74
3BA1800-7AT26	11.5/8.6	220-250/415-460	27.5/15	350/595	-350/400	74
3BA1830-7AT06	6.2/4.6	220-250/415-460	15.2/8.5	500/850	-90/90	79
3BA1830-7AT16	8.4/6.3	220-250/415-460	20/11.2	500/850	-180/180	79
3BA1830-7AT26	11.5/8.6	220-250/415-460	27.5/15	500/850	-270/260	79
3BA1900-7AT06	12.1/9	220-250/415-460	31.5/18.2	710/1207	-150/140	79
3BA1900-7AT16	19.5/14.5	220-250/415-460	50/29	710/1207	-270/260	79
3BA1900-7AT36	28.7/21.3	220-250/415-460	68/39	710/1207	-382/422	79
3BA1930-7AT16	19.5/14.5	220-250/415-460	50/29	930/1581	-270/260	75
3BA1930-7AT36	28.7/21.3	220-250/415-460	68/39	930/1581	-300/280	75
3BA7210-0AT167	1.1/.83	220-250/415-460	3.75/2.15	35/60	-270/320	62
3BA7310-0AT167	1.1/.83	220-250/415-460	3.75/2.15	48/82	-260/250	62
3BA7410-0AT167	2/1.5	220-250/415-460	5.5/3.2	60/102	-340/370	62

When operating at altitudes above 3280 feet (1000 m) above mean sea level, contact Airtech Inc.

CAUTION! Operation of the unit outside the recommended range of pressures and ambient conditions will result in shorted operating life.

Table 3. 3 Phase, Two/Three Stage, 50 Hertz

Model	Rated Power HP/kW	Voltage	Motor Current (Amps)	Open Flow Capacity CFM/m3/hr	Maximum Pressure (mbar)	Sound Pressure Level (dBA)
3BA1310-7AT26	.94/.7	200-240/345-415	3.8/2.2	48/81.6	-120/120	55
3BA1410-7AT36	2.15/1.6	200-240/345-415	7.5/4.3	84/142.8	-200/190	66
3BA1410-7AT46	2.96/2.2	200-240/345-415	9.7/5.6	84/142.8	-320/420	66
3BA1510-7AT46	4.04/3.0	200-240/345-415	12.5/7.2	121.6/206.7	-340/410	72
3BA1510-7AT56	5.39/4.0	200-240/345-415	17.4/10	121.6/206.7	-390/440	72
3BA1610-7AT36	2.9/2.2	200-240/345-415	9.7/5.6	188/319.6	-190/190	73
3BA1610-7AT26	4.04/3.0	200-240/345-415	12.5/7.2	188/319.6	-260/270	73
3BA1610-7AT36	5.39/4.0	200-240/345-415	13.0/7.5	188/319.6	-290/360	73
3BA1610-7AT46	7.41/5.5	200-240/345-415	23/13.3	188/319.6	-420/500	73
3BA1610-7AT56	10.1/7.5	200-240/345-415	29/16.7	188/319.6	-420/610	73
3BA1640-7AT36	5.39/4.0	200-240/345-415	13.0/7.5	280/476	-290/360	74
3BA1640-7AT46	7.41/5.5	200-240/345-415	23/13.3	280/476	-420/500	74
3BA1640-7AT56	10.1/7.5	200-240/345-415	29/16.7	280/476	-420/610	74
3BA1810-7AT16	7.4/5.5	200-240/345-415	23/13.3	280/476	-420/500	74
3BA1810-7AT26	10.1/7.5	200-240/345-415	29/16.7	280/476	-320/430	74
3BA1810-7AT36	14.8/11	200-240/345-415	29/16.7	280/476	-430/600	74
3BA1810-7AT46	20.2/15	200-240/345-415	56.5/32.5	280/476	-460/670	74
3BA1840-7AT26	10.1/7.5	200-240/345-415	29.0/16.7	280/476	-320/430	74
3BA1840-7AT36	14.8/11.0	200-240/345-415	48.5/28.0	280/476	-430/600	74
3BA1910-7AT16	16.8/12.5	200-240/345-415	48.5/28	624/1061	-290/280	74
3BA1910-7AT36	26.95/20.0	200-240/345-415	69/40	624/1061	-443/502	74
3BA1910-7AT46	33.51/24.98	200-240/345-415	90/52	624/1061	-443/592	84
3BA19437AT26	20.1/15	200-240/345-415	59/34	1200/2040	-160/170	75
3BA19437AT36	26.8/20	200-240/345-415	69/40	1200/2040	-250/230	75
3BA19437AT46	33.5/25	200-240/345-415	90/52	1200/2040	-310/280	75
3BA7220-0AT567	2/1.5	200-240/345-415	7.5/4.3	28/48	-370/650	58
3BA7320-0AT467	1.5/1.1	200-240/345-415	5.4/3.1	40/68	-300/380	58
3BA7320-0AT567	2/1.5	200-240/345-415	7.5/4.3	40/68	-480/450	59
3BA7420-0AT267	2/1.5	200-240/345-415	7.5/4.3	50/84	-480/450	61
3BA7420-0AT567	4.4/3.3	200-240/345-415	13/7.5	50/84	-500/750	61
3BA7520-0AT268	3/2.2	200-240/345-415	9.7/5.6	70/120	-470/460	64
3BA7620-0AT368	4.4/3.3	200-240/345-415	13/7.5	96/163	-500/750	68
3BA7620-0AT468	5.4/4	200-240/345-415	14/8.1	96/163	-370/650	67
3BA7620-0AT568	7.5/5.5	200-240/345-415	19.9/11.5	96/163	-520/750	68
3BA7630-0AT668	10.1/7.5	200-240/345-415	29/16.7	96/163	-420/610	77

Table 4. 3 Phase, Two/Three Stage, 60 Hertz

Model	Rated Power HP/kW	Voltage	Motor Current (Amps)	Open Flow Capacity CFM/m3/hr	Maximum Pressure (mbar)	Sound Pressure Level (dBA)
3BA1310-7AT26	1.11/.83	220-250/415-460	3.75/2.15	60/102	-130/130	61
3BA1410-7AT36	2.7/2.05	220-250/415-460	7.5/4.4	105/179	-220/210	69
3BA1410-7AT46	3.4/2.55	220-250/415-460	9.0/5.3	105/179	-350/440	69
3BA1510-7AT46	4.6/3.45	220-250/415-460	12.0/6.5	152/258	-380/360	74
3BA1510-7AT56	6.1/4.6	220-250/415-460	15.2/8.5	152/258	-410/480	74
3BA1610-7AT36	3.4/2.55	220-250/415-460	9.0/5.3	235/400	-190/190	76
3BA1610-7AT26	4.6/3.45	220-250/415-460	12.0/6.5	235/400	-240/230	76
3BA1610-7AT36	6.4/4.8	220-250/415-460	16.5/9.8	235/400	-320/310	76
3BA1610-7AT46	8.4/6.3	220-250/415-460	20/11.2	235/400	-440/440	76
3BA1610-7AT56	11.5/8.6	220-250/415-460	27.5/15.0	235/400	-440/670	76
3BA1640-7AT36	6.1/4.6	220-250/415-460	15.2/8.5	350/595	-320/310	78
3BA1640-7AT46	8.4/6.3	220-250/415-460	20.0/11.2	350/595	-440/440	78
3BA1640-7AT56	11.5/8.6	220-250/415-460	27.5/15.0	350/595	-440/670	78
3BA1810-7AT16	8.4/6.3	220-250/415-460	20.0/11.2	350/595	-440/440	78
3BA1810-7AT26	11.5/8.6	220-250/415-460	27.5/15.0	350/595	-350/400	78
3BA1810-7AT36	17/12.6	220-250/415-460	50.2/29.0	350/595	-460/600	78
3BA1810-7AT46	23.3/17.3	220-250/415-460	60.0/34.5	350/595	-490/750	78
3BA1840-7AT26	11.5/8.6	220-250/415-460	27.5/15.0	350/595	-350/400	78
3BA1840-7AT36	17/12.6	220-250/415-460	50.2/29.0	350/595	-460/600	78
3BA1910-7AT16	19.5/14.5	220-250/415-460	50.0/29.0	780/1326	-270/260	84
3BA1910-7AT36	31/23	220-250/415-460	72 /42	780/1326	-443/433	84
3BA1910-7AT46	38.9/28.9	220-250/415-460	90/52	780/1326	-443/542	84
3BA19437AT26	23.4/17.5	220-250/415-460	63/36.5	1440/2447	-120/110	84
3BA19437AT36	30.8/23	220-250/415-460	72/42	1440/2447	-190/180	84
3BA19437AT46	38.8/28.9	220-250/415-460	90/52	1440/2447	-265/230	84
3BA7220-0AT567	2.7/2.05	220-250/415-460	7.5/4.4	35/60	-500/740	62
3BA7320-0AT467	2/1.5	220-250/415-460	5.5/3.2	48/82	-340/370	63
3BA7320-0AT567	2.7/2.05	220-250/415-460	7.5/4.4	48/82	-430/410	63
3BA7420-0AT267	2.7/2.05	220-250/415-460	7.5/4.4	60/102	-430/410	66
3BA7420-0AT567	5.1/3.8	220-250/415-460	13.5/7.8	60/102	-510/850	66
3BA7520-0AT268	3.4/2.55	220-250/415-460	9/5.3	84/143	-500/450	70
3BA7620-0AT368	5.1/3.8	220-250/415-460	13.5/7.8	115/196	-510/850	71
3BA7620-0AT468	6.1/4.6	220-250/415-460	15.2/8.5	115/196	-480/500	71
3BA7620-0AT568	8.4/6.6	220-250/415-460	22.5/12.6	115/196	-520/820	72
3BA7630-0AT668	11.5/8.6	220-250/415-460	27.5/15	115/196	-440/670	80

3BA7530-7AT76	6.2/4.6	220-250/415-460	16.3/9.5	82/139	-639/729	73

Table 5. Single Phase, 50 Hertz

Model	Rated Power HP/kW	Voltage	Motor Current (Amps)	Open Flow Capacity CFM/m3/hr	Maximum Pressure (mbar)	Sound Pressure Level (dBA)
3BA1100-7AS05	0.27/0.2	230	1.45	24/40	-60/70	50
3BA1200-7AS05	0.33/0.25	115/230	3.5/1.7	35/60	-100/100	50
3BA1300-7AS15	0.5/0.37	115/230	5.4/2.7	48/82	-110/110	53
3BA1330-7AS15	0.5/0.37	115/230	5.4/2.7	60/102	-110/110	54
3BA1400-7AS25	1.47/1.09	115/230	13/6.5	84/142	-149/189	64
3BA1410-7AS25	2/1.49	115/230	22/11	84/142.8	-279/259	66
3BA1500-7AS35	2/1.49	115/230	22/11	120/204	-189/199	64
3BA7210-0AS75	0.74/0.55	115/230	13/6.5	28/48	-229/289	57
3BA7220-0AS75	2/1.49	115/230	19.4/9.7	29/49	-371/600	57
3BA7310-0AS75	1.26/0.93	115/230	15.2/7.6	40/68	-249/351	58
3BA7320-0AS75	2/1.49	115/230	19.4/9.7	40/68	-401/550	59
3BA7410-OAS45	1.47/1.09	115/230	13/6.5	50/84	-299/381	59

Table 6. Single Phase, 60 Hertz

Model	Rated Power HP/kW	Voltage	Motor Current (Amps)	Open Flow Capacity CFM/m3/hr	Maximum Pressure (mbar)	Sound Pressure Level (dBA)
3BA1100-7AS05	0.31/0.23	230	1.3	30/51	-75/80	53
3BA1200-7AS05	0.38/0.28	115/230	5/2.8	48/82	-112/112	53
3BA1300-7AS15	0.6/0.44	115/230	6.0/3.0	60/102	-130/139	56
3BA1330-7AS15	0.6/0.44	115/230	6.0/3.0	74/126	-130/139	57
3BA1400-7AS25	1.74/1.29	115/230	14.0/7.0	105/179	-179/189	64
3BA1410-7AS25	2.35/1.75	115/230	24.0/12.0	105/179	-249/229	69
3BA1500-7AS35	2.35/1.75	115/230	24.0/12.0	150/255	-179/179	70
3BA7210-0AS75	0.84/0.63	115/230	14.2/7.1	35/60	-259/309	62
3BA7220-0AS75	2.35/1.75	115/230	20.6/10.3	35/60	-421/660	62
3BA7310-0AS75	1.47/1.09	115/230	18.0/9.0	48/82	-279/391	62
3BA7320-0AS75	2.35/1.75	115/230	20.6/10.3	48/82	-391/541	63
3BA7410-OAS45	1.74/1.29	115/230	14.0/7.0	60/102	-338/391	62

Operation of any blower is possible at 87 Hertz without modification in most cases. When using a VFD to operate the blower at this frequency, refer to the nameplate for limits on vacuum and pressure, current draw and motor performance.

If your specific model number is not listed above, please consult the nameplate on the unit for electrical data. If the model you are installing is listed above, please confirm the data on the nameplate. Data in Tables 1 through 4 is subject to change and is approximate. Be sure to confirm necessary operating data what that on the nameplate before commissioning the unit.

CAUTION! Do not operate any 3BA blower above 87 Hz without consultation with the factory. Failure of the blower motor is possible when operating out of range. Consult with the factory for assistance.

Expected temperature rise of the handled gas at maximum allowable pressure differential and when operating at sea level is indicated below:

Table 7: Single Stage – Approximate Temperature Rise

Blower Model	Maximum Rise at 50 Hz speed		Maximum Rise at 60 Hz speed	
	Degrees F	Degrees C	Degrees F	Degrees C
3BA1100-7..0.	115	64	136	76
3BA1200-7..0.	65	36	101	56
3BA1300-7..0.	90	50	77	43
3BA1300-7..1.	90	50	140	78
3BA1300-7..2.	90	50	158	88
3BA1400-7..0.	99	55	86	48
3BA1400-7..1.	129	72	122	68
3BA1400-7..2.	149	83	167	93
3BA1500-7..0.	86	48	72	40
3BA1500-7..1.	115	64	97	54
3BA1500-7..2.	138	77	122	68
3BA1500-7..3.	203	113	180	100
3BA1500-7..6.	248	138	248	138
3BA1600-7..0.	81	45	68	38
3BA1600-7..1.	145	81	104	58
3BA1600-7..2.	171	95	176	98
3BA1600-7..3.	225	125	185	103
3BA1600-7..6.	248	138	194	108
3BA1600-7..7.	248	138	248	138
3BA1800-7..0.	104	58	104	58
3BA1800-7..1.	153	85	185	103
3BA1800-7..2.	248	138	221	123
3BA1900-7..0.	97	54	95	53
3BA1900-7..1.	182	101	155	86
3BA1900-7..3.	230	128	212	118
3BA1943-7..2.	85	47	75	42
3BA1943-7..3.	130	72	100	56
3BA1943-7..4.	180	100	140	78
3BA7210-0..1..	126	70	142	79
3BA7310-0..1..	142	79	142	79
3BA7310-0..2..	178	99	187	104
3BA7410-0..1..	194	108	214	119
3BA7510-0..1..	199	111	232	129
3BA7510-0..2..	248	138	234	130
3BA7610-0..1..	244	136	255	142
3BA7610-0..3..	244	136	255	142

Table 8: Two/Three Stage – Approximate Temperature Rise

Blower Model	Maximum Rise at 50 Hz speed		Maximum Rise at 60 Hz speed	
	Degrees F	Degrees C	Degrees F	Degrees C
3BA1310-7..2.	127	71	165	92
3BA1410-7..3.	154	86	149	83
3BA1410-7..4.	181	101	180	100
3BA1510-7..4.	190	106	176	98
3BA1510-7..5.	194	108	201	112
3BA1610-7..1.	92	51	86	48
3BA1610-7..2.	129	72	118	66
3BA1610-7..3.	176	98	167	93
3BA1610-7..4.	221	123	190	106
3BA1610-7..5.	246	137	266	148
3BA1610-7..7.	176	98	167	93
3BA1610-7..8.	176	98	248	138
3BA1810-7..1.	113	63	80	45
3BA1810-7..2.	185	103	140	78
3BA1810-7..3.	248	138	248	138
3BA1910-7..1.	119	66	115	64
3BA1910-7..2.	203	113	169	94
3BA1910-7..3.	248	138	274	152
3BA1910-7..4.	248	138	274	152
3BA7220-0..2..	131	73	171	95
3BA7220-0..5..	165	92	230	128
3BA7320-0..5..	178	99	255	142
3BA7420-0..2..	192	107	176	98
3BA7420-0..5..	250	139	243	135
3BA7520-0..2..	192	107	216	120
3BA7520-0..7..	257	143	262	128
3BA7530-0..7..	250	121	250	121
3BA7620-0..3..	255	142	259	144
3BA7620-0..5..	255	142	262	146
3BA7630-0..6..	248	138	248	138

Table 9: Tightening Torque Specifications

For non-electrical connections

Thread	Ft-lbs maximum torque	Nm maximum torque
M4	2.43	3.3
M5	3.25	4.4
M6	6.49	8.8
M8	19.47	26.4
M10	34.10	46.2
M12	56.76	77

For electrical connections

Thread	Ft-lbs torque	Nm torque
M4	0.6 to 0.9	0.8 to 1.2
M5	1.3 to 1.8	1.3 to 1.8

For metal threaded glands/unions

Thread	Ft-lbs maximum torque	Nm maximum torque
M12x1.5	3 to 4.5	4 to 6
M16x1.5	3.7 to 5.5	5 to 7.5
M20x1.5	4.4 to 6.6	6 to 9
M32x1.5	5.9 to 8.9	8 to 12
M40x1.5	5.9 to 8.9	8 to 12

For plastic threaded glands/unions

Thread	Ft-lbs maximum torque	Nm maximum torque
M12x1.5	1.5 to 2.6	2 to 3.5
M16x1.5	2.2 to 3	3 to 4
M20x1.5	3 to 3.7	4 to 5
M32x1.5	3.7 to 5.2	5 to 7
M40x1.5	3.7 to 5.2	5 to 7

Operating above the indicated maximum pressure or vacuum would overload the motor and/or overheat the unit. In addition to the maximum allowable pressure difference, careful consideration should be given to matching the motor protection devices (provided by others) to the expected current draw. In no case should the blower be operated with inadequate motor overload protection.

Since regenerative blowers are dynamic compression devices, the performance limits shown in Tables 1 to 4 are applicable only for a gas with the same specific gravity, dynamic viscosity and chemical characteristics as air. For gases with different physical properties than air, the limits will be different from those shown in the tables. Please contact Airtech for assistance in determining the proper blower size and configuration if handling gases other than air.

A vacuum relief valve or pressure relief valve should always be installed at the suction or discharge of the regenerative blower. This will prevent operation outside the applicable ranges shown in Tables 1 to 4. If the relief valves were not specified in the ordering process, please contact Airtech for details, price and availability of the needed valves before commissioning the unit. Failure to use the proper relief valve may result in failure of the blower due to operation outside the applicable limits; any such failure is outside the scope of Airtech's standard warranty.

WARNING! Be sure to install the necessary personnel protection devices if unexpected shut-down of the unit presents danger of death or injury.

3. Installation

As illustrated in Figure 1, the Airtech 3BA blower can be installed in any physical configuration.

CAUTION! Regenerative blowers can have surface temperatures in excess of 320° F. To avoid burns or other physical injury, take care to avoid contact with the surfaces of the blower during and immediately after operation.

To ensure adequate cooling of the blower during operation, install the blower with the minimum clearance as indicated in the table below.

Minimum installation clearances, 3BA blowers

Range	Distance from fan guard to closest obstruction. (inches/mm)	Distance from cover (opposite of fan) to closest obstruction. (inches/mm)
3BA11 through 3BA14	1.4/34	0.79/20
3BA15 through 3BA19	2.1/53	1.57/40
3BA72 and 3BA73	1.3/34	1.18/30
3BA74 through 3BA76	2.1/54	1.18/30

Please note that it may be desirable, where possible, to allow for larger clearances to allow access for maintenance or repair personnel. The noted clearances are to ensure adequate air flow for cooling only and are a minimum requirement.

Failure to allow for the noted clearances may result in premature failure of the blower due to lack of cooling, even if all other precautions are taken as recommended. For specific advice about installations requiring closer clearances, please contact Airtech, Inc. for recommendations.

Airtech regenerative blowers can be mounted in any configuration, either horizontally or vertically mounted. It is not usually necessary to bolt the smaller blowers to a rigid surface during operation, though this may be desirable to reduce pipe vibration, movement and noise. Larger models should be bolted in place, especially when installed vertically, to prevent possible rotation, damage or injury due to start-up torque.

CAUTION! For installations at altitudes greater than 3250 Feet above sea level there will be a loss in capacity. Please contact your factory representative for assistance in determining the extent of the loss of capacity likely at your specific location.

WARNING! Be sure to follow all local codes and regulations with respect to installation and operation of the blower. The blower motor should be wired to a branch circuit disconnect and all other safety devices recommended by the relevant sections of NFPA 70, National Electrical Code, and in accordance with all applicable state and local regulations and requirements.

3.1 Installation Procedure

Perform the installation exactly in accordance with the following steps:

1. For vacuum operation, connect the suction pipe to connection A, and for pressure operation connect the pressure pipe to connection B (See Figure 1). Install startup screens before startup to protect pump from debris.

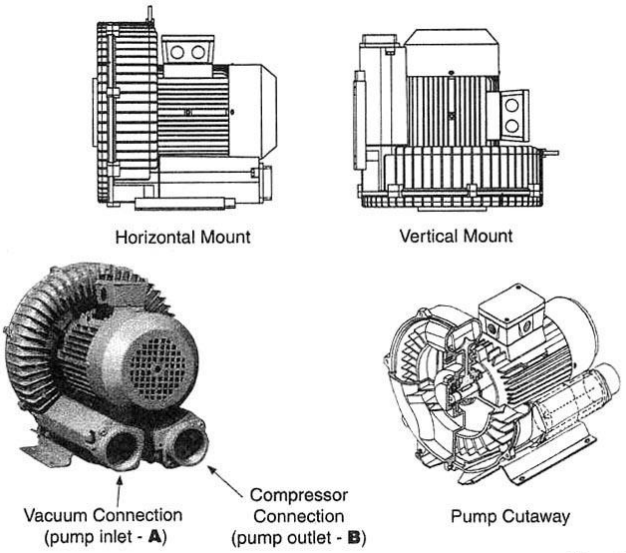


Figure 1

CAUTION! Design your piping system to avoid unnecessary pressure loss, which may significantly affect the operation of any regenerative blower. Contact your Airtech representative for assistance in designing and configuring an appropriate piping system for your application.

For alternation between vacuum and pressure in any application, changeover valves are available. Use of the changeover valve allows the same connection to be used for both vacuum and pressure.

2. The electrical data shown in Tables 1 to 4 (pages 10-14) should be confirmed by examination of the motor data plate on your 3BA blower. The standard motor features Class F insulation as a standard and are UL recognized for applications in both Canada and the United States (CUL). Motors are IEC design IP55, equal to a NEMA TEFC motor design. The connection diagram for the motors can be found in the inside of the terminal box cover. Be sure to confirm that your electrical supply has sufficient capacity to operate the blower according to the nameplate requirements.

3. A magnetic motor starter should always be used to connect the motor to the power supply. It is advisable to use thermal overload motor starters to provide maximum protection for the motor and wiring. All cabling used on starters should be secured with good quality cable clamps.

We recommend that the motor starters used feature a time delay trip on high amperage to avoid nuisance trips on start-up. When the unit is started cold, over amperage may be experienced for a short time due to the higher resistance of the windings at lower temperatures.

If using a change over or solenoid valve, ensure that the voltage connected to the valve matches that shown on the valve instructions or nameplate. Most valves are rated for 110 Volts 60Hz or 220 Volts 50 Hz. Connection of these valves to higher voltages may result in immediate valve failure.

WARNING! The electrical installation should be made by a qualified electrician and in complete compliance with all NFPA 70 (National Electrical Code) requirements along with all state and local code requirements. The main disconnect and motors starters are assumed to be provided by others.

4. Install the necessary relief valves and confirm their proper operation.

4. Start-up

CAUTION! Do not start the blower motor more than 10 times in one hour. If multiple and frequent start-ups are required by your application, install a minimum run timer in the motor control circuit to avoid decreased motor life and possible fire due to over-starting of the motor.

1.1 Start-up Procedure

1. Before operation, confirm the correct direction of rotation by jogging (switching rapidly on and off) the motor and observing the motor fan rotation in the same direction as the arrow. If the direction of rotation is incorrect, lock out the power and switch two leads (three phase) or rewire (single phase) to effect the opposite rotation direction. Recheck the direction of rotation before proceeding.

2. Do not operate the blower at pressure or vacuum ranges that exceed those shown in Tables one through four for the model being installed. This can be achieved by use of the recommended relief valve shown in Table 5.

Note: Relief valves that have been factory pre-set have a label indicating the set pressure and an arrow indicating the direction of flow. The arrow will point into the pipe when installed in vacuum applications and out of the pipe when installed in pressure applications. Do not re-set the relief valve if it has been pre-set from the factory.

In the event the relief valve setting needs to be reset, adjust the set screw to increase or decrease the tension on the spring. Place the blower in operation and note the current draw of the motor. When the current draw of the motor is near the maximum noted on the motor nameplate, tighten the locking nut on the valve and proceed.

3. When checking the current draw of the motor with an ammeter, be sure to confirm the voltage at the motor junction box. Low voltage conditions may result in difficulty starting or in unexpected motor failure or motor starter trips.

1.2 Potential Risks For Operators

Noise emission: Free field noise limits are indicated in Tables 1-4 (pages 10-14). Hearing protection is not normally required at the expected noise generation levels in the table; however, local conditions may result in higher ambient noise. If this is the case and local noise exceeds OSHA recommended levels for expected exposure time (typically 85 dBA for eight hours), hearing protection should be used.

5. Maintenance and Servicing

WARNING! Be sure the power supply is disconnected and locked out before attempting to do any maintenance on the unit. It is critical that the unit be locked out from starting during maintenance as severe injury or death could result from exposure to high voltage or rotating parts.

CAUTION! Allow the blower to cool to a surface temperature of less than 100 F before attempting maintenance. Prolonged exposure to temperatures above 120F can cause severe burns.

Clean the blower surfaces periodically to avoid build up of dust or other debris. Build up of debris can cause overheating and premature failure of the blower.

If an inlet filter is being use, ensure that it remains clean during operation by examining the filter cartridge for debris build up. Replace dirty or clogged filter cartridges.

On pressure units, periodically clean the inlet mesh screen to avoid loss of capacity. If an external inlet filter is used, the filter element should be cleaned monthly or as frequently as required by local conditions. Excessive pressure drop will develop from use of clogged or dirty filters. This pressure drop will degrade blower performance and increase operating temperatures, leading possibly to premature pump failure.

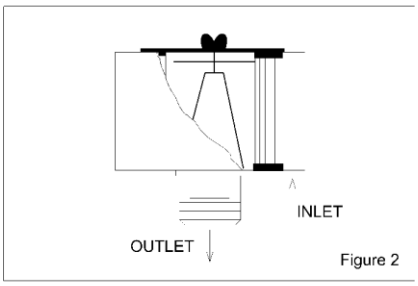


Figure 2

To replace the filter, remove the wing nut and cover. Remove the element and either clean with compressed air or replace. Reassemble in reverse order.

For vacuum applications, the optional in-line vacuum filter must be cleaned regularly, depending on local conditions. Cleaning can be achieved by blowing out with compressed air. If cleaning is not possible, replace the cartridge. Access the cartridge by unhooking the relevant clips and removing the cover.

CAUTION! Do not attempt to check the filter cartridge during operation of the blower. Only check the cartridge after disconnecting the power from the blower and locking out the power to prevent an unexpected start.

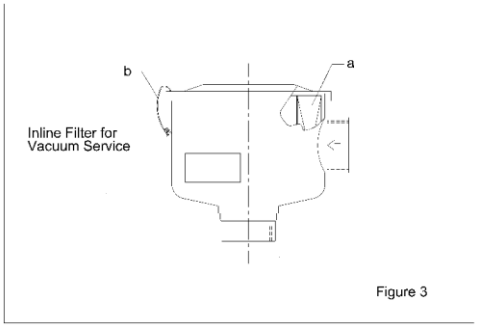


Figure 3

Bearings are grease-packed for life.

5.1 Troubleshooting Chart

Fault	Cause	Remedy	Responsible Party
Motor does not start, no noise.	Two or more power legs interrupted	Check fuses, terminals, etc.. for source of interruption and correct.	Electrician
Motor does not start, humming noise.	One power supply lead interrupted	Check fuses, terminals, etc.. for source of interruption and correct.	Electrician
	Impeller is jammed.	Open blower cover, remove debris, clean.	Service Technician
		Check impeller clearance and reset if necessary.	
	Defective Impeller	Replace impeller.	Service Technician
	Defective Bearing	Replace defective bearing.	Service Technician
Trip of motor starter at start-up	Incorrect starter setting	Ensure starter setting is correct (check current on nameplate)	Electrician
	Winding short-circuit	Megger motor	Electrician
	Motor overloaded due to operation of pump at excessive differential pressures.	Inspect filters, mufflers and connection pipes and clean as required. Check relief valve operation. Reset or replace as necessary.	Operator
	Impeller Jammed	See above fault Motor does not start, humming noise, cause jammed impeller.	Operator
Excessive Power Consumption	Lime or other deposits	Decalcify or clean unit as required (see Maintenance Chart)	Operator
No Vacuum or Pressure.	Severe leak in system	Close off pump and run deadheaded to confirm pump is operating properly. If so, find and fix leak in the system.	Operator
	Wrong direction of rotation	Check air flow direction and change direction of rotation if necessary.	Operator Electrician

Fault	Cause	Remedy	Responsible Party
Insufficient Vacuum	System too small	Use larger system	Operator
	Inlet piping too long or too small.	Increase pipe diameter to reduce pressure loss in inlet piping. Contact Airtech for assistance in determining correct pipe size.	Operator
	Leak at connection to vacuum system.	Check for leaks and repair if necessary.	Operator
	Density of gas handles different from air.	Consider increased limits on operation due to density differences. Consult Airtech, Inc. for assistance.	Airtech Engineering
	Change in impeller geometry due to erosion	Clean impeller and examine for wear. Replace if necessary.	Service Technician
	Inlet filter clogged.	Change filter element; remove clog.	Operator
	Vacuum relief valve incorrectly set.	Reset or replace vacuum relief valve. Contact Airtech for assistance.	Operator
	Seal defective.	Replace seal.	Service Technician
Abnormal flow noises.	Flow speed too high.	Clean pipes or use larger pipes to connect unit to process.	Operator
	Muffler soiled.	Clean muffler inserts, replace if necessary.	Operator
Abnormal running noise	Ball bearing defective or insufficient lubrication on bearing.	Replace bearing if required.	Service Technician
Compressor leaky	Seals on muffler defective.	Tighten muffler connection. Replace gasket if necessary.	Operator
	Seals in motor area defective	Replace as necessary.	Service Technician

WARNING! Before attempting an on-site repair, ensure that a qualified electrician has disconnected the motor from the power supply so that accidental starting of the motor is impossible.

After repairing the unit, be sure to follow the instructions noted in this manual in the **Installation** section (page 20).

5.2 Lifting

For smaller units (less than 65 lbs/ 30 kgs), it may be possible to lift the units manually. When doing so, be sure to understand the weight of the unit being lifted and to follow good lifting safety procedures.

Model	Weight Lbs/kgs	Model	Weight Lbs/kgs
3BA1300-7AT06	20/9	3BA1310-7AT26	33/15
2BA1300-7AT16	22/10	3BA1410-7AT36	55/25
3BA1400-7AT06	29/13	3BA1410-7AT46	59.5/29
3BA1400-7AT26	37.5/17	3BA1510-7AT46	86/39
3BA1500-7AT06	40/18	3BA1510-7AT56	97/44
3BA1500-7AT16	46.5/21	3BA1610-7AT26	104/47
3BA1500-7AT26	51/23	3BA1610-7AT36	119/54
3BA1500-7AT36	55/25	3BA1610-7AT46	163/74
3BA1600-7AT06	57.5/26	3BA1610-7AT56	172/78
3BA1600-7AT16	64/29	3BA1640-7AT36	128/58
3BA1600-7AT26	75/34	3BA1640-7AT46	172/78
3BA1600-7AT36	90.5/41	3BA1640-7AT56	181/82
3BA1800-7AT06	128/58	3BA1810-7AT16	250/113
3BA1800-7AT16	143/65	3BA1810-7AT26	260/118
3BA1800-7AT26	150/68	3BA1810-7AT36	316/143
3BA1900-7AT06	265/120	3BA1810-7AT46	341/155
3BA1900-7AT16	314/142	3BA1840-7AT26	260/118
3BA19437AT26	417/190	3BA1840-7AT36	316/143
3BA19437AT36	463/210	3BA1910-7AT16	409/186
3BA19437AT46	509/231	3BA1910-7AT36	455/206
3BA7210-0AT167	35.3/16	3BA1910-7AT46	500/226
3BA7310-0AT167	35.3/16	3BA7220-0AT567	61.7/28
3BA7410-0AT167	50.7/23	3BA7320-0AT567	66.1/30
3BA7510-0AT168	57.3/26	3BA7420-0AT267	72.7/33
3BA7510-0AT268	63.9/29	3BA7420-0AT567	86/39
3BA7610-0AT168	70.5/32	3BA7520-0AT268	88.2/40
3BA7610-0AT368	77.2/35	3BA7620-0AT368	106/48
3BA7530-0AT768	200/91	3BA7620-0AT568	143/65
		3BA7630-0AT668	207/94

When lifting 3BA15 through 3BA19 (but not 3BA1943 units) or the 3BA75 through the 3BA76, use the eye bolt provided (eye bolts are not included on smaller units). One attachment point should be sufficient. Ensure that the crane is rated for the weight being lifted.

For the 3BA1943, use the eye bolt and the holes in the feet of the blower to lift and maintain a balanced load.

5.3 Storage

The 3BA units should be stored in a clean, dry environment. If stored in an area with a humidity of greater than 80 percent, store in a closed container with desiccant drying agents to avoid damage.

5.4 Disposal

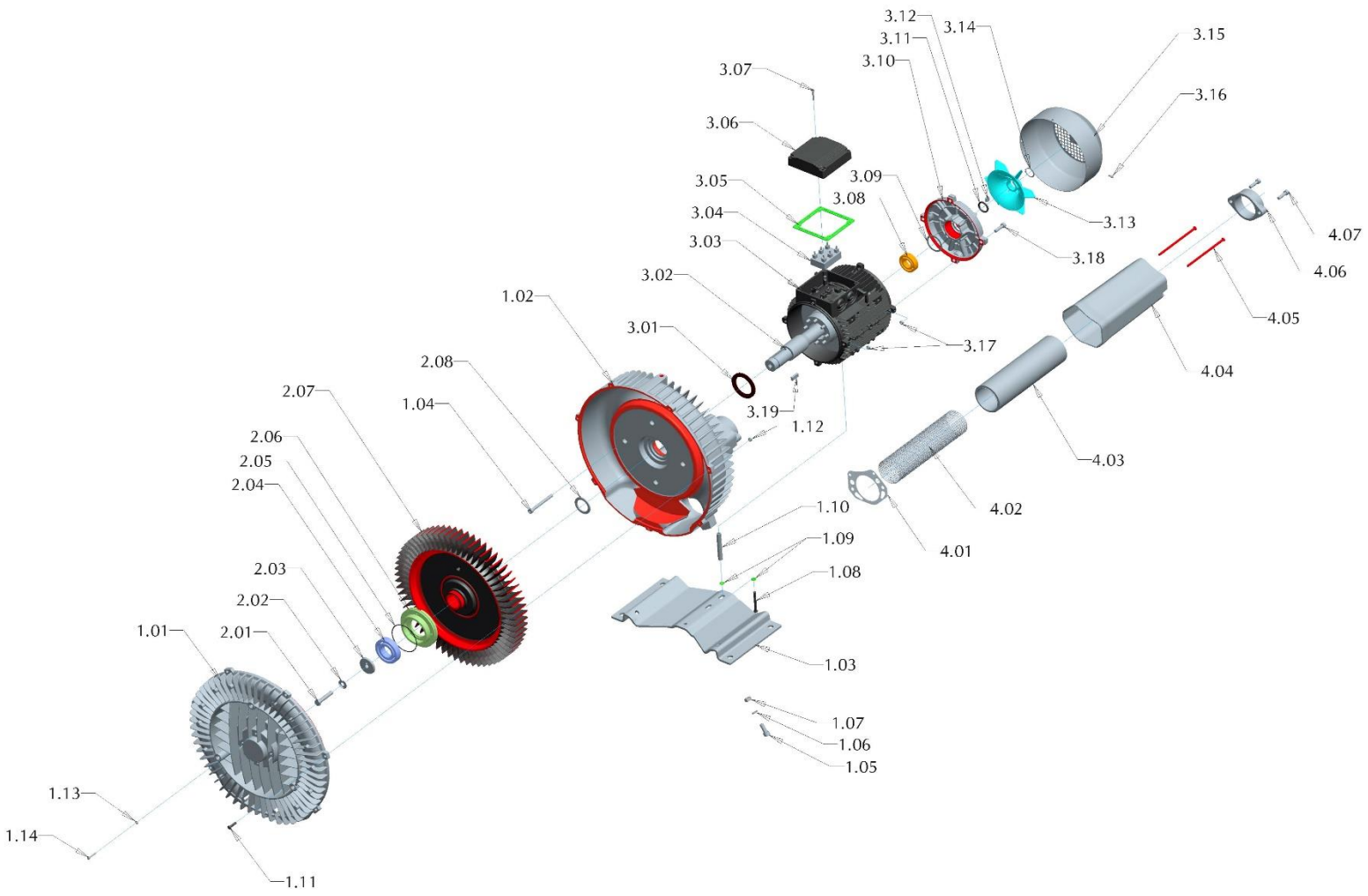
Dispose in accordance with all local health and safety regulations.

Spare parts list are available from your local Airtech service center. Please contact your local Airtech representative for assistance.

For additional assistance, please contact:

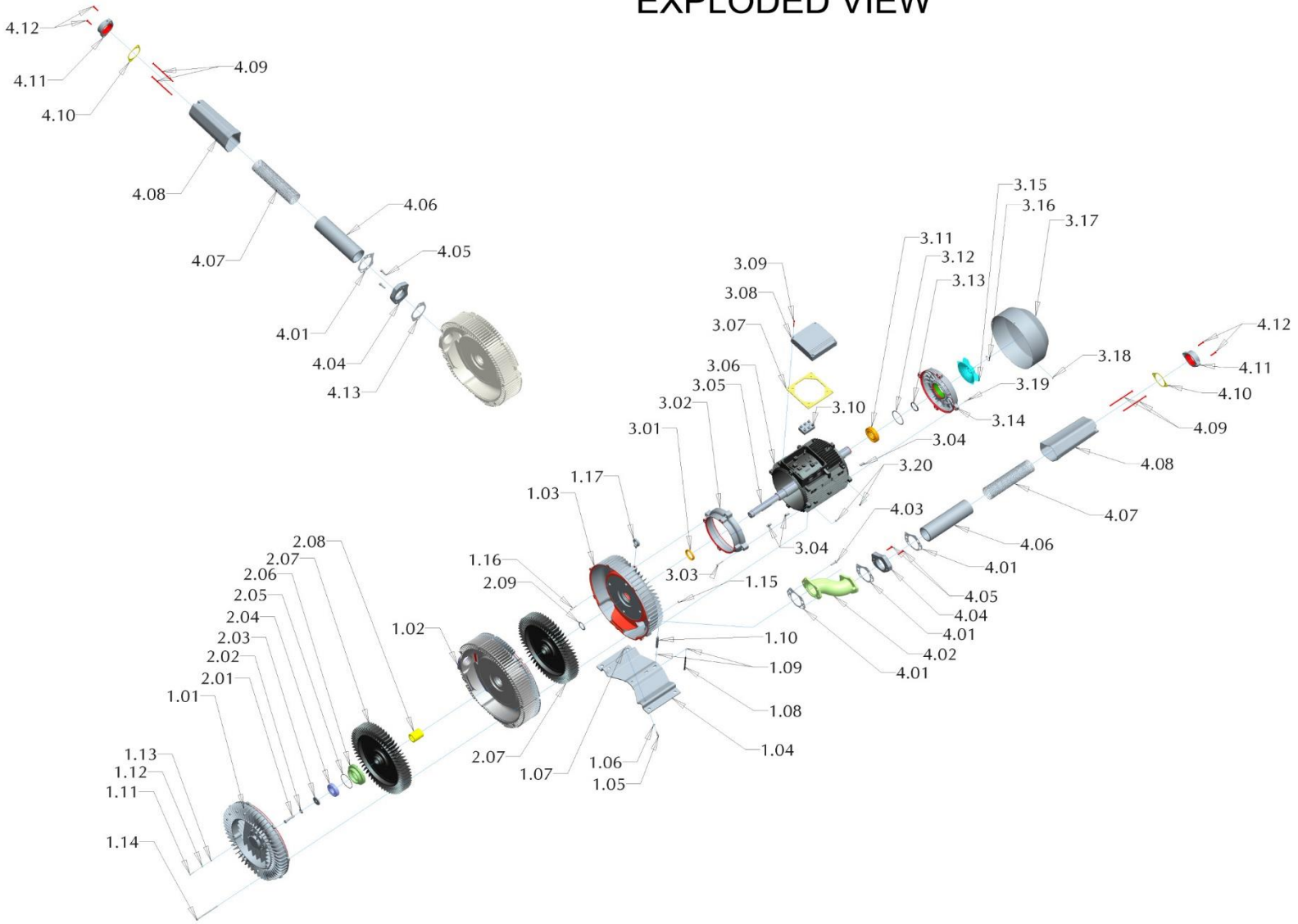
Airtech, Inc.,
301 Veterans Boulevard
Rutherford, NJ, 07070
Phone: 1-201-569-1173
Fax: 201-569-1696.

3BA1 SINGLE STAGE
EXPLODED VIEW



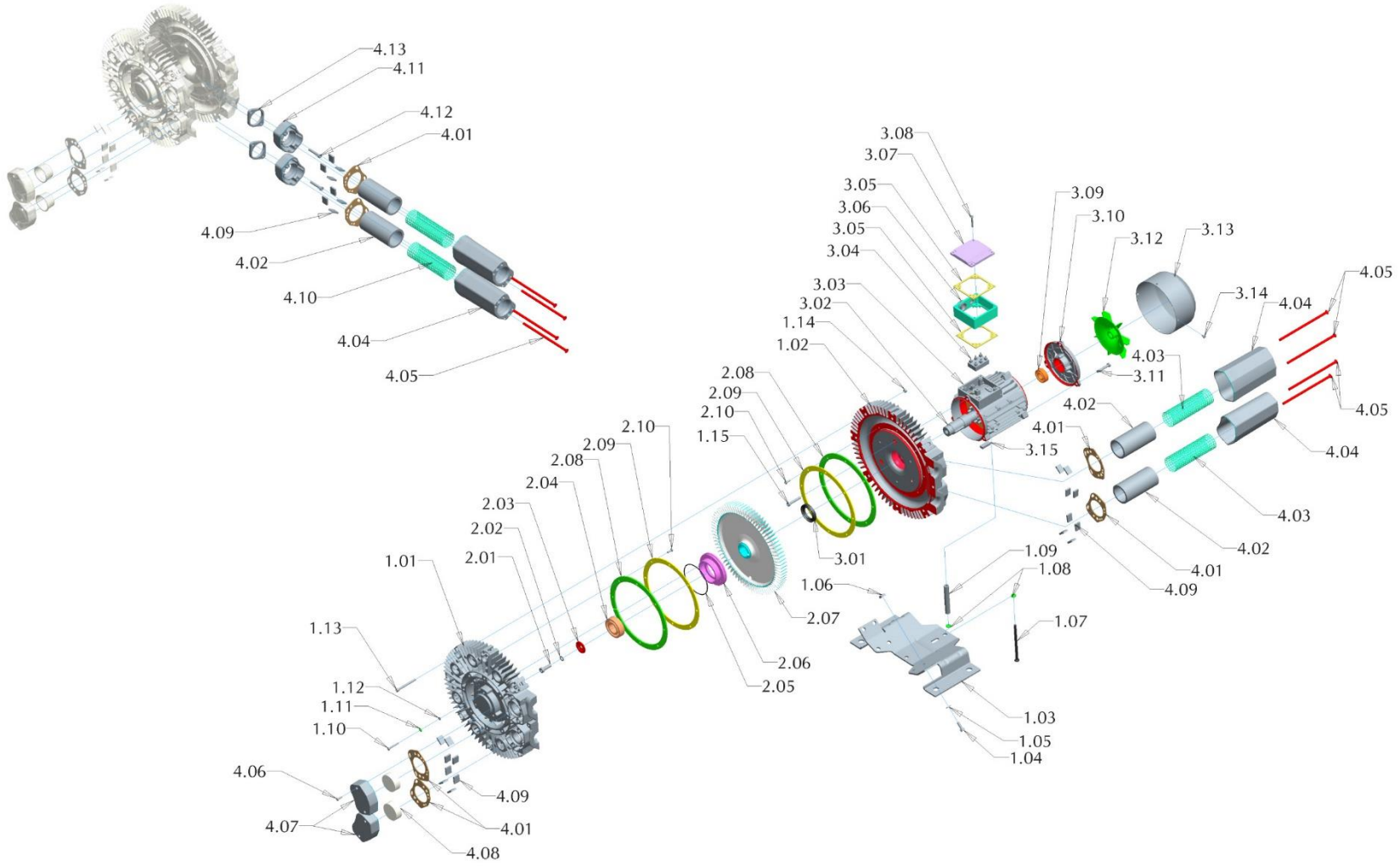
No.	Qty.	Description
1.01	1	Cover
1.02	1	Housing
1.03	1	Mounting Plate
1.04	4	Motor Mounting Screw
1.05	2	Mouting Plate Screw
1.06	2	Mounting Plate Washer
1.07	2	Mouting Plate Nut
1.08	1	Stator Support Screw
1.09	2	Stator Support Washer
1.10	1	Stator Support Sleeve
1.11	8	Cover Mounting Screw
1.12	8	Cover Mounting Nut
1.13	4	Bearing Cover Washer
1.14	4	Bearing Cover Screw
2.01	1	Shaft Screw
2.02	1	Shaft Lock Washer
2.03	1	Disc
2.04	1	Bearing
2.05	1	Bearing Cover O-Ring
2.06	1	Bearing Cover
2.07	1	Impeller
2.08	1	Disc
3.01	1	Seal
3.02	1	Motor Rotor
3.03	1	Stator
3.04	1	Terminal Block
3.05	1	Motor Terminal Box Gasket
3.06	1	Cover For Terminal Box
3.07	4	Terminal Box Cover Screw
3.08	1	Rear Bearing
3.09	1	Bearing Preloading Ring
3.10	1	End Shield
3.11	1	Tolerance Ring
3.12	1	Shaft Key
3.13	1	External Fan
3.14	1	Retaining Ring
3.15	1	Fan Cowl
3.16	4	Fan Cowl Screw
3.17	8	Stator Nut
3.18	4	End Shield Screw
3.19	1	Parallel Key
4.01	2	Silencer Gasket
4.02	2	Silencer Insert
4.03	2	Silencer Insert Filler
4.04	2	Silencer Casing
4.05	4	Silencer Screw
4.06	2	Flange
4.07	4	Flange Screw

3BA1 TWO STAGE
EXPLODED VIEW



No.	Qty.	Description
1.01	1	Cover
1.02	1	Center Section
1.03	1	Blower Housing
1.04	1	Mounting Plate
1.05	2	Plate Mounting Screw
1.06	2	Mouting Plate Washer
1.07	2	Mounting Plate Nut
1.08	1	Stator Support Screw
1.09	2	Stator Support Washer
1.10	1	Stator Support Sleeve
1.11	4	Bearing Cover Screw
1.12	4	Bearing Screw Washer
1.13	4	Bearing Ring Seal
1.14	8	Cover Mounting Screw
1.15	8	Cover Mounting Nut
1.16	4	Motor Mounting Screw
1.17	1	Lifting Ring
2.01	1	Shaft Screw
2.02	1	Shaft Lock Washer
2.03	1	Disc
2.04	1	Bearing
2.05	1	Bearing Cover O-Ring
2.06	1	Bearing Cover
2.07	2	Impeller
2.08	1	Sleeve
2.09	1	Disk
3.01	1	Shaft Seal Ring
3.02	1	Motor Attachment
3.03	4	Motor Attachment Screw
3.04	3	Parallel Key
3.05	1	Motor Rotor
3.06	1	Stator
3.07	1	Motor Terminal Box Gasket
3.08	1	Cover For Terminal Box
3.09	4	Terminal Box Cover Screw
3.10	1	Terminal Block
3.11	1	Rear Bearing
3.12	1	End Shield Seal
3.13	1	Rotary Shaft Lip Seal
3.14	1	End Shield
3.15	1	External Fan
3.16	1	Retaining Ring
3.17	1	Fan Cowl
3.18	4	Fan Cowl Screw
3.19	4	End Shield Screw
3.20	8	Stator Nut
4.01	4	Silencer Gasket
4.02	1	Silencer Attachment
4.03	2	Silencer Attachment Screw
4.04	2	Silencer Flange
4.05	4	Silencer Flange Screw
4.06	2	Silencer Insert Filler
4.07	2	Silencer Insert
4.08	2	Silencer Casing
4.09	4	Silencer Screw
4.10	2	Flange Gasket
4.11	2	Flnage
4.12	4	Flange Screw
4.13	1	Side Silencer Gasket

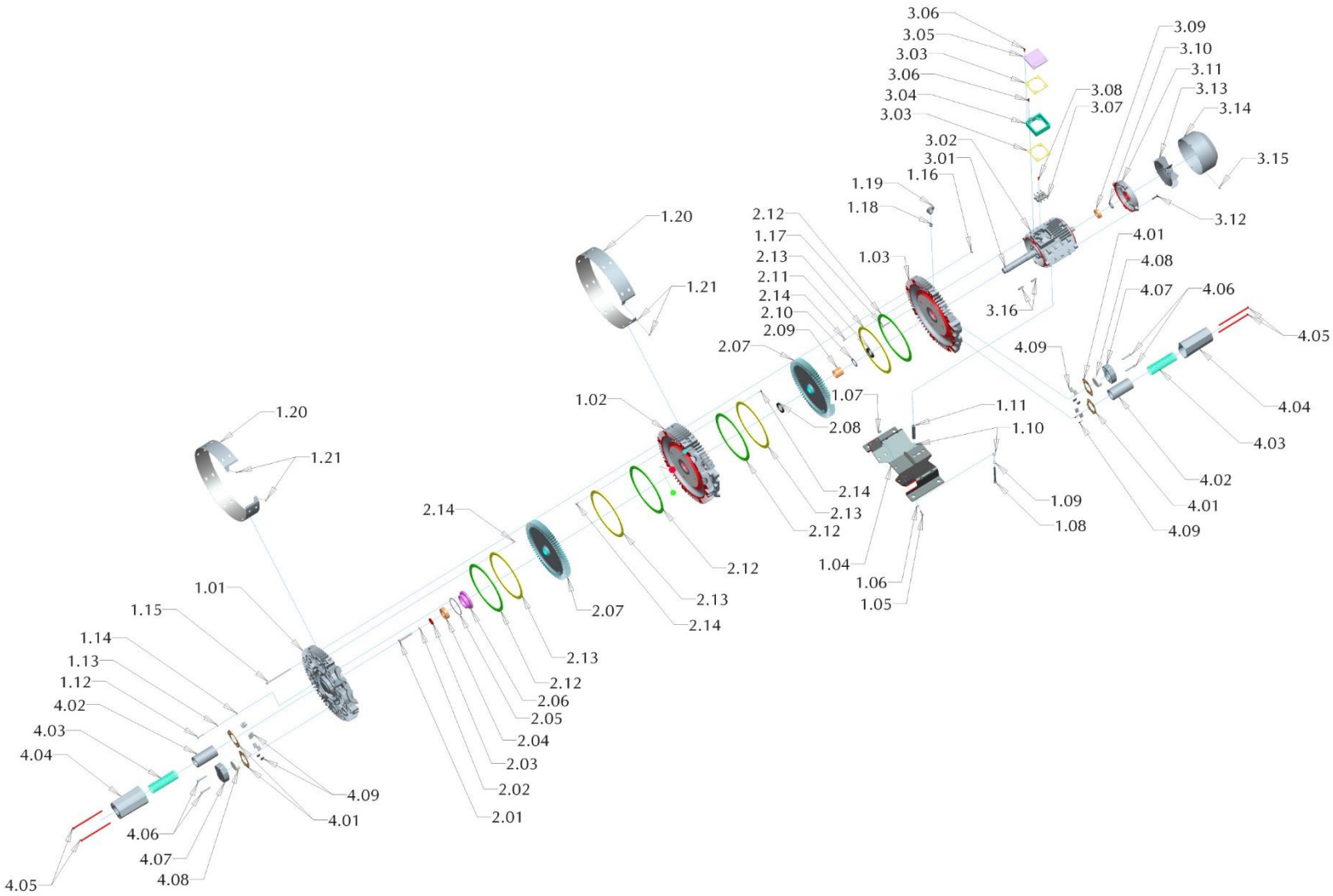
3BA7 SINGLE STAGE
EXPLODED VIEW



No.	Qty.	Description
1.01	1	Cover
1.02	1	Housing
1.03	1	Mounting Plate
1.04	4	Plate Mounting Screw
1.05	4	Mouting Plate Washer
1.06	4	Mounting Plate Nut
1.07	1	Stator Support Screw
1.08	2	Stator Support Washer
1.09	1	Stator Support Sleeve
1.10	3	Bearing Cover Screw
1.11	3	Bearing Screw Washer
1.12	3	Bearing Ring Seal
1.13	8	Cover Mounting Screw
1.14	8	Cover Mounting Nut
1.15	3	Motor Mounting Screw
2.01	1	Shaft Screw
2.02	1	Shaft Lock Washer
2.03	1	Disc
2.04	1	Bearing
2.05	1	Bearing Cover O-Ring
2.06	1	Bearing Cover
2.07	1	Impeller
2.08	2	Teflon Seal
2.09	2	Retaining Ring
2.10	16	Inner Seal Screw
3.01	1	Shaft Seal Ring
3.02	1	Motor Rotor
3.03	1	Stator
3.04	1	Terminal Block
3.05	2	Motor Terminal Box Gasket
3.06	1	Terminal Box
3.07	1	Cover For Terminal Box
3.08	4	Terminal Box Cover Screw
3.09	1	Rear Bearing
3.10	1	End Shield
3.11	3	End Shield Screw
3.12	1	External Fan
3.13	1	Fan Cowl
3.14	4	Fan Cowl Screw
3.15	1	Parallel Key
4.01	4	Silencer Gasket
4.02	2	Silencer Insert Filler
4.03	2	Silencer Insert
4.04	2	Silencer Casing
4.05	4	Silencer Screw
4.06	4	Flange Screw
4.07	2	Flange Cap
4.08	2	Flange Filler
4.09	16	Filler
4.10	2	Silencer Insert
4.11	2	Flange
4.12	4	Flange Screw
4.13	2	Flange Gasket

*Does not apply for 3BA76XX Blowers

3BA7 TWO STAGE
EXPLODED VIEW



No.	Qty.	Description
1.01	1	Cover
1.02	1	Center Section
1.03	1	Housing
1.04	1	Mounting Plate
1.05	4	Plate Mounting Screw
1.06	4	Mouting Plate Washer
1.07	4	Mounting Plate Nut
1.08	1	Stator Support Screw
1.09	1	Stator Support Lock Washer
1.10	2	Stator Support Washer
1.11	1	Stator Support Sleeve
1.12	3	Bearing Cover Screw
1.13	3	Bearing Screw Washer
1.14	3	Bearing Ring Seal
1.15	8	Cover Mounting Screw
1.16	8	Cover Mounting Nut
1.17	4	Motor Mounting Screw
1.18	1	Lifting Ring Nut
1.19	1	Lifting Ring
1.20	2	Blower Cowl
1.21	4	Blower Cowl Screw
2.01	1	Shaft Screw
2.02	1	Shaft Lock Washer
2.03	1	Disc
2.04	1	Bearing
2.05	1	Bearing Cover O-Ring
2.06	1	Bearing Cover
2.07	2	Impeller
2.08	1	Rotary Shaft Seal
2.09	1	Sleeve
2.10	1	Disk
2.11	1	Shaft Seal Ring
2.12	4	Teflon Seal*
2.13	4	Retaining Ring
2.14	32	Inner Seal Screw
3.01	1	Motor Rotor
3.02	1	Stator
3.03	2	Motor Terminal Box Gasket
3.04	1	Terminal Box
3.05	1	Cover For Terminal Box
3.06	8	Terminal Box Screw
3.07	1	Terminal Block
3.08	1	Terminal Block Screw
3.09	1	Rear Bearing
3.10	1	End Shield Disk
3.11	1	End Shield
3.12	4	End Shield Screw
3.13	1	External Fan
3.14	1	Fan Cowl
3.15	4	Fan Cowl Screw
3.16	2	Parallel Key
4.01	4	Silencer Gasket
4.02	2	Silencer Insert Filler
4.03	2	Silencer Insert
4.04	2	Silencer Casing
4.05	4	Silencer Screw
4.06	4	Flange Screw
4.07	2	Flange Cap
4.08	2	Flange Filler
4.09	16	Filler

*Does not apply for 3BA76XX Blowers

Airtech, Inc. ("Company") Warranty Statement

Company warrants that on the date of shipment to Purchaser the goods will be of the kind and quality described herein, merchantable, and free of all defects in workmanship and materials.

If within one year from the date of initial operation, but not more than eighteen months from date of shipment by the Company, of any item of the goods, Purchaser discovers that such item was not as warranted above and promptly notifies Company in writing thereof, Company shall remedy such defect by, at the Company's option, adjustment, repair or replacement of the item and any affected part of the good. Purchaser shall assume all responsibility and expense for removal, reinstallation and freight in connection with the foregoing remedy. The same obligations and conditions shall extend to replacement items furnished by the Company hereunder. Company shall have the right of disposal of items replaced by it. Purchaser shall grant Company access to the goods at all reasonable times in order for Company to determine any defect in the goods. In the event that adjustment, repair or replacement does not remedy the defect, the Company and Purchaser shall negotiate in good faith an equitable adjustment in the contract price.

The Company's responsibility does not extend to any item of the goods which has not been manufactured and sold by the Company. Such item shall be covered only by the express warranty, if any, by the manufacturer thereof. The Company and its suppliers shall also have no responsibility if the goods have been improperly stored, handled or installed, or if the goods have not been operated or maintained according to their ratings or according to the instructions in Company or supplier furnished manuals, or if unauthorized repairs or modifications have been made to the goods.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES (EXCEPT TITLE) INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS, AND CONSTITUTES THE ONLY WARRANTY OF COMPANY WITH RESPECT TO THE GOODS.

The forgoing states Purchaser's exclusive remedy against Company and its suppliers for any defect in the good or for failure of the goods to be as warranted, whether Purchaser's remedy is based on contract, warranty, failure of such remedy to achieve its essential purpose, tort (including negligence), strict liability, indemnity, or any other legal theory, and whether arising out of warranties, representations, instructions, installations, or defects from any cause.

Neither Company nor its suppliers shall be liable, whether in contract, warranty, failure of a remedy to meet its essential purpose, tort (including negligence), strict liability, indemnity or any other legal theory, for loss of use, revenue or profit or for cost of capital or of substitute use or performance or for indirect, liquidated, incidental or consequential damages or for any other loss or cost of a similar type, or for claims by Purchaser for damages of Purchaser's customers.

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www.airtechusa.com

APPENDIX I – QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

for

BROWNFIELD CLEANUP PROGRAM

March 2020
Revised November 2025

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York
Site #C915344

Prepared For:
65 Lake Avenue LLC

Prepared By:

MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been developed by Matrix Environmental Technologies Inc. (METI) for the Lakeside Village Apartments Site located at 65-67 Lake Avenue in the Town of Lancaster, New York. The QAPP was prepared in general accordance with the requirements of Section 2.4 of NYSDEC DER-10: Technical Guidance for Site Investigation and Remediation, dated May 2010 (DER-10).

After completion of the remedial work that is documented in the FER, some VOC-impacted materials remain onsite as residual contamination, which is hereafter referred to as "remaining contamination". The remaining contamination is addressed in the SMP that begins after the FER is approved by NYSDEC. Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment as per the SMP. An Environmental Easement granted to the NYSDEC, and recorded with the Erie County Clerk, requires compliance with this SMP and all ECs and ICs placed on the Site.

The SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC. The QAPP is designed to produce data of the quality necessary to achieve the project objectives. The objective of the quality assurance/quality control (QA/QC) protocol and procedures is to ensure the information, data, and decisions associated with the project are technically sound and properly documented.

1.1 Project Scope

This QAPP presents the project scope, objectives, organization, planned activities, data quality objectives, QA/QC procedures, and sampling procedures. This project will involve subsurface soil, air and groundwater sample collection. A summary of anticipated analytical testing is included in **Table 1**. The goal of the sampling events is to define the nature and extent of post-remedy on-site contamination in both soil and groundwater.

1.2 Project Organization

The general responsibilities of key project personnel are listed below. Resumes are included in **Attachment A**.

Sean R. Carter, P.E. will be the Project Director responsible for project oversight and oversight of the quality assurance program.

Christine M. Curtis, P.E. will be the Project Engineer responsible for data management and report preparation.

Steven L. Marchetti will be the Project Manager responsible for overseeing completion of each task, including the coordination and overall supervision of field activities, schedule, and budget.

Craig D. Zink, **C.P.G., P.G.** will be the Project Geologist responsible for oversight of field activities, including Health and Safety, and maintenance of field soil boring logs.

1.3 Project Subcontractors

Subcontractor specialists may be contracted for services relating to drilling and monitoring well installation, laboratory analytical services, and data validation services. The subcontractors include the following and are subject to change:

- Data Validation - Vali-Data of WNY
- Laboratory Analysis – Eurofins, SGS
- Drilling – METI

2.0 FIELD INVESTIGATION PROCEDURES

Environmental sampling and other field activities will be performed in general accordance with the appropriate techniques presented in the following guidance document.

- DER-10: Technical Guidance for Site Investigations and Remediation; NYSDEC Division of Environmental Remediation, May 2010.

Field activities are described in the following sections.

2.1 Air Monitoring

Air monitoring and screening of volatile organic compounds (VOCs) will be performed with a portable organic vapor meter (OVM) equipped with a photoionization detector (PID) with an 11.7 eV lamp. Monitoring will be conducted during invasive activities such as the installation of soil borings and monitoring wells. Detections above background levels during air monitoring will require that the work be stopped until air monitoring levels decrease to background levels or until health and safety protocol are upgraded and approved by NYSDEC. On-site personnel will be outfitted in modified Level D personnel protection (hardhat, safety glasses, work boots and gloves). For additional details, refer to the Community Air Monitoring Plan (CAMP).

2.2 Soil Borings

Subsurface soil samples will be collected with split-spoon sampling using a rotary drill rig or a direct push rig with stainless-steel dual-tube sampler. Split-spoon samples will be completed in general accordance with ASTM D1586-99 and direct push soil sampling in general accordance with ASTM D6282-98. A soil boring log will be prepared for each location and will include the date, boring location, drill rig type, sample identification, sample depth interval, percent recovery, OVM reading, stratigraphic boundaries, and well installation information.

Soil samples will be visually examined for evidence of suspect contamination (e.g., staining, odor)

and field screened with a calibrated OVM. Portions of the soil samples may be submitted for laboratory analytical testing. Different portions of the soil samples will be placed within sealable plastic bags for screening with the OVM.

Drill cuttings will be visually inspected and screened with an OVM and managed in a manner consistent with DER-10 requirements. Following the completion of soil borings that will not be finished as monitoring wells, drill cuttings will be used to backfill the borehole to 24 inches below surface. The excess cuttings that cannot be replaced into the borehole will be containerized in 55-gallon drums for off-Site disposal.

The drill rig, augers, and tooling will be decontaminated between boreholes at an on-site temporary decontamination pad or area. Decontamination will be accomplished using steam cleaning or high-pressure wash equipment. Sampling equipment will be cleaned manually with non-phosphate detergent (i.e. Alconox) wash and potable water followed by a potable water rinse or a second steam cleaning followed by a distilled/deionized water rinse. All equipment will be cleaned prior to leaving the Site.

For additional details, refer to METI Standard Operating Procedures (SOPs) F-7, F-8, F-9, and F-10 included in **Attachment B**.

2.3 Soil Surface Sampling

Surface soil samples will be collected using dedicated plastic scoops from 0 to 2 inches below grade in each location. If topsoil is present, the topsoil will be removed, and the immediate 2 inches below sampled. The sampled depth interval will be screened for VOCs with the OVM. OVM results and soil descriptions will be recorded on the field soil boring logs.

For additional details, refer to METI SOPs F-7, F-8, F-9, and F-13 included in **Attachment B**.

2.4 Soil Sample Collection

Soil samples for laboratory analysis will be selected in the field based on visual or olfactory observations, OVM screening results, and/or professional judgement. Soil samples selected for VOC analysis will be collected using an Encore or Terracore sampling kit. Samples for VOC analysis will be placed into the appropriate container immediately after opening of the sampler, prior to collecting any field measurements or sample homogenization.

Remaining soil samples will be homogenized using a "coning and quartering" procedure. The soil will be removed from the sampling equipment and transferred to a clean surface (metal foil, steel pan, bowl, etc.) and thoroughly mixed to provide a more homogeneous sample to the lab. An aliquot of the sample will then be transferred to the required sample containers and sealed with the appropriate cap.

Consistent with emergent contaminant sampling requirements, acceptable materials for sampling include stainless steel, high density polyethylene (HDPE), polyvinyl chloride (PVC), silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by NYSDEC. All sampling equipment components and sample containers should not come in contact with

aluminum foil, low density polyethylene (LDPE), glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFC materials must be avoided. Many food and drink packaging materials and "plumbers thread seal tape" contain perfluorinated compounds (PFCs).

All clothing worn by sampling personnel must have been laundered multiple times. The sampler must wear nitrile gloves while filling and sealing the sample bottles.

For additional details, refer to METI SOPs F-10, F-13, and F-24 included in **Attachment B**.

2.5 Monitoring Well Installation

After completion of the soil borings to the target depth, a monitoring well may be installed. A 10 to 20-foot length of 0.010-inch machine slotted well screen will be installed to intercept the top of the water table followed by a riser pipe to the ground surface. The well screen depth will be backfilled with silica sand filter pack (estimated at size #00) from the base to approximately 1 to 2 feet above the well screen. A bentonite seal will be placed above the sand and hydrated to prevent contamination from surface infiltration. The top of the well riser will be cut just below the ground surface for wells located in vehicle or walking pathways and completed with a locking J-plug. The wells will be finished with a flush-mounted road box. All other wells will be completed with a stick-up riser and a locking J-plug.

For additional details, refer to METI SOP F-4 included in **Attachment B**.

2.6 Monitoring Well Development and Sampling

2.6.1 Monitoring Well Development

Monitoring wells will be developed via surge blocking at least 24 hours after grouting is completed. Fluids will not be added during the development process. Water generated during well development activities will be containerized in 55-gallon drums for testing and future off-Site disposal. For additional details, refer to METI SOP F-5 included in **Attachment B**.

2.6.2 Groundwater Sampling

Prior to sample collection, elevations of the top of the monitoring well casings will be surveyed to a common datum (NAVD88), and static groundwater levels will be measured at each of the monitoring wells. Groundwater samples will then be collected using low-flow sampling techniques according to METI SOP F-11, included in **Attachment B**. Groundwater sample collection procedure for PFAS will be done in accordance with NYSDEC protocol and METI SOP F-24, included in **Attachment B**. Purge water generated during sampling activities will be treated onsite with carbon filtration or containerized in 55-gallon drums for testing and future off-Site disposal as appropriate.

2.7 SVE System Effluent Air Sample Collection

SVE system effluent air samples will be collected periodically while the system is operational in accordance with requirements of the Site Management Plan (SMP) and the Operation & Maintenance Plan for the remedial systems.

For additional details, refer to METI SOP F-26 included in **Attachment B**.

2.8 Background Samples

Due to known historical usage of the Site as a dry cleaner and the limited contaminants of concern identified, soils and groundwater samples have not been pre-designed to characterize site background conditions.

2.9 Equipment Decontamination

In order to reduce the potential for cross-contamination of samples collected during the project, sampling equipment will be decontaminated to ensure that data is acceptable. It is anticipated that most of the materials used in sample collection will be disposable one-time use materials, such as sampling containers, bailers, tubing, gloves, etc.

Non-dedicated material such as split spoon samples, stainless steel mixing bowls, drill rig, water-level indicator, etc., will be decontaminated by the following methods:

- Steam clean the equipment within a dedicated decontamination area; or
- Decontamination typically involves scrubbing/washing with a laboratory grade detergent (e.g. alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system.

The effectiveness of the equipment decontamination of non-dedicated sampling equipment will be evaluated via analytical testing of equipment rinsate blanks. Decontamination liquids, disposable equipment, and PPE will be containerized for future disposal.

2.10 Storage and Disposal of Investigation-Derived Waste

The sampling methods and equipment have been selected to limit the need for decontamination and the volume of waste material to be generated. Following the completion of soil borings that will not be finished as monitoring wells, drill cuttings will be used to backfill the borehole. The excess cuttings that cannot be replaced into the borehole will be containerized in 55-gallon drums for off-Site disposal. Development and purge water generated during well development and/or sampling activities will be treated onsite with carbon filtration and discharged to surface or containerized in 55-gallon drums for testing and future off-Site disposal as appropriate.

Personal protective equipment and disposable sampling equipment will be placed in plastic garbage bags for disposal as a non-hazardous waste.

2.11 Survey/Site Mapping

A Site base map will be maintained and updated with future sampling locations. Soil boring and monitoring well locations will be field located and incorporated within the survey. Elevations of the ground surface and top of PVC riser will be measured for each monitoring well. A current Site Plan is included as **Figure 1.**

3.0 SAMPLE HANDLING and MANAGEMENT

Various environmental samples will be collected during investigation and remedial activities. The procedures below will assist in documentation and tracing of the various samples.

During sampling, field personnel will wear disposable or latex or nitrile gloves. Gloves will be changed and discarded between sampling locations.

Laboratory analysis samples will be placed in new laboratory-grade containers. Appropriate sample preservatives will be added to the sample containers by the laboratory prior to delivery to the project site. The specific volume and preservation of samples, if any, is summarized on **Table 2**. Samples will be shipped to the laboratory within 48 hours of sample collection. Samples will be kept on ice in coolers for shipment to the analytical laboratory.

3.1 Sample Label and Identification

Each field and QC sample will be identified by a self-adhesive, non-removable label placed on the sample containers as detailed in METI SOP F-20, included in **Attachment B**. Quality control (QC) field duplicate samples will be submitted blind to the laboratory; a fictitious sample identification will be created using the same system as the original. The sample identifications (of the original sample and its field duplicate) will be marked in the project specific field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager.

3.2 Chain of Custody

Samples will be packaged into coolers used for shipment. A chain-of-custody form will trace the path of sample containers from the project site to the laboratory. The chain-of-custody documentation will accompany the samples from their inception until analysis. Refer to METI SOPs F-19 and F-21, included in **Attachment B**, for further details.

4.0 FIELD DOCUMENTATION

Daily field activities will be recorded in a bound field notebook. The field notebook will include the following daily information for Site activities:

- Date, time of arrival, time of departure, weather conditions.
- Field staff, subcontractors or other personnel on site.
- Description of field activities and location of work area.

- Equipment used on site (such as drill rig)
- Field observations and descriptions, such as soil descriptions, well installation information, evidence of contamination, staining, odors, etc.
- Field measurements (OVM, water quality readings) and calibration
- Sampling locations, depths, identification numbers, time, etc.
- Sampling location measurements.
- Chain of custody information
- Modifications to scope of work or issues encountered.

Field notes may be transferred to soil boring logs or monitoring well forms as part of the RI. Typical forms to be utilized during the field investigation may include:

- Daily Field Report
- Soil Boring Log or Test Pit Log (included in SOP F-9)
- Monitoring Well Installation Log
- Well Development Data Sheet
- Chain of Custody

5.0 ANALYTICAL LABORATORY QA/QC PROTOCOLS

This section describes the analytical methods, principles, and procedures that will be used to generate quality data. These protocols include laboratory calibration, field equipment calibration, QC sample collection and analysis, quantitative evaluation of data quality protocols, and data qualification, if necessary.

5.1 Analytical Methods, Procedures and Calibration

Chemical analysis for samples collected during the field work will be completed by a laboratory capable of performing project specific analysis as included in this QAPP.

5.1.1 Analytical Methods

Sample analytical analysis will be consistent with the NYSDEC ASP Category B requirements. Specific methods and references for each parameter, including sample preservation and holding times, are shown in **Table 2**. Quantification and detections limits for all analysis are those specified under the appropriate test methods.

NYSDEC has provided specific laboratory requirements associated with 1,4-dioxane and PFAS analytical methods, which are included in **Attachment C**.

5.1.2 Laboratory Instrumentation & Equipment

Laboratory instruments and equipment will be calibrated following SW-846 analytical methods protocol and laboratory requirements.

5.1.3 Field Equipment

Various field equipment, including the OVM, particulate meter, and water quality meters, will be used during the project. Calibration of the field equipment will be complete in accordance with manufacturer's specifications prior to the start of each day.

5.2 Quality Control Samples

Laboratory SOPs for the analytical methods detailed in **Table 1** address the quality control to be used and the frequency of replicates, blanks and calibration standards for laboratory analytical equipment. Several types of field QC samples will be collected and submitted for laboratory analysis including trip blanks, sample duplicate, matrix spike (MS) and matrix spike duplicate (MSD).

Trip Blanks

A trip blank sample monitors for potential impacts due to handling, transport, cross contamination from other samples during storage or laboratory contamination. The trip blanks will be submitted for analysis of aqueous VOCs only and will consist of analyte-free reagent grade water in VOC sampling containers. Trip blanks will be prepared at the laboratory, sealed, transported to the Site and returned without being opened to assess contamination that may have occurred during transport. Trip blanks will be submitted at a rate of one per cooler when aqueous VOCs are shipped to the laboratory.

Field Duplicates

Blind duplicate samples are used to assess field and laboratory precision as well as matrix heterogeneity. The samples are separate aliquots of the same sample collected from the same location, at the same time, and in the same manner as the first, placed into a separate container. Each duplicate sample will be analyzed for the same parameters as the original sample collected that day. Blind duplicates will be collected at a frequency of 1 per 20 environmental samples of a given matrices (i.e. soil or groundwater).

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD samples are used to monitor precision and accuracy of the analytical method on various matrices. The samples are spiked with known quantities of target analytes at the laboratory. The MS/MSD will be collected at a frequency of 1 pair per 20 environmental samples of a given matrices (i.e. soil or groundwater).

Equipment Blanks

Equipment blanks are used to quantify potential contamination from sample instruments used to collect and/or transfer samples. The equipment blank will be generated by passing distilled water through and over cleaned sampling equipment. Equipment blank samples will not be performed when dedicated disposal equipment is used. The equipment blank will be collected at a frequency of 1 per 20 environmental samples of a given matrices (i.e. soil or groundwater).

5.3 Corrective Actions

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken to resolve problems and restore proper functioning of the analytical system. Actions may

include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work. Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

6.0 DATA USABILITY

The main objective of the DUSR is to determine whether the data presented meets the project-specific needs for data quality and data use. Data validation will be performed and a Data Usability Summary Report (DUSR) will be prepared where necessary to meet NYSDEC requirements. The DUSR will be completed in general accordance with Appendix 2B of DER-10. Waste characterization and/or delineation samples will not be validated.

TABLES

TABLE 1
Analytical Testing Program Summary
Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, NY
NYSDEC Brownfield Cleanup Program Site #C915344

Methodology	Matrix	TCL VOCS	TCL SVOCs	TAL Metals (Total)	TAL Metals (Dissolved)	TCL PCBs	Pesticides/ Herbicides	1,4-dioxane	PFAS
EPA Method	**Soil**	**8260**	**8270**	**6010, 7470**	**6010, 7470**	**8082**	**8081/8151**	**8270-SIM**	**1633**
EPA Method	**Air**	**TO-15**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
EPA Method	**Water/ Groundwater**	**8260C**	**8270D**	**6010C, 7471A**	**6010C, 7471A**	**8082A**	**8081/8151**	**8270-SIM**	**1633**

Notes:

TCL VOCs - Target Compound List Volatile Organic Compounds.
TCL SVOCs - Target Compound List Semi-volatile Organic Compounds.
TAL Metals - Target Analyte List Metals.
TCL PCBs - Target Compound List Polychlorinated Biphenyls.
PFAS - Polyfluoroalkyl Substances

TABLE 2
Sample Container, Volume, Preserving and Holding Time Requirements
Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, NY
NYSDEC Brownfield Cleanup Program Site #C915344

PARAMETER DESCRIPTION	MATRIX	METHOD NO.	Quantity/ Bottle Type	Preservation	Holding Time
Soil Samples					
Volatiles, TCL list	Soil	5035/3035A/8260	Encore or Terracore Samplers	Freeze within 48 hours	Freeze within 48 hours 14 days
Semi-Volatiles, TCL list	Soil	8270	(1) 4oz glass jar	Cool, 4 C	14 days
Metals, TAL	Soil	6010/7470	(1) 4oz glass jar	none	180 days, Mercury 28 days
PCBs	Soil	8082	(1) 4oz glass jar	Cool, 4 C	365 days/40 days from extraction
Pesticides	Soil	8081	(1) 4oz glass jar	Cool, 4 C	14 days/40 days from extraction
Herbicides	Soil	8151	(1) 4oz glass jar	Cool, 4 C	14 days/40 days from extraction
1,4-Dioxane	Soil	8270-SIM	(1) 8oz glass jar	Cool, 4 C	14 days
Polyfluoroalkl Substances (PFAS)	Soil	Method 1633	(1) 8oz glass jar	Cool, 4 C	28 days
Air Samples					
Volatiles, TCL list	Air	TO-15	(1) Tedlar bag - 1 L	Keep out of sunlight	3 days
Water Samples					
Volatiles, TCL list	Water	8260	(3) 40ml vial	Cool, 4 C, HCL	14 days
Semi-Volatiles, TCL list	Water	8270	(2) 1 liter amber	Cool, 4 C	7 days
PCBs	Water	8082	(2) 1 liter amber	Cool, 4 C	7 days/40 days from extraction
Pesticides	Water	8081	(2) 500ml amber	Cool, 4 C	7 days/40 days from extraction
Herbicides	Water	8151	(2) 1 liter amber	Cool, 4 C	7 days/40 days from extraction
Metals, TAL	Water	6010	(1) 250ml plastic	HNO3	180 days
Mercury, Total	Water	7470	(1) 250ml plastic	HNO3	28 days
Metals, TAL (dissolved) field filtered	Water	6010	(1) 250ml plastic	HNO3	180 days
Mercury, Dissolved	Water	7470	(1) 250ml plastic	HNO3	28 days
1,4-Dioxane	Water	8270-SIM	(2) 500ml amber	Cool, 4 C	7 days
Polyfluoroalkl Substances (PFAS)	Water	Method 1633	2 plastic/1 plastic/1 H20 plastic*	Cool, 4 C	14 days

* Three bottles in kit provided by lab. These bottles will be kept separate from other bottles that may have teflon lids.

FIGURES

PREPARED BY:
MATRIX
ENVIRONMENTAL TECHNOLOGIES INC.
3730 California Road
P.O. Box 427
Orchard Park, NY 14127
p:716.662.0745
www.matrixbiotech.com

PREPARED FOR:
65 Lake Avenue LLC

PROJECT MGR: SLM

DESIGNED BY: CMC

REVIEWED BY: SRC

DRAWN BY: CMC

REVISION

BY	DATE
CMC	3/19/20

SCALE IN FEET: NOT TO SCALE
0

PROJECT NAME / LOCATION:
Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, New York

BCP Site No. C915344

TITLE:
Aerial View
Site Plan

DATE: NA

PROJECT NO.: 18-046

FIGURE: 1

30 years dedicated to a CLEANER ENVIRONMENT 1991-2021

ATTACHMENT A

METI RESUMES

Sean R. Carter, P.E.
President/Principal Engineer

Education

M.S., Agricultural and Biological Engineering
Cornell University

B.S., Agricultural and Biological Engineering
Cornell University

Professional Registrations

2006, Licensed Professional Engineer, New York State, #083593-1

2011, Licensed Professional Engineer, Pennsylvania #PE078921

Affiliations and Certifications

Certified for Work at Hazardous Waste Sites (OSHA 29 CFR 1910.120)

ASTM Risk-Based Corrective Action (RBCA) Certified

American Chemical Society

American Society of Civil Engineers

National Groundwater Association

Summary of Experience

Mr. Carter is an Environmental Engineer with over 25 years experience in remediation, water, air and waste treatment processes. He has designed, field-tested and operated biological, chemical and physical treatment systems for a wide range of waste streams. He was the design engineer for the Matrix Oxygen Injection System and MATRIX Biofilter. Mr. Carter takes on challenging remediation projects that require creative solutions to meet client and regulatory goals. He also works on projects with shared risks and guaranteed or performance based contracts.

His professional career began in agricultural waste management and wastewater treatment. At Cornell University he worked on a team of engineers and microbiologists to develop biotreatment systems for solvent contaminated groundwater, industrial waste and sewage. His research focused on the bench scale development of anaerobic reactors for the dechlorination of halogenated organics. He currently provides innovative technologies and remediation consulting services to a wide range of companies in the environmental field.

Areas of Specialization

- Remediation System Design
- Application of Microbial Processes to Site Assessment and Remediation
- Biological Treatment of Soils and Groundwater
- Protection and Treatment of Aquifers and Potable Water
- Design of Biofiltration Systems for Air Treatment
- Remediation and Redevelopment of Distressed Properties
- Agricultural Waste Management
- Wastewater Treatment

Publications

S.R. Carter, N. Minute, H. Akers, T. Ruth, and T. France (2013). Remediation of a Petroleum Hydrocarbon Plume in Low-Permeability Soils Using Engineered Biobarriers, Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies Conference, June 10-13, 2013. Jacksonville, Florida.

J.M. Baker, D.M. Conley, S.R. Carter, and J.P. Gwinn (2013). Stimulating Intrinsic Biodegradation with Oxygen (o2) Injection: A Success Story, Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies Conference, June 10-13, 2013. Jacksonville, Florida.

Biondolillo, J., Peck, D., Carter, S.R., and Porter, D. (2011). Bioremediation of a Petroleum and Solvent Plume During Redevelopment of a Municipal Facility, Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies Conference, June 27-30, 2011, Reno, Nevada.

Butler, C., Mott-Smith, E., Turner, T.R., Spalvins, E., and Carter, S.R. (2011). Injection of Oxygen in Deep Horizontal Wells for the Biostimulation of PAH Degradation at a Former Wood Treating Superfund Site, Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies Conference, June 27-30, 2011, Reno, Nevada.

O'Neil, M.J., Parillo, J.R., Terry, D.B., Ryan, W.J., Leissing, T.O., Carter, S.R., Cross, G.W., and Omorogbe, A.M., Evaluation of the Hydrologic Effects of Oxygen Injection for Biostimulation in an Upper Glacial Aquifer on Long Island, National Ground Water Association, Northeast Regional Conference, June 23 and 24, 2008, Long Island, NY.

Morse, W.R., Brochu, W.J., Carter, S.R., Gibbs, J.A., Begley, J.F., Perriello, F.A., DiCesare, G.A. (2002). Treatment of MTBE Impacted Sites Using Biostimulation, National Petroleum Retailers Association, 2002 Environmental Conference, September 8-10, 2002, New Orleans, LA.

Zamojski, L.D., Stachowski, J.R. and Carter, S.R. (1999). A case history of enhanced bioremediation utilizing pure oxygen injection, In: *In Situ* Bioremediation of Petroleum Hydrocarbons and Other Organic Compounds, Bruce C. Alleman and Andrea Leeson (Eds.), Battelle Press, 5(3): 65-70, 1999.

Zamojski, L.D., Stachowski, J.R. and Carter, S.R. (1998) . Biodegradation case history at a heavily contaminated petroleum site utilizing pure oxygen injection, IGT International Symposium on Environmental Biotechnologies and Site Remediation Technologies, Orlando, FL.

Carter, S.R. (1998). Process increases pure oxygen to aid in biodegradation of MTBE, Soil & Groundwater Cleanup.

Carter, S.R. and Clark. J.E. (1995). Oxygen-enhanced *in situ* bioremediation in a sand and gravel aquifer, In: *In Situ* Aeration: Air sparging, Bioventing and Related Remediation Processes, Robert E. Hinchee, Ross N. Miller and Paul C. Johnson (Eds.), Battelle Press.

Carter, S.R. and Jewell. W. J. (1993). Biotransformation of tetrachloroethylene by anaerobic attached films at low temperatures, *Water Research*, 27(4): 607-614.

Jewell, W.J., Carter, S.R., Fennell, D.E., Hicks, E.E., Nelson, Y.M., Nock, T.D., Richards, B.K. and Wilson, M.S. (1993). Methanotrophs for biological pollution control: TCE removal and nutrient removal with the expanded bed, Two year final report, January 1, 1991 - December 31, 1992, GRI - 93/10455, Gas Research Institute, Chicago, IL.

Carter, S.R. (1991). Low temperature biodegradation of tetrachloroethylene in an anaerobic attached film process, M.S. Thesis, Cornell University, Ithaca, NY.

Jewell, W.J., Carter, S.R., Chu, K.H., Fennell, D.E., Nelson, Y.M., White, T.E. and Wilson, M.S. (1990). Methanotrophs for biological pollution control: TCE removal and nutrient removal with expanded bed, Annual report, April 1, 1990 - December 31, 1990, GRI - 91/0274, Gas Research Institute, Chicago, IL.

Abstracts

Carter, S.R., Morse, W.R., Davis, G., Reynolds , S. and Pfiffner, S.M. (2003). MTBE biodegradation under oxygen-enhanced conditions; field and laboratory results, Seventh International In Situ and On-Site Bioremediation Symposium, June 2-5, 2003, Orlando, FL.

Carter, S.R., Gibbs, J.A. and Morse, W.R., (2001). Biodegradation of MTBE in groundwater under oxygen-enhanced conditions, presented at the Sixth International In Situ and On-Site Bioremediation Symposium, June 4-7, 2001, San Diego, CA.

Carter, S.R., Bender, D.J., and Morse, W.R. (1999). An innovative oxygen injection process for the treatment of groundwater, presented at the Fifth International In Situ and On-Site Bioremediation Symposium, San Diego, CA.

Carter, S.R. and Oppenheim, J.R. (1997). Control of volatile organic compounds and odor causing agents from air streams with a biofiltration process, presented at New York Water Environment Association, Inc., 69th Annual Conference, New York, NY.

Carter, S. R., Bullock, J.M. and Morse, W.R. (1997). Enhanced biodegradation of MTBE and BTEX using pure oxygen injection, *In Situ* and On-Site Bioremediation, Volume 4, Fourth International In Situ and On-Site Symposium, Pg. 147.

Carter, S.R., (1995). Full-scale treatment of vapor-phase petroleum hydrocarbons with a novel biofiltration process, *In Situ* and On-Site Bioreclamation, The Third International Symposium, Poster Abstract, April 24-27, 1995, San Diego, CA.

Carter, S.R. and Jewell, W. J. (1993). Biotransformation of tetracholorethylene (PCE) by an anaerobic attached film process at 15°C, *In Situ* and On-Site Bioreclamation, The Second International Symposium, Poster Abstracts, April 5-8, 1993, San Diego, CA.

Patents and Trademarks

U.S. Patent No. 5,891,711, Bioremediation apparatus for the removal of volatile organic compounds in hydrocarbon contaminated vapors

U.S. Patent No. 5,874,001, Groundwater remediation method, Oxygen injection process for the *in situ* bioremediation of groundwater

Registration No. 2,158,194, MATRIX®, Biofilters for non-laboratory use, namely, for bioremediation

Christine Curtis, P.E.
Environmental Engineer

Education

B.S., 2012,
Biological Engineering,
Bioenvironmental
Concentration,
Cornell University

M.S., 2013,
Master of Engineering
Cornell University

Professional Registrations

2018, 2006, Licensed Professional Engineer, New York State, #100560

Affiliations and Certifications

Certified for Work at Hazardous Waste Sites (OSHA 29 CFR 1910.120)

Summary of Experience

Ms. Curtis has been with Matrix for 8 years with tasks primarily focused on environmental site investigation and remediation. She has participated in the successful remediation of sites including underground storage tank closures, environmental site investigation, and remedial system design and installation. Ms. Curtis has experience managing numerous remediation projects at once, all in various phases of completion. She has also successfully managed individual projects from initial site assessment, through investigation and remedial design, participating in pilot testing, design, implementation, system operation and maintenance, post-remediation monitoring, and closure. In addition to overseeing engineering aspects of projects, Ms. Curtis also manages sampling schedules, reviews and analyzes analytical data, completes reports, and consults with clients and regulators.

Areas of Specialization

- Project management
- Remedial investigations
- Remedial design
- Field oversight
- Communication between site owner and state regulatory agencies
- Subcontractor/crew management

Steven Marchetti
Senior Project Manager

Education

B.S., Environmental Studies
SUNY College of Environmental Science and Forestry, Syracuse, New York

Affiliations and Certifications

Certified for Work at Hazardous Waste Sites (OSHA 29 CFR 1910.120)

10 Hour OSHA Outreach Construction Safety Training

Summary of Experience

Mr. Marchetti joined Matrix Environmental in 1995 as an environmental technician. He was soon advanced to Senior Project Manager due to his expertise, productivity, and client management skills. Mr. Marchetti assumes the major responsibility for two major retail petroleum clients. He also prepares monthly schedules for all technical and professional site personnel, and coordinates this schedule with subcontractors and all other third party professionals. He also coordinates any rescheduling on both a weekly and daily basis as the need arises. In addition, he is also responsible for providing tools, equipment and services during the preparation and actual execution of remedial or investigative actions at project sites and manages the expenditures, subcontractors and project personnel.

He has a strong background in environmental studies, health and safety, site investigations, remedial design, NYSDEC and remedial O&M program management and optimization. He is currently managing public sector programs at both the state and local level. These programs include general term contracts that provide various services including: SPDES Permitting, Phase I, II, III site investigations & remediation, Brownfields Assessment & Cleanup, Indoor Air Quality studies, PBS projects, and Health & Safety planning. He has planned, managed and reported on voluntary cleanup and Brownfield programs.

Areas of Specialization

- Experience with all phases of environmental site assessments and remediation
- Soil, groundwater, and air sampling analysis
- Coordination for onsite drilling and knowledge of well installation methods and applications
- Technical field service support for installation, operation and maintenance of remediation systems
- Executes remedial investigations and prepares feasibility studies
- Manages and coordinates numerous projects
- Data analysis and technical report preparation
- Schedules personnel and coordinates with subcontractors for field operations
- Interacts with federal, state, and local officials

Craig D. Zink, C.P.G., P.G.
Senior Project Manager/Geologist

Education

B.S., Geology,
Concentration:
Environmental
Science
SUNY College at
Cortland

Graduate Courses:
Leadership and
Motivation,
Personal Leadership
Canisius
College

Professional Registrations

Professional Geologist
Commonwealth of
Pennsylvania
PG-002769-G

Certified Professional
Geologist
American Institute of
Professional Geologists
CPG 9687

Affiliations and Certifications

Certified for Work at
Hazardous Waste Sites
(OSHA 29 CFR
1910.120)
National Groundwater
Association

Summary of Experience

Mr. Zink is a Professional Geologist and Project Manager with 32 years of experience in subsurface investigation and remediation of retail and bulk storage petroleum facilities, commercial and residential properties, railways and landfills. His experience includes subsurface investigations and site characterization, response to petroleum-related emergencies, data analysis, report and proposal preparations, remedial system design, management of remedial system installation, operation and maintenance, and negotiations with regulators.

Mr. Zink has over 20 years of experience supervising environmental professionals and opened the local office for Groundwater and Environmental Services in Buffalo, New York, managing the operations for twelve years. He is experienced in financial and operations management for environmental services, business planning and forecasting, hiring and staffing, resources management, and health and safety stewardship at the activity, staff and office level.

Mr. Zink has seventeen years experience as an Environmental Services Account Manager for clients in the petroleum industry. He has managed environmental programs for multiple site portfolios in New York, New Jersey and Pennsylvania, negotiated terms and conditions for services, and provided regulatory negotiations for project action plans.

Areas of Specialization

- Geologic and Hydrogeologic Evaluations
- Remedial Investigations/Feasibility Studies
- Environmental Site Assessments
- Remedial Action Plan (RAP) Development
- Technical Field Service Support
- Project Management

ATTACHMENT B

METI STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE F-4: MONITORING WELL INSTALLATION

Summary:

Monitoring wells will be constructed to supplement the existing monitoring well network. A rotary drill rig will be used to install the wells to ensure proper construction.

Equipment:

A Central Mining Equipment Model 85 rotary drill rig equipped with 4¼-inch hollow stem augers will be used to install the monitoring wells.

Materials:

- 2-inch ID, 0.020-inch, ASTM thread SCH 40 PVC well screen
- 2-inch ID, ASTM thread SCH 40 PVC riser
- Threaded end cap
- #00-grade silica sand
- Bentonite pellets
- Portland cement
- Concrete mix
- 4-inch ID x 60-inch L cylindrical steel casing with hinged cover and provision for installation of padlock
- Keyed-alike padlock(s) with registered serial number

Procedure:

The monitoring wells will be installed in borings in which split-barrel samples have been obtained. Refer to SOP F-10 for augering procedures.

1. Remove center plug from augers and verify borehole depth using weighted measuring tape.

2. Insert a six-inch deep threaded PVC plug to one end of a 10-foot section of well screen. The plug will serve as a sump.

3. Slowly lower the screen into the augers. Continually add sections of screen while lowering. The objective is to ensure that a minimum of five feet of screen extends upward into the unsaturated zone.

4. Finish with riser making sure that at least three feet protrudes above ground surface.

5. Pour sand into the annulus between the augers and the monitoring well while simultaneously slowly retracting the augers one or two feet at a time. Tamp the sand with a weighted tape to force it into the voids as the augers are removed. The rate of removal of the augers from the

borehole should closely follow the rate that the sand pack fills the borehole. Repeat until the sand pack is the desired depth above the screen.

6. Add a layer of bentonite pellets above the sand while continuing to retract the augers. Hydrate the pellets with a bucket of clean water.

7. Prepare a grout mixture with the following specifications:

- 1.5 to 3.0% powdered bentonite
- 40 to 60% Portland Type I cement
- 40 to 60% clean tap water

8. Add grout to borehole through tremie pipe or hose from the top of the bentonite seal to the ground surface.

9. Remove remaining augers from borehole.

10. Top off grout in borehole. Grout should extend to approximately two feet below ground surface.

11. Trim well riser pipe to three feet above ground surface and install an expandable plug.

12. Prepare two 80-pound bags of concrete mix according to manufacturer's instructions. Pour the concrete into the remaining annulus, place the protective casing over the well, and suspend three inches above the top.

13. Pour the remaining concrete around the casing, shaping a circular pad which extends four-inches above ground surface and one-foot outward. The pad will slope slightly outward such that surface water will drain away from the well. Use a level to plum the casing. Drill a ¼-inch weep hole at the base of the casing to allow for internal drainage.

14. Install a padlock on the hinged cover.

15. Document the procedure in the field notebook. The following data should be recorded:

- Monitoring well identification
- Beginning and ending dates and times of well construction
- Weather conditions
- Subcontracting company
- Name of driller and assistant(s)
- Drill rig make and model
- Auger type and size
- Borehole diameter
- Estimated depth of groundwater while augering
- Depth of complete well, well diameter, screen slot size and type, riser type, screened interval, sand pack grade, sand pack interval, bentonite seal type and thickness, grout

mixture specifications, grouted interval, type and depth of protective casing, concrete pad dimensions.

- Any other pertinent details such work stoppage, problems and resolutions, alternative drilling methods and reasons for, etc.

Well construction details will be summarized in graphical format for inclusion in the final report.

STANDARD OPERATING PROCEDURE F-5: WELL DEVELOPMENT

Summary:

Following completion of drilling and well installation, each monitoring well will be developed by surge blocking until the discharged water is relatively sediment free. Developing the well not only removes any sediment, but also may improve the hydraulic properties of the formation and facilitate more accurate determination of hydraulic conductivity. The effectiveness of the development measures will be closely monitored in order to keep the volume of discharged water to the minimum necessary to obtain sediment free samples.

Equipment:

- Geoprobe® direct-push equipped with 80 feet of drive rods and a 1¾" ID solid PVC surge block
- Grundfos® Redi-Flo 2 system which includes a Model MP1 1½ OD stainless-steel submersible pump with 80 feet of cable and Model BMI/MP1 115-volt power converter/regulator
- Portable generator
- ½-inch ID dedicated black polyethylene pipe
- Nylon rope
- 55-gallon drums

Procedure:

1. Measure pH, temperature, conductivity, and turbidity in a groundwater sample per SOP F-14 and SOP F-16.

2. Attach the surge block to end of lead drive rod. Assemble enough drive rods such that the surge block is located near the bottom of the well.

3. Using the Geoprobe® hydraulics, raise and lower the surge block the entire five-foot range of the mast. Repeat for approximately five minutes.

4. Remove 10 feet of the drive rods and proceed as in Step 2. Continue removing lengths of drive rods until the entire water column has been surged.

5. Clean the submersible pump with tap water followed by a triple-rinse with deionized water.

6. Install enough piping to the discharge port of the pump to account for the entire water column.

7. Attach nylon rope to the eyelet at the top of the pump.

8. Lower the pump to the bottom of the monitoring well using the nylon rope, raise up five feet, and secure the rope to the well casing with an S-hook or similar hardware. Be sure the electric cable does not bind in the well.

9. Attach the pump electric cable to the power converter.

10. Activate the generator and allow warm up. Test the voltage output of the generator to ensure that it is within the manufacturer's specified range for operation of the Redi-Flo 2 system.

11. Plug the power converter into the 115-volt outlet on the generator. The frequency reading should be 0 hertz (Hz). If not, refer to the troubleshooting guide in the operations manual.

12. Set the converter speed dial to full speed and press the start/stop switch to the start position.

13. Groundwater discharge should occur within a few to several seconds depending on the depth of the well. Groundwater will be discharged directly into the drums. If necessary, periodically gauge the depth to groundwater to determine if the flow rate requires adjustment.

14. Pump for approximately 10 minutes. Raise the pump 10 feet and pump for approximately 10 minutes. Repeat until each 10-foot increment of the water column has been pumped. Remove the pump from the well.

15. Repeat Steps 1-14 two additional cycles.

16. Repeat Step 1. A well will be considered appropriately developed if three successive measurements of temperature, conductivity, and pH are within 10% of each other and the turbidity is less than 50 NTU's. Continue surge and pump process until parameters have stabilized.

Containerized groundwater may be discharged to the ground surface if laboratory analysis of samples from the well indicates that it is contaminant-free. Otherwise, the water may be treated on-site using a mobile air stripper, activated carbon, or both. If the groundwater exhibits a hazardous waste characteristic or contains a listed hazardous waste, the material will be managed as hazardous waste.

STANDARD OPERATING PROCEDURE F-7: UNIFIED SOIL CLASSIFICATION SYSTEM

Summary:

Soils are classified for engineering and geological purposes according to the Unified Soil Classification System (USCS) adopted by the U.S. Army Corps of Engineers and U.S. Department of the Interior Bureau of Reclamation. Soil properties which form the basis for the USCS are:

- Percentage of gravel, sand, and fines
- Shape of the grain-size distribution curve
- Plasticity and compressibility characteristics

According to this system, all soils are divided into three major groups: coarse-grained, fine-grained, and highly-organic (peaty). The boundary between coarse-grained and fine- grained soils is taken to be the 200-mesh sieve (0.074mm). In the field, the distinction is based on whether the individual particles can be seen with the unaided eye. If more than 50% of the soil by weight is judged to consist of grains that can be distinguished separately, the soil is considered to be coarse-grained.

The coarse-grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50% of the visible grains are larger than No. 4 sieve (3/16 inch). They are each divided further into four groups:

W: Well graded; fairly clean (<5% finer than 0.074 mm)

P: Poorly graded (gap-graded); fairly clean (<5% finer than 0.074 mm)

C: Clayey (>12% finer than 0.074 mm); plastic (clayey) fines. Fine fraction above the A-line with plasticity index above 7.

M: Silty (>12% finer than 0.074 mm); non-plastic or silty fines. Fine fraction below the A-line and plasticity index below 4.

The soils are represented by symbols such as GW or SP. Borderline materials are represented by a double symbol, as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower than 50% (L), or higher 50% (H).

The distinction between the inorganic clays (C), the inorganic silts (M), and organic soils (O) is made on the basis of a modified plasticity chart. Soils CH and CL are represented by points above the A-line, whereas soils OH, OL, and MH correspond to positions below the A-line. Soils ML, except for a few clayey fine sands, are also represented by points below the A-line. The organic soils O are distinguished from the inorganic soils M and C by their characteristic odor and dark color.

Equipment:

A W.F. McCullough Geotechnical Gauge will be used as a field reference by any personnel classifying soils to maintain consistency in interpretation. The Gauge is a plastic card which includes a summary of the USCS system with visual aids. A copy of the Gauge is attached.

Procedure:

ASTM Standard D 2488-90: *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)* will be used as a guide for characterizing the following parameters as applicable:

1. predominant soil type
2. color
3. moisture content
4. grain size
   a. estimated maximum grain size
   b. estimated percent by weight of fines (passing #200 sieve0
5. gradation
6. grain shape
7. plasticity
8. secondary components
9. classification symbol

STANDARD OPERATING PROCEDURE F-8:
VOC SCREENING WITH PHOTOIONIZATION DETECTOR

Summary:

Soil is screened for total volatile organic compound (VOC) concentration using an organic vapor meter (OVM) equipped with a photoionization detector (PID). PIDs are useful in the field for soil segregation, targeting samples for laboratory analysis, and determining no-action boundaries. For this project, the instrument will be calibrated to measure total VOC concentration. When the instrument is activated, it will immediately function as desired without additional programming.

Equipment:

Thermo Environmental Model 580B or RAE Systems MiniRae 3000 organic vapor meter equipped with 10.6 or 11.7 eV lamp.

Procedure:

Calibration:

1. Power up unit using power plug.
2. Depress ON/OFF key to ignite lamp and initiate sample pump
3. Depress MODE/STORE key
4. Depress -/CRSR key in response to LOG THIS VALUE? prompt
5. Depress -/CRSR key to select Parameters Mode from the Main Menu
6. Depress +/INC key to advance through the Run Mode Selection parameter prompt
7. Depress +/INC key to advance through the Auto Logging Mode Selection parameter prompt
8. Depress +/INC key to advance through the Average Time Selection parameter prompt
9. Depress +/INC key to advance through the Alarm Setting parameter prompt
10. Depress +/INC key to advance through the Lamp Selection parameter prompt
11. Depress +/INC key to advance through the Response Factor Setting prompt
12. Depress RESET key to initiate calibration sequence
13. Depress -/CRSR key to decline restoration of the backup calibration

14. Connect outlet of calibration tubing assembly to the detector inlet
15. Introduce zero air to the instrument by opening the flow regulator
16. Depress RESET key to “zero” the instrument
17. Close the flow regulator
18. Simultaneously depress RESET and -/CRSR keys to activate the movable cursor
19. Repeat Step 18 until the cursor is at the “ones” place
20. Simultaneously depress RESET and -/CRSR keys to increment the ones place value
21. Repeat Step 20 until the ones place value reads 0
22. Repeat Step 18 to move the cursor to the “tens” place
23. Repeat Step 20 until the tens place value reads 1
24. Repeat Step 18 to move the cursor to the “hundreds” place
25. Repeat Step 20 until the hundreds place value reads 0
26. Repeat Step 18 to move the cursor to the “thousands” place
27. Repeat Step 20 until the thousands place value reads 0
28. The LCD should now read:

    SPAN PPM = 0100

    “+” TO CONTINUE

29. Depress +/INC to accept the span concentration value
30. Connect isobutylene cylinder (100 ppm)
31. Connect outlet of calibration tubing assembly to the detector inlet
32. Introduce isobutylene standard by opening flow regulator
33. Reset key to “CALIBRATE” the instrument
34. Close flow regulator
35. Depress +/INC key in response to RESET TO CALIBRATE message
36. Depress MODE/STORE to return to the Run Mode

Operation:

The unit will operate on battery power for up to eight hours when fully charged. All service vehicles used on-site will be equipped with an auxiliary power supply and a power inverter in the event that direct power is required.

1. Depress ON/OFF key to ignite lamp and initiate sample pump.

2. Record background or ambient air VOC concentration from the LED display.

3. Obtain representative soil sample and transfer immediately to a properly labeled 4-ounce (minimum) glass jar with a Teflon-lined cap.

4. Tamp lightly with a plastic knife or spoon to minimize headspace. Discard after use.

5. Seal container with aluminum foil and cap.

6. Within five (5) minutes, remove the cap and lightly puncture the foil with the sample tip of the PID.

7. Record the high reading in the field notebook and immediately replace cap.

STANDARD OPERATING PROCEDURE F-9: GEOLOGIC LOGGING

Summary:

Comprehensive geologic logging of intrusive soil samples will be performed to help develop a conceptual model of subsurface geologic and hydrogeologic conditions. All entries will be made in the sampler's field notebook and will be transferred to subsurface logs for inclusion in the interim and final reports. An example of a subsurface log is attached. If a monitoring well is installed in the boring, include well construction details as directed in SOP F-4.

Procedure:

The following shall be included in the sampler's field notebook written in indelible ink:

- Sampling location
- Date
- Weather conditions
- Subcontractor name, address, telephone number
- Driller and assistant(s) names
- Begin and end times of sampling
- Method used (direct-push, split-barrel, etc.)
- Make and model of drill rig
- Borehole size
- Sampling interval in feet from ground surface
- Standard penetration test blow counts (if applicable)
- USCS classification of each sample per SOP F-7
- Evidence of contamination (odor, sheen, discoloration)
- PID reading
- Estimated depth to groundwater
- Depth or location of any lost tools or equipment
- Any modifications to sampling procedures

Matrix Environmental Technologies Inc. **SUBSURFACE LOG**

PROJECT & LOCATION: _____ PROJECT No. _____

CLIENT: _____ WELL/BORING ID: _____

START DATE: _____ COMPLETION DATE: _____ RECORDED BY: _____

GROUNDWATER DEPTH WHILE DRILLING: _____ GROUNDWATER DEPTH AFTER COMPLETION: _____

WEATHER: _____ DRILLING CONTRACTOR/DRILLERS: _____

DRILL RIG: _____ DRILL SIZE & TYPE: _____ SAMPLER TYPE: _____

Sample Collected Y/N	Sample Interval (feet)	OVM Reading (ppm)	Blows/6"	Recovery (inches)	Material Classification trace – 1-10% little – 11-20% some – 21-35% and – 36-50% f-fine m-medium c-coarse

Monitoring Well Detail:

Notes:

MC - Geoprobe Macrocore SS - Split Spoon SH - Shelby Tube C - Bedrock Core ND - Non-detect

Matrix Environmental Technologies Inc. **SUBSURFACE LOG**

PROJECT & LOCATION: _____ PROJECT No. _____

CLIENT: _____ WELL/BORING ID: _____

Sample Collected Y/N	Sample Interval (feet)	OVM Reading (ppm)	Blows/6"	Recovery (inches)	Material Classification trace – 1-10% little – 11-20% some – 21-35% and – 36-50% f-fine m-medium c-coarse

Monitoring Well Detail: Notes:

MC - Geoprobe Macrocore SS - Split Spoon SH - Shelby Tube C - Bedrock Core ND - Non-detect

STANDARD OPERATING PROCEDURE F-10: SPLIT-BARREL SOIL SAMPLING BY ROTARY DRILL RIG

Summary:

Using a rotary drill rig enables soil sampling at depths greater than what can typically be achieved using augerless direct push methods. In addition, the penetration resistance of the soils can be represented by the number of hammer blows required to advance the sampler a given distance.

Samples are obtained by drilling into the subsurface using hollow stem augers. The lead auger is plugged to keep material out of the augers. At the desired depth, the plug is retracted and a steel split-barrel sampler is lowered to the bottom of the augers. A steel hammer driven semi-manually or hydraulically is used to advance the sampler into the soil. The sampler is then retracted, the ends removed, and the barrel halved to expose the sample.

Equipment:

A Central Mining Equipment Model 85 truck-mounted diesel-powered rotary drill rig equipped with five-foot sections of 4¼-inch ID hollow stem augers and a drive-weight assembly with a 140 pound hammer will be used to secure the samples. All advancing and retracting mechanisms will be done with hydraulically controlled pulleys and winches, including the drive-weight assembly. The split-barrel sampler is constructed of tempered steel with a sample capacity of 24 inches in length and two inches in width.

Procedure:

1. Decontaminate the split-barrel sampler, cutting shoe, and head using the following procedure:

    - Clean thoroughly with Alconox® solution using brushes made of inert material.
    - Rinse with control water of known chemistry.
    - Rinse with certified deionized water.
    - Air dry.

2. Advance a lead 4¼-inch ID hollow stem auger simultaneously with the tri-cone plug attached to 1-5/8-inch steel sample rods to the desired depth. If significant cuttings are produced, remove from the working area throughout the procedure.

3. Retract the plug and sample rod assembly, remove the plug, attach a split-barrel sampler to the rods, and lower to the bottom of the borehole assuring that the sampler does not come in contact with the soil.

4. Position the anvil over the top of the sample rods and rest the dead weight of the sampler, rods, anvil, and hammer on the bottom of the borehole and apply a seating blow.

5. Mark the sample rods in three successive 6-inch increments so that the advance of the sampler under the impact of the hammer can be easily observed for each increment.

6. Drive the sampler into the soil with the hammer and count the number of blows applied in each 6-inch increment until either the entire 24-inch interval has been completer or until 100 blows have been applied without completing any of the increments (refusal). The hydraulically controlled hammer will have a fall of 30 ± 1 inches.

7. Record the number of blows in the field notebook. The amount of the second and third increments constitutes the *N-value* which is defined as the "standard penetration resistance."

8. Retract the sampler and unscrew from the sample rods.

9. The field geologist will take custody of the sampler and remove the head and cutting shoe allowing the barrel halves to separate exposing the sample. As quickly as possible, the sample will be classified, containerized, and stored in accordance with the standard operating procedures for those tasks.

10. Repeat the procedure obtaining samples every five (5) feet until the confining layer is encountered or until refusal.

Recovery Guidelines

Samples will be collected every five feet (standard intervals) while installing the monitoring wells using split-barrel samplers two feet in length. At the discretion of the supervising geologist, the driller will be instructed to drive the sampler the next two feet if there is insufficient recovery from a sample interval. For example, if there is insufficient recovery from 20 to 22 feet, a sample will be obtained from the 22-- to 24-foot interval. The standard interval sampling protocol will be resumed afterward.

STANDARD OPERATING PROCEDURE F-11: GROUNDWATER SAMPLING

Summary:

Groundwater samples will be obtained from the shallow wells using low stress purging and sampling methodology. The purpose of the methodology is to produce groundwater samples which are representative of groundwater conditions in the geological formation. Low stress sampling minimizes disturbance of sediment collected at the bottom of the well and reduces aeration of the water which is particularly important when analyzing for VOCs.

Equipment:

- Fultz Model SP-300 (or equivalent) positive displacement pump
- Orion Model 1230 Multi-Function Meter (or equivalent)
- LaMotte Model 2020 turbidity meter (or equivalent)
- Solinst Model 122 Interface Meter (or equivalent)
- Teflon-lined polyethylene tubing
- Power inverter for vehicle battery
- Graduated cylinder
- Stopwatch
- Small trash bags to discard gloves, tubing, etc.
- Small portable table for stable work surface
- 55-gallon drums

Procedure:

1. The monitoring well cover will be unlocked and carefully removed to avoid having any foreign material enter the well.

2. Don a pair of disposable latex gloves.

3. Gauge liquid levels in the well per SOP F-3.

4. Lower the probes of the multi-function meter into the groundwater to a depth greater the anticipated depth of the sampling pump intake. Obtain baseline dissolved oxygen (DO) concentration, conductivity, redox potential, pH, temperature per SOP F-14. Obtain baseline turbidity level per SOP F-16.

5. Lower the pump, cable, tubing, and electrical wires slowly into the well. The pump intake will be set approximately three feet into groundwater.

6. Plug the power inverter into a power point in the service vehicle. Plug the power cord of the pump into the power inverter.

7. With the pump in place and prior to activation, gauge the depth to groundwater. Leave the probe in place.

8. Activate the pump and adjust the discharge rate to 200 to 500 milliliters per minute (ml/min) with all discharge water directed into a 55-gallon drum. Use a graduated cylinder and stopwatch to measure the discharge rate.

9. Measure the indicator parameters approximately every 15 minutes until they have stabilized. The stabilization criteria are:

   - pH ±0.1 unit
   - temperature ±0.2°C
   - redox potential ± 10 millivolts
   - DO ±10%
   - turbidity ±10%

10. Remove the sample containers from the carrying packs which will be stored in an ice-filled cooler until needed. The following information should be written on a label affixed to the container in indelible ink:

    - Site name
    - Project number
    - Sample identification code
    - Date and time of sampling
    - Sampler's initials
    - Preservation added (if any)
    - Analysis to be performed

13. Collect the samples at a flow rate between 100 and 250 ml/min to minimize turbulence. Always collect the sample for VOC analysis first.

14. Begin the chain-of-custody record.

15. When sampling has been completed, replace well cap and lock hinged cover.

16. The following information should be recorded in the field notebook:

    - Sample location
    - Date and time of each sample
    - Weather conditions
    - Sample analyses
    - Liquid level measurements
    - Initial and final parameter measurements
    - Purge volumes
    - Physical appearance of samples

- Any NAPL observed

Decontamination of Equipment

Decontaminate the pump between wells using the following procedure:

1. Operate pump in a basin of 8-10 gallons of potable water for five minutes.
2. Operate pump in a basin of 8-10 gallons of Alconox solution for five minutes.
3. Repeat Step 1.
4. Repeat Step 1 using deionized water.

Decontaminate probes of the meters according to the applicable SOP.

STANDARD OPERATING PROCEDURE F-13: SURFACE SOIL SAMPLING

Summary:

Surface soil samples will be collected by direct-push methods and dedicated plastic scoops. Sample points not corresponding to soil boring points will be obtained using plastic scoops. Designated plastic scoops minimize cross-contamination due to inadequate cleaning of shovels, metal scoops, etc. This method is most appropriate for shallow samples to a depth of one foot or less. In addition, reaction to plated samplers by metals in the soil are eliminated.

Equipment:

- Dedicated plastic scoops
- Large industrial gauge plastic bags for homogenizing samples
- Portable fold-out table

Procedure:

1. When direct-push soil core samples are used, segregate the first six inches of the core by scoring the liner with the special cutting tool and cap both ends with the polystyrene caps.

2. Label the liners with the following information and store in the site trailer for future homogenization with other samples.

    - Site name
    - Project number
    - Sample location
    - Date and time of sampling
    - Sampler's initials

3. Don a pair of latex gloves.

4. Using a plastic scoop, whisk away any loose debris from the sample point then place the point of the scoop onto the ground surface. Simultaneously apply downward force and pivot the scoop perpendicular to the ground such that it penetrates the soil. In effect, a soil core will be collected.

5. Pour the soil core into a plastic bag.

6. Repeat Steps 3 and 4 for each designated aliquot and pour into the bag. Add any direct-push soil core samples designated for the composite by uncapping and pouring into the bag.

7. Once all required aliquots have been added to the bag, tie off or twist the bag to seal the contents inside.

8. Place the bag on the table and alternately roll back and forth and gently shake for several minutes to homogenize the soil.

9. Fill the appropriate pre-labeled sample container to 90% capacity and cap. The labels must contain the following information:

    - Site name
    - Project number
    - Sample identification code
    - Date and time of sampling
    - Sampler's initials
    - Preservation added (if any)
    - Analysis to be performed

10. Commence chain-of custody procedures (with the first sample).

STANDARD OPERATING PROCEDURE F-19: SAMPLE PACKING AND SHIPMENT

Summary:

The objective of this Standard Operating Procedure (SOP) is to summarize requirements for the packaging, marking/labeling, and shipping of environmental samples. Samples must be transported in a manner that will ensure their integrity, guard the samples from the detrimental effects of sample leakage or breakage and protect the health and safety of shipping/receiving personnel.

Equipment:

- Sample containers
- Shipping container
- Polyethylene bag or plastic sheeting
- Cushioning material
- Ice

Procedure:

1. Label the sample jars in accordance with METI SOP F-20, Sample Documentation, and wipe dry and clean the exteriors of the sample jars, if necessary. Place the sealed sample jars in a polyethylene bag (one sample per bag) and seal the bag.

2. Place the sample jars in a U.S. DOT-approved fiberboard box or cooler (shipping container) lined with a large polyethylene bag or plastic sheeting.

3. Pack the shipping container with enough noncombustible, absorbent, cushioning material to minimize the possibility of sample jar breakage, and to absorb any material that may have leaked. If there are multiple sample jars, there must be sufficient cushioning material between them to prevent breakage if the shipping container is dropped or severely shocked.

4. If maintenance of the sample jars at 4°C is necessary, place wet or blue ice into two sealable polyethylene bags. Seal and place in the shipping container. Additional absorbent material may be added, if necessary.

5. Place the Chain of Custody Record, completed in accordance with METI SOP F-21, Chain of Custody Procedures, in a polyethylene bag which must be sealed and taped to the inside of the shipping container lid.

6. Close the shipping container and seal with duct or strapping tape. Place a custody seal across the shipping container opening as per METI SOP F-21, Chain of Custody

Procedures. Label the shipping container with the names and addresses of both the sender and the receiver. Ship samples overnight to the selected analytical laboratory.

STANDARD OPERATING PROCEDURE F-20: SAMPLE DOCUMENTATION

Summary:

Samples will be identified according to the specified procedures.

Equipment:

- Sample containers
- Sample labels

Procedure for Soil Samples:

1. Surface soil, soil boring, and groundwater samples will be identified as follows:

Media Type	Identifier	Location Number	Depth Identifier	Example
Soil (surface)	SS	1-9	TBD	SS1 (0-2")
Soil (subsurface)	SB	1-10	TBD	SB1 (8-10')
Groundwater	MW	1-7	N/A	MW2

2. Quality control samples will be identified as follows:

Media Type	Identifier	Example
Trip blank	TB	TB1
Equipment blank	EB	EB1
MS/MSD	MS- / MSD-	MS-SB1, MSD-MW2

3. Sample labels will be written on gummed paper using permanent black ink and affixed to the sample container. Labels will contain the following information:

    - Sample identifier, location number
    - Name of collector
    - Date and time of collection
    - Project name and location
    - Preservative, if applicable
    - Required laboratory analysis and analytical method

STANDARD OPERATING PROCEDURE F-21: CHAIN OF CUSTODY PROCEDURES

Summary:

Chain of Custody refers to the ability to guarantee the identity and integrity of the sample from collection through reporting of the test results. It is a process used to maintain and document the chronological history of the sample.

Equipment:

- Chain of Custody (COC) document
- Custody seal
- Sample cooler

Procedure:

1. Obtain a COC document and custody seal from the analytical laboratory performing the analysis.

2. Collect samples per the applicable METI SOP and perform sample documentation per METI SOP F-20, *Sample Documentation*. If samples are to be stored overnight, they will be placed in a locked, secure location and protected from outside temperatures and gaseous contaminants.

3. Package samples per METI SOP F-19, *Sample Packing and Shipment*.

4. Completely and accurately fill out the COC document, making sure that the information on the COC document matches the information on the sample container labels. If laboratory quality control (QC) is to be performed to test for precision and matrix effects, indicate which sample is to be analyzed on the COC document. The field sampler must maintain custody of the samples, or if custody is transferred to another person, the transfer must be documented via signatures, times, and dates on the COC document.

5. Close the shipping container and seal with duct or strapping tape. Place a custody seal across the shipping container opening. Label the shipping container with the names and addresses of both the sender and the receiver. Ship samples via overnight courier or overnight mail to the selected analytical laboratory.

6. When samples are received at the laboratory, the sample custodian will verify the number of samples, their identification, and their integrity. He or she shall sign the COC document accepting transfer of custody of the samples.

STANDARD OPERATING PROCEDURE F-24: FIELD SAMPLING PROTOCOLS TO AVOID CROSS-CONTAMINATION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Summary:

The purpose of this SOP is to describe the additional procedures and considerations to be undertaken when collecting soil, sediment, surface water, and groundwater samples at potential per- and polyfluoroalkyl substances (PFAS) release areas. Given the low detection limits associated with laboratory PFAS analysis and the many potential sources of trace levels of PFAS, field personnel are advised to act on the side of caution by strictly following the subject protocols.

Equipment:

A summary of the prohibited and acceptable items for PFAS investigation areas is included in Table 1.

Sampling Equipment:

- **Do not use Teflon®-containing materials** (e.g., Teflon® tubing, bailers, tape, plumbing paste, or other Teflon® materials) since Teflon® contains fluorinated compounds.
- Sample containers and collected samples will be stored and shipped using dedicated coolers provided by the laboratory.
- Stainless steel, high-density polyethylene (HDPE), polypropylene, and silicone materials are acceptable for sampling. Samples should not be collected with tubing or stored in containers made of low-density polyethylene (LDPE) materials (fluorinated compounds are known to adsorb to LDPE). All sampling equipment components and sample containers should not come in contact with aluminum foil, LDPE, glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.
- Peristaltic pumps may be used for groundwater sample collection at depths shallower than 20 feet. ProActive SS Pumps with polyvinyl chloride (PVC) leads or Geotech SS Geosub pumps for groundwater sample collection at depths greater than 25 feet may be used. These pumps are constructed with stainless steel and will minimize introductions of PFAS. However, for groundwater sample depths greater than 150 feet, a Grundfos RediFlo pump (or similar) may be used due to the pumping limitations of stainless steel pumps. PFAS-free bladder pumps may also be used for sampling. Whale® pumps can be used for well development, if needed, but should not be used for sampling, or left in the wells.
- When using liners to collect soil samples during direct-push technology or during conventional drilling and sampling methodologies, acetate liners are to be used.

- Field reports will be documented on loose paper secured on masonite or aluminum clipboards (i.e. plastic clipboards, binders, or spiral hard cover notebooks are not acceptable) using a pen or pencil.
- **Post-It Notes are not allowed** on project sites.
- Use ballpoint pens. Pens will be used when documenting field activities in the field log and on field forms as well as labeling sample containers and preparing the Chain of Custody.
- **Do not use chemical (blue) ice packs** during the sampling program. This includes the use of ice packs for the storage of food and/or samples.

Field Clothing and Personal Protective Equipment

- **Do not wear water resistant, waterproof, or stain-treated clothing** during the field program. Field clothing made of synthetic and natural fibers (preferably cotton) are acceptable. Field clothing should be laundered without the use of fabric softener. Preferably, field gear should be cotton construction and well laundered (i.e., washed a minimum of three times prior to use after purchase). New clothing may contain PFAS related treatments. **Do not use new clothing** while sampling or sample handling.
- **Do not wear clothing or boots containing Gore-Tex™** during the sampling program as it contains a PFAS membrane.
- Safety footwear will consist of steel-toed boots made with polyurethane and PVC, untreated leather boots, or well-worn leather boots. Newer leather boots may be worn if they are covered with polypropylene, polyethane, or PVC boot covers.
- Disposable nitrile gloves must be worn at all times. Further, a new pair of nitrile gloves shall be donned prior to the following activities at each sample location:
  - Decontamination of re-usable sampling equipment;
  - Prior to contact with sample bottles or water containers;
  - Insertion of anything into the well (e.g., HDPE tubing, HydraSleeve bailer, etc.);
  - Insertion of silicone tubing into the peristaltic pump;
  - Completion of monitor well purging, prior to sample collection;
  - Handling of any quality assurance/quality control samples including field blanks and equipment blanks; and,
  - After the handling of any non-dedicated sampling equipment, contact with non-decontaminated surfaces, or when judged necessary by field personnel.

Sample Containers

- Different laboratories may supply sample collection containers of varying sizes dependent on the type of media to be sampled (e.g., soil, groundwater, etc.). All samples should be collected in polypropylene or HDPE bottles. The screw cap will be made of polypropylene or HDPE and may be lined or unlined. However, if lined, the liner may not be made of Teflon® or contain PFAS.

- Container labels will be completed using pen after the caps have been placed back on each bottle.
- Glass sample containers are not to be used due to potential loss of analyte through adsorption.

Procedure:

The following are additional procedures and considerations to be made during field activities at potential PFAS release or sampling areas.

Groundwater Sampling

- At sites with dedicated sampling equipment installed in the wells that contains Teflon (e.g., tubing, pumps), this equipment should be removed from the wells and replaced with HDPE tubing and non-Teflon containing equipment, if possible. These wells will be re-developed by removing three well volumes of water, if possible, and letting the wells recover for at least 48 hours prior to sampling.
- At sites with dedicated sampling equipment installed in the wells that contain LDPE tubing, this tubing should be removed from the wells and replaced with HDPE tubing. These wells can be sampled immediately following replacement of tubing; however, attempts should be made to remove one well volume prior to sampling. For larger wells, with higher volumes of water, it may be preferable to redevelop the wells and remove one well volume with a higher volume pump. In such cases the wells should be allowed to recover for at least 48 hours prior to sampling.

Wet Weather

- Field sampling occurring during wet weather (e.g., rainfall and snowfall) should be conducted while wearing appropriate clothing that will not pose a risk for cross-contamination. Teams will avoid synthetic gear that has been treated with water-repellant finishes containing PFAS. Use rain gear made from polyurethane, vinyl, and wax or rubber-coated materials.
- Teams should consider the use of a gazebo tent, which can be erected overtop of the sample location and provide shelter from the rain. It should be noted that the canopy material is likely a treated surface and should be handled as such; therefore, gloves should be worn when setting up and moving the tent, changed immediately afterwards and further contact with the tent should be avoided until all sampling activities have been finished and the team is ready to move on to the next sample location.

Equipment Decontamination

- Field sampling equipment, including oil/water interface meters and water level indicators, and other downhole equipment used at each sample location, will require cleaning between uses. Alconox® and Liquinox® soap is acceptable for use since the Safety Data Sheets do

not list fluoro-surfactants as an ingredient (do not use Liquinox® soap if also sampling for 1,4-dioxane). However, Decon 90 will not be used during decontamination activities. Water used for the final rinse during decontamination of sampling equipment will be laboratory certified "PFAS-free" water.

- For larger equipment (e.g., drill rig and large downhole drilling and sampling equipment), decontamination will be conducted with potable water using a high-pressure washer and then rinsed using potable water.

Personnel Hygiene Considerations

- Field personnel will not use cosmetics, moisturizers, hand cream, or other related products as part of their personal cleaning/showering routine on the morning of a sampling event, unless the products are applied to a part of the body that will be coved by clothing. These products may contain surfactants and represent a potential source of PFAS.
- All clothing worn by sampling personnel must have been laundered multiple times.
- Many manufactured sunblock and insect repellants contain PFAS and should not be brought or used on-site. Sunblock and insect repellants that are used on-site should consist of 100% natural ingredients, unless previously vetted by the project chemist. A list of acceptable sunscreens and insect repellents is provided in Table 1.
- For washroom breaks, field personnel will leave the exclusion zone and then remove gloves and overalls. Field personnel should wash as normal with extra time for rinsing with water after soap use. When finished washing, the use of a mechanical dryer is preferred and the use of paper towel for drying is to be avoided (if possible).

Food Considerations

- No food or drink shall be brought on-site, with the exception of bottled water and hydration drinks (e.g., Gatorade® and Powerade®), which will only be allowed to be brought and consumed within the staging area.

Table 1. Summary of Prohibited and Acceptable Items for PFAS Sampling

Prohibited Items	Acceptable Items
Field Equipment	
Teflon® containing materials	High-density polyethylene (HDPE) materials
Storage of samples in containers made of LDPE materials	Acetate liners, HDPE bottles
Teflon® tubing	HDPE or silicone tubing
Waterproof field books not manufactured by Rite in the Rain	Rite in the Rain products or Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Sharpies®, if possible	Ballpoint pens
Post-It Notes	
Chemical (blue) ice packs	Regular ice
Excel Purity Paste TFW Multipurpose Thread Sealant Vibra-Tite Thread Sealant	Gasoils NT Non-PTFE Thread Sealant Bentonite
Equipment with Viton Components (need to be evaluated on a case by case basis, Viton contains PTFE, but may be acceptable if used in gaskets or O-rings that are sealed away and will not come into contact with sample or sampling equipment.)	
Field Clothing and PPE	
New clothing or water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing, defined as clothing that has been washed 6 or more times after purchase, made of synthetic or natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™	Boots made with polyurethane and PVC, well-worn or untreated leather boots, leather boots with boot covers
	Reflective safety vests, Tyvek®, Cotton Clothing, synthetic under clothing, body braces
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling, unless the products are applied to body parts that will be covered by clothing.	**Sunscreens** - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are "free" or "natural" **Insect Repellents** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics, Deep Woods Off **Sunscreen and insect repellant -** Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Lined or unlined HDPE or polypropylene caps
Rain Events	

Waterproof or resistant rain gear	Polyurethane, vinyl, wax or rubber-coated rain gear. Gazebo tent that is only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90	Alconox® and/or Liquinox® (Do not use Liquinox® if also sampling for 1,4-dioxane).
Water from an on-site well	Potable water from municipal drinking water supply
Food Considerations	
All food and drink, with exceptions noted on the right	Bottled water and hydration drinks (i.e. Gatorade® and Powerade®) to be brought and consumed only in the staging area

STANDARD OPERATING PROCEDURE F-25: REMEDIAL SYSTEM AIR SAMPLING

Summary:

The purpose of this SOP is to describe the procedure for collecting air samples from a remedial system, such as a soil vapor extraction (SVE) system.

Equipment:

- Low flow rate (50-200 mL/min) pump
- Tedlar bag
- Teflon tubing

Procedure:

1. Purge the air sample port.
2. Attach new Teflon tubing from the sample port or probe to the low flow rate pump.
3. Purge the tubing.
4. Fill out the Tedlar bag sample tag.
5. Attach additional new Teflon tubing from the pump outlet to the Tedlar bag valve.
6. Open Tedlar bag valve and collect the sample, filling the bag no more than 2/3 full.
7. Close the Tedlar bag valve by hand tightening the valve clockwise.
8. Return the Tedlar bag in the provided box or container for transport to the analytical laboratory.

ATTACHMENT C

EMERGENT CONTAMINANT SAMPLING AND LABORATORY ANALYSIS

NEW YORK STATE OF OPPORTUNITY.

Department of Environmental Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

April 2023

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ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Interim SCO Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	"In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L"	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix D	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	"These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report."	"These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)."	
Appendix H	"The holding time is 14 days…"	"The holding time is 28 days…"	
Appendix H, Initial Calibration	"The initial calibration should contain a minimum of five standards for linear fit…"	"The initial calibration should contain a minimum of six standards for linear fit…"	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: □Electrofishing □Gill netting □Trap netting □Trawling □Seining □Angling □Other _____

Preservation Method: □Freezing □Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

LAB SUPERVISOR: Olga Y. Ojanen

QA OFFICER: Maria Buschke

EFFECTIVE DATE: 7-29-2025

TITLE: ANALYSIS OF PER- AND POLYFLUORINATED ALKYL SUBSTANCES (PFAS) IN AQUEOUS AND SOLID SAMPLES BY LC/MS/MS

REFERENCES: EPA METHOD 1633, January 2024

REVISED SECTIONS: Table 3

1.0 SCOPE AND APPLICATION

1.1 This method is used to determine the concentrations of select Per- and Polyfluorinated Alkyl Substances (PFAS) in aqueous, solid (soil, sediment, biosolids), and tissue matrices utilizing an HPLC equipped with a tandem mass spectrometer (MS/MS).

1.2 Analytes that may be reported under this method are listed in TABLE 1. Translations between analytes names and acronyms used in EPA 1633 versus the laboratory report and raw data are listed in TABLE 4.

1.3 This method is "performance-based," meaning that modifications may be made without additional EPA review to improve performance (e.g., overcome interferences, or improve the sensitivity, accuracy, or precision of the results) provided that all performance criteria in this method are met.

2.0 SUMMARY OF METHOD

2.1 This method is adapted from EPA Method 1633 for the analysis of environmental water and soil samples. This SOP is not designed to be used to analyze aqueous and solid samples by the laboratory's in-house LCMSMS method.

2.2 Samples are received, stored, and extracted within the appropriate holding times.

2.3 Sample preparation is performed following SGS-Dayton SOP EOP040 and EOP041.

2.4 Samples known to be high in PFAS (such as AFFF or AFFF impacted waters) should be screened by serial dilution and direct injection onto the LC/MS/MS in order to determine the appropriate subsample size. High level water and soil samples require that a smaller sample aliquot be used so that the analytes fall within the instrument calibration range. For definitive analysis AFFF samples must be subcontracted to a laboratory certified for AFFF analysis by QSM 5.4.

2.5 Per- and Polyfluorinated Alkyl Analytes are separated, detected and quantitated using an LC/MS/MS. After HPLC separation and ionization, the specific Perfluorinated compound is isolated in the first mass spectrometer and transferred to a collision cell for fragmentation. The resulting fragments are introduced into the second mass spectrometer where they are detected and quantified.

2.6 Per- and Polyfluorinated Alkyl Analytes may exist in branched and/or linear form. Fluorotelomer production results in linear isomers only but electrochemical fluorination results in branched and linear isomers. The branched isomers may account for up to 30% of the total analyte. The branched isomers will elute just before the linear isomer. A qualitative branched/linear RT standard with additional branched isomers is used to help establish transition windows.

2.7 Manual integrations are performed in accordance with SOP EQA044.

3.0 REPORTING LIMIT AND METHOD DETECTION LIMIT

3.1 The Lower Limit of Quantitation (LLOQ) or Reporting limits (RL) are based on the extraction procedure and the lowest calibration standard. LLOQs may vary depending on matrix complications and volumes. LLOQs for this method are 0.002-0.050 ug/l for aqueous samples and 0.2-50 ug/kg for solid samples. Solid matrices are reported on a dry weight basis.

3.2 **MeFOSA, EtFOSA, MeFOSE, and EtFOSE** tend to recover erratically by SPE cartridge. These analytes may also be lost during the evaporative step. Data for these analytes should be reviewed carefully.

3.3 The Method Detection Limit (MDL). Experimentally determine MDLs using the procedure specified in 40 CFR, Part 136, Appendix B, Revision 2. Experimental MDLs must be determined in accordance with SGS SOP EQA075

3.4 Compounds detected at concentrations between the LLOQ and MDL are quantitated and qualified as estimated values and reported with a “J” qualifier. Some program or project specifications may require that no values below the LLOQ be reported.

4.0 DEFINITIONS

4.1 Batch: A group of samples which are similar with respect to matrix and the testing procedures being employed and which are processed as a unit. A sample batch is limited to a maximum of 20 samples or 12 hours whichever comes first.

4.2 Blank Spike (BS): An analyte-free matrix spiked with a known number of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. Blank Spike Recoveries are used to document laboratory performance for a given method. This may also be called a Laboratory Control Sample (LCS).

4.3 Low Level Blank Spike (LLBS): An analyte-free matrix spiked with a known number of analyte(s) at 2x LLOQ, processed simultaneously with the samples through all the steps of the analytical procedure. Low-Level Blank Spike Recoveries are used to document laboratory performance at the LLOQ for a given method. This may also be called a Low Level Laboratory Control Sample (LLLCS) or the Low-Level Ongoing Precision And Recovery Standard (LLOPR).

4.1 Extracted Internal Standards (EIS): A standard containing isotopically labelled versions of the native target analytes. These isotopes are usually labelled with C13, d2, or O18 atoms.

Isotope Dilution Standards are used to measure the extraction efficiency and to correct the concentrations of the native analytes based on the recovery of their isotopically labelled analogs.

4.2 Field Blank (FB): An aliquot of reagent water that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FB is to determine if method analytes or other interferences are present in the field environment.

4.3 Holding Time: The maximum times that samples may be held prior to preparation and/or analysis and are still considered valid.

4.4 Matrix Duplicate (DUP): A replicate sample which is used to document the precision of a method in a given sample matrix.

4.5 Matrix Spike (MS): A sample aliquot spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. The matrix spike recoveries are used to document the bias of a method in a given sample matrix.

4.6 Matrix Spike Duplicate (MSD): A replicate sample aliquot spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. The matrix spike duplicate recoveries are used to document the precision and bias of a method in a given sample matrix.

4.7 Method Blank (MB): An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is processed simultaneously with the samples through all the steps of the analytical procedure. The method blank is used to document contamination resulting from the analytical process.

4.8 Preservation: Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical integrity of the sample.

5.0 HEALTH & SAFETY

5.1 The analyst must follow normal safety procedures as outlined in the SGS Laboratory Safety Manual which includes the use of Safety glasses, gloves and lab coats. In addition, all acids are corrosive and must be handled with care. Flush spills with plenty of water. If acids contact any part of the body, flush with water and contact the supervisor.

5.2 Safety Data Sheets (SDS) are available for all reagents and solvents used in the lab. Technicians should review the SDS prior to using any new reagents or solvents.

5.3 Methanol is an inhalation hazard. Use in well ventilated area.

5.4 The toxicity or carcinogenicity of each reagent used in this method has not been precisely determined; however, each chemical must be treated as a potential health hazard. Exposure to these reagents should be reduced to the lowest possible level. The laboratory maintains a current awareness file of OSHA regulations regarding the safe handling of the chemicals

specified in this method. A reference file of data handling sheets is available to all personnel involved in these analyses.

6.0 COLLECTION, PRESERVATION, AND HOLDING TIME

6.1 Collection

6.1.1 Aqueous samples should be collected in 500mL high density polyethylene bottles (HDPE). Caps must not have Teflon liners. Alternate size bottles may be used depending on project requirements. Additional bottles should be provided for solids determination, dilutions, and pre- screening of samples.

6.1.2 All containers must demonstrate to be PFAS-free at or above the MDLs for the target analytes by testing one or more representative containers from each lot.

6.1.3 Solid samples shall be collected in 4oz or 2oz HDPE wide mouth jars. Caps must not have Teflon liners.

6.1.4 The samples must be chilled to ≤ 6°C from the time of collection until arrival at the laboratory.

6.2 Storage

6.2.1 Samples may be stored in the dark at either ≤ 6°C or ≤ -20°C.

6.2.1.1 Issues were observed with MeFOSE, EtFOSE, MeFOSAA and EtFOSAA after 7 days when stored at ≤ 6°C. These issues are more likely to elevate the observed concentrations of other PFAS compounds via the transformation of these precursors if they are present in the sample.

6.2.2 The extracts should be stored in the dark at ≤ 6°C. All extracts must be allowed to come to room temperature and vortexed just prior to transfer to the autosampler vials.

6.3 Holding Time

6.3.1 Aqueous and solid samples must be extracted within 28 days of collection if stored at ≤ 6°C. When stored at below -20°C and protected from the light, aqueous samples may be held for up to 90 days.

6.3.2 Solid samples must be extracted and analyzed within 90 days of collection if stored in the dark at ≤ -20°C or ≤6°C, with the caveat that samples may need to be extracted as soon as possible if NFDHA is an important analyte for a given project.

6.3.3 Leachates must be leached within 28 days of collection and extracted and analyzed within 28 days from leaching date.

6.3.4 The extracts must be analyzed within 90 days of collection date if stored at ≤ 6°C and protected from light.

7.0 APPARATUS AND MATERIALS

7.1 HPLC – Agilent Technologies 1260 or 1290

7.1.1 Suitable HPLC equipped with an autosampler, pump, and column compartment. System may have a membrane degasser if shown to not adversely affect the analysis.

7.2 MS/MS – Agilent Technologies 6470A or 6495B

7.2.1 LC/MS/MS must be capable of negative ion electrospray ionization near the required flow rate of the HPLC Column. The system must be capable of performing MS/MS to produce unique precursor and product ions for the PFAS method analytes within the specified retention time segments. A minimum of 10 scans across each peak is required to ensure adequate precision.

7.3 Data System – Agilent Technologies Mass Hunter B10.0x

7.3.1 A computer system interfaced to the HPLC/MS/MS that allows for the continuous acquisition and storage of all data obtained throughout the duration of the chromatographic program.

7.3.2 The software must allow for the viewing of the specific MS/MS Spectra acquired over the analytical run. Comparisons can then be made between spectra from standards and samples.

7.3.3 Data is archived to a backup server for long term storage.

7.4 Columns: Agilent Poroshell 120 EC C18 2.7um, 100 x 2.1 mm ID or equivalent

7.5 Delay Columns: Agilent Poroshell or Eclipse C18 50 x 4.6 mm ID or equivalent

7.6 Disposable polyethylene transfer pipettes

7.7 15ml Centrifuge tubes

7.8 HDPE or Polypropylene screw cap and autosampler vials

7.9 Volumetric Pipettors and volumetric “plasticware” for dilutions of standards and extracts.

7.10 Class A volumetric flasks.

7.11 HDPE bottles – various sizes, shown to be PFAS free.

8.0 STANDARDS AND REAGENTS

8.1 Acetonitrile – HPLC grade or equivalent (Eluent A)

8.2 Water – HPLC grade or equivalent

8.3 Ammonium Acetate – LCMS grade or equivalent (Replace 2 Years after opening date)

8.4 Ammonium Hydroxide – Fisher A669-212 or equivalent (28-30% Aqueous Ammonia(replace 2 years after opening date).

8.5 Eluent A - Acetonitrile

8.6 Eluent B – 2mM Ammonium Acetate in 95:5 Water: Acetonitrile
Dissolve 0.154 grams of ammonium acetate in 950ml of water and 50ml of acetonitrile. Store at room temperature, and discard after two months.

8.7 Dilution Mix - Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid

Add ammonium hydroxide (3.3ml of 30%), reagent water (1.7ml) and acetic acid (0.625ml) to methanol (92ml). Store at room temperature, replace after 1 month.

8.8 Nitrogen – various grades

8.9 Per fluorinated Alkyl Substances stock standards – Traceable to Certificate of Analysis.

8.10 Per fluorinated Alkyl Substances stock standards for ICV -Second source if available or If **not available**, a different lot number from the same vendor can be considered a secondary source.

8.11 Qualitative Identification Standards- br-PFNA and T-PFOA from Wellington Laboratories.

8.12 Bile salt interference check standard- Taurodeoxycholic Acid (TDCA) or Sodium taurodeoxychloate hydrate – (Sigma Aldrich 580221-5GM, or equivalent). Prepare solution at a concentration of 1 µg/mL in the Acetonitrile.

8.13 Mass labeled – Non-Extracted Internal Standards

$^{13}C_3$-PFBA	$^{13}C_4$-PFOA	$^{13}C_2$-PFDA	$^{13}C_4$-PFOS
$^{13}C_2$-PFHxA	$^{13}C_5$-PFNA	$^{18}O_2$-PFHxS	

8.14 Mass labeled – Extracted Internal Standards

$^{13}C_4$-PFBA	$^{13}C_9$-PFNA	$^{13}C_3$-PFBS	$^{13}C_2$-8:2 FTS	D_5-NEtFOSAA
$^{13}C_5$-PFPeA	$^{13}C_6$-PFDA	$^{13}C_3$-PFHxS	$^{13}C_8$-PFOSA	D_7-NMeFOSE
$^{13}C_5$-PFHxA	$^{13}C_7$-PFUnA	$^{13}C_8$-PFOS	D_3-NMeFOSA	D_9-NEtFOSE
$^{13}C_4$-PFHpA	$^{13}C_2$-PFDoA	$^{13}C_2$-4:2 FTS	D_5-NEtFOSA	$^{13}C_3$-HFPO-DA
$^{13}C_8$-PFOA	$^{13}C_2$-PFTeDA	$^{13}C_2$-6:2 FTS	D_3-NMeFOSAA	

9.0 INTERFERENCES

9.1 Data from all blanks, samples, and spikes must be evaluated for interferences. Method interferences may be caused by contaminants in solvents, reagents, or glassware. The analytes in this method can also be found in many common laboratory supplies and equipment, such as PTFE (polytetrafluoroethylene) or Teflon products, HPLC solvent lines, methanol, aluminum foil, SPE transfer lines, bottle caps, etc. All materials must be demonstrated to be free from interferences.

9.2 Contact with glass containers, pipettes, or syringes should be minimized since the

Perfuorinated compounds can potentially adsorb to glass surfaces.

9.3 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the sample. Humic and/or fulvic material can be co-extracted during SPE and high levels can cause enhancement and/or suppression in the electrospray ionization source or low recoveries on the SPE sorbent. Total organic carbon (TOC) is a good indicator of the humic content of the sample. High levels of iron have been shown to reduce the d5-EtFOSAA recoveries.

9.4 When establishing the chromatographic conditions, it is important to consider the potential interference of bile salts during analyses of tissue samples. A standard containing TDCA should be injected to ensure that TDCA does not coelute with any of the target analytes, EIS, or NIS standards. Analytical conditions must be set to allow a separation of at least 1 minute between the bile salts and PFOS.

9.5 SPE cartridges can be a source of interferences. The analysis of field and method blanks can provide important information regarding the presence or absence of such interferences. Brands and lots of SPE devices must be tested to ensure that contamination does not preclude analyte identification and quantitation.

9.6 Water and containers used for equipment blanks or field blanks must be tested prior to use. For smaller sampling events DI water will be provided in the same type of bottle used for sample collection. For larger sampling events four-liter HDPE containers should be used. Containers should be filled with DI water and allowed to sit for several hours before testing. If the bottles are from the same lot and filled with DI on the same day, then one analysis per 10 containers should suffice. The DI water and container blanks must be free of any analytes of interest or interferences below the MDL.

9.7 A field blank should be collected with each set of samples. Each field blank consists of 4 bottles. Two bottles are filled with DI water at the lab and the other two bottles are empty. At the sampling site the sampler should open then two empty bottles and transfer the DI water from the full bottles into them. Cap the bottles, label as field blanks, and return them to the laboratory along with the samples for analysis.

10.0 PROCEDURE

10.1 Standards Preparation. **Standards and sample extracts must be brought to room temperature and vortexed prior to aliquoting into an instrument vial.**

10.1.1 Standards are prepared from commercially available certified neat or reference standards. All standards must be logged in the HPLC Standards Logbook. All standards shall be traceable to their original source. The standards must be stored at ≤ 6°C, or as recommended by the manufacturer. Calibration levels, spike and isotope dilution standard concentrations, preparation information, and vendor part numbers can be found in the LCMS STD Summary in the Active SOP directory. A summary of the calibration concentrations can be found in Table 3.

10.2 Stock Standard Solutions

10.2.1 Stock standards are available from some commercial vendors. All vendors must supply a "Certificate of Analysis" with the standard. The certificate will be retained by the lab. Hold time for unopened stock standards is until the vendor's expiration date. Once opened, the hold time is reduced to one year or the vendor's expiration date (whichever is shorter).

10.3 Intermediate Standard Solutions

10.3.1 Intermediate standards are prepared by quantitative dilution of the stock standard with methanol. The hold time for intermediate standards is six months or the vendor's expiration date (whichever is shorter). Intermediate standards may need to be remade if comparisons to other standards indicate analyte degradation or concentration changes. Intermediate standards should be prepared using the dilution mix and stored in polyethylene vials.

10.4 Calibration Standards

10.4.1 Calibration standards for Perfluorinated analytes are prepared at a minimum of six concentration levels through quantitative dilutions of the intermediate standard. Calibration standards are prepared in methanol. The low standard is at a concentration at or below the RL and the remaining standards define the working range of the detector. Calibration standards should be prepared using the dilution mix and be stored in polyethylene vials. See Table 3 for levels.

10.4.2 Calibration standards concentrations for the sulfonates may need to be corrected for the molecular weight of the cation in the salt. Check the vendor's Certificate of Analysis to see if their nominal concentration is based on the acid or salt.

$$Mass_{acid} = Mass_{salt} \mathbf{X} MW_{acid}/MW_{salt}$$

MW_{acid} = Molecular weight of PFAA
MW_{salt} = Molecular weight of the salt

NOTE: Per fluorinated analytes may exist in branched and/or linear form. If a branched form is commercially available, then the calibration standards must contain the branched and linear form. The Quantitative standards must contain PFHxS, PFOS, PFOSA, NMeFOSAA, NEtFOSAA NMeFOSA, NEtFOSA, NMeFOSE, NEtFOSE, PFOA and PFNA which are currently available in mixes of branched and linear isomers.

10.4.3 Calibration standard concentrations are verified by the analysis of an initial calibration verification (ICV) standard.

10.5 HPLC/MS/MS Conditions

10.5.1 HPLC Conditions

10.5.1.1 6-10ul autosampler injection
10.5.1.2 Gradient Program
10.5.1.3 Eluent A – Acetonitrile
10.5.1.4 Eluent B – 2mM ammonium acetate in 95:5 water: acetonitrile
10.5.1.5 Column temperature – 50.0 °C

Time (min)	A (%)	B (%)	Flow (mL/min)
0.20 min	10.0 %	90.0 %	0.350 mL/min
4.00 min	30.0 %	70.0 %	0.350 mL/min
7.00 min	55.0 %	45.0 %	0.350 mL/min
9.00 min	75.0 %	25.0 %	0.350 mL/min
10.00 min	95.0 %	5.0 %	0.400 mL/min
10.30 min	95.0 %	5.0 %	0.400 mL/min
10.40 min	2.0 %	98.0 %	0.400 mL/min
11.80 min	2.0 %	98.0 %	0.400 mL/min
13.00 min	2.0 %	98.0 %	0.350 mL/min

10.5.2 MS/MS Conditions

Parameter	Value	Parameter	Value
Gas Temp C	250	Sheath Gas Flow (l/min)	10
Gas Flow (l/min)	10	Capillary (V)	3500
Nebulizer (psi)	50	V Charging	500
Sheath Gas Heater	300	Ionization Mode	Neg ESI
Collision Cell Gas (psi)	40	Collision Cell Gas	UHP N2

Fragmentation voltages and collisions energies are optimized for each analyte and are stored in the instrument method. Precursor ions and transition masses are listed in Table 2.

LC/MS/MS conditions are optimized for each instrument. Actual conditions may vary slightly from those listed above.

10.6 Sample Preparation

10.6.1 Low Level Aqueous Samples

10.6.1.1 A 500ml aliquot of sample (entire bottle) is extracted utilizing a solid phase extraction cartridge. The cartridge is eluted with basic methanol. The extract is carbon cleaned, filtered and the final volume is adjusted to 5.0ml, and then transferred to a centrifuge tube for storage. Refer to SOP EOP041.

10.6.2 Solid Samples

10.6.2.1 A 5-gram aliquot sample is extracted with basic methanol utilizing vortex mixer and a shaker table. The extract is carbon cleaned, SPE cleaned, filtered and the final volume is adjusted to 5.0ml, and then transferred to a centrifuge tube for storage. Refer to SOP EOP040.

10.7 HPLC/MS/MS Analysis

Instrument calibration consists of four major sections:

Mass Tuning and Calibration

Transition Window Selection

Initial Calibration Procedures Continuing Calibration Verification

10.7.1 Mass Calibration and Transition Window Selection

The instrument must have a valid mass calibration prior to any sample analysis. The mass calibration must be updated as needed. (i.e. QC failures, ion masses showing large deviations from known masses, or after major instrument maintenance is performed). It is recommended that the mass calibration be verified weekly through the analysis of a Check Tune. The Agilent Check Tune Masses range from 112.99 to 2233.91 amu for MS1 and 69.00 to 2233.91 for MS2.

The Check Tune Report may show both Positive and Negative ESI Results. Only the Negative results need to be evaluated. Unit resolution is demonstrated when the value of the peak width at half-height is within 0.5 ± 0.1 amu of the true value.

MS1 (UNIT)	MS2 (UNIT)
	69.00
112.99	112.99
302.00	302.00
601.98	601.98
1033.99	1033.99
1633.95	1633.95
2233.91	2233.91

Since masses greater than 1033.99 amu are not used for this method, the 1633.95 and 2233.91 amu masses must be present but do not need to be within 0.1 amu of the true value.

The Branched/Linear RT Check and mid-point calibration standard are used to check the analyte retention times. These retention times are used to update the transition windows. The windows must be wide enough to ensure that the branched and linear isomer PFAS analytes are completely within the transition window. The branched isomers will elute just prior to the linear isomer. If they are partially cut off, adjust the retention time of the linear isomer or the width of the transition window. Use a similar size window for the other analytes that do not have a branched standard. Later eluting peaks are broader and require a slightly wider transition windows because of peak broadening.

10.7.2 Initial Calibration Procedures

Before samples can be run, the LC/MS/MS system must be calibrated. The calibration must be performed every time after taking an action that changes the chromatographic conditions or when either ICV/CCV or Instrument Sensitivity check don’t meet acceptance criteria. The signal to noise ratio must be >= 3:1 for analytes

with both a quant and confirmation ion and >= 10:1 for analytes with no confirmation ion.

10.7.2.1 Isotope Dilution Standard (Extracted Internal Standard) Calibration

A minimum 6-point calibration curve is created for the native PFAS compounds using an Isotope Dilution or Extracted Internal Standard technique. SGS - Dayton routinely performs an 8-point calibration to maximize the calibration range and to allow for quadratic fits. See Table 3.

The calibration standards for PFHxS, PFOS, PFOA, PFNA, PFOSA, NMeFOSAA, NEtFOSAA NMeFOSA, NEtFOSA, NMeFOSE, and NEtFOSE must consist of both branched and linear isomers. The branched isomer elutes just prior to the linear isomer. These 9 PFAS are currently being reported as the sum of the branched and linear isomers so both the branched and linear isomers in the calibration standards must be integrated.

Response factors (RF) for each analyte at each calibration level are determined as follows:

$$RF = (A_{analyte}\ C_{ids})/(A_{ids} \mathbf{X}\ C_{analyte})$$

$A_{analyte}$ = area of the analyte
A_{ids} = area of the isotope dilution standard
$C_{analyte}$ = concentration of the analyte
C_{ids} = concentration of the isotope dilution standard.

The mean RF and standard deviation of the RF are determined for each analyte and EIS. The percent relative standard deviation (%RSD) of the response factors is calculated for each analyte as follows:

%RSD = (Standard Deviation of RF X 100) / Mean RF

If the %RSD ≤ 20%, linearity through the origin can be assumed and the mean RF can be used to quantitate target analytes in the samples.

10. 7.2.2 If the average response factor criteria cannot be achieved, and the problem is associated with one or more of the standards, reanalyze the standards and recalculate the RSD. The instrument logbook must provide clear documentation of the suspected problem.

Alternately, if the average response factor criteria cannot be achieved, the calibration range can be narrowed by dropping the low or high point of the curve. Multiple levels may be removed, but removal of interior levels is not permitted

The changes to the upper end of the calibration range will affect the need to dilute samples above the range, while changes to the lower end will affect the overall sensitivity of the method. Consider the regulatory limits or action levels associated with the target analytes when adjusting the lower end.

The laboratory may remove an entire single standard calibration level from the interior of the calibration curve when the instrument response demonstrates that the standard was not properly introduced to the instrument, or an incorrect standard was analyzed. If a calibration standard was removed from the interior of the calibration, this particular standard calibration level must be removed for all analytes. Removal of calibration points from the interior of the curve is not to be used to compensate for a lack of maintenance or repair to the instrument.

Alternatively, a weighted linear regression or non-linear regression may be used. If used, the regression must be weighted inversely proportional to concentration and must not be forced through zero. The correlation coefficient (r value) must be ≥ 0.995 or ±0.99 (for r^2 value) for each compound to be acceptable. If a linear or non-linear regression is used, then the Relative Standard Error (%RSE) must be calculated.

Calculation of Relative Standard Error (%RSE)

$$RSE = 100 \times \sqrt{\sum_{i=1}^{n} \left[\frac{x_i' - x_i}{x_i}\right]^2 \Big/ (n-p)}$$

x'i = Measured amount of analyte at calibration level i, in mass or concentration units.

xi = True amount of analyte at calibration level i, in mass or *concentration units.*

p = Number of terms in the fitting equation. (average = 1, linear = 2, quadratic = 3)

n = Number of calibration points.

If Relative Standard Error (%RSE) ≤ 20%, then the curve can be used to quantitate target analytes in the samples.

NOTE: If any EIS was removed from a specific calibration point to meet the acceptance criteria for the initial calibration, then corresponding native compound in that calibration point must be also removed.

10.7.2.3 Initial Calibration Verification (ICV)

The validity of the initial calibration curve must be verified through the analysis of an initial calibration verification (ICV) standard. The ICV must be prepared from a second source at a mid-range concentration.

NOTE: Second source standards may consist of linear isomers only.

The %D for the compound of interest must be ≤ ±30% (70-130% of True Value). If the ICV does not meet criteria, a fresh standard must be prepared. If this ICV meets criteria, proceed with sample analysis. If the ICV still does not meet criteria, make fresh calibration standards. Recalibrate the instrument.

NOTE: Analyze the branched/linear standard to identify the branched isomers. This is a qualitative standard only. Currently it should contain branched isomers of PFOA and PFNA. This standard is loaded into LIMS as an ICV.

10.7.2.4 Bile Salt Interference Check and Branched/Linear Retention Time Check.

The separation between Taurodeoxycholic Acid (TDCA) and PFOS must be verified with each ICAL.
For QSM 5.4 the separation between Taurodeoxycholic Acid (TDCA) and PFOS must be verified daily.

Inject a mid-level PFAS standard that has been fortified with 1 ug/ml TDCA. The standard may also contain Taurochenodeoxycholic Acid (TCDCA) and Tauroursodeoxycholic Acid (TUDCA) as well.

TDCA must be separated by at least 1 minute from all branched and linear isomers of PFOS.

10.7.2.5 Branched/Linear RT Check. Analyze

The branched/linear RT standard to identify the branched isomers. This is a qualitative standard only. Currently, it should contain branched isomers of PFOA and PFNA. This standard is loaded into LIMS as an RT Check.

10.7.2.6 Highest Standard and Instrument Blank

Analyze an instrument blank (IBLK) immediately following the highest standard analyzed. The highest standard analyzed may be analyzed as part of the calibration curve or following the calibration curve. The highest standard may be at or above the concentration of highest level of calibration. It cannot be used to

extend the calibration range.

The instrument blank must be analyzed immediately following the highest standard. The instrument blank must be free of any analytes of interest or interferences at or below the MDL to be acceptable.

If the acceptance criteria is not met, the concentration of the standard should be lowered and another blank analyzed.

The highest standard and instrument blank pair are used only to document the highest concentration at which carryover does not occur. If a sample concentration exceeds this range and the sample(s) following have reportable detections for that analyte, then they must be reanalyzed.

10.7.2.7 Retention Time Windows

The retention time of each analyte and extracted internal standard must fall within **0.4 minutes** of the predicted retention times from the daily calibration verification or from the midpoint standard of the ICAL (on days when an ICAL is performed).

Establish the center of the retention time window for each analyte and surrogate by using the absolute retention time for each analyte and extracted internal standard from the calibration verification standard at the beginning of the analytical shift. For samples run during the same shift as an initial calibration, use the retention time of the mid-point standard of the initial calibration.

Initial peak identification is based on the retention time of a peak falling within the retention time window for a given analyte. Time reference peaks (extracted internal standards) are used to correct for run-to-run variations in retention times due to temperature, flow, or injector fluctuations. HPLC retention times tend to shift more than GC retention times.

The retention time of the target analyte must fall within **0.1 minutes** of the associated isotope dilution standard (for analytes that have an exact isotopic counterpart).

10.7.2.8 Ion Ratios and Signal to Noise

A minimum of two transition ions are monitored for each target analyte except for those analytes in Table 2 which only have a single transition ion.

The ratio of the primary and secondary transition masses should be updated from the initial calibration. They may be updated from the midpoint standard or from an average of all levels.

Additionally, the ion ratio may be updated from the opening daily CCV.

Isotope Ratio criteria is still being developed for EPA method 1633. The MassHunter software calculates the ratio as the response of the primary transition mass divided by the response of the secondary transition mass times 100. It is set to flag the analyte if the ratio of these ions is not within ± 50% of the expected, (e.g., if the ion ratio is expected to be 50% in the standard, the ion ratio in the corresponding sample must be between 25 and 75%).

Primary and secondary transition masses must maximize within ± 2 seconds.

The signal to noise ratio for the primary transition mass must be at least 3 times that of the background and the secondary transition mass must be at least 3 times that of the background.

10.7.3 Daily Calibration and Carryover Verifications

10.7.3.1 Continuing Calibration Verification (CCV)

Continuing calibration verification standards for the Perfluorinated compounds are prepared at low and mid-range concentration. CCV standards are prepared from the same stock as the initial calibration standards.

A low level CCV (Instrument Sensitivity check) must be analyzed at the beginning of each analytical sequence (prior to sample analysis) and at least once every 24 hours during the sequence to ensure accuracy at the LOQ.

The CCV must be analyzed at the beginning and end of each run to verify that the initial calibration is still valid. Additionally, the mid-point CCV must be analyzed after every 10 samples.

The percent difference (%D) for each analyte of interest will be monitored. The |%D| must be ≤ 30% for the target analytes and EIS in each CCV.

If the first continuing calibration verification does not meet criteria, a second standard may be injected. If the second standard does not meet

criteria, the system must be recalibrated. If the second standard meets criteria, then a third standard must be analyzed. If the third standard also meets criteria, then the system is considered in control and results may be reported.

If the |%D| is outside the control limits, then documented corrective action is necessary. This may include recalibrating the

instrument and reanalyzing the samples, performing instrument maintenance to correct the problem and reanalyzing the samples, or qualifying the data. Qualifying the data should only be done if the sample cannot be reanalyzed. Under certain circumstances, the data may be reported,
i.e. The CCV failed high, the associated QC passed, and the samples were ND.

NOTE: Any target analytes that are detected in the samples must be bracketed by an acceptable initial calibration curve and acceptable CCV standards; otherwise, the samples must be reanalyzed, or the data must be qualified.

10.7.3.2 Carryover Verification

A high standard and an instrument blank (IBLK) must be analyzed each day prior to the analysis of samples. The high standard may be at or above the concentration of highest level of the calibration.

The instrument blank must be analyzed immediately following the high standard. The instrument blank must be free of any analytes of interest or interferences at or below the MDL to be acceptable.

If the acceptance criteria are not met, the concentration of the standard should be lowered, and another blank analyzed.

The highest standard and instrument blank pair are used only to document the highest concentration at which carryover does not occur. If sample concentrations exceed this range and the sample(s) following exceed this acceptance criteria (>1/2 LOQ), they must be reanalyzed.

10.7.3.3 Continuing Calibration Blank (CCB)

An additional blank must be analyzed after each CCV to ensure no carryover from the standard. The instrument blank must be free of any analytes of interest or interferences at ½ the required LOQ to be acceptable. The CCB is loaded into LIMS as "ICCB".
If the acceptance criteria are not met, the system should be checked. Any samples bracketed by the failing CCB must be reanalyzed.

Review the data to see if there was a high sample prior to the CCV/CCB pair that may have contaminated the system? If so, clean the system and run additional blanks to see if the system is in control.

10.7.3.4 Bile Salt Interference Check.

Inject a mid-level PFAS standard that has been fortified with 1 ug/ml TDCA. The standard may also contain

Taurochenodeoxycholic Acid (TCDCA) and Tauroursodeoxycholic Acid (TUDCA) as well.

TDCA must be separated by at least 1 min relative to all of the branched and linear isomers of PFOS.

10.7.3.5 Branched.Linear RT Check

Analyze the branched/linear RT standard daily to identify the branched isomers. This is a qualitative standard only. Currently, it should contain branched isomers of PFOA and PFNA. This standard is loaded into LIMS as an RT Check

10.7.4 Sample Extract Analysis

10.7.4.1 Samples are analyzed in a set referred to as an analysis sequence or batch. A batch consists of the following:

Initial Calibration Standards
ICV
Instrument Blank (IBLK)
Bile Salt Interference Check
Branched/Linear RT
CCV Standards:
Low-Level (LOQ)- Instrument Sensitivity check
Mid-Level

Instrument Blank (IBLK)
QC Extracts
Sample Extracts
Bracketing CCV
Bracketing CCB

NOTE: Bile Salt Interference Check, Branched/Linear RT, and Low-Level (LOQ)- Instrument Sensitivity check must be analyzed every 24 hours, at the beginning of each new sequence.

10.7.4.2 Six to ten microliters (same amount as standards) of extract is injected into the HPLC by the autosampler. The data system then records the resultant peak responses and retention times.

10.7.4.3 Tentative identification of an analyte occurs when the peak from the sample extract falls within the retention time window of the target compound.

10.7.4.4 Positive identification is confirmed by comparing the ion ratio in the sample to the ion ratio of the standards. For the linear isomer, the primary and secondary transition masses must both be present. For the branched isomers the primary and secondary transition masses should both be present. In rare circumstances a particular

branched peak may only exhibit the primary transition ion. These should be omitted from the quantitation.

The MassHunter software is set to flag the analyte if the ratio of these ions is not within ± 30% of the expected, (e.g., if the ion ratio is expected to be 50% in the standard, the ion ratio in the corresponding sample must be between 20 and 80%).

The signal to noise ratio for the primary transition mass must be at least 3 times that of the background and the secondary transition mass must be at least 3 times that of the background.

10.7.4.5 Some of the PFASs may have multiple chromatographic peaks due to the presence of linear and branched isomers. This is prevalent in PFHxS and PFOS. The areas of all the linear and branched isomers peaks must be included and the concentrations reported as a total for each of these analytes.

NOTE: The branched isomers for PFOA and PFNA must be included in the quantitation even if the calibration is based on just the linear isomer.

10.7.4.6 If the compound identification does not confirm, then the result should be reported as ND.

10.7.4.7 If the analyte response exceeds the linear range of the system, the extract must be diluted and reanalyzed. It is recommended that extracts be diluted so that the response falls into the middle of the calibration curve.

Dilutions for this method are performed differently depending on the concentration of the target analytes in the extract. For dilutions in the 2x to 10x range, the extract is diluted with the dilution mix. No additional EIS nor NIS are added. NIS concentrations in the diluted samples are normalized by multiplying calculated concentration by dilution factor.

If the responses for each EIS in the diluted extract meet the S/N requirements in Section 10.7.2 and retention time requirements in Section 10.7.2.6, and the EIS recoveries from the analysis of the diluted extract are greater than 5%, then the compounds associated with those EISs may be quantified using isotope dilution.

Use the EIS recoveries from the original analysis to select the dilution factor, with the objective of keeping the EIS recoveries in the dilution above that 5% lower limit (i.e., if the EIS recovery of the affected analyte in the undiluted analysis is 50%, then the sample cannot be diluted more than 10:1; if the if the EIS recovery of the affected analyte in the undiluted analysis is 30%, then the sample cannot be diluted more than 6:1).

For dilutions greater than 10-fold, a smaller aliquot should be extracted for soil samples. The estimated analyte concentration from below can be used to determine the best aliquot size. The method requires the collection of a smaller sample size for aqueous samples in such cases (i.e., 125 mL). If aliquoting of an aqueous sample is necessary, the client must be notified prior to subsampling.

If no additional sample is available, then additional EIS and NIS are added, and the sample re-analyzed. The theoretical concentration of the isotope dilution standards in the extract will need to be entered into MassHunter so that the software can correctly calculate the native analyte concentration. This result is estimated based on an internal standard approach. The results should be footnoted as such.

10.7.4.8 If peak identification is prevented by the presence of interferences, further cleanup may be required, or the extract must be diluted so that the interference does not mask any analytes.

10.8 Maintenance and Trouble Shooting

10.8.1 All instrument maintenance must be documented in the appropriate "Instrument Repair and Maintenance" log. The log will include such items as problem, action taken, correction verification, date, and analyst.

10.8.2 Repairs performed by outside vendors must also be documented in the log. The analyst or Department Supervisor responsible for the instrument must complete the log if the repair technician does not.

10.8.3 PC and software changes must be documented in the "Instrument Repair and Maintenance" log. Software changes may require additional validation.

11.0 METHOD PERFORMANCE

11.1 Method performance is monitored through the routine analysis of negative and positive control samples. These control samples include method blanks (MB), blank spikes (BS), low-level blank spikes (LLBS), matrix spikes (MS), matrix spike duplicates (MSD) and sample duplicates (DUP). The MB, BS, LLBS are used to monitor overall method performance, while the MS and MSD or DUP are used to evaluate the method performance and reproducibility in a specific sample matrix.

11.2 The QC sample recoveries for water samples are compared to the required QC acceptance limits in table 5 and 6. The limits for soil samples are in the Table 7 and 8.

12.0 QC REQUIREMENTS

Accuracy and matrix bias are monitored by the use of isotope dilution standards and by the analysis of a QC set that is prepared with each batch (maximum of 20 samples) of samples. The QC set consists of a method blank (MB), blank spike (BS), matrix spike (MS), matrix spike

duplicate (MSD) or sample duplicate (DUP). All control limits are updated annually and are listed in the LIMS.

12.1 Initial Demonstration of Capability.
To establish the ability to generate acceptable precision and recovery, the laboratory must perform the following: four blank spikes (BS) and metho blank (MB) must be prepared and analyzed for each matrix type to be tested. Using the results, the average recovery and RSD (Relative Standard Deviation) are calculated. The average percent recovery and RSD must meet the requirements in the Table 5 for water samples and Table 7 for soil samples.

12.2 Non-Extracted Internal Standards (NIS)

12.2.1 The analytes listed in section 5.10 are used as the Non-Extracted Internals Standards for this method. The response of the NIS in all subsequent runs must be 50-200% of the average response from the initial calibration (see Table 5 for waters and Table 7 for soils).

12.2.2 If the NIS responses are not within limits, the following are required.

12.2.2.1 Check to be sure that there are no errors in calculations, integrations, or internal standards solutions. If errors are found, recalculate the data accordingly.

12.2.2.2 Check instrument performance. If an instrument performance problem is identified, correct the problem, and reanalyze the sample. If no problem is found, prepare a second aliquot of extract, and reanalyze the sample.

12.2.2.3 If upon reanalysis, the responses are still not within limits reanalyze the sample at a dilution.

12.2.2.4 If upon analysis of the dilution the responses are within limits, then the sample or select analytes may need to be reported from the dilution or qualified.

12.3 Extracted Internal Standard (EIS)

12.3.1 The analytes listed in section 5.11 are used as the Extracted Internal Standards for this method.

A known amount of isotope dilution standard is added to each sample including the QC set prior to extraction. The recovery (corrected for dilution) for each isotope dilution standard must follow the limits in Table 6 for water and Table 8 soil matrices.

The % recovery is calculated from the calculated concentrations.

% Recovery = (Sample Amount / Amount Spiked) X 100

Only those isotope dilution standards that directly link to the native analytes being reported need to pass. For example, 13C4-PFBA only needs to pass if PFBA is being reported.

12.3.2 If any isotope dilution standard response/recovery is not within the established control limits, the following are required.

12.3.2.1 Check to be sure that there are no errors in calculations, dilutions, integrations, isotope dilution standard solutions. If errors are found, recalculate the data accordingly. If errors are suspected, re-vial and re- inject the extract to verify.

12.3.2.2 Check instrument performance. It may be necessary to re-vial and re- inject the extract in order to verify performance. If an instrument performance problem is identified, correct the problem and reanalyze the sample.

12.3.2.3 Check for instrument suppression or enhancement by reanalyzing the sample at a dilution.

12.3.2.4 If no problem is found re-extract and reanalyze the sample. **NOTE:** If the recoveries are high and the sample is non-detect, then re-extraction may not be necessary. If there is insufficient sample for re-extraction, reanalyze the sample and footnote this on the report.

12.3.2.5 If upon reanalysis, the recovery is still not within control limits, the problem is considered matrix interference . Isotope dilution standards from both sets of analysis must be reported on the final report.

12.4 Method Blank

12.4.1 The method blank is either HPLC water or cleaned sand (depending upon sample matrix). The method blank is then taken through all procedures along with the other samples to determine any contamination from reagents, glassware, or high- level samples. The method blank must be free of any analytes of interest or interferences at ½ the required LOQ to be acceptable. If the method blank is not acceptable, corrective action must be taken to determine the source of the contamination. Samples associated with a contaminated method blank shall be evaluated as to the best corrective action for each particular sample. This may include reanalyzing the samples, re-extracting and reanalyzing the samples or qualifying the results with a “B” or “V” qualifier.

12.4.2 If the MB is contaminated but the samples are non-detect, then the source of contamination must be investigated and documented. The samples may need to be re-extracted and reanalyzed for confirmation. If there is insufficient sample to re-extract, or if the sample is re-extracted beyond hold time, the appropriate footnote and qualifiers must be added to the results. This must be approved by the department supervisor.

12.4.3 If the MB is contaminated but the samples results are > 10 times the contamination level, the source of the contamination must be investigated and documented. The samples results may be reported with the appropriate "B" or "V" qualifier. This must be approved by the department supervisor.

12.4.4 If the MB is contaminated but the samples results are < 10 times the contamination level, the source of the contamination must be investigated and documented. The samples must be re-extracted and reanalyzed for confirmation. If there is insufficient sample to re-extract, or if the sample is re-extracted beyond hold time, the appropriate footnote and qualifiers must be added to the results. This must be approved by the department supervisor.

12.5 Blank Spike

12.5.1 The blank spike is either HPLC water or cleaned sand (depending upon sample matrix) to which the spike standard has been added. The blank spike is then taken through all procedures along with the other samples to monitor the efficiency of the extraction procedure. The percent recovery for each analyte is calculated as follows:

% Recovery = (Blank Spike Amount / Amount Spiked) X 100

The percent recovery for each analyte of interest must fall within the established control limits for the results to be acceptable (see Table 5 and Table 7). As additional analytes are added to this method, the recoveries will need to be carefully evaluated.

12.5.2 If the blank spike recoveries are not within the established control limits, the following are required.

12.5.2.1 Check to be sure that there are no errors in calculations, dilutions, integrations, or spike solutions. If errors are found, recalculate the data accordingly. If errors are suspected, re-vial and re-inject the extract to verify.

12.5.2.2 Check instrument performance. It may be necessary to re-vial and re- inject the extract in order to verify performance. If an instrument performance problem is identified, correct the problem and reanalyze the sample.

12.5.2.3 If the recovery of an analyte in the BS is high and the associated sample is non-detect, the data may be reportable.

12.5.2.4 If no problem is found, the department supervisor shall review the data and determine what further corrective action is best for each particular sample. That may include reanalyzing the samples, re-extracting and reanalyzing the samples, or qualifying the results as estimated.

12.5.2.5 If there is insufficient sample to re-extract, or if the sample is re-extracted beyond hold time, the appropriate footnote and qualifiers must be added to the results. This must be approved by the

department supervisor.

12.6 Low-Level Blank Spike

12.6.1 The low-level blank spike is either HPLC water or cleaned sand (depending upon sample matrix) to which the spike standard has been added at no more than 2 times the LLOQ. The low-level blank spike is then taken through all procedures along with the other samples to monitor the efficiency of the extraction procedure. The percent recovery for each analyte is calculated as follows:

% Recovery = (Blank Spike Amount / Amount Spiked) X 100

The percent recovery for each analyte of interest must fall within the established control limits for the results to be acceptable (see table 5 and Table 7). As additional analytes are added to this method, the recoveries will need to be carefully evaluated.

12.6.2 If the low-level blank spike recoveries are not within the established control limits, the following are required. Check to be sure that there are no errors in calculations, dilutions, integrations, or spike solutions. If errors are found, recalculate the data accordingly. If errors are suspected, re-vial and re-inject the extract to verify.

12.6.2.1 Check instrument performance. It may be necessary to re-vial and re- inject the extract in order to verify performance. If an instrument performance problem is identified, correct the problem and reanalyze the sample.

12.6.2.2 If the recovery of an analyte in the BS is high and the associated sample is non-detect, the data may be reportable.

12.6.2.3 If no problem is found, the department supervisor shall review the data and determine what further corrective action is best for each particular sample. That may include reanalyzing the samples, re-extracting and reanalyzing the samples, or qualifying the results as estimated.

12.6.2.4 If there is insufficient sample to re-extract, or if the sample is re-extracted beyond hold time, the appropriate footnote and qualifiers must be added to the results. This must be approved by the department supervisor.

12.7 Matrix Spike and Matrix Spike Duplicate/Matrix Duplicate

12.7.1 Matrix spike and spike duplicates are second samples to which the spike standard has been added. The matrix spike and spike duplicate or matrix duplicate are then taken through all procedures along with the other samples to monitor the precision and accuracy of the procedure. The percent recovery for each analyte is calculated as follows:

% Recovery = [(Spike Amount – Sample Amount) / Amount Spiked] X 100

The percent recovery for each analyte of interest must fall within the established control limits for the results to be acceptable (see table 5 and Table 7).

12.7.2 If the matrix spike recoveries are not within the established control limits, the following are required.

12.7.2.1 Check to be sure that there are no errors in calculations, dilutions, integrations, or spike solutions. If errors are found, recalculate the data accordingly. If errors are suspected, re-vial and re-inject the extract to verify.

12.7.2.2 Check instrument performance. It may be necessary to re-vial and re- inject the extract in order to verify performance. If an instrument performance problem is identified, correct the problem and reanalyze the sample.

12.7.2.3 If no problem is found, compare the recoveries to those of the blank spike. If the blank spike recoveries indicate that the problem is sample related, document this on the run narrative. Matrix spike recovery failures are not grounds for re-extraction but are indications of the sample matrix effects.

12.7.3 Precision

Matrix spike and spike duplicate or sample and matrix duplicate recoveries for each analyte OR sample result and duplicate result are used to calculate the relative percent difference (RPD) for each compound.

RPD = [| MS Result – MSD Result | / Average Result] X 100

The RPD for each Perfluorinated compound must be less than 30%. If the RPDs fall outside of the established control limits, the MS/MSD should be reanalyzed to ensure that there was no injection problem. If upon reanalysis the RPDs are still outside of the control limits, the department supervisor shall review the data and determine if any further action is necessary. RPD failures are generally not grounds for re-extraction.

The RPD for each Per fluorinated compound must be less than 30%. If the RPDs fall outside of the established control limits, the DUP should be reanalyzed to ensure that there was no injection problem. If upon reanalysis the RPDs are still outside of the control limits, the department supervisor shall review the data and determine if any further action is necessary. RPD failures are generally not grounds for re-extraction.

12.7.4 Accuracy assessment of the recovery of EIS and NIS compounds.

After the analysis of 30 samples of a given matrix type (water, solids, etc.), the lab must compute the recovery and the standard deviation of the percent recovery (SR) for the isotopically labeled compounds only. The assessment is expressed as a percent recovery interval from R - 2SR to R + 2SR for each matrix. The

records must be maintained and assessed periodically (after every 10 new preparation batches).

13.0 CALCULATIONS

The concentration of each Perfluorinated compound in the original sample is calculated as follows:

Water (ug/l) = ($CONC_{inst}$) X (V_F / V_I) X DF

Soil (ug/kg) = [($CONC_{inst}$) X (V_F / W_I) X DF] / %solids

$CONC_{inst}$	=	Instrument concentration calculated from the initial calibration using mean CF or curve fit (ppb)
DF	=	Dilution Factor
V_F	=	Volume of final extract (ml)
V_I	=	Volume of sample extracted (ml)
W_I	=	Weight of sample extracted (g)
% solids	=	Dry weight determination in decimal form

14.0 DOCUMENTATION

14.1 The Analytical Logbook is a record of the analysis sequence; the logbook must be completed daily. Each instrument will have a separate logbook.

14.1.1 If samples require reanalysis, a brief explanation of the reason must be documented in this log.

14.1.2 Overwriting of data files is never allowed.

14.2 The Standard Preparation Logbook must be completed for all standard preparations. All information requested must be completed; the page must be signed and dated by the respective person.

14.2.1 The SGS Lot Number must be cross-referenced on the standard vial.

14.3 The Instrument Maintenance Logbook must be completed when any type of maintenance is performed on the instrument. Each instrument has a separate log.

14.4 Any corrections to laboratory data must be done using a single line through the error. The initials of the person and date of correction must appear next to the correction.

14.5 Unused blocks of any form must be X'ed or Z'ed out by the analyst before submitting the data for review.

14.6 Supervisory (or peer) personnel must routinely review (at least once per month) all laboratory logbooks to ensure that information is being recorded properly. Additionally, the maintenance

of the logbooks and the accuracy of the recorded information must also be verified during this review.

15.0 DATA REVIEW AND REPORTING

15.1 Initial and continuing calibration check. Verify that all calibration and continuing calibration criteria have been achieved. If the criteria had not been achieved, corrective action must be performed to bring the system in control before analyzing any samples.

15.1.1 If samples had been analyzed under non-compliant calibration criteria, all sample extracts must be re-analyzed once the system is brought into control.

15.2 Quality Control Data Review. Review all QC data. If QC criteria were not achieved, perform corrective action before proceeding with analysis.

15.2.1 In some situation, corrective action may demand that the entire sample batch be re-extracted and re-analyzed before processing data.

15.3 Chromatogram Review. The chromatogram of each sample is evaluated for target analytes.

15.3.1 Each sample may require the reporting of different target analytes. Review the login to assure that the correct target compounds are identified.

15.3.2 Manual integration of chromatographic peaks must be identified by the analysts. Upon review, the supervisor will initial and date the changes made to the report.

15.4 Transfer to LIMS. Following the initial screen review, transfer the processed data to the LIMS.

15.4.1 Compare the printed values to the original values to verify transfer accuracy.

15.4.2 If transfer errors occured, the errors must be corrected before the data is re-submitted.

15.4.3 The results in LIMS are reported in ug/L for water samples and in ug/Kg on a dry-weight basis for soil samples. All results in the samples and blanks are reported to the MDL as per the laboratory policy (refer to the SOP EQA035).

16.0 POLLUTION PREVENTION & WASTE MANAGEMENT

16.1 Wastewater and acetonitrile from the instrument are collected in waste storage bottles and are eventually transferred to the non-chlorinated waste drum.

16.2 Sample Extracts are archived and stored for 30 days after analysis. Old extracts and standards are disposed of in the waste vial drum.

17.0 REFERENCES

17.1 EPA Method 1633, Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS, January 2024.

Table 1 : Target Analytes

PFAS Analyte	Acronym	CAS #	RL(µg/L)Water	RL(µg/kg) Soils
Perfluorobutanoic acid	PFBA	375-22-4	0.008	0.8
Perfluoropentanoic acid	PFPeA	2706-90-3	0.004	0.4
Perfluorohexanoic acid	PFHxA	307-24-4	0.002	0.2
Perfluoroheptanoic acid	PFHpA	375-85-9	0.002	0.2
Perfluorooctanoic acid	PFOA	335-67-1	0.002	0.2
Perfluorononanoic acid	PFNA	375-95-1	0.002	0.2
Perfluorodecanoic acid	PFDA	335-76-2	0.002	0.2
Perfluoroundecanoic acid	PFUnA	2058-94-8	0.002	0.2
Perfluorododecanoic acid	PFDoA	307-55-1	0.002	0.2
Perfluorotridecanoic acid	PFTriA	72629-94-8	0.002	0.2
Perfluorotetradeconoic acid	PFTeA	376-06-7	0.002	0.2
Perfluorobutanesulfonic acid	PFBS	375-73-5	0.08	0.2
Perfluoropentanesulfonic acid	PFPeS	2706-91-4	0.002	0.2
Perfluorohexanesulfonic acid	PFHxS	355-46-4	0.002	0.2
Perfluoroheptanesulfonic acid	PFHpS	375-92-8	0.002	0.2
Perfluorooctanesulfonic acid	PFOS	1763-23-1	0.002	0.2
Perfluorononanesulfonic acid	PFNS	68259-12-1	0.002	0.2
Perfluorodecanesulfonic acid	PFDS	335-77-3	0.002	0.2
Perfluorododecanesulfonic acid	PFDoDS	79780-39-5	0.002	0.2
4:2 Fluorotelomer sulfonate	4:2 FTS	757124-72-4	0.008	0.8
6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2	0.008	0.8
8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4	0.008	0.8
3:3 Fluorotelomer carboxylate	3:3 FTCA	356-02-5	0.01	1
5:3 Fluorotelomer carboxylate	5:3 FTCA	914637-49-3	0.05	5
7:3 Fluorotelomer carboxylate	7:3 FTCA	812-70-4	0.05	5
N-ethyl perfluorooctanesulfonamido	EtFOSAA	2991-50-6	0.002	0.2
N-methyl perfluorooctanesulfonamido	MeFOSAA	2355-31-9	0.002	0.2
Perfluorooctane sulfonamide	PFOSA	754-91-6	0.002	0.2
N-Ethyl perfluorooctane sulfonamide	EtFOSA	4151-50-2	0.002	0.2

N-Methyl perfluorooctane sulfonamide	MeFOSA	31506-32-8	0.002	0.2
N-Ethyl perfluorooctane	EtFOSE	1691-99-2	0.02	2
N-Methyl perfluorooctane	MeFOSE	24448-09-7	0.02	2
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6	0.008	0.8
11-chloroicosafluoro-3-oxaundecade-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9	0.008	0.8
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9Cl-PF3ONS	756426-58-1	0.008	0.8
4,8-dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4	0.008	0.8
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6	0.004	0.4
Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7	0.004	0.4
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1	0.004	0.4
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5	0.004	0.4

TABLE 2: Precursor and Primary Transition Masses

Analyte	Type	RT	Primary Transition	Secondary Transition	Reference Compound
13C3-PFBA	NIS	3.34	216.0 -> 172.0		
13C4-PFBA	EIS	3.34	216.8 -> 171.9		13C3-PFBA
PFBA	Target	3.34	212.8 -> 168.9		13C4-PFBA
PFMPA	Target	3.99	229.0 -> 84.9		13C5-PFPeA
3:3FTCA	Target	4.32	241.0 -> 177.0	241.0 -> 117.0	13C5-PFPeA
13C5-PFPeA	EIS	4.93	268.3 -> 223.0		13C2-PFHxA
PFPeA	Target	4.93	263.0 -> 219.0		13C5-PFPeA
PFMBA	Target	5.38	279.0 -> 85.1		13C5-PFPeA
13C2-4:2FTS	EIS	5.85	329.1 -> 80.9		18O2-PFHxS
4:2FTS	Target	5.85	327.1 -> 307.0	327.1 -> 80.9	13C2-4:2FTS
NFDHA	Target	6.08	295.0 -> 201.0	295.0 -> 84.9	13C5-PFHxA
13C3-PFBS	EIS	6.15	302.1 -> 79.9		18O2-PFHxS
PFBS	Target	6.15	298.7 -> 79.9	298.7 -> 98.8	13C3-PFBS
13C2-PFHxA	NIS	6.20	315.1 -> 270.0		
13C5-PFHxA	EIS	6.20	318.0 -> 273.0		13C2-PFHxA
PFHxA	Target	6.20	313.0 -> 269.0	313.0 -> 118.9	13C5-PFHxA
13C3-HFPO- DA	EIS	6.59	286.9 -> 168.9		13C2-PFHxA
HFPO-DA	Target	6.59	284.9 -> 168.9	284.9 -> 184.9	13C3-HFPO-DA

PFEESA	Target	6.71	314.8 -> 134.9	314.8 -> 82.9	13C5-PFHxA
5:3FTCA	Target	6.82	341.0 -> 237.1	341.0 -> 217.0	13C5-PFHxA
13C4-PFHpA	EIS	7.14	367.1 -> 322.0		13C2-PFHxA
PFHpA	Target	7.14	363.1 -> 319.0	363.1-> 169.0	13C4-PFHpA
PFPeS	Target	7.22	349.1 -> 79.9	349.1 -> 98.9	13C3-PFBS
ADONA	Target	7.40	376.8 -> 250.9	376.8 -> 84.8	13C3-HFPO-DA
13C2-6:2FTS	EIS	7.56	429.1 -> 80.9		18O2-PFHxS
6:2FTS	Target	7.56	427.1 -> 407.0	427.1 -> 80.9	13C2-6:2FTS
13C4-PFOA	NIS	7.81	417.1 -> 172.0	417.1 -> 372.0	
13C8-PFOA	EIS	7.81	421.0 -> 376.0		13C4-PFOA
PFOA	Target	7.81	413.0 -> 369.0	413.0 -> 169.0	13C8-PFOA
PFHxS	Target	7.96	398.9 -> 79.9	398.9 -> 98.9	13C3-PFHxS
18O2-PFHxS	NIS	7.97	403.0 -> 83.9		
13C3-PFHxS	EIS	7.97	402.1 -> 79.9		18O2-PFHxS
7:3FTCA	Target	8.27	441.0 -> 316.9	441.0 -> 336.9	13C5-PFHxA
13C5-PFNA	NIS	8.40	468.0 -> 427.0		
13C9-PFNA	EIS	8.40	472.1 -> 427.0		13C5-PFNA
PFNA	Target	8.40	463.0 -> 419.0	463.0 -> 219.0	13C9-PFNA
PFHpS	Target	8.58	449.0 -> 79.9	449.0 -> 98.8	13C3-PFHxS
13C2-8:2FTS	EIS	8.69	529.1 -> 80.9		18O2-PFHxS
8:2FTS	Target	8.70	527.1 -> 507.0	527.1 -> 80.8	13C2-8:2FTS
13C2-PFDA	NIS	8.95	515.1 -> 470.1		
13C6-PFDA	EIS	8.95	519.1 -> 474.1		13C2-PFDA
PFDA	Target	8.95	512.9 -> 469.0	512.9 -> 219.0	13C6-PFDA
d3-MeFOSAA	EIS	8.97	573.2 -> 419.0		13C4-PFOS
MeFOSAA	Target	8.97	570.1 -> 419.0	570.1 -> 483.0	d3-MeFOSAA
13C4-PFOS	NIS	9.14	503.8 -> 79.9		
13C8-PFOS	EIS	9.13	507.1 -> 79.9		13C4-PFOS
PFOS	Target	9.14	498.9 -> 79.9	498.9 -> 98.8	13C8-PFOS
d5-EtFOSAA	EIS	9.19	589.2 -> 419.0		13C4-PFOS
EtFOSAA	Target	9.20	584.2 -> 419.1	584.2 -> 526.0	d5-EtFOSAA
13C7-PFUnDA	EIS	9.44	570.0 -> 525.1		13C2-PFDA
PFUnDA	Target	9.44	563.1 -> 519.0	563.1 -> 269.1	13C7-PFUnDA
9Cl-PF3ONS	Target	9.49	530.8 -> 351.0	532.8 -> 353.0	13C3-HFPO- DA
PFNS	Target	9.63	548.8 -> 79.9	548.8 -> 98.8	13C8-PFOS
13C2-PFDoDA	EIS	9.87	615.1 -> 570.0		13C2-PFDA
PFDoDA	Target	9.87	613.1 -> 569.0	613.1 -> 319.0	13C2-PFDoDA
PFDS	Target	10.05	599.0 -> 79.9	599.0 -> 98.8	13C7-PFUnDA
13C8-FOSA	EIS	10.23	506.1 -> 77.8		13C4-PFOS
FOSA	Target	10.23	498.1 -> 77.9	498.1 -> 478.0	13C8-FOSA
PFTrDA	Target	10.26	663.0 -> 619.0	663.0 -> 168.9	13C2-PFDoDA

11Cl-	Target	10.32	630.9 -> 451.0	632.9 -> 453.0	13C3-HFPO- DA
13C2-PFTeDA	EIS	10.60	715.1 -> 670.0		13C2-PFDA
PFTeDA	Target	10.60	713.1 -> 669.0	713.1 -> 168.9	13C2-PFTeDA
PFDoDS	Target	10.75	699.1 -> 79.9	699.1 -> 98.8	13C8-PFOS
d7-MeFOSE	EIS	11.21	623.1 -> 58.9		13C4-PFOS
MeFOSE	Target	11.22	616.1 -> 58.9		d7-MeFOSE
d3-MeFOSA	EIS	11.30	515.0 -> 219.0		13C4-PFOS
MeFOSA	Target	11.30	512.0 -> 219.0	512.0 -> 169.0	d3-MeFOSA
d9-EtFOSE	EIS	11.45	639.1 -> 58.9		13C4-PFOS
EtFOSE	Target	11.46	630.0 -> 58.9		d9-EtFOSE
d5-EtFOSA	EIS	11.53	531.1 -> 219.0		13C4-PFOS
EtFOSA	Target	11.53	526.0 -> 219.0	526.0 -> 169.0	d5-EtFOSA

TABLE 3: Standard Levels (Targets), ng/ml

Compound	CS1	CS2	CS3	CS4 (CV1)	CS5	CS6	CS7	CS8
Perfluoroalkyl carboxylic acids								
PFBA	0.8	1.6	5.0	10	20	50	100	250
PFPeA	0.4	0.8	2.5	5	10	25	50	125
PFHxA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFHpA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFOA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFNA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFDA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFUnA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFDoA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFTrDA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
PFTeDA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
Perfluoroalkyl sulfonic acids								
PFBS	0.177	0.354	1.109	2.218	4.435	11.087	22.17	55.438
PFPeS	0.188	0.376	1.176	2.353	4.705	11.762	23.52	58.813
PFHxS	0.183	0.366	1.143	2.285	4.570	11.425	22.85	57.125
PFHpS	0.191	0.382	1.191	2.383	4.765	11.912	23.82	59.563
PFOS	0.186	0.372	1.160	2.320	4.640	11.600	23.20	58.000
PFNS	0.192	0.384	1.203	2.405	4.810	12.025	24.05	60.125
PFDS	0.193	0.386	1.206	2.413	4.825	12.062	24.12	60.313
PFDoS	0.194	0.388	1.213	2.425	4.850	12.125	24.25	60.625
Fluorotelomer sulfonic acids								
4:2FTS	0.750	1.500	4.688	9.375	18.75	46.87	93.75	234.375
6:2FTS	0.760	1.520	4.750	9.500	19.00	47.50	95.00	237.500
8:2FTS	0.768	1.536	4.800	9.600	19.20	48.00	96.00	240.000
Perfluorooctane sulfonamides								
PFOSA	0.2	0.4	1.25	2.5	5	12.5	25	62.5
NMeFOSA	0.2	0.4	1.25	2.5	5	12.5	25	62.5
NEtFOSA	0.2	0.4	1.25	2.5	5	12.5	25	62.5
Perfluorooctane								
NMeFOSAA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5
NEtFOSAA	0.2	0.4	1.25	2.5	5.0	12.5	25	62.5

Perfluorooctane sulfonamide								
NMeFOSE	2	4.0	12.5	25	50	125	250	625
NEtFOSE	2	4.0	12.5	25	50	125	250	625
Per- and polyfluoroether								
HFPO-DA	0.8	1.6	5.0	10	20	50	100	250
ADONA	0.756	1.512	4.725	9.45	18.9	47.25	94.5	236.25
PFMPA	0.4	0.8	2.5	5.0	10	25	50	125
PFMBA	0.4	0.8	2.5	5.0	10	25	50	125
NFDHA	0.4	0.8	2.5	5.0	10	25	50	125
Ether sulfonic acids								
9Cl-PF3ONS	0.748	1.496	4.675	9.35	18.7	46.75	93.5	233.75
11Cl-PF3OUdS	0.756	1.512	4.725	9.45	18.9	47.25	94.5	236.25
PFEESA	0.356	0.712	2.225	4.45	8.90	22.25	44.5	111.25
Fluorotelomer carboxylic acids								
3:3FTCA	1	2	6.25	12.5	25.0	62.5	125	312.5
5:3FTCA	5	10	31.25	62.5	125	312.5	625	1562.5
7:3FTCA	5	10	31.25	62.5	125	312.5	625	1562.5
Extracted Internal Standard (EIS)								
13C4-PFBA	10	10	10	10	10	10	10	10
13C5-PFPeA	5	5	5	5	5	5	5	5
13C5-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C4-PFHpA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C8-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C9-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C6-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C7-PFUnA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C2-PFDoA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C2-PFTeDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C3-PFBS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C3-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C8-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C2-4:2 FTS	5	5	5	5	5	5	5	5
13C2-6:2 FTS	5	5	5	5	5	5	5	5
13C2-8:2 FTS	5	5	5	5	5	5	5	5
13C8-PFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D3-NMeFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D5-NEtFOSA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
D3-NMeFOSAA	5	5	5	5	5	5	5	5
D5-NEtFOSAA	5	5	5	5	5	5	5	5
D7-NMeFOSE	25	25	25	25	25	25	25	25
D9-NEtFOSE	25	25	25	25	25	25	25	25
13C3-HFPO-DA	10	10	10	10	10	10	10	10
Non-extracted Internal Standard								
13C3-PFBA	5	5	5	5	5	5	5	5
13C2-PFHxA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C4-PFOA	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C5-PFNA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
13C2-PFDA	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
18O2-PFHxS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
13C4-PFOS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

TABLE 4 : Method Names vs Lab Names

METHOD		LABORATORY		
ANALYTE NAME	**ACRONYM**	**LIMS REPORT NAME**	**RAW DATA NAME**	**RAW DATA EIS as ISTD**
Perfluorobutanoic acid	PFBA	Perfluorobutanoic acid	PFBA	
Perfluoropentanoic acid	PFPeA	Perfluoropentanoic acid	PFPeA	
Perfluorohexanoic acid	PFHxA	Perfluorohexanoic acid	PFHxA	
Perfluoroheptanoic acid	PFHpA	Perfluoroheptanoic acid	PFHpA	
Perfluorooctanoic acid	PFOA	Perfluorooctanoic acid	PFOA	
Perfluorononanoic acid	PFNA	Perfluorononanoic acid	PFNA	
Perfluorodecanoic acid	PFDA	Perfluorodecanoic acid	PFDA	
Perfluoroundecanoic acid	PFUnA	Perfluoroundecanoic acid	PFUnDA	
Perfluorododecanoic acid	PFDoA	Perfluorododecanoic acid	PFDoDA	
Perfluorotridecanoic acid	PFTrDA	Perfluorotridecanoic acid	PFTrDA	
Perfluorotetradecanoic acid	PFTeDA	Perfluorotetradecanoic acid	PFTeDA	
Perfluorobutanesulfonic acid	PFBS	Perfluorobutanesulfonic acid	PFBS	
Perfluoropentanesulfonic acid	PFPeS	Perfluoropentanesulfonic acid	PFPeS	
Perfluorohexanesulfonic acid	PFHxS	Perfluorohexanesulfonic acid	PFHxS	
Perfluoroheptanesulfonic acid	PFHpS	Perfluoroheptanesulfonic acid	PFHpS	
Perfluorooctanesulfonic acid	PFOS	Perfluorooctanesulfonic acid	PFOS	
Perfluorononanesulfonic acid	PFNS	Perfluorononanesulfonic acid	PFNS	
Perfluorodecanesulfonic acid	PFDS	Perfluorodecanesulfonic acid	PFDS	
Perfluorododecanesulfonic acid	PFDoS	Perfluorododecanesulfonic acid	PFDoDS	
1H ,1H ,2H ,2H -Perfluorohexane sulfonic acid	4:2FTS	4:2 Fluorotelomer sulfonate	4:2FTS	
1H ,1H ,2H ,2H -Perfluorooctane sulfonic acid	6:2FTS	6:2 Fluorotelomer sulfonate	6:2FTS	
1H ,1H ,2H ,2H -Perfluorodecane sulfonic acid	8:2FTS	8:2 Fluorotelomer sulfonate	8:2FTS	
Perfluorooctanesulfonamide	PFOSA	PFOSA	FOSA	
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	EtFOSAA	EtFOSAA	
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	MeFOSAA	MeFOSAA	
N-ethyl perfluorooctanesulfonamide	NEtFOSA	EtFOSA	EtFOSA	
N-methyl perfluorooctanesulfonamide	NMeFOSA	MeFOSA	MeFOSA	
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	EtFOSE	MeFOSE	
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	MeFOSE	EtFOSE	
Hexafluoropropylene oxide dimer acid	HFPO-DA	HFPO-DA (GenX)	HFPO-DA	
4,8-dioxa-3H-perfluorononanoic acid	ADONA	ADONA	ADONA	
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	9Cl-PF3ONS (F-53B Major)	9Cl-PF3ONS	
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	11Cl-PF3OUdS (F-53B Minor)	11Cl-PF3OUdS	
Perfluoro-3-methoxypropanoic acid	PFMPA	PFMPA	PFMPA	
Perfluoro-4-methoxybutanoic acid	PFMBA	PFMBA	PFMBA	
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	NFDHA	NFDHA	

Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	PFEESA	PFEESA	
3-Perfluoropropyl propanoic acid	3:3FTCA	3:3 Fluorotelomer carboxylate	3:3FTCA	
2H,2H,3H,3H-Perfluorooctanoic acid	5:3FTCA	5:3 Fluorotelomer carboxylate	5:3FTCA	
3-Perfluoroheptyl propanoic acid	7:3FTCA	7:3 Fluorotelomer carboxylate	7:3FTCA	
Perfluoro-n-[13C4]butanoic acid	13C4-PFBA	13C4-PFBA	13C4-PFBA	M4-PFBA
Perfluoro-n-[13C5]pentanoic acid	13C5-PFPeA	13C5-PFPeA	13C5-PFPeA	M5-PFPeA
Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid	13C5-PFHxA	13C5-PFHxA	13C5-PFHxA	M5-PFHxA
Perfluoro-n-[1,2,3,4-13C4]heptanoic acid	13C4-PFHpA	13C4-PFHpA	13C4-PFHpA	M4-PFHpA
Perfluoro-n-[13C8]octanoic acid	13C8-PFOA	13C8-PFOA	13C8-PFOA	M8-PFOA
Perfluoro-n-[13C9]nonanoic acid	13C9-PFNA	13C9-PFNA	13C9-PFNA	M9-PFNA
Perfluoro-n-[1,2,3,4,5,6-13C6]decanoic acid	13C6-PFDA	13C6-PFDA	13C6-PFDA	M6-PFDA
Perfluoro-n-[1,2,3,4,5,6,7-13C7]undecanoic acid	13C7-PFUnA	13C7-PFUnDA	13C7-PFUnDA	M7-PFUnDA
Perfluoro-n-[1,2-13C2]dodecanoic acid	13C2-PFDoA	13C2-PFDoDA	13C2-PFDoDA	M2-PFDoDA
Perfluoro-n-[1,2-13C2]tetradecanoic acid	13C2-PFTeDA	13C2-PFTeDA	13C2-PFTeDA	M2-PFTeDA
Perfluoro-1-[2,3,4-13C3]butanesulfonic acid	13C3-PFBS	13C3-PFBS	13C3-PFBS	M3-PFBS
Perfluoro-1-[1,2,3-13C3]hexanesulfonic acid	13C3-PFHxS	13C3-PFHxS	13C3-PFHxS	M3-PFHxS
Perfluoro-1-[13C8]octanesulfonic acid	13C8-PFOS	13C8-PFOS	13C8-PFOS	M8-PFOS
1H,1H,2H,2H-Perfluoro-1-[1,2-13C2]hexanesulfonic acid	13C2-4:2FTS	13C2-4:2FTS	13C2-4:2FTS	M2-4:2FTS
1H,1H,2H,2H-Perfluoro-1-[1,2-13C2]octanesulfonic acid	13C2-6:2FTS	13C2-6:2FTS	13C2-6:2FTS	M2-6:2FTS
1H,1H,2H,2H-Perfluoro-1-[1,2-13C2]decanesulfonic acid	13C2-8:2FTS	13C2-8:2FTS	13C2-8:2FTS	M2-8:2FTS
Perfluoro-1-[13C8]octanesulfonamide	13C8-PFOSA	13C8-FOSA	13C8-FOSA	M8-FOSA
N-ethyl-d5-perfluoro-1-octanesulfonamide	D5-NEtFOSA	d5-EtFOSA	d5-EtFOSA	M5-EtFOSA
N-methyl-d3-perfluoro-1-octanesulfonamide	D3-NMeFOSA	d3-MeFOSA	d3-MeFOSA	M3-MeFOSA
N-ethyl-d5-perfluoro-1-octanesulfonamidoacetic acid	D5-NEtFOSAA	d5-EtFOSAA	d5-EtFOSAA	M5-EtFOSAA
N-methyl-d3-perfluoro-1-octanesulfonamidoacetic acid	D3-NMeFOSAA	d3-MeFOSAA	d3-MeFOSAA	M3-MeFOSAA
N-methyl-d7-perfluorooctanesulfonamidoethanol	D7-NMeFOSE	d7-MeFOSE	d7-MeFOSE	M7-MeFOSE
N-ethyl-d9-perfluorooctanesulfonamidoethanol	D9-NEtFOSE	d9-EtFOSE	d9-EtFOSE	M9-EtFOSE
Tetrafluoro-2-heptafluoropropoxy-13C3-propanoic acid	13C3-HFPO-DA	13C3-HFPO-DA	13C3-HFPO-DA	M3-HFPO-DA
Perfluoro-n-[2,3,4-13C3]butanoic acid	13C3-PFBA	13C3-PFBA	13C3-PFBA	
Perfluoro-n-[1,2,3,4-13C4]octanoic acid	13C4-PFOA	13C4-PFOA	13C4-PFOA	
Perfluoro-n-[1,2-13C2]decanoic acid	13C2-PFDA	13C2-PFDA	13C2-PFDA	
Perfluoro-n-[1,2,3,4-13C4]octanesulfonic acid	13C4-PFOS	13C4-PFOS	13C4-PFOS	
Perfluoro-1-hexane[18O2]sulfonic acid	18O2-PFHxS	18O2-PFHXS	18O2-PFHxS	
Perfluoro-n-[1,2-13C2]hexanoic acid	13C2-PFHxA	13C2-PFHXA	13C2-PFHxA	
Perfluoro-n-[1,2,3,4,5-13C5]nonanoic acid	13C5-PFNA	13C5-PFNA	13C5-PFNA	

Table 5. Acceptance QC limits for wastewater samples

Compounds	iDOC		BS/LLBS Recovery (%)
	Recovery (%)	RSD (%)	
PFBA	70-135	21	70-140
PFPeA	70-135	23	65-135
PFHxA	70-135	24	70-145
PFHpA	70-135	28	70-150
PFOA	65-155	27	70-150
PFNA	70-140	28	70-150
PFDA	65-140	26	70-140
PFUnA	70-135	29	70-145
PFDoA	70-130	21	70-140
PFTrDA	60- 145	29	65-140
PFTeDA	70-145	27	60-140
PFBS	70-140	23	60-145
PFPeS	70-135	25	65-140
PFHxS	70-135	27	65-145
PFHpS	70-140	30	70-150
PFOS	70-140	29	55-150
PFNS	70-135	29	65-145
PFDS	70-135	30	60-145
PFDoS	45-135	35	50 – 145
4:2FTS	70 – 135	27	70-145
6:2FTS	70-135	32	65-155
8:2FTS	70-140	33	60-150
PFOSA	70-135	22	70-145
NMeFOSA	70-135	30	60-150
NEtFOSA	70-130	26	65 – 145
NMeFOSAA	65-140	32	50-140
NEtFOSAA	70-135	28	70-145
NMeFOSE	70-135	29	70-145
NEtFOSE	70-130	21	70-135
HFPO-DA	70 – 135	23	70-140
ADONA	70-135	23	65-145
PFMPA	60-140	23	55-140
PFMBA	65 – 145	27	60-150
NFDHA	65-140	37	50-150
9Cl-PF3ONS	70-145	30	70-155

	iDOC		
Compounds	**Recovery (%)**	**RSD (%)**	**BS/LLBS Recovery (%)**
11Cl-PF3OUdS	50-150	35	55-160
PFEESA	70-135	25	70-140
3:3FTCA	70-130	23	65-130
5:3FTCA	70 – 130	24	70-135
7:3FTCA	55 – 130	34	50 – 145

Table 6. QC Acceptance Limits for EIS and NIS Recoveries in wastewater samples

EIS Compound	Recovery Range (%)
$^{13}C_4$-PFBA	5 – 130 *
$^{13}C_5$-PFPeA	40-130
13C5-PFHxA	40-130
$^{13}C_4$-PFHpA	40-130
$^{13}C_8$-PFOA	40-130
$^{13}C_9$-PFNA	40-130
$^{13}C_6$-PFDA	40-130
$^{13}C_7$-PFUnA	30 – 130
$^{13}C_2$-PFDoA	10 – 130
$^{13}C_2$-PFTeDA	10 – 130
$^{13}C_3$-PFBS	40-135
$^{13}C_3$-PFHxS	40-130
$^{13}C_8$-PFOS	40-130
$^{13}C_2$-4:2FTS	40 – 220
$^{13}C_2$-6:2FTS	40 – 200
$^{13}C_2$-8:2FTS	40-300
$^{13}C_8$-PFOSA	40 – 130
D_3-NMeFOSA	10 – 130
D_5-NEtFOSA	10 – 130
D_3-NMeFOSAA	35-170
D_5-NEtFOSAA	25-135
D_7-NMeFOSE	10 – 130
D_9-NEtFOSE	10 – 130
$^{13}C_3$-HFPO-DA	40-130
13C3-PFBA	50-200
13C2-PFHxA	
13C4-PFOA	
13C5-PFNA	
13C2-PFDA	
18O2-PFHxS	
13C4-PFOS	

* Recovery of 13C4-PFBA can be problematic in some field samples. Although the lower limit for recovery for this EIS is set below 10%, laboratories should routinely track recovery of this EIS and take reasonable steps to ensure that recovery is at least 10% in the majority of samples.

Table 7. Acceptance QC limits for solid samples

Compound	Solid Matrices[1]		
	iDOC		
	Mean Recovery (%)	RSD (%)	BS/LLBS Recovery (%)
PFBA	70 - 140	17	70 - 140
PFPeA	70 - 140	26	60 - 150
PFHxA	70 - 135	23	65 - 140
PFHpA	70 - 140	21	65 - 145
PFOA	70 - 140	23	70 - 150
PFNA	65 - 145	24	70 - 155
PFDA	70 - 145	26	70 - 155
PFUnA	70 - 145	26	70 - 155
PFDoA	70 - 145	25	70 - 150
PFTrDA	55 - 160	26	65 - 150
PFTeDA	70 - 145	24	65 - 150
PFBS	60 - 145	25	65 - 145
PFPeS	65 - 140	29	55 - 160
PFHxS	65 - 145	28	60 - 150
PFHpS	70 - 140	27	65 - 155
PFOS	70 - 135	27	65 - 160
PFNS	70 - 140	27	55 - 140
PFDS	50 - 150	31	40 - 155
PFDoS	40 - 140	40	25 - 160
4:2FTS	70 - 135	27	60 - 150
6:2FTS	60 - 160	50	55 - 200
8:2FTS	70 - 140	27	70 - 150
PFOSA	70 - 140	19	70 - 140
NMeFOSA	65 - 145	26	70 - 155
NEtFOSA	70 - 135	19	70 - 140
NMeFOSAA	65 - 145	31	65 - 155
NEtFOSAA	60 - 150	31	65 - 165
NMeFOSE	70 - 140	19	70 - 140
NEtFOSE	70 - 135	17	70 - 135
HFPO-DA	70 - 140	25	70 - 145
ADONA	70 - 155	26	70 - 160
PFMPA	70 - 140	25	30 - 140
PFMBA	55 - 145	33	60 - 150
NFDHA	45 - 145	27	60 - 155
9Cl-PF3ONS	65 - 135	23	70 - 150
11Cl-PF3OUdS	50 - 135	31	45 - 160
PFEESA	70 - 140	20	70 - 140
3:3FTCA	45 - 155	32	45 - 130
5:3FTCA	70 - 135	28	60 - 130
7:3FTCA	70 - 145	39	60 - 150

1.The recovery limits apply to the target analyte results.

Table 8. Acceptance Limits for EIS and NIS Compounds in Soil Samples

	Soil/Sediment Samples
EIS Compound	**Recovery (%)**
$^{13}C_4$-PFBA	8 - 130
$^{13}C_5$-PFPeA	35 - 130
$^{13}C_5$-PFHxA	40 - 130
$^{13}C_4$-PFHpA	40 - 130
$^{13}C_8$-PFOA	40 - 130
$^{13}C_9$-PFNA	40 - 130
$^{13}C_6$-PFDA	40 - 130
$^{13}C_7$-PFUnA	40 - 130
$^{13}C_2$-PFDoA	40 - 130
$^{13}C_2$-PFTeDA	20 - 130
$^{13}C_3$-PFBS	40 - 135
$^{13}C_3$-PFHxS	40 - 130
$^{13}C_8$-PFOS	40 - 130
$^{13}C_2$-4:2FTS	40 - 165
$^{13}C_2$-6:2FTS	40 - 215
$^{13}C_2$-8:2FTS	40 - 275
$^{13}C_8$-PFOSA	40 - 130
D_3-NMeFOSA	10 - 130
D_5-NEtFOSA	10 - 130
D_3-NMeFOSAA	40 - 135
D_5-NEtFOSAA	40 - 150
D_7-NMeFOSE	20 - 130
D_9-NEtFOSE	15 - 130
$^{13}C_3$-HFPO-DA	40 - 130
$^{13}C_3$-PFBA $^{13}C_2$-PFHxA $^{13}C_4$-PFOA $^{13}C_5$-PFNA $^{13}C_2$-PFDA $^{18}O_2$-PFHxS $^{13}C_4$-PFOS	50 - 200

Current Version Revision Information

Changes / Edits made (this should include added or deleted information within a sentence or paragraph only):

Section / Subsection	Detailed description of what was revised
Table 3	Concentrations for some analytes were updated

Sections or Subsections deleted:

Section / Subsection	Reason section or subsection was removed

Sections or Subsections added:

Section / Subsection	Reason section or subsection was added

History of Revisions

Version #	Date of Revision	Revised By
09	08/21/2024	Olga Azarian
10	8/29/2024	Olga Azarian
11	10/30/2024	Paul Czajak
12	04/02/2025	Olga Azarian
13	06/19/2025	Olga Azarian /Anita Jagtap
14	07/29/2025	Olga Azarian

END OF DOCUMENT

LAB SUPERVISOR: Olga H. Ayala

QA OFFICER: DanAep

EFFECTIVE DATE: 06/19/2025

TITLE: STANDARD OPERATING PROCEDURE FOR THE EXTRACTION OF PER- AND POLYFLUORINATED ALKYL SUBSTANCES FROM SOIL SAMPLES FOR LC/MS/MS ANALYSIS

REFERENCES: EPA 1633, January 2024
REVISED SECTIONS: 10.12,10.16,10.19,10.23
ADDED SECTIONS:11.15

1.0 SCOPE AND APPLICATION

1.1 This procedure applies to soil samples submitted for Perfluorinated Alkyl Substances (PFAS) analysis by LC/MS/MS using an Isotope Dilution technique.

2.0 SUMMARY OF METHOD

2.1 Soil samples are serially extracted with basic methanol using a shaker table, cleaned with graphitized carbon, concentrated, and back-extracted utilizing a solid phase extraction cartridge. The cartridge is eluted with basic methanol, the volume is adjusted to 5.0 mL and stored in a centrifuge tube.

3.0 REPORTING LIMIT AND METHOD DETECTION LIMIT

3.1 See analytical SOP-EMS1633

4.0 DEFINITIONS

4.1 Batch: A group of samples that are similar with respect to matrix and the testing procedures being employed and which are processed as a unit. A sample batch is limited to a maximum of 20 samples or 12 hours whichever comes first.

4.2 Blank Spike (BS): An analyte-free matrix spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. Blank Spike Recoveries are used to document laboratory performance for a given method. This may also be called a Laboratory Control Sample (LCS).

4.3 Low-Level Blank Spike (LLBS): An analyte-free matrix spiked with a known amount of analyte(s) at 2x LLOQ, processed simultaneously with the samples through all the steps of the analytical procedure. Low-Level Blank Spike Recoveries are used to document laboratory performance at the LLOQ for a given method. This may also be called a

Low Level Laboratory Control Sample (LLLCS) or the Low-Level Ongoing Precision

And Recovery Standard (LLOPR).

4.4 Extracted Internal Standards (EIS): A standard containing isotopically labelled versions of the native target analytes. These isotopes are usually labelled with C13, d2, or O18 atoms. Isotope Dilution Standards are used to measure the extraction efficiency and to correct the concentrations of the native analytes based on the recovery of their isotopically labelled analogs.

4.5 Field Blank (FB): An aliquot of reagent water that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FB is to determine if method analytes or other interferences are present in the field environment.

4.6 Holding Time: The maximum times that samples may be held prior to preparation and/or analysis and are still considered valid.

4.7 Matrix Duplicate (DUP): A replicate sample which is used to document the precision of a method in a given sample matrix.

4.8 Matrix Spike (MS): A sample aliquot spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. The matrix spike recoveries are used to document the bias of a method in a given sample matrix.

4.9 Matrix Spike Duplicate (MSD): A replicate sample aliquot spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. The matrix spike duplicate recoveries are used to document the precision and bias of a method in a given sample matrix.

4.10 Method Blank (MB): An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is processed simultaneously with the samples through all the steps of the analytical procedure. The method blank is used to document contamination resulting from the analytical process.

4.11 Preservation: Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical integrity of the sample.

5.0 HEALTH & SAFETY

5.1 The analyst must follow normal safety procedures as outlined in the SGS Laboratory Safety Manual which includes the use of Safety glasses, gloves, and lab coats. In addition, all acids are corrosive and must be handled with care. Flush spills with plenty of water. If acids contact any part of the body, flush with water and contact the supervisor.

5.2 Safety Data Sheets (SDS) are available for all reagents and solvents used in the lab. Technicians should review the SDS before using any new reagents or solvents.

5.3 Methanol is an inhalation hazard. Use in a well-ventilated area.

5.4 The toxicity or carcinogenicity of each reagent used in this method has not been precisely determined; however, each chemical must be treated as a potential health hazard. Exposure to these reagents should be reduced to the lowest possible level. The laboratory maintains a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of data handling sheets is available to all personnel involved in these analyses.

6.0 COLLECTION, PRESERVATION, AND HOLDING TIME

6.1 Preservation

6.1.1 Samples shall be collected in wide mouth 4oz HDPE jars fitted with a HDPE or Polypropylene screw cap. Alternate size HDPE bottles may be used depending on project requirements. **Glass bottles with Teflon lined caps can NOT be used.**

6.1.2 The samples must be chilled to ≤6°C from the time of collection until arrival at the laboratory. The samples must be refrigerated at ≤ 6°C or frozen at ≤ -20°C from the time of receipt until extraction.

6.1.3 The extracts should be stored at ≤6°C. They must be allowed to come to room temperature prior to analysis. All extracts should be vortexed just before transfer to the autosampler vials.

6.2 Holding Time

6.2.1 Soil samples must be extracted and analyzed within 90 days of collection if stored at ≤6°C or at ≤ -20°C. The Date/Time that the extraction is started and completed must be recorded on the prep sheet.

7.0 APPARATUS AND MATERIALS

7.1 Solid-phase cartridge extraction system – suitable for use with extraction cartridges

7.2 Vacuum pump

7.3 Vacuum Flasks – or equivalent

7.4 SPE reservoirs – various sizes

7.5 SPE cartridges – Weak Anion Exchange – must have pKa of >8 and 150mg bed size

7.6 Mechanical Shaker or Shaker Table

7.7 Vortex Mixer

7.8 15ml and 50ml Polyethylene Centrifuge tubes with caps

7.9 25ul, 50ul, 250ul, and 500ul syringes

7.10 10ml, 25ml, 250ml, and 1000ml Polyethylene graduated cylinder

7.11 Volumetric Pipettor and tips

7.12 1ml and 5ml Disposable polyethylene luer lock syringes

7.13 0.2um Nylon syringe filter 13mm and 25mm

7.14 10ml, 25ml, and 100ml Polyethylene or Polypropylene volumetric flasks

7.15 Disposable polyethylene transfer pipettes

7.16 2.0ml polyethylene screw cap vials

7.17 HDPE Wash Bottles

7.18 Spatula – Stainless Steel or Wood

7.19 Top loading balance – capable of weighing samples to +/- 0.01 grams

7.20 Centrifuge – 3000 rpm minimum speed

7.21 Micro-scoop 10mg

7.22 Nitrogen Evaporator, TurboVap LV or ExcelVap

7.23 Extrahera HV-5000

8.0 STANDARDS AND REAGENTS

8.1 Methanol – HPLC grade or equivalent

8.2 Reagent water – HPLC grade or equivalent - free of interference

8.3 SPE Cartridges – Wax (weak anion exchange) or equivalent

8.4 Acetic Acid - HPLC grade or equivalent

8.5 Ammonium Hydroxide – Fisher A669-212 or equivalent (28-30% Aqueous Ammonia)

8.6 3% v:v Ammonium Hydroxide Solution – add 10ml of 30% Ammonium Hydroxide to 90ml of reagent water. Store at room temperature for up to 1 month.

8.7 0.3% v:v Ammonium Hydroxide in Methanol Solution – mix 1ml NH4OH and 99ml Methanol (based off 30%).

8.8 1% v:v Ammonium Hydroxide in Methanol Solution – mix 3.3ml NH4OH and 97ml Methanol (based off 30%).

8.9 Dilution Mix - Methanol with 4% water, 1% ammonium hydroxide and 0.625% acetic acid

8.10 Formic Acid – ACS grade or equivalent

8.10.1 0.1M Formic acid – add 4.6g formic acid to 1L of reagent water. Store at room temperature for up to a year.

8.10.2 0.3M Formic acid – add 13.8g formic acid to 1L of reagent water. Store at room temperature for up to a year.

8.10.3 5% v:v Formic acid – mix 5ml formic acid and 95ml of reagent water. Store at room temperature for up to a year.

8.10.4 50% v:v Formic acid – mix 50ml formic acid and 50ml of reagent water. Store at room temperature for up to a year.

8.10.5 1:1 Formic Acid in Methanol Solution – mix 50ml 0.1M formic acid and 50ml of methanol. Store at room temperature for up to a year.

8.11 ENVI-carb – graphitized carbon powder

8.12 PFAS EIS Mix – prepared in methanol at various concentrations by the vendor. All EIS solutions must be logged in the Spike and Surrogate Logbook and each solution must be verified prior to use.

8.13 PFAS Spike Solution – prepared in methanol at various concentrations by the LC/MS/MS analyst. All spike solutions must be logged in the Spike and Surrogate Logbook and each solution must be verified prior to use.

8.14 PFAS NIS Mix - prepared in methanol at various concentrations by the vendor. All EIS solutions must be logged in the Spike and Surrogate Logbook and each solution must be verified prior to use.

9.0 INTERFERENCES

9.1 Samples expected to contain high levels of PFAS compounds should be screened prior to extraction.

9.2 The analytes in this method can also be found in many common laboratory supplies and equipment, such as PTFE (polytetrafluoroethylene) or Teflon products, HPLC solvent lines, methanol, aluminum foil, SPE transfer lines, bottle caps, etc. All the materials used for this method must be demonstrated to be free from interference.

9.3 Contact with glass containers, pipettes, or syringes should be minimized since the PFAS compounds can potentially adsorb (stick) to glass surfaces.

9.4 SPE cartridges can be a source of interference. The analysis of method and field blanks can provide important information regarding the presence or absence of such interferences. Brand and lots of SPE devices should be tested to ensure that contamination does not preclude analyte identification and quantitation.

9.5 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the soil or sediment. Humic and/or fulvic material can be co-extracted and can cause enhancement and/or suppression in the electrospray ionization source.

10.0 PROCEDURES (There are 2 Extraction Methods) -

Option 1

10.1 The extraction of all samples must be documented on a "prep sheet". The prep sheet will include such items as: batch number, sample ID, bottle number, initial amount, final volume, solvent lot numbers, spike and surrogate lot numbers, batch numbers, extraction dates and times, and extraction technician. The extraction technician is responsible for filling out all the required information on the prep sheet. A copy of the prep sheet will be submitted to the LC/MS/MS analyst with the extracts. The Batch number, extraction technician, and extraction start Date and Time are entered into LIMS.

10.2 Remove any foreign objects such as twigs or rocks. Thoroughly mix the sample with a spatula. Refer to SOP QA034 for more information on sample homogenization. Do not homogenize samples in glass containers or on aluminum tray.

- Determine the percent Solids as per the SOP EGN007.

10.3 Transfer approximately 5.0 gram of each soil or sediment sample to the appropriately labeled 50ml centrifuge tube. Use a clean spatula for each sample. Record the weight to the nearest 0.01 gram on the prep sheet.

Note: If the samples are biosolids or similar matrix use 0.5 gram. These samples should be prepared in their own batch with separate 0.5-gram QC samples.

10.4 It may be beneficial to add a small amount (10% of sample weight or less) of PFAS free water to unusually dry samples.

10.5 Use 5.0 gram of blank sand wetted with 2.5 gram (2.5ml) of PFAS free water for the method blank (MB), blank spike (BS) low level blank spike (LLBS). Use additional 5.0 gram aliquots for the matrix spike (MS) and matrix spike duplicate (MSD).

Note: If the samples are biosolids or similar matrix use 0.5 gram of blank sand wetted with 0.25 gram (0.25ml) of PFAS free water for the method blank (MB), blank spike (BS) low level blank spike (LLBS). Use additional 0.5-gram aliquots for the matrix spike (MS) and matrix spike duplicate (MSD).

10.6 Using the dedicated surrogate syringe add **50ul** of isotope dilution standard to each of the samples including the QC samples. Record the isotope dilution standard lot number on the prep sheet. Cap and vortex the samples to mix.

10.7 Using the dedicated spike syringe or volumetric pipettor add **64ul** of PFAS spike solution to the LLBS. Record the spike lot numbers on the prep sheet. Cap and

vortex the samples to mix.

10.8 Using the dedicated spike syringe or volumetric pipettor add **400ul** of PFAS spike solution to the BS, MS, and MSD. Record the spike lot numbers on the prep sheet. Cap and vortex the samples to mix.

10.9 Allow the samples and QC so equilibrate for at least 30 minutes before extracting.

10.10 Add 10ml of 0.3% ammonium hydroxide in methanol solution to each centrifuge tube. Cap and vortex each sample to thoroughly mix the contents.

10.11 Place the centrifuge tubes on the shaker table and shake for 30 minutes.

10.12 Remove the samples from the shaker table. Centrifuge the samples for 10 minutes at 3000 rpm to separate the solids from the extract.

10.13 Transfer supernatant to a clean appropriately labelled 50ml Centrifuge tube.

10.14 Add an additional 15ml of 0.3% ammonium hydroxide in methanol solution to the sample, cap and vortex.

10.15 Place the centrifuge tubes on the shaker table and shake for 30 minutes.

10.16 Remove the samples from the shaker table. Centrifuge the samples for 10 minutes at 3000 rpm to separate the solids from the extract.

10.17 Transfer the supernatant from the second extraction into the centrifuge tube with the supernatant from the fist extraction.

10.18 Add an additional 5ml of 0.3% ammonium hydroxide in methanol solution to the sample, cap and vortex.

10.19 Centrifuge the samples for 10 minutes at 3000 rpm to separate the solids from the extract.

10.20 Combine the final supernatant in the 50ml Centrifuge tube with the supernatant from the first and second extraction.

10.21 Using a 10mg micro-scoop, add 10mg of ENVI-Carb powder to each sample and QC extract. Cap and vortex each sample to thoroughly mix the contents.

NOTE: Excessive contact time with the carbon (more than 5 minutes) may cause low recoveries.

10.22 Label another 50ml centrifuge tube for each sample and QC extract.

10.23 Centrifuge the extracts for 10 minutes at 3000 rpm to separate the ENVI-Carb from

the extract. Immediately decant the extracts into the new centrifuge tube. Rinse the original tube with a small amount of 0.3% ammonium hydroxide in methanol being careful not to disturb the carbon at the bottom. Transfer the rinse to the new tube.

10.24 Place the centrifuge tubes in the rack for the nitrogen evaporator. The temperature of the evaporator should be set to ~55°C and the nitrogen flow rate to ~1.2 ml/min. Concentrate the extract to 7-8 ml.

NOTE: Evaporation of all the methanol can cause significant loss of the neutral compounds.

10.25 Label a 125ml HDPE bottle for each sample and QC extract. Fill each bottle with approximately 100ml of PFAS free water.

10.26 Transfer the extracts into the 125ml HDPE bottles. Rinse the original tube with a small amount of PFAS free water and transfer that to the bottle. This will result in an extract solution that is less than 10% methanol.

10.27 Check the pH of each extract by dipping a disposable polyethylene transfer pipette into the extract and touching it to the pH paper. Record the pH on the prep sheet.

10.28 The pH should be 6.5 +/- 0.5. If necessary, adjust the pH with 50% formic acid or 30% ammonium hydroxide solution OR with 5% formic acid or 3% ammonium hydroxide solution.

10.29 Assemble the solid-phase extraction system.

10.30 Label the side of each cartridge with the sample ID.

10.31 Loosely pack deactivated glass wool to half the height of the SPE cartridge and attach each of them to the SPE manifold.

10.32 Condition each SPE cartridge with 15ml of 1% ammonium hydroxide in methanol solution followed by 5ml of 0.3M formic acid. Use gravity flow if possible or a 1 to 2 ml/min flow rate. Stop the flow just before the cartridge goes dry.

Note: Do not allow the cartridge to go dry.

10.33 Using a reservoir adaptor, attach the sample reservoir to the top of the SPE cartridge.

10.34 Transfer an aliquot of each extract including the QC extracts to the appropriate sample reservoirs.

10.35 Turn on the vacuum and draw the extract through the cartridge at a rate of about 5 ml/min. Add additional extract aliquots to the sample reservoirs until the entire extract has passed through the cartridge. If particulates clog the cartridge, increase the vacuum to maintain a reasonable flow rate.

10.36 Once the entire extract has been pulled through the cartridge, shut off the vacuum. Rinse each sample bottle and reservoir with 2 x 5ml aliquots of reagent water. Draw the reagent

water through the cartridge. Shut off the vacuum once the water has passed through the cartridge.

10.37 Rinse each sample bottle and reservoir with 5ml of the 1:1 0.1M Formic Acid/methanol solution. Turn on the vacuum. Draw the solution through the cartridge. Dry the cartridge by pulling air through the cartridge for another 15 seconds. Shut off the vacuum.

10.38 Open the SPE manifold and place an appropriately labeled 15.0ml centrifuge tube in the rack under the position for SPE cartridge.

10.39 Set the manifold top back on the system, make sure that each of the delivery tubes goes into the appropriate centrifuge tube.

10.40 Rinse each sample bottle and reservoir with 5ml of 1% ammonium hydroxide in methanol solution. Use a pipet to transfer the solution to the SPE cartridge. Allow it to pass through the cartridge under gravity flow, then apply a slight vacuum to draw the remaining solution through the cartridge.

10.41 Open the SPE manifold and remove all the centrifuge tubes. If necessary, adjust the volume to 5ml with 1% ammonium hydroxide in methanol solution.

10.42 Add 25ul of NIS solution to each centrifuge tube. Then add 25ul of concentrated acetic acid to each centrifuge tube, cap and vortex.

10.43 Label another 15ml centrifuge tube for each sample and QC extract.

10.44 Attach 0.2um syringe filters to 5ml polypropylene syringes. Remove the barrel and pour the entire 5ml extract into the syringe. Insert the barrel and filter each extract into the appropriately labeled centrifuge tube.

10.45 Cap each centrifuge tube. Transfer the extracts to the LCMSMS lab for storage.

10.46 Store the extracts at ≤6°C. Extracts must be allowed to come to room temperature prior to analysis. All extracts should be vortexed just prior to transfer to the autosampler vials.

10.47 Determination of %solids is performed in accordance with the SOP EGN007 for Percent solids in a solid matrix.

11.0 PROCEDURE Option 2 – Biotage Extrahera HV-5000

11.1 The extraction of all samples must be documented on a “prep sheet”. The prep sheet will include such items as: batch number, sample ID, bottle number, initial amount, final volume, solvent lot numbers, spike and surrogate lot numbers, batch numbers, extraction dates and times, and extraction technician. The extraction technician is responsible for filling out all the required information on the prep sheet. A copy of the prep sheet will be submitted to the LC/MS/MS analyst with the extracts. The Batch number, extraction technician, and extraction start Date and Time are entered into LIMS.

11.2 Remove any foreign objects such as twigs or rocks. Thoroughly mix the sample with a spatula. Refer to SOP QA034 for more information on sample homogenization. Do not homogenize samples in glass containers or on aluminum tray.

11.3 Weigh out 5g of sample and blank sand into labeled 30mL centrifuge tubes.

11.4 Using the dedicated surrogate syringe add 50ul of EIS standard to each of the samples including the QC samples. Record the EIS lot number on the prep sheet. Cap and vortex the samples to mix.

11.5 Using the dedicated spike syringe or volumetric pipettor add 64ul of PFAS spike solution to the LLBS. Record the spike lot numbers on the prep sheet. Cap and vortex the samples to mix.

11.6 Using the dedicated spike syringe or volumetric pipettor add 400ul of PFAS spike solution to the BS, MS, and MSD. Record the spike lot numbers on the prep sheet. Cap and vortex the samples to mix.

11.7 Add 10mL of 0.3% Ammonium Hydroxide in methanol solution to each sample

11.8 Place the samples in the Biotage Lysera.

11.9 Remove the samples and place them in the centrifuge for 10 min at 3000 rpm.

11.10 Decant samples into clean labeled 15mL centrifuge tubes.

11.11 Place the samples in the Turbovap and select the “1633 pre” method.

11.12 Dry samples down to ~3mL.

11.13 While the samples are drying, add an additional 10mL of 0.3% Ammonium Hydroxide in methanol solution to each sample.

11.14 Place the samples in the Biotage Lysera.

11.15 Select the “1633 PFAS in Soils V1_1 method.

11.16 Remove the samples and place them in the centrifuge for 10 min at 3000 rpm.

11.17 Decant samples into the 15mL tubes containing the concentrated 3mL extract.

11.18 Place the samples back in the Turbovap and restart the “1633 pre” method. The sample volume will be ~13mL, so there may be spattering as the gas flow increases and in that case the gas flow might be adjusted manually.

11.19 Dry samples down to 3mL.

11.20 Turn on the instrument. Make sure there is enough 0.3% Ammomium hydroxide in MeOH solution in the bottle.

11.21 Place 5000uL pipette tips in the tip holder rack (position 2).

11.22 Place Biotage SPE cartridges in the column rack (position 3).

11.23 Place labeled 7mL tubes in the sample/collection rack and place the rack in position B.

11.24 Turn on the instrument pump.

11.25 Place the 15mL tubes containing the sample extracts in the sample rack (position 4).

11.26 On the touch screen click “run method.”

11.27 Select the “1633 PFAS in soils V1_1” method.

11.28 Click “prepare run.”

11.29 On the prepare run screen, select the number of columns for extraction media (position 3) and sample plate/rack (position 4) depending on the number of samples. For sample tips (position 2), select the pipette tip type and the number of columns depending on the number of samples.

11.30 After the run is done, make sure all the samples went through the cartridges and if not go to main menu, click maintenance, click manual control and apply more pressure.

11.31 Transfer the samples from 7mL tubes to clean labeled centrifuge tubes.

11.32 Add 30uL of acetic acid into each sample.

11.33 Add micro scoop of carbon and centrifuge at 3000 rpm for 10 min.

11.34 Using a 10mg micro-scoop, add 10mg of ENVI-Carb powder to each sample and QC extract. Cap and vortex each sample to thoroughly mix the contents.

11.34.1.1 NOTE: Excessive contact time with the carbon (more than 5 minutes) may cause low recoveries.

11.35 Decant samples into new labeled 15mL centrifuge tubes.

11.36 Spike 50uL NIS into each sample.

11.37 Cap the 15ml centrifuge tube. Shake or vortex for 1 minute.

12.0 QC REQUIREMENTS

12.1 An extraction batch is defined as samples of a similar matrix that are prepared for a particular parameter. The batch size is limited to 20 samples. A batch may be held open for up to 12 hours; however, samples should not be added after the QC set has been completed. **NOTE:** Some project plans may require different batch definitions.

12.2 A method blank (MB), blank spike (BS), low-level blank spike (LLBS), matrix spike (MS), and matrix spike duplicate (MSD) must be extracted with each new batch of samples. If there is insufficient sample to extract a matrix spike duplicate (MSD) then a sample duplicate (DUP) should be extracted.

13.0 DOCUMENTATION REQUIREMENTS

13.1 See analytical SOP EMS1633

14.0 DATA REPORTING

14.1 See analytical SOP EMS1633

15.0 POLLUTION PREVENTATION & WASTE MANAGEMENT

15.1 Waste methanol is placed in the “non-chlorinated waste” container.

15.2 Spent solid-phase extraction cartridges may be disposed of in the trash.

15.3 Extracted soil samples are placed in a waste container after the solvent has drained.

15.4 Waste soil from the homogenizing process should be placed in the “soil waste” container. NOTE: Waste soil from foreign soils must follow “foreign soil” disposal requirements.

15.5 Samples are archived and stored for 30 days after analysis. After the storage time has elapsed, the remaining aqueous samples are transferred to the appropriate drums for disposal.

16.0 REFERENCES

15.1 EPA Method 1633, Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS, January 2024.

15.2 Biotage Extrahera HV-5000 Manual

Current Version Revision Information

Changes / Edits made (this should include added or deleted information within a sentence or paragraph only):

Section / Subsection	Detailed description of what was revised
10.12,10.16,10.19,10.23	RPM value changes from 2800 to 3000.

Sections or Subsections deleted:

Section / Subsection	Reason section or subsection was removed
none	

Sections or Subsections added:

Section / Subsection	Reason section or subsection was added
11.15	Added a method to select on Biotage Lysera for EPA 1633 Soils.

History of Revisions

Version #	Date of Revision	Reviewed/Revised By
00	01/05/2023	ANITA JAGTAP
01	07/19/2023	Olga Azarian
02	2/22/24	Raj Singh
03	06/21/2024	Anita Jagtap
04	8/21/2024	Olga Azarian
05	5/12/2025	Diego Cuadros – Aysegal Aldemir / Maria Ruschke
06	06/19/2025	Ben Esposito /Anita Jagtap

END OF DOCUMENT

LAB SUPERVISOR: Raj

QA OFFICER: Olga Y. Agaian

EFFECTIVE DATE: 6-21-2024

TITLE: STANDARD OPERATING PROCEDURE FOR THE EXTRACTION OF PER- AND POLYFLUORINATED ALKYL SUBSTANCES FROM WATER SAMPLES FOR LC/MS/MS ANALYSIS

REFERENCES: EPA METHOD 1633, January 2024
ADDED SECTIONS:10.1.1.

1.0 SCOPE AND APPLICATION

1.1 This procedure applies to low-level aqueous samples submitted for Per- and Polyfluorinated Alkyl Substances (PFAS) analysis by LC/MS/MS using the Isotope Dilution technique.

2.0 SUMMARY OF METHOD

2.1 A 500ml aliquot of the sample (entire bottle) is extracted utilizing a solid phase extraction cartridge. The cartridge is eluted with basic methanol. The extract is carbon cleaned, filtered and the final volume is adjusted to 5.0ml, and then transferred to a centrifuge tube for storage.

3.0 REPORTING LIMIT AND METHOD DETECTION LIMIT

3.1 See analytical SOP-EMS1633

4.0 DEFINITIONS

4.1 Batch: A group of samples that are similar with respect to the matrix and the testing procedures being employed and which are processed as a unit. A sample batch is limited to a maximum of 20 samples or 12 hours whichever comes first.

4.2 Blank Spike (BS): An analyte-free matrix spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. Blank Spike Recoveries are used to document laboratory performance for a given method. This may also be called a Laboratory Control Sample (LCS).

4.3 Low Level Blank Spike (LLBS): An analyte-free matrix spiked with a known amount of analyte(s) at 2x LLOQ, processed simultaneously with the samples through all the steps of the analytical procedure. Low-Level Blank Spike Recoveries are used to document laboratory performance at the LLOQ for a given method. This may also be called a

Low Level Laboratory Control Sample (LLLCS) or the Low-Level Ongoing Precision And Recovery Standard (LLOPR).

4.4 Extracted Internal Standards (EIS): A standard containing isotopically labelled versions of the native target analytes. These isotopes are usually labelled with C13, d2, or O18 atoms. Isotope Dilution Standards are used to measure the extraction efficiency and to correct the concentrations of the native analytes based on the recovery of their isotopically labelled analogs.

4.5 Field Blank (FB): An aliquot of reagent water that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FB is to determine if method analytes or other interferences are present in the field environment.

4.6 Holding Time: The maximum times that samples may be held prior to preparation and/or analysis and are still considered valid.

4.7 Matrix Duplicate (DUP): A replicate sample which is used to document the precision of a method in a given sample matrix.

4.8 Matrix Spike (MS): A sample aliquot spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. The matrix spike recoveries are used to document the bias of a method in a given sample matrix.

4.9 Matrix Spike Duplicate (MSD): A replicate sample aliquot spiked with a known amount of analyte(s), processed simultaneously with the samples through all the steps of the analytical procedure. The matrix spike duplicate recoveries are used to document the precision and bias of a method in a given sample matrix.

4.10 Method Blank (MB): An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is processed simultaneously with the samples through all the steps of the analytical procedure. The method blank is used to document contamination resulting from the analytical process.

4.11 Preservation: Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical integrity of the sample.

5.0 HEALTH & SAFETY

5.1 The analyst must follow normal safety procedures as outlined in the SGS Laboratory Safety Manual which includes the use of Safety glasses, gloves and lab coats. In addition, all acids are corrosive and must be handled with care. Flush spills with plenty of water. If acids contact any part of the body, flush with water and contact the supervisor.

5.2 Safety Data Sheets (SDS) are available for all reagents and solvents used in the lab. Technicians should review the SDS prior to using any new reagents or solvents.

5.3 Methanol is an inhalation hazard. Use in a well-ventilated area.

5.4 The toxicity or carcinogenicity of each reagent used in this method has not been precisely determined; however, each chemical must be treated as a potential health hazard. Exposure to these reagents should be reduced to the lowest possible level. The laboratory maintains a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of data handling sheets is available to all personnel involved in these analyses.

6.0 COLLECTION, PRESERVATION, AND HOLDING TIME

6.1 Preservation

6.1.1 Samples shall be collected in 500ml HDPE bottles fitted with a polyethylene screw cap. Alternate size HDPE bottle may be used depending on project requirements. **Glass bottles with Teflon lined caps can NOT be used.**

6.1.2 The samples must be chilled to ≤6°C from the time of collection until arrival at the laboratory. The samples must be refrigerated at ≤ 6°C or frozen at ≤ -20°C from the time of receipt until extraction.

6.1.3 The extracts should be stored at ≤6°C. They must be allowed to come to room temperature prior to analysis. All extracts should be vortexed just prior to transfer to the autosampler vials.

6.2 Holding Time

6.2.1 Aqueous samples must be extracted and analyzed within 28 days of collection if stored at ≤6°C or within 90 days of collection if stored at ≤ -20°C. The Date/Time that the extraction is started and completed must be recorded on the prep sheet.

7.0 APPARATUS AND MATERIALS

7.1 Solid-phase cartridge extraction system – suitable for use with extraction cartridges

7.2 Vacuum pump

7.3 Vacuum Flasks – or equivalent

7.4 SPE reservoirs – various sizes

7.5 SPE cartridges – Weak Anion Exchange – must have pKa of >8 and 150mg bed size

7.6 15ml and 50ml Polyethylene Centrifuge tubes with caps

7.7 10ml, 25ml, 250ml, and 1000ml Polyethylene graduated cylinder

7.8 Top loading balance for aqueous sample volume determination to 0.1 g

7.9 10ul, 25ul, 50ul, 250ul and 500ul syringes

7.10 Volumetric Pipettors and tips

7.11 1ml and 5ml Disposable polyethylene luer lock syringes

7.12 0.2um Nylon syringe filter 13mm and 25mm

7.13 10ml, 25ml, and 100ml Polyethylene or Polypropylene volumetric flasks

7.14 Disposable polyethylene transfer pipettes

7.15 Deactivated glass wool.

7.16 2.0ml polyethylene screw cap vials

7.17 HDPE Wash Bottles

7.18 Nitrogen Evaporator, TurboVap LV or ExcelVap

7.19 Balance +/- 0.1 gram

7.20 Centrifuge - 3000 rpm minimum speed

7.21 Micro-scoop 10mg

8.0 STANDARDS AND REAGENTS

8.1 Methanol – HPLC grade or equivalent

8.2 Reagent water – HPLC grade or equivalent - free of interference

8.3 SPE Cartridges – Wax (weak anion exchange) or equivalent

8.4 Acetic Acid - HPLC grade or equivalent

8.5 Ammonium Hydroxide – Fisher A669-212 or equivalent (28-30% Aqueous Ammonia)

8.6 3% v:v Ammonium Hydroxide Solution – add 10ml of 30% Ammonium Hydroxide to 90ml of reagent water. Store at room temperature and replace after 3 months.

8.7 0.3% v:v Ammonium Hydroxide in Methanol Solution – mix 1ml NH4OH and 99ml Methanol (based off 30%). Store at room temperature and replace after 1 month.

8.8 1% v:v Ammonium Hydroxide in Methanol Solution – mix 3.3ml NH4OH and 97ml Methanol (based off 30%). Store at room temperature and replace after 1 month.

8.9 Dilution Mix - Methanol with 4% water, 1% ammonium hydroxide, and 0.625% acetic acid-– add ammonium hydroxide (3.3 mL, 30%), reagent water (1.7 mL) and acetic acid (0.625 mL) to methanol (92 mL). Store at room temperature and replace after 1 month.

8.10 Formic Acid – ACS grade or equivalent

8.10.1 1M Formic acid – add 4.6g formic acid to 1L of reagent water. Store at room temperature for up to a year.

8.10.2 0.3M Formic acid – add 13.8g formic acid to 1L of reagent water. Store at room temperature for up to a year.

8.10.3 5% v:v Formic acid – mix 5ml formic acid and 95ml of reagent water. Store at room temperature for up to a year.

8.10.4 50% v:v Formic acid – mix 50ml formic acid and 50ml of reagent water. Store at room temperature for up to a year.

8.10.5 1:1 Formic Acid in Methanol Solution – mix 50ml 0.1M formic acid and 50ml of methanol. Store at room temperature for up to a year.

8.11 ENVI-carb – graphitized carbon powder

8.12 PFAS EIS Mix – prepared in methanol at various concentrations by the vendor. All EIS solutions must be logged in the Spike and Surrogate Logbook and each solution must be verified prior to use.

8.13 PFAS Spike Solution – prepared in methanol at various concentration by the LC/MS/MS analyst. All spike solutions must be logged in the Spike and Surrogate Logbook and each solution must be verified prior to use.

8.14 PFAS NIS Mix - prepared in methanol at various concentrations by the vendor. All EIS solutions must be logged in the Spike and Surrogate Logbook and each solution must be verified prior to use.

9.0 INTERFERENCES

9.1 Samples expected to contain high levels of PFAS compounds should be screened prior to extraction.

9.2 The analytes in this method can also be found in many common laboratory supplies and equipment, such as PTFE (polytetrafluoroethylene) or Teflon products, HPLC solvent lines, methanol, aluminum foil, SPE transfer lines, bottle caps, etc. All materials used for this method must be demonstrated to be free from interferences.

9.3 Contact with glass containers, pipettes, or syringes should be minimized since the PFAS compounds can potentially adsorb (stick) to glass surfaces.

9.4 SPE cartridges can be a source of interferences. The analysis of method and field blanks can provide important information regarding the presence or absence of such interferences. Brands and lots of SPE devices should be tested to ensure that contamination does not preclude analyte identification and quantitation.

9.5 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending

upon the nature of the water. Humic and/or fulvic material can be co-extracted during SPE and high levels can cause enhancement and/or suppression in the electrospray ionization source or low recoveries on the SPE sorbent.

10.0 PROCEDURE

10.1 The extraction of all samples must be documented on a "prep sheet". The prep sheet will include such items as: batch number, sample ID, bottle number, initial amount, final volume, solvent lot numbers, spike and surrogate lot numbers, batch numbers, extraction dates and times, and extraction technician. The extraction technician is responsible for filling out all the required information on the prep sheet. A copy of the prep sheet will be submitted to the LC/MS/MS analyst with the extracts. The Batch number, extraction technician, and extraction start Date and Time are entered into LIMS.

10.1.1 Visually determine the samples for the presence of TSS, determine the TSS amount only for samples that might clog the SPE Cartridge. Subject to project-specific client Approval that may include other documented strategies to minimize disruption due to clogging such as centrifugation. If client-specific requirements are absent, please refer to SOP **EGN087** for Analysis of Total Suspended Solids. In extreme cases of aqueous samples where TSS>10% treat that sample as a Sediment. Maintain the record for assessment type for each aqueous sample.

10.2 The 150mg WAX (weak anion exchange) SPE cartridge is considered the default cartridge for this method. Other bed sizes may be used if they have been fully validated.

10.2.1 Assemble the solid-phase extraction system.

10.2.2 Label the side of each cartridge with the sample ID.

10.2.3 Loosely pack deactivated glass wool to half the height of the SPE cartridge and attach each of them to the SPE manifold.

10.2.4 Condition each SPE cartridge with 15ml of 1% ammonium hydroxide in methanol solution followed by 5ml of 0.3M formic acid. Use gravity flow if possible or a 1 to 2 ml/min flow rate. Stop the flow just before the cartridge goes dry.

Note: Do not allow the cartridge to go dry.

10.2.5 Using a reservoir adaptor, attach the sample reservoir to the top of The SPE cartridge.

10.2.6 The volume of sample is determined by weighing the sample, bottle, and cap and recording the weight to 0.1g. Air dry the empty bottle after the bottle is rinsed, the rinse is transferred. Weigh the empty bottle with the cap on and subtract from the weight with the sample.

10.2.7 Use 500ml HDPE bottles for the method blank (MB), blank spike (BS) and Low- Level Blank Spike (LLBS). Fill each of these bottles with 500ml of reagent water. Use 100ml HDPE bottles for MB, BS, LLBS if the project required smaller sample volumes.

10.2.8 Use separate bottles for the matrix spike (MS) and the matrix spike duplicate (MSD). **NOTE: Bottles must NOT be split.** If there are no samples with two extra bottles for the MS/MSD, then prepare a matrix spike (MS) and a duplicate (DUP) from separate samples. Record the sample ID, bottle number, and volume on the prep sheet.

10.2.9 Using the dedicated surrogate syringe add **25ul** of isotope dilution standard to each of the samples including the QC samples. Record the isotope dilution standard lot number on the prep sheet. Cap and invert the samples to mix.

10.2.10 Using the dedicated spike syringe or volumetric pipettor add **32ul** of PFAS spike solution to the LLBS. Record the spike lot numbers on the prep sheet. Cap and invert the samples to mix.

10.2.11 Using the dedicated spike syringe or volumetric pipettor add **200ul** of PFAS spike solution to the BS, MS, and MSD. Record the spike lot numbers on the prep sheet. Cap and invert the samples to mix.

10.2.12 Check the pH of each sample by dipping a disposable polyethylene transfer pipette into the sample and touching it to the pH paper. Record the pH on the prep sheet.

10.2.13 The pH should be 6.5 +/- 0.5. If necessary, adjust the pH with 50% formic acid or 30% ammonium hydroxide solution OR with 5% formic acid or 3% ammonium hydroxide solution. Record this on the prep sheet.

10.2.14 Transfer an aliquot of each sample including the QC samples to the appropriate sample reservoirs.

10.2.15 Turn on the vacuum and draw the sample through the cartridge at a rate of about 5 ml/min. Add additional sample aliquots to the sample reservoirs until the entire sample has passed through the cartridge. As particulate clogs the cartridge, increase the vacuum to maintain a reasonable flow rate.

10.2.16 Once the entire sample has been pulled through the cartridge, shut off the vacuum. Rinse each sample bottle and reservoir with 2 x 5ml aliquots of reagent water. Draw the reagent water through the cartridge. Shut off the vacuum once the water has passed through the cartridge.

10.2.17 Rinse each sample bottle and reservoir with 5ml of the 1:1 0.1M Formic Acid/methanol solution. Turn on the vacuum. Draw the solution through the cartridge. Dry the cartridge by pulling air through the cartridge for another 15 seconds. Shut off the vacuum.

10.2.18 Open the SPE manifold and place an appropriately labeled 15.0ml centrifuge tube in the rack under the position for SPE cartridge.

10.2.19 Set the manifold top back on the system, make sure that each of the delivery tubes goes into the appropriate centrifuge tube.

10.2.20 Rinse each sample bottle and reservoir with 5ml of 1% ammonium hydroxide in methanol solution. Use a pipet to transfer the solution to the SPE cartridge. Allow it to pass through the cartridge under gravity flow, then apply a slight vacuum to draw the remaining solution through the cartridge.

10.2.21 Retain the sample bottle and cap for Initial Volume determination. See Section 10.2.6.

10.2.22 Open the SPE manifold and remove all the centrifuge tubes. If necessary, adjust the volume to 5ml with 1% ammonium hydroxide in methanol solution. Add 25ul

of concentrated acetic acid to each centrifuge tube, cap and vortex to mix.

10.2.23 Using a 10mg micro-scoop, add 10mg of ENVI-Carb powder to each sample and QC extract. Cap and vortex each sample to thoroughly mix the contents.

Note: Excessive contact time with the carbon (more than 5 minutes) may cause low recoveries.

10.2.24 Centrifuge the samples for 10 minutes at 2800 rpm to separate the ENVI-Carb from the extract.

10.2.25 Label another 15ml centrifuge tube for each sample and QC extract. Add 25ul of NIS solution to each centrifuge tube.

10.2.26 Attach 0.2um syringe filters to 5ml polypropylene syringes. Remove the barrel and pour the entire 5ml extract into the syringe. Insert the barrel and filter each extract into the appropriately labeled centrifuge tube.

10.2.27 Cap each centrifuge tube. Transfer the extracts to the LCMSMS lab for storage.

10.2.28 Store the extracts at ≤4°C. Extracts must be allowed to come to room temperature prior to analysis. All extracts should be vortexed just prior to transfer to the autosampler vials.

11.0 QC REQUIREMENTS

11.1 An extraction batch is defined as samples of a similar matrix that are prepared for a particular parameter. The batch size is limited to 20 samples. A batch may be held open for up to 12 hours; however, samples should not be added after the QC set has been completed. **NOTE:** Some project plans may require different batch definitions.

11.2 A method blank (MB), blank spike (BS), low-level blank spike (LLBS), matrix spike (MS), and matrix spike duplicate (MSD) must be extracted with each new batch of samples. If there is insufficient sample to extract a matrix spike duplicate (MSD) then a sample duplicate (DUP) should be extracted.

12.0 DOCUMENTATION REQUIREMENTS

12.1 See analytical SOP EMS1633

13.0 DATA REPORTING

13.1 See analytical SOP EMS1633

14.0 POLLUTION PREVENTION & WASTE MANAGEMENT

14.1 Waste methanol is placed in the “non-chlorinated waste” container.

14.2 Spent solid-phase extraction cartridges may be disposed of in the trash.

14.3 Extracted soil samples are placed in a waste container after the solvent has

drained.

14.4 Waste soil from the homogenizing process should be placed in the “soil waste” container. NOTE: Waste soil from foreign soils must follow “foreign soil” disposal requirements.

14.5 Samples are archived and stored for 30 days after analysis. After the storage time has elapsed, the remaining aqueous samples are transferred to the appropriate drums for disposal.

15.0 REFERENCES

15.1 EPA Method 1633, Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS, January 2024.

Current Version Revision Information

Changes / Edits made (this should include added or deleted information within a sentence or paragraph only):

Section / Subsection	Detailed description of what was revised

Sections or Subsections deleted:

Section / Subsection	Reason section or subsection was removed

Sections or Subsections added:

Section / Subsection	Reason section or subsection was added
10.1.1	Specified the process for TSS determination

History of Revisions

Version #	Date of Revision	REVISED BY
00	01/05/2023	ANITA JAGTAP
01	7/19/2023	Olga Azarian
02	02/22/2024	Raj Singh
03	06/21/2024	Anita Jagtap

END OF DOCUMENT

APPENDIX J
SITE MANAGEMENT FORMS

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, NY
METI Project #18-046

DATE: _____

COMPLETED BY: _____

GROUNDWATER EVALUATION SHEET

WELL ID:							
Time	**DTW (ft)**	**DO (mg/L)**	**ORP (mV)**	**pH (SU)**	**Temp. (°C)**	**Cond. (ms/cm)**	**Turb. (NTU)**

Time Sampled: _____ Total Volume Removed (gal): _____

Monitoring Well condition/repairs needed: _____

WELL ID:							
Time	**DTW (ft)**	**DO (mg/L)**	**ORP (mV)**	**pH (SU)**	**Temp. (°C)**	**Cond. (ms/cm)**	**Turb. (NTU)**

Time Sampled: _____ Total Volume Removed (gal): _____

Monitoring Well condition/repairs needed: _____

Lakeside Village Apartments **DATE: _____**
65-67 Lake Avenue, Lancaster, NY
METI Project #18-046 **COMPLETED BY: _____**

SEMI-ANNUAL AND ANNUAL INSPECTION SHEET – SSD SYSTEMS

Building A

Vapor Extraction Well:	VP-A1	VP-A2	VP-A3	VP-A4
Pressure Gauge Reading (in. H2O)				

Building 1

Vapor Extraction Well:	VP-1	VP-2	VP-3
Pressure Gauge Reading (in. H2O)			

Building A

Monitoring Point	A1-M1	A1-M2	A2-M1	A2-M2	A3-M1	A3-M2
Pressure Gauge Reading (in. H2O)						

Building 1

Monitoring Point	A4-M1	A4-M2	M1	M2	M3	M4
Pressure Gauge Reading (in. H2O)						

Are systems operational? _____

Any damage to exterior components (i.e. discharge stack) or interior components? _____

Any structural changes to the buildings? _____

Any new cracks in basement walls or floors? _____

ADDITIONAL COMMENTS:

_____

_____

NOTES:

1. The target pressure differential in the vapor monitoring points is 0.004 in. H2O.
2. During semi-annual inspections, only exterior observations will be made. Vacuum data will not be collected from the vapor monitoring points.
3. The NYSDEC project manager must be notified of any problems within 3 days of the inspection.

Lakeside Village Apartments
65-67 Lake Avenue
Lancaster, NY

DATE: _____

COMPLETED BY: _____

QUARTERLY INSPECTION SHEET – SSD and SVE SYSTEMS

SSD Systems - Vacuum Reading (in. H2O)						
Building A				Building 1		
VP-A1	VP-A2	VP-A3	VP-A4	VP-1	VP-2	VP-3

SVE SYSTEM OPERATIONAL (YES/NO): _____

VACUUM READING (in. H2O): _____

ADDITIONAL COMMENTS:

_____

_____

_____

_____

_____

_____

_____

NOTE: Copies of these field sheets must be submitted to the Remedial Engineer within 24 hours of the inspection.

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, NY
METI Project #18-046

DATE: _____

COMPLETED BY: _____

SEMI-ANNUAL AND ANNUAL INSPECTION SHEET – SVE SYSTEM

System Status (ON/OFF)	Pre/Post Filter Vac. (in. WC)	Temp. (°F)	Effluent PID (ppm)

Well ID	PID Measurement (ppm)	Vacuum (in. WC)	Valve (% Open)
SVE1			
SVE2			
SVE3			

Effluent Air Sample Collection Time: _____

Any damage to exterior components (i.e. discharge stack) or interior components? _____

COMMENTS/MAINTENANCE PERFORMED:

_____

_____

_____

_____

_____

_____

_____

NOTE: The NYSDEC project manager must be notified of any problems within 3 days of the inspection.

Lakeside Village Apartments
65-67 Lake Avenue, Lancaster, NY
METI Project #18-046

DATE: _____

COMPLETED BY: _____

ANNUAL INSPECTION SHEET – COVER SYSTEM

Inspection Time: _____

Weather Conditions: _____

Pre-Inspection Checklist:

- Review previous annual inspection
- Meet with Site representative to solicit comments/concerns regarding the inspection

Pre-Inspection Comments:

_____

_____

_____

_____

Exterior Inspection:

Are there any signs of significant cracks, settlement, or deterioration of paved areas? _____

Has any pavement material been removed? _____

Have any structures been constructed on the paved or unpaved areas? _____

Are there any signs of soil washing or erosion? _____

Are there any signs of intrusive activities (drilling, digging, trenching, grading)? _____

Comments:

_____

_____

_____

_____

Summary of Any Needed or Completed Repairs to the Engineering Controls:

_____

_____

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies and lab-supplied bottles, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service (bottle and sample delivery)		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site (not including treated water)		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Recommendations/Other:

CONTRACTOR CERTIFICATION
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of _____ (**Contractor Name**), which is responsible for the work documented on this form. According to my knowledge and belief, all of the information provided in this form is accurate and the site management program complies with the DER-10, DER-31, and CP-49 policies. _____ **Date** **Contractor**

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies and lab-supplied bottles, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service (bottle and sample delivery)		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site (not including treated water)		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Recommendations/Other:

CONTRACTOR CERTIFICATION
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of _____ (**Contractor Name**), which is responsible for the work documented on this form. According to my knowledge and belief, all of the information provided in this form is accurate and the site management program complies with the DER-10, DER-31, and CP-49 policies. _____ **Date** **Contractor**

APPENDIX K – FIELD SAMPLING PLAN

This Appendix includes a description of monitoring well gauging and sampling procedures, sampling methodology for groundwater and system sampling, and analytical methodology.

1.0 LIQUID LEVEL GAUGING

Depth to groundwater will be gauged in all site monitoring wells and piezometers to calculate groundwater elevations and determine direction of groundwater flow.

Equipment:

- Solinst Model 122 Interface Meter

Procedure:

1. Clean the interface meter probe using an Alconox® detergent solution and soft bristle brush followed by a tap water rinse and triple deionized water rinse. Allow to air dry or dry with a sterile wipe such as a Chem-Wipe.

2. Remove the padlock from the protective casing and clean any debris from the hinged cover. Open cover, remove the well cap, and place in clean area.

3. Lower the probe slowly into the monitoring well or piezometer until the audible alarm sounds. A continuous tone indicates the presence of a non-aqueous liquid. An intermittent tone indicates water.

4. Record the depth of the surface liquid, to the nearest one-hundredth foot, from the graduated cable relative to the marked survey reference point on the casing. If a non-aqueous phase liquid was detected, continue lowering the probe until water is detected. Record the depths to both phases in the field notebook.

5. Retract the probe slowly, drying the tape simultaneously with a Chem-Wipe. Inspect the probe for evidence of non-aqueous phase liquid. If none is present, consult the operations manual for troubleshooting procedures.

6. In any case, repeat the measurement for confirmation and record the liquid level(s) in the field notebook.

7. Replace the well cap and re-lock the protective casing.

2.0 MONITORING WELL PURGING AND GROUNDWATER SAMPLING

Groundwater samples will be obtained from monitoring wells using low-flow purging and sampling methodology. The purpose of the methodology is to produce groundwater samples which are representative of groundwater conditions in the geological formation.

Equipment:

- Positive displacement pump
- YSI Multi-Function Meter
- Teflon-lined polyethylene tubing
- Power inverter for vehicle battery
- Graduated cylinder
- Stopwatch
- Small trash bags to discard gloves, tubing, etc.
- Small portable table for stable work surface
- 55-gallon drums

Procedure:

1. Unlock the monitoring well cover and carefully remove the cover to avoid having any foreign material enter the well.

2. Don a pair of disposable latex gloves.

3. Gauge liquid levels in the well.

4. Lower the probes of the multi-function meter into the groundwater to a depth greater the anticipated depth of the sampling pump intake. Obtain baseline dissolved oxygen (DO) concentration, conductivity, redox potential, pH, turbidity, and temperature.

5. Lower the pump, cable, tubing, and electrical wires slowly into the well.

6. Plug the power inverter into a power point in the service vehicle. Plug the power cord of the pump into the power inverter.

7. With the pump in place and prior to activation, gauge the depth to groundwater. Leave the probe in place.

8. Activate the pump and adjust the discharge rate to 200 to 500 milliliters per minute (ml/min) with all discharge water directed into a 55 gallon drum. Use a graduated cylinder and stopwatch to measure the discharge rate.

9. Measure the indicator parameters approximately every 15 minutes until they have stabilized. The stabilization criteria are:

- pH ±0.1 unit
- temperature ±0.2°C
- redox potential ± 10 millivolts
- DO ±10%
- turbidity ±10%

10. Remove the sample containers from the carrying packs which will be stored in an ice-filled cooler until needed. The following information should be written on a label affixed to the container in indelible ink:

- Site name
- Project number
- Sample identification code
- Date and time of sampling
- Sampler's initials
- Preservation added (if any)
- Analysis to be performed

11. Collect the samples at a flow rate between 100 and 250 ml/min to minimize turbulence. Always collect the sample for VOC analysis first. Required sample containers and volumes are indicated in the QAPP.

12. Begin the chain-of-custody record.

13. When sampling has been completed, replace well cap and lock hinged cover.

14. The following information should be recorded in the field notebook:

- Sample location
- Date and time of each sample
- Weather conditions
- Sample analyses
- Liquid level measurements
- Initial and final parameter measurements
- Purge volumes
- Physical appearance of samples
- Any NAPL observed

Decontamination of Equipment

Decontaminate the pump between wells using the following procedure:

1. Operate pump in a basin of 5 gallons of potable water for five minutes. Transfer contents of the basin to a 55-gallon drum for laboratory analysis prior to discharge or disposal.

2. Operate pump in a basin of 5 gallons of Alconox solution for five minutes. Transfer contents of the basin to a 55-gallon drum for laboratory analysis prior to discharge or disposal.

3. Repeat Step 1.

4. Repeat Step 1 using deionized water.

3.0 AIR SYSTEM SAMPLING

Equipment:

- Low flow rate (50-200 mL/min) pump
- Tedlar bag
- Teflon tubing

Procedure:

1. Purge the air sample port.

2. Attach new Teflon tubing from the sample port or probe to the low flow rate pump.

3. Purge the tubing.

4. Fill out the Tedlar bag sample tag.

5. Attach additional new Teflon tubing from the pump outlet to the Tedlar bag valve.

6. Open Tedlar bag valve and collect the sample, filling the bag no more than 2/3 full.

7. Close the Tedlar bag valve by hand tightening the valve clockwise.

8. Return the Tedlar bag in the provided box or container for transport to the analytical laboratory.

4.0 ANALYTICAL METHODOLOGY

Samples will be submitted for analysis to an ELAP-certified laboratory using EPA-approved methods, or where appropriate, Standard Methods for the analytes of concern.

APPENDIX L

REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION

FOR LAKESIDE VILLAGE APARTMENTS (SITE NO. C915344)

TABLE OF CONTENTS

APPENDIX M
REQUEST TO IMPORT/REUSE FILL MATERIAL FORM

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.

SECTION 1 – SITE BACKGROUND

Site Name:

Site Number:

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that passes a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Name and address of fill source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

APPENDIX N

RESPONSIBILITIES of OWNER and REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan (SMP) for the Lakeside Village Apartments site (the "site"), number C915344, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:

65 Lake Avenue LLC
32 Central Avenue
Lancaster, NY 14086

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party (RP) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (NYSDEC) is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

65 Lake Avenue LLC
32 Central Avenue
Lancaster, NY 14086

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a(n) Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.

6) If some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site properties. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.

9) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .

6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3- Notifications of the SMP.

7) The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in Section 5.3 or Appendix H (Operation, Monitoring and Maintenance Manual) of the SMP.

8) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

9) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a

change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC project manager to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.