

Phase I: Remedial Action Scope of Work Excavation and In-Situ Bioremediation at Village of Pelham Department of Public Works Property Crystal Cleaners Site (No. 360053)

Village of Pelham Westchester County, New York

Prepared for

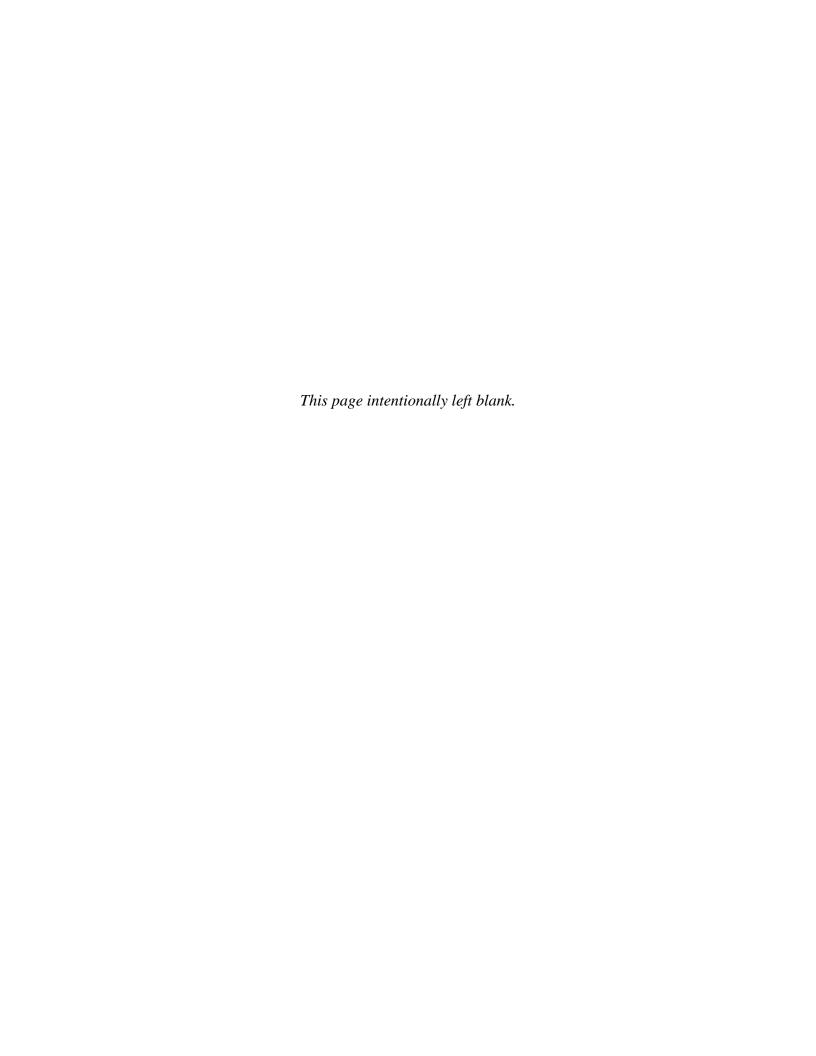
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E
625 Broadway
Albany, New York 12233-7017



Prepared by

EA Engineering, P.C. and Its Affiliate EA Science and Technology 269 W. Jefferson Street Syracuse, New York 13020 (315) 431-4610

> July 2021 Version: FINAL EA Project No. 16025.11



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Donald Conan, P.E., P.G.

Vice President, EA Engineering, P.C.

Adam Etringer

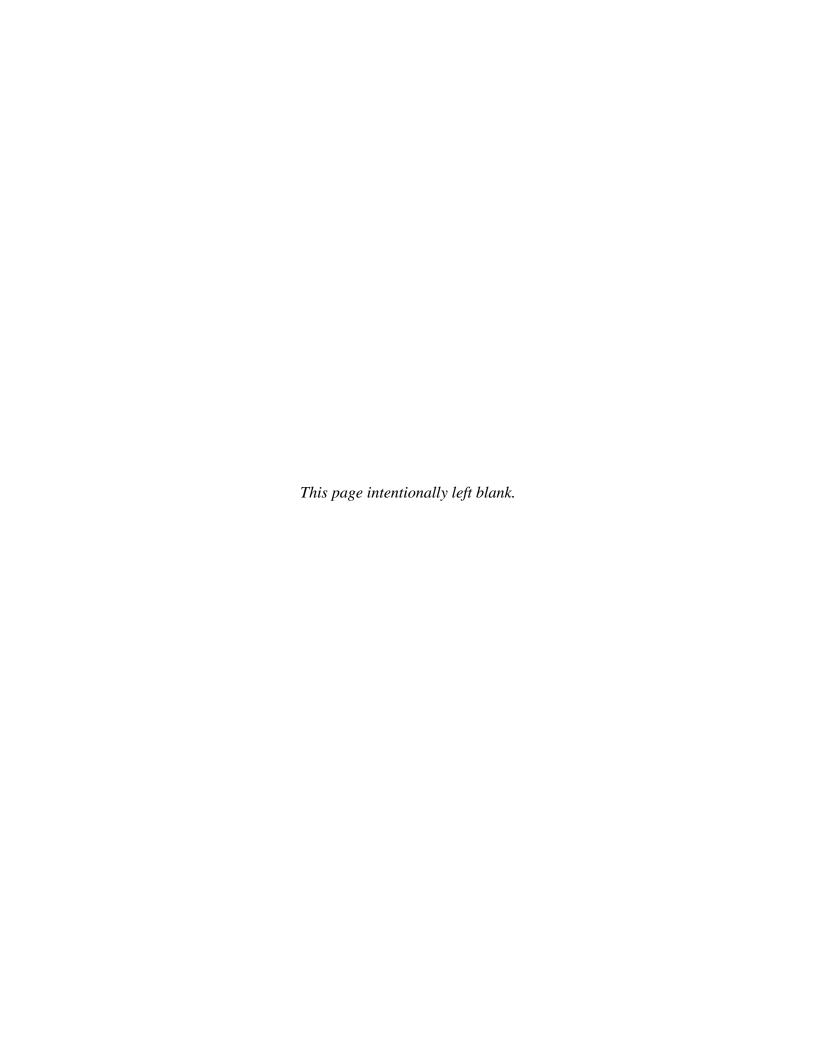
Project Manager, EA Science and Technology

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CERTIFICATION

I, Donald Conan, certify that I am currently a New York State Registered Professional Engineer (P.E.), and that this Remedial Action Scope of Work was prepared in accordance with all applicable statues and regulations in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



Donald Conan, P.E., P.G.

New York State Professional Engineer No. 75666

1 July 2021		
Date	 	

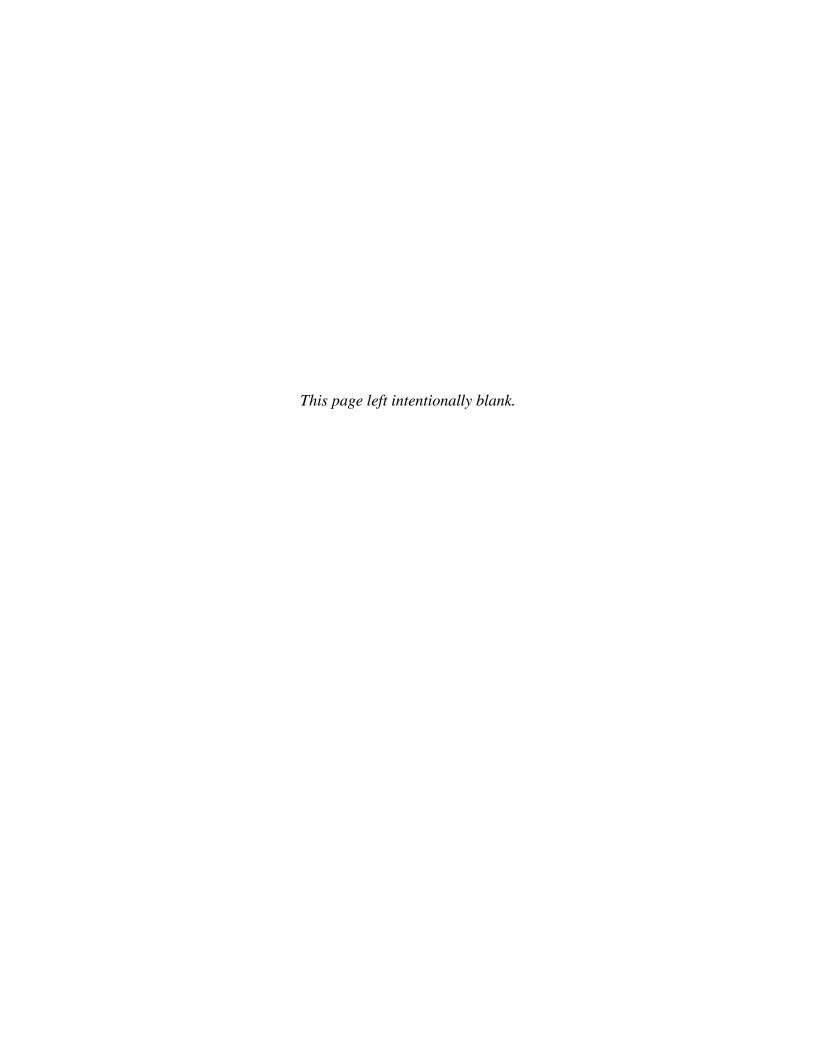


TABLE OF CONTENTS

			<u>Page</u>
LIST	OF TA	BLES	iii
LIST	OF AC	RONYMS AND ABBREVIATIONS	iv
1.	INTR	ODUCTION	1
	1.1	SITE DESCRIPTION	1
	1.2	RESPONSIBILITIES OF THE CONTRACTOR	
2.	REM	EDIAL DESIGN	
	2.1	DESIGN RATIONALE	4
		2.1.1 Soil Excavation	
		2.1.2 In-Situ Bioremediation.	4
	2.2	DESIGN ASSUMPTIONS	4
		2.2.1 Soil Excavation	4
		2.2.2 In-Situ Bioremediation	5
3.	DESC	CRIPTION OF WORK TASKS	6
	3.1	WORK TASK 1 – PLANNING DOCUMENTS AND	
		MOBILIZATION/DEMOBILIZATION	6
		3.1.1 Planning Documents	6
		3.1.2 Project Meetings	8
		3.1.3 Permitting Plan/Permits	
		3.1.4 Mobilization/Demobilization Activities	9
	3.2	WORK TASK 2 – MONITORING WELL INSTALLATION	10
	3.3	WORK TASK 3 – SOIL EXCAVATION AND OFFSITE DISPOSAL	11
		3.3.1 Soil Removal	11
		3.3.2 Protection of Adjacent Structures and Utilities	12
	3.4	WORK TASK 4 – INSITU BIOREMEDIATION INJECTIONS/PRODUCT APPLICATION	
	3.5	WORK TASK 5 – TRANSPORTATION AND OFFSITE DISPOSAL	
		WORK TASK 5 – TRANSPORTATION AND OFFSITE DISPOSAL WORK TASK 6 – SITE RESTORATION	-
	3.6 3.7	WORK TASK 6 – SITE RESTORATION	
	3.8	ROLES AND RESPONSIBILITIES	
	3.8		
		3.8.1 New York State Department of Environmental Conservation	
		3.8.2 EA Engineering, P.C. and its affiliate EA Science and Technology 3.8.3 Remedial Contractor	
4.	DD∩I	ECT CONTACTS	
4.	L KOJ	ECT CONTACTS	1 /
5	REFE	RENCES	19

EA Engineering, P.C. and Its Affiliate EA Science, and Technology

Version: FINAL

EA Engineering, P.C. and Its Affiliate

Page ii EA Science, and Technology July 2021

APPENDIX A: SPECIFICATIONS

APPENDIX B: CONSTRUCTION DRAWINGS

APPENDIX C: CARBON VENDOR PROPOSAL PACKAGES

APPENDIX D: RELEVANT SITE DATA DOCUMENTS

Version: FINAL

Page iii July 2021

EA Engineering, P.C. and Its Affiliate EA Science, and Technology

LIST OF TABLES

<u>Number</u> <u>Title</u>

1 Project Roles and Contact Information

Version: FINAL Page iv

July 2021

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LIST OF ACRONYMS AND ABBREVIATIONS

bgs Below ground surface

CY Cubic yard(s)

CAMP Community Air Monitoring Plan CFR Code of Federal Regulations

COVID-19 Coronavirus-2019

DER Division of Environmental Remediation

DPT Department of Transportation
DPW Department of Public Works

EA Engineering, P.C. and its affiliate EA Science and Technology

EIT Engineer-in-Training

ft Foot (feet)

HASP Health and Safety Plan

in. Inch(es)

No. Number

NYSDEC New York State Department of Environmental Protection

NYSDOH New York State Department of Transportation

OSHA Occupational Safety and Health Administration

PCE Tetrachloroethene
P.E. Professional Engineer
P.G. Professional Geologist
PDI Pre-design investigation

RA Remedial action RD Remedial design ROD Record of Decision

SARS-CoV-2 Severe Acute Respiratory Syndrome Coronavirus 2

SF Square foot (feet)
Site Crystal Cleaners Site
SOW Scope of Work

SSDS Sub-slab depressurization system

TBD To be determined

VOC Volatile organic compound

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Page 1
July 2021

1. INTRODUCTION

EA Engineering, P.C. and its affiliate EA Science and Technology (EA) was tasked by the New York State Department of Environmental Conservation (NYSDEC) under Work Assignment Numbers (No.) D009806-11 to plan and oversee a pre-design investigation (PDI) and remedial design (RD) at the Crystal Cleaners Site (No. 360053) in the Village of Pelham, Westchester County, New York. The remedial action (RA) is designed to address the elevated concentrations of contaminants of concern in soil west of the Site and facilitate remediation of the groundwater plume. The RA has been separated into two phases. Phase I includes the excavation of contaminated soils and treatment of groundwater at the Pelham DPW property immediately west of the Site. Phase II will include the treatment of the groundwater plume in the Manning Circle area.

This document provides a Scope of Work (SOW), Construction Drawings, and health and safety requirements to complete Phase I of the RA.

1.1 SITE DESCRIPTION

The Crystal Cleaners Site (Site) is a single-story commercial building, which sits on approximately

0.1 acres of land in a row of similar buildings on Wolfs Lane in Pelham. The Site was utilized as a dry-cleaning facility for several decades and is entirely covered by the building except for an area of concrete sidewalk in the front. Ground elevation drops approximately 10 feet (ft) behind the row of commercial buildings. A larger neighboring parcel behind these buildings is owned by the Village of Pelham and is used by the Department of Public Works (DPW). Contaminated groundwater has migrated south and west of the Site, reaching a residential area located on Manning Circle. The Site is listed as a Class 2 Site in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites.

1.2 RESPONSIBILITIES OF THE CONTRACTOR

The Contractor shall, in general, be responsible for the following:

- Completing the work in accordance with NYSDEC Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation (NYSDEC 2010), Occupational Safety and Health Administration (OSHA) regulations, and other applicable state and federal regulations.
- Providing all labor, equipment, and materials necessary to execute the SOW. The Contractor shall ensure that all onsite personnel have OSHA 40-hour training (in accordance with 29 Code of Federal Regulations [CFR] 1910.120 and corresponding 8-hour refresher updates).
- Developing and implementing a Work Plan submitted and approved by EA and NYSDEC prior to mobilization. The Work Plan shall include but not be limited to:

Version: FINAL

Page 2 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

- Health and Safety Plan (HASP)
- Work Plan (that includes the following)
 - o Excavation Plan, including means and methods
 - o Community Air Monitoring Plan (CAMP), per NYSDEC DER-10 (NYSDEC 2010) as an Appendix to the Work Plan.
 - o Erosion and Sediment Control Plan
 - Nuisance Control Plan
 - o Transportation and Disposal Plan
- Implementing the work as described in this SOW, Specifications (Appendix A), and the Construction Drawings (Appendix B).
- Conducting air monitoring at the perimeter of the site boundaries and maintaining total particulates and volatile organic compound (VOC) level below the levels as stated in NYSDEC DER-10.
- Conduct vibration monitoring and crack monitoring during excavation activities as prescribed by EA and its structural engineering subcontractor.
- Obtaining certification for, or appropriately characterizing, backfill materials brought onsite to ensure clean materials are used to backfill the excavation in accordance with NYSDEC DER-10 and NYSDEC's Guidelines for Sampling and Analysis of per- and polyfluoroalkyl substances (NYSDEC 2020).
- The Contractor shall be responsible for the means, methods, techniques, sequences, and procedures necessary to complete the SOW in an efficient and timely fashion.
- The Contractor shall be required to obtain any work permits needed including building permits and street opening permits at the municipal level.
- Coordinating with EA, the property owner, NYSDEC, the Village of Pelham, as well as owners and/or operators of underground facilities, as necessary, to complete required work activities.
 - Note that NYSDEC has obtained access agreements with the property owners for access and use of the Village of Pelham DPW property and select residential properties on Manning Circle for investigative purposes. A revised access agreement(s) to perform the SOW will be required and obtained by NYSDEC.
 - Before any intrusive work, demolition, or excavation is started, the Contractor is to contact Dig Safe New York, and other utility owners to identify all potential underground utilities located within the site boundaries.
 - The Contractor shall be responsible for confirming the location of all utilities prior to initiating any onsite work.

Version: FINAL

Page 3 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

— The Contractor shall promptly notify EA, NYSDEC, and utility owner (in writing) if an underground utility is uncovered or revealed at or contiguous to the Site, which was not shown or indicated in the SOW or otherwise identified by the Dig Safe utility mark out. During such time, the Contractor shall be responsible for the safety and protection of such underground facility.

Page 4
July 2021

2. REMEDIAL DESIGN

2.1 DESIGN RATIONALE

2.1.1 Soil Excavation

During previous investigations and the PDI, elevated concentrations of VOCs, particularly PCE, were identified in subsurface soils. Concentrations of PCE exceeded soil cleanup objectives as defined by 6 New York Codes, of Rules and Regulations Part 375-6.8 in soil borings and samples collected on the DPW property. Exceedances of PCE were observed in soil from 5 to 6 ft below ground surface (bgs) as well as in samples collected from 7 to 8 ft bgs. Per the ROD, soil exceeding the specified cleanup goals will be excavated and removed from the Site (NYSDEC 2016). Limits of excavation were designed to remove the maximum volume of contaminated soil while being protective of adjacent structures.

Groundwater elevations collected from a nearby monitoring well (MW-C03) indicated that depth to groundwater is approximately 13 to 14 ft bgs. However, observations of soil borings collected during the PDI noted saturated soil approximately 8 ft bgs. Given the depth of soil contamination and potential depth to groundwater, the soil excavation will extend to approximately 8 ft bgs to remove contaminated media to the extent possible and to prevent water accumulation in the bottom of the excavation. EA is proposing to limit the vertical extent of excavation to soils at or above the groundwater table for this RA.

2.1.2 In-Situ Bioremediation

Per the ROD, areas of groundwater contamination exceeding 500 parts per billion will be treated by in-situ bioremediation and injection of carbon substrate. Additionally, injections will be performed in the vicinity of the excavation area following backfill (and prior to pavement restoration) to prevent further migration of contaminants from this area and assist in addressing any areas potentially not addressed through excavation due to restrictions based on surrounding structures. Due to access restrictions and private property owner prohibitions on intrusive activities on Manning Circle, the downgradient location of groundwater contamination will be addressed through a separate mobilization at a later date under Phase II. Further work tasks associated with the remedy to be employed at the downgradient area will be presented in a separate SOW (i.e., Phase II).

2.2 DESIGN ASSUMPTIONS

2.2.1 Soil Excavation

The proposed excavation area is shown in the drawing set provided in Appendix B and is approximately 720 SF to a depth of 8 ft bgs, a total of 215 CY of material. The excavation footprint may be expanded based on visual and olfactory evidence of impacted soil; however, this will be limited due to location of surrounding utilities and infrastructure and only will be performed at the direction of EA and NYSDEC. No dewatering is expected as the depth of the

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Page 5 July 2021

excavation will be limited by the groundwater table. Management of water that enters the excavation during soil removal will be determined in the field. If the water level is in less than 1 foot, the excavation may be backfilled with washed stone until stone is 1 ft above the water level. If depth of water in excavation is greater than 1 ft, it will be removed, characterized, and disposed of offsite by the remedial contractor at an appropriate facility.

Toxicity Characteristic Leaching Procedure results collected during the PDI indicate that the subsurface soil is not characteristic of hazardous waste as defined by Resource Conservation and Recovery Act (40 CFR Part 261). However, it is possible that the excavated material will be disposed offsite as F002 hazardous waste given that dry-cleaner waste is a listed hazardous waste. If the Remedial Contractor can secure a Contained-In Determination for the waste during profiling activities, waste will be able to be disposed as non-hazardous waste. For the purposes of design and estimation, it was assumed that all excavated material will be disposed of as F002 listed waste.

2.2.2 In-Situ Bioremediation

Injection areas were determined based on historical groundwater concentrations and verified by groundwater sampling conducted as part of the PDI. The proposed injection areas are also limited by site constraints including the locations of surface structures and underground and overhead utilities.

The volume of water to be treated in the Phase I injection areas was estimated using the approximate surface area, 4,455 SF, and estimated "thickness" of groundwater in the treatment areas. Onsite at the DPW property, it was assumed that depth to water was 13.2 ft bgs based on historic gauging and that bedrock was located approximately 22 ft bgs based upon historic boring logs. Soil at the Site is generally fine to medium sand (based upon grain-size analysis and PDI soil boring logs); porosity of material was estimated at 30 percent, resulting in an estimated groundwater volume of 90,000 gallons.

EA consulted with suppliers of injectable carbon substrates. Final volumes of product and injection spacing will be subject to input from the vendor selected by the Contractor. In accordance with the ROD, the injectable product is intended to reduce groundwater concentrations on contaminants of concern through anaerobic reductive dechlorination and be enhanced by the addition of activated carbon injections (NYSDEC 2016). The injectate selected by the Contractor shall not only be able to provide both sorption on the surface of the carbon, but also be supplemented with a product promoting degradation of PCE and other contaminants of concern. Contractor's selected product shall be approved by NYSDEC.

3. DESCRIPTION OF WORK TASKS

This section presents a task-by-task description of the Contractor's activities associated with the SOW to address the contaminated source area and implement in situ bioremediation at the Crystal Cleaners Site. The Contractor's activities will be implemented under the following general work tasks:

- Work Task 1 Planning Documents and Mobilization/Demobilization
- Work Task 2 Monitoring Well Installation
- Work Task 3 Soil Excavation and Offsite Disposal
- Work Task 4 In Situ Bioremediation Injections
- Work Task 5 Transportation and Disposal
- Work Task 6 Site Restoration
- Work Task 7 Site Survey.

A description of each of the anticipated work tasks is presented in the following sections.

3.1 WORK TASK 1 – PLANNING DOCUMENTS AND MOBILIZATION/DEMOBILIZATION

The Remedial Contractor will be responsible for conducting the following activities under this work task:

- Development, submittal, and revision (if needed) of a Work Plan that includes the following: an Excavation Work Plan presenting means and methods, Transportation and Disposal Plan, HASP, Erosion and Sediment Control Plan, CAMP, and Traffic Control Plan.
- Obtain any work permits needed including building permits, street opening permits, hydrant permits, etc. at the municipal level. The remedial contractor shall provide NYSDEC and EA copies of any permits obtained for the execution of the work.
- Attending project meetings as required.
- Mobilization/demobilization of all equipment, labor, and materials necessary to complete the SOW.
- Furnish and maintain temporary construction facilities to support remediation activities. Temporary construction facilities will include at a minimum sanitation facilities and necessary utilities.

Additional details for these activities are presented in the following sections.

3.1.1 Planning Documents

The Contractor shall submit appropriate planning documents to EA and NYSDEC for review. The Contractor shall finalize the documents submitted based on comments provided by EA and

Version: FINAL

Page 7 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

NYSDEC. Contractor shall not mobilize until all planning documents have been reviewed and approved by EA and NYSDEC.

The selected Contractor shall prepare a Work Plan including, but not limited to, the following:

- A full project schedule, including the length of time it will take for the Contractor to complete each individual work activity.
- Sequence of operations and proposed hours of operation. Normal working hours shall be defined during the pre-construction meeting, or if none are set forth, shall be defined as beginning no earlier than 8:00 a.m. and ending at no later than 6:00 p.m.
- Excavation Plan:
 - Sequence of excavation activities (i.e., segregating and stockpiling, or load-and-go) of delineated areas.
 - Contractor's method of excavation support
 - Contractor's plan to manage contaminated groundwater potentially encountered during sub-surface excavation.
 - Materials and methods that will be used to temporarily cover excavated areas and stockpiled materials.
- Characterization and waste profile for each waste stream. Identification of names and addresses of proposed disposal facilities, including letters of commitment and operating licenses.
- Excavation backfill and site restoration including identification of the names and address of the source(s) of the backfill material, and analytical data of source material.

• HASP:

— The health and welfare of the Contractor's staff is the direct responsibility of the Contractor. The Contractor shall take all necessary precautions for the health and safety of all onsite Contractor employees in compliance with all applicable provisions of federal, state, and local health/safety laws; and provisions associated with the site-specific HASP. The Contractor shall designate a responsible representative at the site to act as the Site Health and Safety Officer whose duties include executing and ensuring compliance with the approved HASP.

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- As part of the HASP, the Contractor shall prepare a plan to manage and minimize the potential for transmission of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus, which causes the Coronavirus Disease 2019 (COVID-19) in accordance with Section 01 35 33 COVID-19 Risk Management (Appendix A).
- Permitting requirements/permits acquired.
- Subsurface utility identification, location, and termination.
- Proposed method(s) of decontamination procedures for Contractor's small equipment and hand tools, waste material and personal protective equipment, and large equipment and vehicles included as a component of the Work Plan.
- Noise control measures and monitoring as required by local ordinances (Village of Pelham, Part II, Chapter 68, Article VII Noise Control).
- Decontamination procedures.
- Erosion and Sediment Control Plan—A full Stormwater Pollution Prevention Plan is not required for this work as it is not expected that site work will disturb an area greater than 1 acre. However, Contractor shall be responsible for managing runoff and run on of work area.
- A CAMP will require real-time monitoring for particulates (i.e., dust) and VOCs, and shall be prepared in accordance with NYSDEC DER-10 and NYSDOH Generic Community Air Monitoring Plan:
 - The CAMP will be used to confirm that work activities do not spread contamination offsite through the air. The Contractor shall provide a daily data submittal from real-time monitoring.
- Dust control measures and monitoring, monitoring to be detailed in CAMP.

The Contractor shall revise the required submittals as necessary to address comments from EA and NYSDEC. The Contractor shall submit the revised and/or final submittals to EA and NYSDEC. EA and NYSDEC's review do not relieve the Contractor of any responsibility to comply with applicable laws, rules, regulations, or agreements.

3.1.2 Project Meetings

The Contractor shall be responsible for coordinating (as necessary) and attending project meetings including a pre-construction meeting (onsite or virtually); weekly project coordination

Page 9 July 2021

meetings to discuss project status, schedule, and any implementation issues; daily health and safety meetings onsite; and final inspection meeting following completion of the SOW.

3.1.3 Permitting Plan/Permits

The Remedial Contractor will be required to obtain any work permits needed including building permits and/or excavation permits at the municipal level. The Contractor shall provide NYSDEC and EA copies of any permits obtained for the execution of the work.

3.1.4 Mobilization/Demobilization Activities

The Contractor shall be responsible, at a minimum, for the following mobilization tasks:

- Coordinating access to water and electrical service (if required). Onsite water could be supplied utilizing a hydrant adjacent to DPW facility gate. Access to other various municipal structures (i.e., hydrants, valves, manholes, fire alarms, etc.) shall not be obstructed by the Contractor to prevent use by others. The Contractor shall secure any required permits from the local water authority and be responsible for installing a backflow preventer and water meter on the hydrant. The Contractor shall also be required to provide sanitary facilities for the duration of the site work.
- Verifying the existing site conditions and identifying and marking the location(s) of all aboveground and underground utilities, equipment, and structures, as necessary to implement the SOW:
 - Prior to commencing onsite activities, the Contractor shall contact Dig Safe New York to obtain utility clearances. A geophysical survey was conducted by EA and mapping of identified utilities is provided on the Drawings. The Contractor shall be responsible for verifying all utility locations and for coordinating with the applicable utility companies. The Contractor shall also obtain and pay for all necessary permits to complete the work.
 - Performing soft dig utility clearances in the vicinity of the excavation area (e.g., around identified catch basis and conveyance piping) and monitoring well install locations.
 - If the Contractor damages existing utilities, equipment, or structures, the Contractor is responsible for notifying the appropriate utility company, EA, and NYSDEC, and fully repairing all damages at no additional cost to NYSDEC. Repairs, if necessary, shall be completed in accordance with all requirements of the utility company and to the satisfaction of EA and NYSDEC.
- Mobilizing all manpower, equipment, and materials to the Site as necessary to implement the SOW. The Contractor shall be responsible for providing all labor, equipment, and

Version: FINAL

Page 10 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

materials needed to conduct decontamination activities (as necessary) of all personnel and equipment associated with the SOW.

- Completing site preparation activities included but not limited to:
 - Establishing a work area with temporary construction fencing or barricades to prevent access by unauthorized personnel.
 - Constructing additional remedial support area(s) and decontamination area(s) in accordance with the provisions of the reviewed documentation and plans.
 - Waste stream characterization—The Contractor shall submit waste profiles for each sampled and identified waste stream to EA and indicate the proposed disposal facility the waste will be transported.
- Decontamination activities shall be conducted on a decontamination pad constructed by the Contractor in an area approved by EA. Procedures shall include scraping equipment of residual debris with a shovel/brush and a hot-water pressure washing of heavy equipment buckets and vehicle tires, as needed. Excavation equipment that is used for the handling of contaminated soil shall be decontaminated prior to entering a clean area and prior to leaving the Site. Decontamination fluids shall be containerized in an appropriate container for characterization and disposal offsite by the Contractor.
- Demobilization activities to be conducted by the Contractor include, at a minimum, decontamination, dismantling and removal from the site of all equipment, additional materials not used by the Contractor, and other support services.

3.2 WORK TASK 2 – MONITORING WELL INSTALLATION

The Contractor shall be responsible for installing three monitoring wells in locations indicated on the Construction Drawings. Monitoring wells will be installed as follows:

- Monitoring wells will be installed to the top of bedrock surface, which is anticipated at 20 ft bgs in the vicinity of Manning Circle.
- Wells will be installed with an estimated length of 10-ft of screen (0.001 in. slot screen) and an appropriate length of Schedule 40 polyvinyl chloride flush joint well casing to ground surface.
- Sand pack consisting of #0 US Silica or equivalent will be installed from the base of the boring to approximately 2 ft above the top of the well screen. A minimum 2-ft bentonite seal will be installed above the sand pack. A bentonite/cement grout mixture will be tremie grouted to fill the remaining annulus to within 0.5 ft bgs.

EA Project No.: 16025.11 Version: FINAL

Page 11

July 2021

EA Engineering, P.C. and Its Affiliate
EA Science and Technology

• The contractor shall install a protective flush-mount 8-inch diameter steel-frame and cover and fill inner annulus between the well casing and frame with coarse sand.

• The flush-mount well-cover shall be finished in a 4 ft square and 6 inch (in.) thick concrete pad centered around the protective casing, with concrete sloped away from the well.

The monitoring wells will be developed by the Contractor no sooner than 48 hours but no longer than 7 calendar days following installation. The monitoring wells will be developed using surging and pumping techniques. Monitoring well development will be considered complete when temperature, conductivity, and pH have stabilized and a turbidity of less than 50 nephelometric turbidity units has been achieved. At a minimum, development will remove 3–5 well volumes of water. One development volume is defined as (1) equivalent volume, plus (2) the amount of fluid lost during drilling, plus (3) the volume of water used in filter pack placement.

Development water and any other wastes generated during well install will be containerized, handled, and disposed of offsite at an appropriate facility by the Contractor.

3.3 WORK TASK 3 – SOIL EXCAVATION AND OFFSITE DISPOSAL

3.3.1 Soil Removal

The impacted subsurface soils west of the Crystal Cleaners building (on DPW property) and soils exhibiting high photoionization detector measurements, strong odors, and/or visual staining shall be excavated, live loaded, transported offsite, and disposed of at an approved facility. The Contractor shall remove impacted site soils in the area shown on Sheet 4 of the Construction Drawings (Appendix B). Excavation depths are expected to range to 8 ft bgs, but final excavation depths may be adjusted in the field by EA and NYSDEC. The depth of excavation should not extend below the water table (estimated between 13 and 14 ft bgs) to avoid water accumulation in the excavation; however, additional soil may be removed at the direction of NYSDEC and EA. A cross-section of the proposed excavation is presented in the attached Construction Drawings. Excavated material shall be transported offsite to an approved disposal facility.

The Contractor should make provisions to prevent stormwater run-in into the excavation. Additionally, the Remedial Contractor shall make provisions to have treatment agents to mitigate vapors, if determined necessary by the EA, NYSDEC, and NYSDOH.

The excavation footprint may be extended based on visual and olfactory evidence of impacted soil. The Remedial Contractor may be instructed by EA and NYSDEC to expand the excavation horizontally and/or vertically. The Remedial Contractor shall make provisions to remove impacted groundwater or construction water if excavation dewatering is required. Any water removed from the excavation shall be disposed offsite at an approved facility.

Version: FINAL

Page 12 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

Prior to backfill, confirmation samples shall be collected to confirm removal of contaminated subsurface soil above soil cleanup objectives as defined by 6 New York Codes, of Rules and Regulations Part 375-6.8. Samples will be collected from the excavation bottom and sidewalls. A minimum of one sample will be collected from each 30 linear ft of excavation sidewall and 900 SF of excavation bottom in accordance with NYSDEC DER-10 (NYSDEC 2010).

3.3.2 Protection of Adjacent Structures and Utilities

Given the proximity to adjacent buildings and structures, the contractor shall employ methods of excavation support (e.g., trench boxes, or equivalent) to prevent damage to surrounding structures. All work and excavations should be conducted in accordance with OSHA specifications (29 CFR Part 1926) and be protective of adjacent structures (e.g., Crystal Cleaners building, DPW buildings and infrastructure, subsurface utilities, etc.). Underground utilities are present in the proposed excavation area. For the stormwater conveyance piping located near the northern portion of the excavation, the Contractor shall remove the piping during excavation and re-install and reconnect the stormwater piping in kind during restoration. The drop inlet and conveyance piping shall be re-installed at the existing elevations and slope in accordance with the Construction Drawings (Appendix B) and Village of Pelham Street Opening Instructions specification (Appendix A).

It is not anticipated that personnel will be required to work within the excavation footprint; however, if personnel are to work within the excavation footprint, the Contractor shall follow specifications for sloping and benching, or excavation support outlined in 29 CFR Part 1926 Subpart P.

3.4 WORK TASK 4 – INSITU BIOREMEDIATION INJECTIONS/PRODUCT APPLICATION

To target areas of groundwater contamination, the Remedial Contractor shall inject a colloidal activated carbon product to the areas/locations shown on the Construction Drawings. Injection locations within the footprint of the excavation shall be completed prior to final surface completion with concrete and asphalt as specified in Work Task 6. The material(s) will be procured and supplied by the Contractor.

The Contractor shall inject colloidal activated carbon into the areas shown on the Drawings through direct-push technology (DPT). Quantities and volumes of product will be determined through consultation with the selected carbon vendor, the Contractor, EA, and NYSDEC. Generally, EA anticipates that the Contractor (with assistance from the vendor) will install between 60 and 70 injection points in the targeted areas. EA solicited proposals from companies that provide carbon treatment products. As is typical with in-situ products, each company has proprietary formulated products, resulting in no two companies being able to provide identical products or injection methodology. Each company was given all the site data for their professionals to review and propose the most appropriate product to meet project requirements. Estimated injection quantities varied between 3,200 and 9,200 pounds of activated carbon, depending on the product. Copies of EA's solicitation and vendor response are provided in

Version: FINAL Page 13 July 2021

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Appendix C. Final volumes of product and injection spacing will be subject to input from the vendor selected by the Contractor.

As noted in each vendor's proposal, the vendor can provide a DPT drilling contractor to perform injections of the in-situ product. It is expected that the vendor will work with the drilling contractor onsite to complete injections. The Contractor shall be responsible for soliciting vendor pricing, selecting appropriate vendor, and overseeing implementation of injections.

3.5 WORK TASK 5 – TRANSPORTATION AND OFFSITE DISPOSAL

It is the Contractor's responsibility to select approved disposal facilities for the excavated soil, construction water (e.g., investigation-derived waste, decontamination fluids), and other wastes generated during the performance of this RA. The Contractor shall submit all proposed disposal or recycling facilities to EA and NYSDEC in Contractor's Work Plan for approval prior to beginning work onsite. Results from previous waste characterization samples (obtained by EA during the PDI) are included in the Relevant Site Data Documents (Appendix D) to this SOW. If the selected landfill/disposal/recycling facility requires additional sample analysis, it is the Contractor's responsibility to collect and analyze the required samples. The Contractor shall be responsible for containerizing, transporting (including providing and preparing manifests, bills-of-lading, etc.), and disposing of waste streams in accordance with all applicable federal, state, and local laws.

Copies of manifests or certificates of disposal shall be maintained by the Contractor at the Site and shall be provided to EA and NYSDEC when received. The Contractor shall obtain documentation of weights for each waste shipment to the disposal facilities for invoice payment purposes. The documentation should present the weights of materials disposed at the facility for each manifest or bill-of-lading identification number. The Contractor shall promptly inform EA and NYSDEC of any issues or discrepancies found in the waste transport and/or disposal process.

3.6 WORK TASK 6 – SITE RESTORATION

A demarcation layer of 4-ft orange safety fencing, or equivalent, will be installed on the excavation sidewalls and bottom. The excavation will be restored in accordance with the Village of Pelham specification for Street Opening provided in Appendix A, Sheet 4 of the Construction Drawings (Appendix B), and as described herein. If the excavation is dry, the Remedial Contractor shall backfill the excavated areas first with 3 ft of certified clean common fill. Common Fill shall meet NYSDOT Standard Specification requirements for Select Granular Subgrade No. 733-1302. Should water be present in the bottom of the excavation, 1-in. washed stone originating from a virgin source shall be placed in the excavation and extend 1 ft above the water level. On top of the common fill, 24-in. of clean graded sand will be placed and compacted in 12-in. lifts. The replacement stormwater piping (15-in. corrugated HDPE pipe) shall be placed so that at least 4-in. of graded sand are above and below the pipe. The remaining annulus will be backfilled with New York State Department of Transportation (NYSDOT) Item 304.02 Type 2 subbase to within 11-in. of final grade. All imported materials shall be certified

July 2021

clean or from a virgin source, meeting requirements of NYSDEC DER-10 5.4(e) and 6 New York Code of Rules and Regulations Part 375.67 (d)(1)(iii)(c). The excavation will be temporarily covered with poly-sheeting and secured. Injections will be performed within the restored excavation area prior to final surface completion with concrete and asphalt. Injection details are described in Work Task 4.

Site restoration of injection points will be dependent upon surrounding surfaces. Injection points installed at the southern end of the DPW property will be backfilled with hydrated bentonite to within 6-in of surrounding grade and then restored with cold patch to meet existing grades of surrounding asphalt. Injection points installed within the excavation area will be backfilled to surrounding grade with hydrated bentonite.

Once injections are completed, 8-in. of concrete meeting the requirements of NYSDOT Section 608 and have a compressive strength not less than 4,000 pounds per square in. with fiber reinforcement meeting the requirements of NYSDOT Standard Specifications §711-01 Fibers for Concrete Reinforcement. will be installed on top of the Type 2 subbase. The restoration of the surface will be completed with a 3-in. asphalt top course of New York State Type 6, or equivalent.

3.7 **WORK TASK 7 – SITE SURVEY**

The Contractor shall be responsible for procuring a New York State-licensed surveyor to survey the extent of excavation and location/elevation of confirmation samples prior to backfilling. The Contractor's surveyor will record the final surface elevations following completion of each of the following: backfilling, compaction activities, surface restoration with asphalt. These elevations will be used for establishing quantities of material placed by the Contractor and for preparation of final as-built drawings by EA.

Injection points of carbon product shall be flagged/marked and surveyed once all injections are complete. Monitoring wells installed under Work Task 2 shall be surveyed as part of the final site survey for inclusion in the as-built drawings.

3.8 **ROLES AND RESPONSIBILITIES**

A description of the roles and responsibilities for the RA is included in the following sections.

3.8.1 New York State Department of Environmental Conservation

The NYSDEC is responsible for the administration of the RA and coordination with EA. They will receive and review daily reports from EA's onsite construction inspector, coordinating review and changes to the design/SOW with all parties, and coordinate access to the remedial site and adjacent properties.

3.8.2 EA Engineering, P.C. and its affiliate EA Science and Technology

EA will directly report to the NYSDEC Project Manager. EA will review plans, specifications, and submittals from the Remedial Contractor. EA will also host regular progress/preconstruction meetings and provide minutes to NYSDEC and the Remedial Contractor for review and concurrence. Additionally, EA will provide dedicated full-time onsite construction management, inspection, and engineering during the RA implementation.

3.8.3 Remedial Contractor

Phase I RA implementation will be completed by the Remedial Contractor, under a standby callout contract to NYSDEC. The Remedial Contractor shall complete the following activities under this SOW:

- Development of an Excavation Work Plan that presents means and methods, Transportation and Disposal Plan, HASP, Erosion and Sediment Control Plan, CAMP, and Traffic Control Plan
- Permitting (Section 2.3.1)
- Sanitation and health and safety measures to prevent spread of COVID-19
- Continuous particulate and VOC monitoring in accordance with the Contractor's CAMP
- Mobilization and demobilization
- Soil excavation and offsite disposal of materials
- Solicitation and procurement of vendor for carbon product to be injected into subsurface to treat groundwater contamination.
- Injection of carbon product for in-situ bioremediation in locations shown on the Construction Drawings through DPT
- Survey of final excavation limits and confirmation sampling locations
- Survey of backfill, final restoration, injection points, and installed monitoring wells.
- Site restoration
- Decontamination of all equipment and vehicles prior to leaving site.
- Supply weight tickets for offsite disposal of contaminated material and weight tickets of imported material used for site restoration.

Version: FINAL

Page 16 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

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Version: FINAL

Page 17 July 2021

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4. PROJECT CONTACTS

The following personnel identified in **Table 1** have been identified for this project to fulfill requirements, roles, and responsibilities listed in Section 3.8.

Table 1 Project Roles and Contact Information

Name	Project Role	Company	Telephone	Email
John Miller, P.E.	Site Project Manager	NYSDEC-DER	Office: (518) 402-9589 Cell: (315) 269-5928	john.miller@dec.ny.gov
Joseph Senerchia	Superintendent of Department of Buildings and Public Works	Village of Pelham	Office: (914) 738-2258	buildingdept@pelhamgov.com
Chris Scelza	Village Administrator	Village of Pelham	Office: (914) 738-2015	chris.scelza@pelhamgov.com
TBD	Environmental and Exposure Evaluation	NYSDOH	Office: TBD	TBD
Donald Conan, P.E., P.G.	EA Program Manager	EA Engineering, P.C.	Office: (315) 565-6551 Cell: (315) 877-7403	dconan@eaest.com
Frank DeSantis, Jr.	EA Deputy Program Manager	EA Science and Technology	Office: (315) 565-6554 Cell: (315) 395-7689	fdesantis@eaest.com
Adam Etringer	EA Project Manager	EA Science and Technology	Office: (315) 565-6564 Cell: (518) 242-9773	aetringer@eaest.com
Emily Cummings, EIT	EA Project Engineer	EA Science and Technology	Office: (315) 565-6553 Cell: (860) 309-3837	ecummings@eaest.com
TBD	EA Construction Inspector	EA Science and Technology	TBD	TBD
TBD	Construction Manager	Remedial Contractor	TBD	TBD
Adam Etringer Emily Cummings, EIT TBD	EA Project Manager EA Project Engineer EA Construction Inspector	EA Science and Technology EA Science and Technology EA Science and Technology	Cell: (315) 395-7689 Office: (315) 565-6564 Cell: (518) 242-9773 Office: (315) 565-6553 Cell: (860) 309-3837 TBD	aetringer@eaest.com ecummings@eaest.com TBD

Notes:

EIT = Engineer-in-Training

P.E. = Professional Engineer

P.G. = Professional Geologist

TBD = To be determined

Version: FINAL

Page 18 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

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Version: DRAFT

Page 19 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

5. REFERENCES

New York State Department of Environmental Protection (NYSDEC). 2010. DER-10 Technical Guidance for Site Investigation and Remediation. May.
——. 2016. Record of Decision, Crystal Cleaners, State Superfund Project, Pelham (V), Westchester County, Site No. 360053. March.
——. 2020. Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Program. October.

Version: DRAFT

Page 20 July 2021

EA Engineering, P.C. and Its Affiliate EA Science and Technology

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Appendix A

Specifications

SECTION 01 35 33 - COVID-19 RISK MANAGEMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes requirements for managing and minimizing the potential for transmission of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus, which causes the Novel Coronavirus Disease 2019 (COVID-19). COVID-19 typically causes respiratory illness in people.
- B. <u>Transmission</u>: SARS-CoV-2 is currently known to spread via respiratory droplets produced when a person infected with the virus coughs or sneezes, the same way flu and other respiratory illnesses spread. SARS-CoV-2 can also be transmitted if people touch surfaces and objects with the virus on it.
- C. <u>Symptoms</u>: COVID-19 can cause mild to severe respiratory illness with symptoms of fever, cough, and difficulty breathing. Preliminary information suggests older adults and people with underlying health conditions or compromised immune systems may be at higher risk of severe illness from this virus. Center for Disease Control (CDC) believes that symptoms of COVID-19 begin between 2 and 14 days after exposure.
- D. <u>Best Practices to Prevent Infection</u>: Currently the best way identified to prevent infection is to minimize the potential of exposure to SARS-CoV-2. CDC recommends everyday actions to help prevent the spread of any respiratory viruses
 - Wash your hands often with soap and water for at least 20 seconds. If soap and water are not available, use an alcohol-based hand sanitizer, containing at least 60% alcohol.
 - Avoid touching your eyes, nose, and mouth with unwashed hands.
 - Avoid close contact with people who are sick.
 - Stay home when you are sick.
 - Cover your cough or sneeze with a tissue, then throw the tissue in the trash can and wash hands or use hand sanitizer.
 - Clean and disinfect frequently touched objects and surfaces.
 - Wear face masks
 - Safe social distancing (e.g., maintain a distance of 6 feet between people, limited group meetings)

1.2 OBJECTIVE

A. The objective of this specification is to minimize transmission and subsequent infections of COVID-19 in project staff that may arise as a result of exposure to SARS-CoV-2 released into the environment during construction and renovation activities. Controlling the dispersal of airborne infectious agents is critical to achieving this objective.

1.3 PERFORMANCE REQUIREMENTS AND RESPONSIBILITIES

A. The intent of this Section is to document and formalize the Contractor's requirements for minimizing the risk of transmission of COVID-19 among site workers, project staff, and

New York State Department of Environmental Conservation

- the surrounding community during construction per the latest recommendations of federal, state and local health agencies. This includes developing a COVID-19 Management Plan, establishing procedures for conducting onsite work activities to prevent virus transmission, monitoring staff health, and reporting requirements.
- B. The Contractor is expected to communicate the requirements described in this section to all site workers, subcontractors, and visitors to the site daily, during daily Health and Safety meetings as well as through site postings (see attachment).
- C. Contractors and their subcontractors are required at all times to guard the safety and health of all persons on and in the vicinity of the work site.
- D. Contractors and their subcontractors are required to comply with all applicable rules, regulations, codes, and bulletins of the New York State Department of Labor and the standards imposed under the Federal Occupational Safety and Health Act of 1970, as amended ("OSHA").
- E. Contractors and their subcontractors must comply with all City or State of New York safety requirements for projects within the City or State of New York constructed in accordance with the applicable building code.
- F. Contractors and their subcontractors shall stay current and immediately implement the most up-to-date government issued practices to protect the safety and health of your employees, clients, and the general public.
- 1.4 RELATED SECTIONS (Not Used).

1.5 REFERENCES

- A. Occupational Safety and Health Administration (OSHA) Guidance on Preparing Workplaces for COVID-19
- B. New York State Department of Health
- C. Centers for Disease Control and Prevention (CDC)
- D. National Institute for Occupational Safety and Health (NIOSH)
- E. Health Insurance Portability and Accountability Act (HIPAA)

1.6 SUBMITTALS

- A. The Contractor shall prepare a COVID-19 Management Plan which can be a Supplement, or Addendum, to the Contractor' Health and Safety Plan
- B. The CONTRACTOR shall develop a one-page summary of site-specific practices for COVID-19 management and clearly display on site. Operating hours, delivery times, and extra considerations for works involving a high volume of personnel or potential for interaction with community members could also be included in the summary.
- C. The Contractor's Daily Field Report shall include a Daily Health Checklist, with the following questions at a minimum:

DAILY HEALTH CHECKLIST

Is social distancing being practiced?	Yes 🗆	No □
Is the tail gate safety meeting held outdoors?	Yes 🗆	No □
Are remote/call-in job meetings being held in lieu of meeting in person where possible?	Yes 🗆	No □
Were personal protective gloves, masks, and eye protection being used?	Yes 🗆	No □
Are sanitizing wipes, wash stations or spray available?	Yes 🗆	No □
Have any workers/visitors been excluded based on close contact with individuals diagnosed with COVID-19, have recently traveled to restricted areas or countries, or are symptomatic (fever, chills, cough/shortness of breath)?	Yes □	No □
Comments:		

1.7 COVID-19 MANAGEMENT PLAN

- A. At a minimum, the COVID-19 Management Plan shall include:
 - 1. Identification of potential exposure pathways and exposure risks associated with work tasks, e.g. activity hazard analysis (AHA).
 - 2. Identification of local health department contact information and COVID-19 testing sites and procedures.
 - 3. Detailed written description of the onsite personnel protection measures that will be utilized and a detailed explanation of how they will be implemented, monitored, and communicated.
 - 4. Detailed written description of measures that will be taken to prevent transmission to or from the surrounding community and how they will be implemented and communicated.
 - 5. Procedures to be followed in the event a site worker is diagnosed with or is suspected of having COVID-19, including identification of all personnel potentially exposed and isolation requirements.
 - 6. Daily cleaning schedules and disinfection procedures per the most recent CDC guidelines.
 - 7. Cleaning and disinfection procedures in the event there is/are suspected COVID-19 case(s) among site personnel.
 - 8. Site access controls and entry/exit procedures.
 - 9. Plan view of points of egress and delivery locations.
- B. The COVID-19 Management Plan must be updated following any issued change(s) in federal, state, or local health agency guidance.

1.8 PRECONSTRUCTION CONFERENCE

- A. Pre-Construction Conference shall include a review of methods and procedures related to COVID-19 risk management including, but not limited to the following:
 - 1. Review of COVID-19 Management Plan
 - 2. Review infection control procedures
 - 3. Review staff monitoring and reporting requirements.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 RISK IDENTIFICATION

- A. COVID-19 is a new disease; scientists and health agencies are continuously learning about how it spreads. The Contractor shall adjust site policies based on the most up to date government issued guidance regarding transmission.
- B. Contractor shall confirm staff that have worked in locations where quarantine orders are in place, have met the minimum quarantine guidance and do not have symptoms prior to mobilizing to site.
- C. Contractor shall monitor staff daily, including checking, and documenting, temperature with no contact infrared thermometer, to confirm onsite staff do not exhibit COVID-19 symptoms. Contractor shall provide daily reports of those tests upon NYSDEC's request.

3.2 RISK MINIMIZATION

A. Engineering Controls

- 1. Increasing ventilation rates of interior workspaces.
- 2. Access controls, including fences and locking gates.
- 3. Maintain 6 feet distances, using distance markers where appropriate in the field.

B. Administrative Controls

- 1. Continuous and effective communication of administrative controls/requirements to all site personnel and visitors, through the posting of site signage, preparation and distribution of site plans, presented during site meetings, and verbal warnings if necessary.
- 2. Require that all employees exhibiting any COVID-19 symptom do not enter the site and provide sick leave policies to support this requirement.
- 3. To minimize face-to-face interaction, the Site's Health & Safety Officer's (or other designated employee) phone number shall be prominently posted and disseminated to project staff to be called for the purpose of site sign in and sign out by all visitors to the site upon arrival and exit. The designated employee will receive entry and exit calls each day and will fill out the site entry/exit log for each site visitor to reduce traffic in site trailer and/or the number of individuals contacting the site access tracking log.
- 4. Staffing: only those employees necessary to complete critical path task(s) shall be present on-site at any given time. Work shall be scheduled to minimize the density of personnel in any given area at any given time.
- 5. Working Remotely; employees shall be encouraged to complete work remotely if possible.
- 6. Face-to-face meetings shall be replaced with video or phone conferences when practicable.
- 7. Social distancing shall be exercised for face-to-face meetings e.g. daily Health and Safety tailgate meeting. In addition, the Contractor shall plan to have multiple meetings (if necessary) to keep the number of participants to a threshold that allows for the practice of social distancing protocol. The Health and Safety

- officer will keep a record of all present for each meeting on the Health and Safety log.
- 8. Quarantine staff that have been in contact with a anyone that tested positive and notify NYSDEC immediately.

C. Safe Work Practices

- 1. The Contractor shall employ social distancing protocol for all onsite activities when able.
- 2. The Contractor provide PPE and adequate hand washing stations and hand sanitizer (containing a minimum of 60% alcohol) to allow site personnel and visitors to practice good personal hygiene.
- 3. The Contractor shall provide tissues, paper towels, no-touch trash cans, and disinfectants to maintain site cleanliness.
- 4. Sharing of tools and heavy equipment shall be limited to the extent practicable; handles of shared tools and equipment shall be sanitized regularly.

D. Personal Protective Equipment

- 1. Employees shall be provided disposable personal protective equipment (PPE), including gloves, goggles, face shields, face masks, and respiratory protection, as appropriate based on work environment and current recommendations by OSHA and CDC.
- 2. All PPE must be selected based on hazard to the worker, properly fitted and periodically refitted, consistently and properly worn when required, regularly inspected, maintained, and replaced, as necessary, and properly removed, cleaned, and stored or disposed of, to avoid contamination of self, others, or the environment.
- 3. PPE worn to prevent transmission of COVID-19 is not to be confused with PPE for protection against site contaminants.
- 4. PPE must be worn, removed, and disposed of correctly in order to remain effective.
 - a. Face masks should fit snugly but comfortable against the side of the face and over the nose and be secured with ties or ear loops; cloth masks must include multiple layers of fabric, allow for breathing without restriction, and be able to be laundered and machine dried without damage.
 - b. Face masks should be worn consistently and removed without touching eyes, nose, and mouth. An individual should wash their hands after handling a used face mask.
 - c. Cloth face coverings should be sterilized by machine washing between use; disposable face masks shall be disposed of properly after using.
 - d. Gloves are only effective if changed and disposed of frequently, to avoid cross-contamination.

3.3 NOTIFICATION OF POTENTIAL OR CONFIRMED INFECTION

- A. The Contractor shall notify the Department immediately upon identification of a suspected or confirmed infection of COVID-19. This notification shall comply with HIPAA regulations.
- B. The Contractor shall remove an individual suspected to have COVID-19 from the site immediately (to the individuals' hotel or local place of residence if transport home is not

immediately feasible), as well as those who have worked in close contact with that individual for extended periods of time (an hour at a time or more) over the previous week. The individual with suspected infection shall contact their health care provider and/or follow local health department testing procedures and protocol.

- C. While in the process of removing an employee exhibiting symptoms, steps should be taken to isolate the individual, place a surgical mask on the individual and inform the local health department and the NYSDEC.
- D. In the event the individual with suspected infection cannot get home right away, they shall isolate in their hotel room (notifying hotel management of their symptoms), contact their health care provider, and/or follow local health department testing procedures and protocol.
- E. In the absence of local health department information, the individual may call the New York State Hotline at 1-888-364-3065.
- F. The Contractor shall maintain communication with potentially infected individual(s) and notify the Engineer upon receipt of COVID-19 test results.
- G. Positively infected individuals may return to work at the site after 72 hours of being symptom-free and 7 days of isolation after the first symptoms appeared, or in accordance with the current federal, state, and local guidelines
- H. OSHA recordkeeping requirements at 29 CFR Part 1904 mandate covered employers record certain work-related injuries and illnesses on their OSHA 300 log. COVID-19 can be a recordable illness if a worker is infected as a result of performing their work-related duties. However, employers are only responsible for recording cases of COVID-19 if all the following are met:
 - 1. The case is a confirmed case of COVID-19 (see CDC information on persons under investigation and presumptive positive and laboratory-confirmed cases of COVID-19).
 - 2. The case is work-related, as defined by 29 CFR 1904.5; and
 - 3. The case involves one or more of the general recording criteria set forth in 29 CFR 1904.7 (e.g. medical treatment beyond first-aid, days away from work).

END OF SECTION

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Entry/Exit Log with COVID-19 Acknowledgement

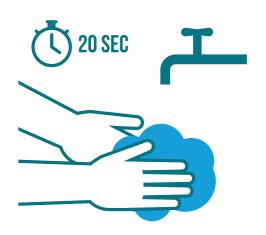
Project Nan	ne:	 	
Project #: _		 	

New York State Department of Environmental Conservation's (DEC) objective is to provide a safe and healthy workplace. In response to COVID-19, DEC is prohibiting access to our work areas by those who pose an elevated risk of spreading COVID-19. By completing this site Entry/Exit log, you acknowledge your understanding of this policy and confirm that your health and travel history is NOT in one of the prohibited access groups listed below, and to the best of your knowledge, you do not pose an elevated risk of transmitting COVID-19 to others. Please leave the site immediately and follow recommendations from public health agencies and your healthcare provider if you fall into one of the prohibited access groups listed below:

- You are experiencing flu-like symptoms including but not limited to fever, chills, cough, sore throat, diarrhea, vomiting, runny/stuffy nose, muscle or body aches, headaches, fatigue.
- You have traveled to CDC-restricted destinations in the last 2 weeks including China, South Korea, Iran, United Kingdom & Ireland, all European Union countries, Switzerland and regions within the U.S. for which public health agencies have prohibited travel.
- You had direct contact with a person diagnosed with COVID-19 or suspected of having COVID-19 during the last 2 weeks.

Name	Initials	Affiliation	Date	Time In	Time Out

PREVENT INFECTION



Wash your hands and use hand sanitizer

Wash your hands frequently and thoroughly, for a minimum of 20 seconds.

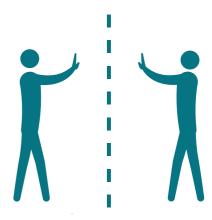
Use hand sanitizer, containing at least 60% alcohol when you are unable to wash you hands with soap and water.



Cover your cough or sneeze

Cover your mouth and nose when coughing or sneezing. Turn your head away from others, if possible, when sneezing.

Use a paper tissue or your sleeve and not your hand. Dispose of used tissues immediately.



Limit physical contact

Avoid handshakes, kisses and hugs.

Maintain at least 6 feet from all others persons when possible.



Keep clean

Regularly sanitize frequently touched and shared surfaces at home as well as at work.



Be considerate

Stay home whenever possible especially if you are experiencing symptoms.



Department of Environmental Conservation

SITE ACCESS RESTRICTIONS



SITE ACCESS IS PROHIBITED FOR THE FOLLOWING PERSONS DUE TO COVID-19 RISK

 You are experiencing flu-like symptoms including but not limited to:

Fever or feeling feverish/chills, cough, sore throat, diarrhea, vomiting, runny or stuffy nose, muscle or body aches, headaches, fatigue (tiredness)

 You have traveled to CDC-restricted destinations during the last 2 weeks:

China, South Korea, Iran, United Kingdom & Ireland, all European Union countries, Switzerland and regions within the U.S. for which public health agencies have prohibited travel

 You had direct contact with a person diagnosed with COVID-19 or suspected of having COVID-19 during the last 2 weeks

Immediately notify NYSDEC site management.

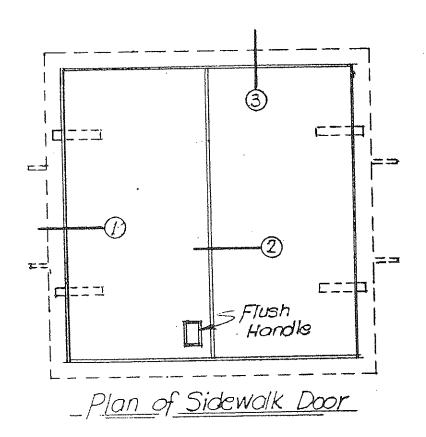


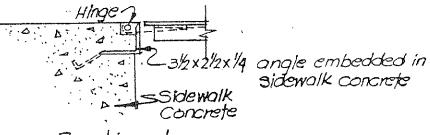
VILLAGE OF PELHAM

WESTCHESTER COUNTY, NEW YORK

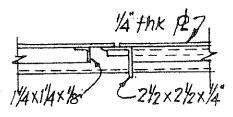
Street Opening Instructions

- 1. All work related to a street opening permit must be performed strictly in accordance with all applicable regulations of the Village of Pelham and to the satisfaction of the Village Administrator.
- The permit shall not be assigned or transferred except upon written consent of the Village Administrator.
- 3. All materials used shall conform to such specifications as may be required by the Village Administrator.
- 4. The work site shall be promptly cleaned upon completion of the required work and all surplus excavated material and debris removed, leaving the site in a neat and orderly condition. Where top soil and/or seeded areas are disturbed, the ground surfaces shall be restored as required by the Village Administrator.
- 5. Suitable barricades must be maintained while excavation or other work is in progress, as may be required by the Village Administrator. All work must be performed in such a manner as to cause a minimum of inconvenience to traffic.
- 6. No back filling shall be done until the work authorized by this permit is first inspected by the Village Administrator or his authorized representative.
- Back filling shall be completed by thoroughly tamping in such a manner as to obtain compacted back fill.
- 8. Immediately after back filling the excavation, an acceptable temporary resurfacing of the disturbed area shall be completed, as determined by the Village Administrator.
- Permanent restoration of the surface of a street opening excavation shall be completed as required by the Village Administrator.
- 10. No permit shall be issued until the applicant has filed with the Village, evidence of suitable liability insurance, workmen's compensation, and property damage insurance, and has presented a deposit in the amount required by the Village. A Public Service corporation may, in lieu of a deposit, file with the Village of Pelham, a surety bond in an amount as determined by the Village Administrator, for the faithful performance of all permits issued to such a corporation

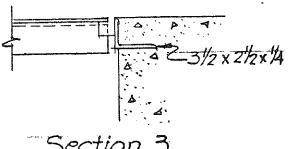




Section 1



Section 2



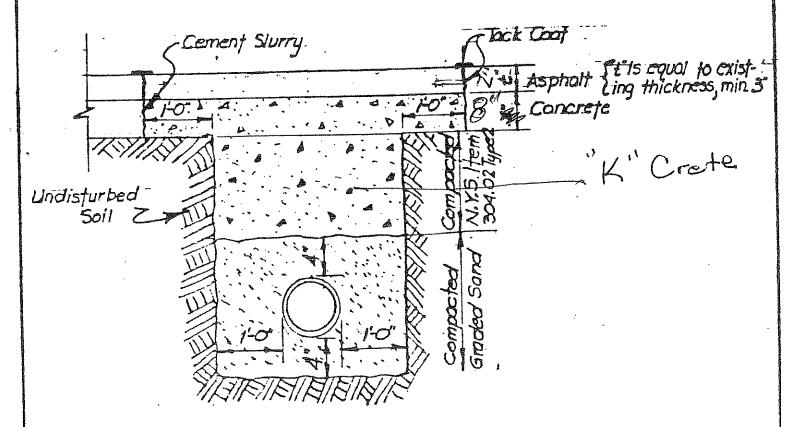
Section 3

SIDEWALK HATCHWAY VILLAGE OF PELHAM

Shoot 4 of 5

N. Grecco P.E.

Village of Pelham



Standard Detail for Excavation & Backfilling for Utility Lines

Note:

1. Trenches over 4'c' deep shall have sheathing.

2. At least 4° of Graded Sond Shall be placed below and above pipe. 3.71.4.5. Item 304.02 Type 2, shall be placed from top of graded

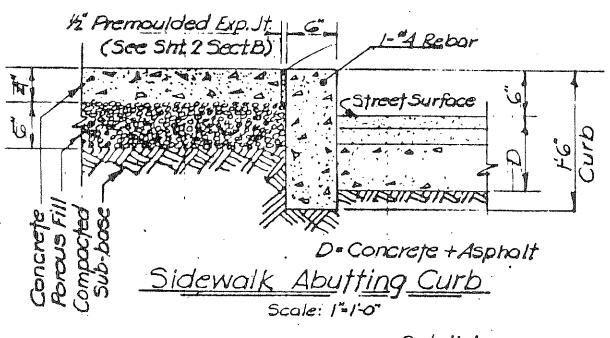
sand to underside of 4 concrete slab.

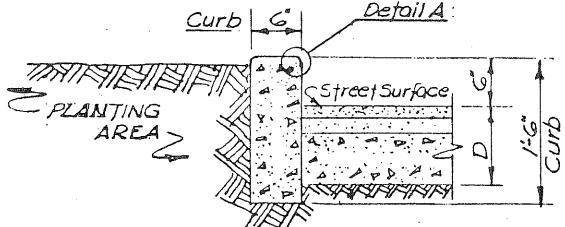
4. All moterial shall be compacted to insure no sattlement will take place. Mechanical means of compaction shall be used. layers, not exceeding 12 shall be placed and compacted

5. A cement slumy shall be opplied to the existing concrete prior

to placing new concrete, t'c = 3000 psi min.
6. Tack Coot shall be opplied to existing asphalt of least 30 minute prior to placing the new asphalt wearing surface.

7. New asphalt shall be NYS Type 6 or equal compacted to produce a tight surface conforming to the adjacent parement area.





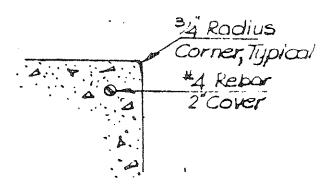
Planting Area Abutting Curb

NOTES:

I. Concrete shall be fc = 3000 psi stone.

2 Provide 1/2" premoukled Exp. Jt. every 20".

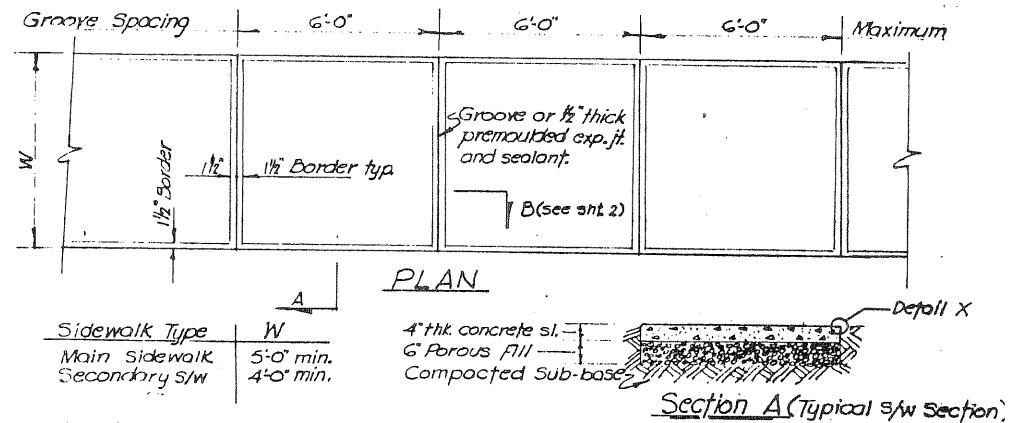
3 Match 5/w & Curb Exp. Jt. where possible.



<u>Detail A</u> Typical Curb Corner

SIDEWALK STANDARD VILLAGE of PELHAM

Sheetsofs



<u>NOTES</u>:

1. Exponsion Joint shall be every 2003

2. Sidewalks, where "W" is greater than 15:0",
Shall have an intermediate exp. it. parallel
to curb. Submit proposed layout for approval.

3. Thickness of sidewolk slab shall be 4" min.

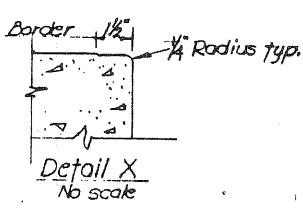
4. Concrete shall be f'c = 3000 psl. stone.

5. Surface finish of concrete shall be Float.

6.Grooves shall be 34" deep.

7. Spacing of grooves to be the same as adjacent sidewalk. 6'0' is a max. space only.

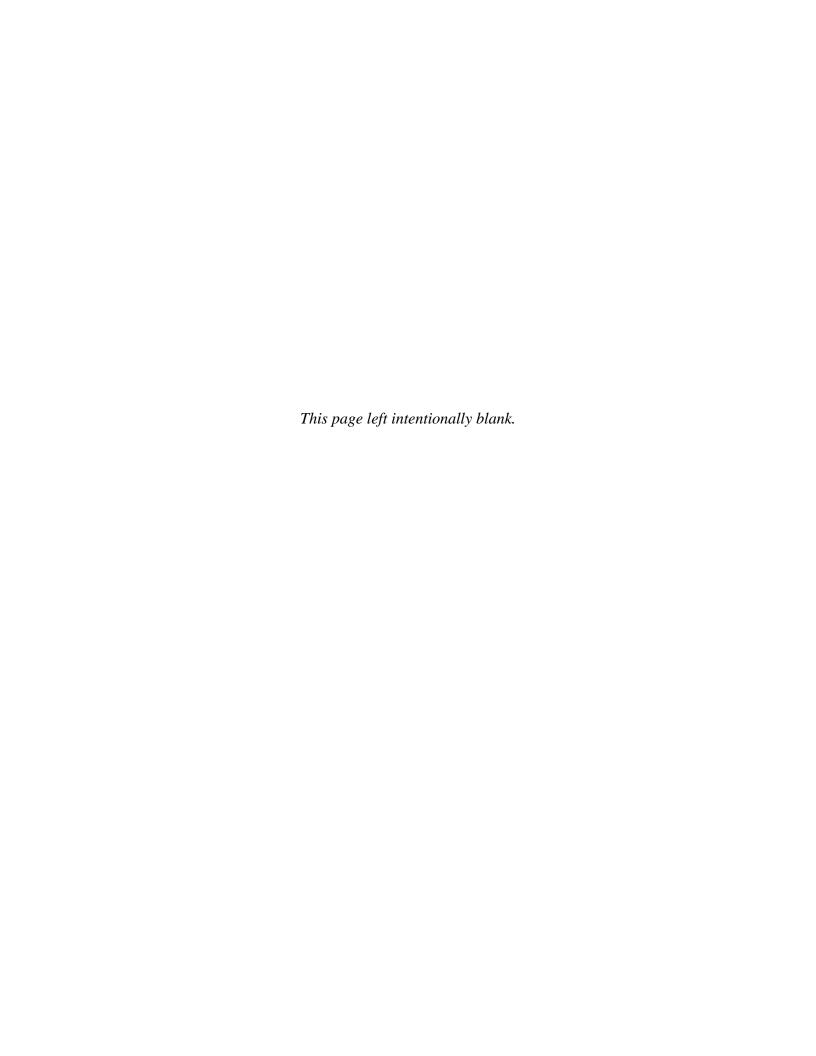
8.Provide Exp. St. where S/w abuts vertical surfaces.



SIDEWALK STANDARD VILLAGE of PELHAM

Sheet 143

11/-10000 171

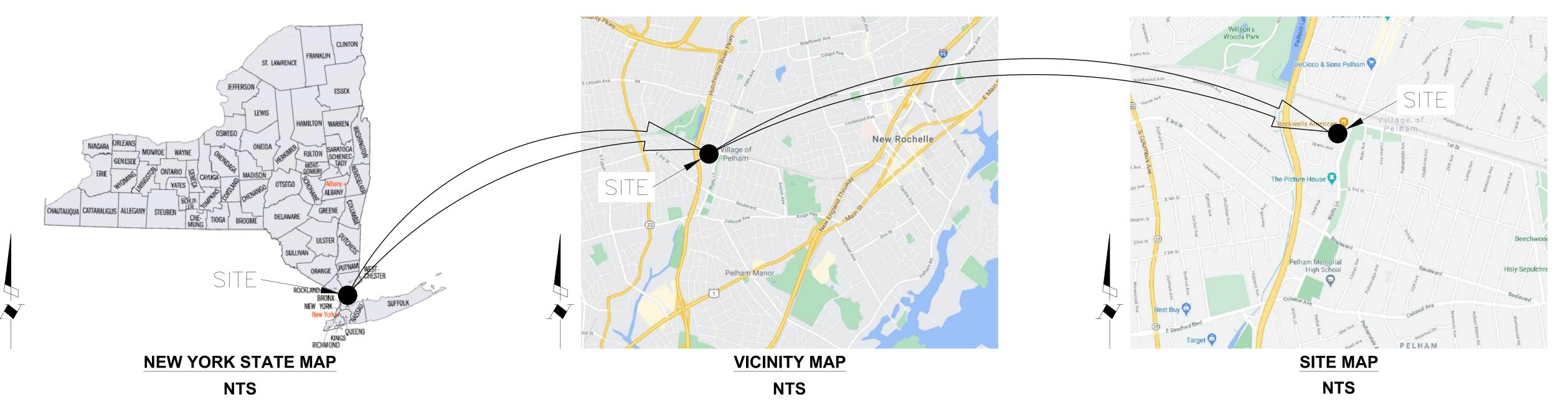


Appendix B Construction Drawings

CRYSTAL CLEANERS SITE NYS REGISTRY NO. 360053

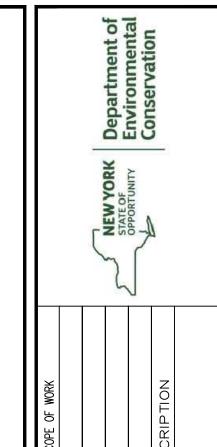
113 WOLFS LANE
PELHAM, NEW YORK
PHASE I - REMEDIAL ACTION PLAN

PREPARED FOR NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION ALBANY, NY



SHEET LIST TABLE		
SHEET NUMBER	SHEET TITLE	
1	TITLE SHEET	
2	GENERAL NOTES & LEGEND	
3	EXISTING CONDITIONS PLAN	
4	EXCAVATION & RESTORATION PLANS	
5	GROUNDWATER PLUME & INJECTION LAYOUT	

WARNING - IT IS A VIOLATION OF NEW YORK EDUCATION LAW, ARTICLE 145, SECTION 7209.2, FOR ANY PERSON, UNLESS HE OR SHE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED, THE ALTERING ENGINEER OR LAND SURVEYOR SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW, ARTICLE 145, SECTION 7209.2.



NO. DATE DESCRIPTION
REVISIONS

CRYSTAL CLEANERS SITE
NYS REGISTRY NO. 360063

PREPARED BY:

EA ENGINEERING, F
AND ITS AFFILIATE

EA SCIENCE AND

TECHNOLOGY



EA #	16025.11
FILE	16025.11-Planset.dwg
DRAWN BY	DPA
DATE	JUNE 2021
SCALE	AS SHOWN



IEET #

LEGAL NOTES

- 1. ONLY BOUNDARY SURVEY MAPS WITH THE SURVEYOR'S EMBOSSED SEAL ARE GENUINE TRUE AND CORRECT COPIES OF THE SURVEYOR'S ORIGINAL WORK AND OPINION.
- 2. THE CERTIFICATION IS LIMITED TO PERSONS FOR WHOM THE BOUNDARY SURVEY MAP IS PREPARED, TO THE TITLE COMPANY, AND TO THE OTHER INSTITUTIONS LISTED ON THIS BOUNDARY SURVEY MAP.
- 3. THE CERTIFICATIONS HEREON ARE NOT TRANSFERABLE.
- 4. THE LOCATION OF UNDERGROUND IMPROVEMENTS OR ENCROACHMENTS ARE NOT ALWAYS KNOWN AND OFTEN MUST BE ESTIMATED. UNDERGROUND IMPROVEMENTS OR ENCROACHMENTS ARE NOT COVERED BY THIS CERTIFICATE.
- 5. UNDERGROUND UTILITY LOCATIONS ARE NOT GUARANTEED, NOR IS THERE ANY GUARANTEE THAT ALL EXISTING UTILITIES WHETHER FUNCTIONAL OR ABANDONED WITHIN THE PROJECT AREA ARE SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES BY CONTACTING DIG SAFELY, NEW YORK AT 1-800-962-7962, IN ACCORDANCE WITH 16 NYCRR PART 753, (ALSO CITED AS INDUSTRIAL CODE 53 OR CODE RULE 53) BEFORE STARTING WORK AND SHALL BE RESPONSIBLE FOR ALL DAMAGE RESULTING FROM HIS WORK.

GENERAL NOTES

- THE FOLLOWING EXCAVATION AND REMEDIAL PLAN OUTLINES THE SCOPE OF WORK ITEMS TO BE COMPLETED AT THE CRYSTAL CLEANERS SITE (SITE NO. 360063). THE ONSITE AREA LOCATED IN PROXIMITY TO 113 WOLFS LANE AND THE OFFSITE AREA IS LOCATED ON MANNING CIRCLE. ALL CONTAMINATED SOILS (AS INDICATED ON THIS DRAWING SET) ARE TO BE EXCAVATED AND DISPOSED OFFSITE. SCOPE OF WORK ALSO INCLUDES ADDITION OF COLLOIDAL ACTIVATED CARBON IN OPEN EXCAVATION AND INJECTION POINTS DEPICTED IN THE DRAWING SET. CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING AND PROVIDING ALL EQUIPMENT, MATERIALS, AND PERSONNEL REQUIRED TO COMPLETE THE SCOPE OF WORK.
- 2. CONTRACTOR PRIOR TO START OF WORK SHALL OBTAIN ANY AND ALL REQUIRED PERMITS FROM THE TOWN OF PELHAM BUILDING DEPARTMENT AND ANY OTHER AGENCIES THAT HAVE JURISDICTION. WHICH SHALL INCLUDE THE FOLLOWING WHERE APPLICABLE:
 - A. BUILDING PERMIT
 - B. SOLID AND HAZARDOUS WASTE TRANSPORTER PERMITS
 - C. MECHANICAL MEANS/EXCAVATION PERMIT
 - D. CONSTRUCTION FENCE PERMIT
 - E. STREET RIGHT-OF-WAY PERMIT
 - F. STREET OPENING PERMIT
- 3. WORK WILL REQUIRE A STREET OPENING PERMIT FROM THE VILLAGE OF PELHAM. CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING ALL PERMIT CONDITIONS AND WORK WILL BE PERFORMED IN ACCORDANCE WITH THE VILLAGE OF PELHAM STREET OPENING INSTRUCTION SPECIFICATION PROVIDED IN THE SCOPE OF WORK.
- 4. THE CONTRACTOR SHALL PREPARE AND SUBMIT A WORK PLAN AS SPECIFIED IN THE CONTRACTOR SCOPE OF WORK FOR APPROVAL BY THE ENGINEER AND NYSDEC PRIOR TO COMMENCING WORK ONSITE. THE WORK PLAN WILL INCLUDE, AT A MINIMUM THE FOLLOWING:
 - A. PROPOSED MEANS AND METHODS AND SEQUENCE OF TASKS

MAINTAIN SAFE AND CLEAR ACCESS AROUND AND FROM THE SITE.

- B. HEALTH AND SAFETY PLAN
- C. EROSION AND SEDIMENT CONTROL PLAN
- D. DUST CONTROL PLAN
- 4. CONTRACTOR SHALL COMPLY WITH NYSDOT WORK ZONE TRAFFIC CONTROL MANUAL, WHERE APPLICABLE, AND ALWAYS
- 5. DURING AND THROUGHOUT ALL CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL IMPLEMENT AIR MONITORING AND DUST CONTROL MEASURES UTILIZING WATER SPRAY AND MISTING.
- 6. THE CONTRACTOR SHOULD MAKE PROVISIONS TO PREVENT STORM WATER RUN-IN INTO THE EXCAVATION ADDITIONALLY, THE REMEDIAL CONTRACTOR SHALL MAKE PROVISIONS TO HAVE TREATMENT AGENTS AND COVER ON-SITE TO CONTAIN VAPORS, IF DETERMINED NECESSARY BY EA AND NYSDEC.
- 7. CONTRACTOR SHALL PREPARE A TRANSPORTATION AND DISPOSAL PLAN AS A COMPONENT OF THE WORK PLAN. IT SHALL INCLUDE RELEVANT TRANSPORTER AND DISPOSAL/TREATMENT FACILITY IDENTIFICATIONS, STATUS, METHODS OF TRANSPORTATION FOR DISPOSAL/TREATMENT, CONTINGENCY FOR SPILLS DURING TRANSPORTATION, AND SCHEDULE FOR TRANSPORTATION AND DISPOSAL. IDENTIFY FACILITY SPECIFIC REQUIREMENTS FOR WASTE PROFILE SAMPLING AND ANALYSIS TO DETERMINE ACCEPTANCE FOR DISPOSAL/TREATMENT. INCLUDE COPY OF LETTER OF COMMITMENT FROM EACH FACILITY AND COPIES OF THE FACILITY OPERATING LICENSES AND PERMITS
- 8. PROVIDE TO ENGINEER AND DEPARTMENT COPIES OF WEIGH SCALE TICKETS ON APPROVED FORMS SIGNED BY AN AUTHORIZED WEIGH SCALE OPERATOR INCLUDING THE FOLLOWING INFORMATION:
 - A. LOCATION, DATE, AND TIME OF WEIGHING.
 - B. MEASURED WEIGHTS.
 - C. VEHICLE AND CONTAINER IDENTIFICATION.
 - D. SHIPMENT IDENTIFICATION NUMBER.
- 9. SUBMIT TO ENGINEER AND DEPARTMENT COMPLETED WASTE PROFILE FOR EACH WASTE STREAM. WASTE PROFILE WILL BE SIGNED BY ENGINEER OR AN AUTHORIZED AGENT OF THE DEPARTMENT EXCEPT FOR MATERIALS BROUGHT ONSITE BY CONTRACTOR.
- 10. THE CONTRACTOR SHALL IMPLEMENT ALL REQUIRED SITE LOGISTICS, TRUCK ROUTING, SAFETY ZONES. DECONTAMINATION PADS, ETC PRIOR TO START OF CONSTRUCTION.
- 11. ESTABLISHED SURVEY CONTROL POINTS ARE AVAILABLE FOR CONSTRUCTION PURPOSES. THE CONTRACTOR SHALL VERIFY LOCATIONS OF SURVEY CONTROL POINTS STARTING TO WORK, SAFEGUARD ALL SURVEY CONTROL POINTS DURING WORK, AND REPLACE ANY CONTROL POINTS DAMAGED OR DESTROYED DURING EXECUTION OF THE REMEDIAL ACTION.
- 12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF THE SITE, CONSTRUCTION AND ANY ADDITIONAL SURVEY CONTROL POINTS, LINES, GRADES, AND LEVELS NECESSARY FOR PROPER EXECUTION OF THE WORK. SURVEY CONTROL SHALL INCLUDE, BUT IS NOT LIMITED TO, MAINTAINING APPROPRIATE SLOPES, SPECIFIED THICKNESSES, SPECIFIED ELEVATIONS, AND CONSTRUCTED LOCATIONS AS SHOWN ON THE DRAWINGS.
- 13. THE CONTRACTOR SHALL EMPLOY A LAND SURVEYOR LICENSED IN THE STATE OF NEW YORK AND IS RESPONSIBLE FOR SCHEDULING SURVEYS TO COINCIDE WITH CONSTRUCTION ACTIVITIES. SURVEY DOCUMENTATION INCLUDES, BUT MAY NOT BE LIMITED TO:
 - A. POST-EXCAVATION WHEN FINAL CUTS ARE MET INCLUDING:
 - A.1. TOPOGRAPHIC SURVEY FOLLOWING EXCAVATION OF CONTAMINATED SOIL. A.2. SURVEY LOCATIONS OF POST-EXCAVATION CONFIRMATION SAMPLES
 - B. BACKFILL, COMPACTION, AND RESTORATION SURVEY
 - B.1. FINAL GRADING OF THE SITE AND FINAL SURFACE ELEVATIONS OR RESTORED EXCAVATION AREA TO BE PRESENTED ON AS-BUILT DRAWINGS
 - B.2. DOCUMENTATION OF AS-BUILT QUANTITIES REQUIRED FOR MEASUREMENT AND PAYMENT
 - B.3. LOCATION OF INJECTION POINTS AND OTHER FEATURES FOR INCLUSION ON THE AS-BUILT DRAWINGS.
- 14. THE CONTRACTOR SHALL CONDUCT A PRE-CONSTRUCTION AND POST-CONSTRUCTION STRUCTURAL ASSESSMENT OF SURROUNDING PROPERTIES WITH THE ASSISTANCE OF A NEW YORK STATE LICENSED STRUCTURAL ENGINEER AND CONDUCT VIBRATION MONITORING DURING CONSTRUCTION ACTIVITIES.

ON-SITE GENERAL NOTES

- 1. ABSTRACT OF TITLE NOT PROVIDED AT THE TIME OF SURVEY AND MAY CONTAIN SPECIFIC TITLE INFORMATION. 2, CERTIFICATE OF TITLE - NOT PROVIDED AT THE TIME OF SURVEY AND MAY CONTAIN SPECIFIC TITLE INFORMATION.
- 2. "CONSTRUCTION, ACCESS AND UTILITY EASEMENT AGREEMENT" BETWEEN THE VILLAGE OF PELHAM AND PELPARK, LLC, RECORDED 03/01/2019 IN THE OFFICE OF THE WESTCHESTER COUNTY CLERK, DIVISION OF LAND RECORDS, DOCUMENT CONTROL NUMBER 590423177.
- 3. NYSGIS 2016 ORTHOIMAGERY WAS USED AS THE BASIS FOR SHOWING THE LOCATION OF CERTAIN FEATURES (EXCLUDING BOUNDARIES) WHERE GROUND MEASUREMENTS ARE NOT OTHERWISE NECESSARY TO LOCATE THOSE FEATURES TO AN APPROPRIATE AND ACCEPTABLE ACCURACY RELATIVE TO A NEARBY BOUNDARY.
- 4. POTENTIAL ENCROACHMENT ONE STORY CONCRETE BUILDING FROM TMN 163.44-1-2.1 ONTO TMN 163.51-1-70 NEAR THE NORTHEAST CORNER, AS SHOWN.

ON-SITE REFERENCE DATA

- 1. TAX MAP TOWN OF PELHAM, VILLAGE OF PELHAM, WESTCHESTER COUNTY, NEW YORK, MAP 163.43, DATE OF MAP 03/26/1990, LAST REVISED 01/19/2016.
- 2. TAX MAP- TOWN OF PELHAM, VILLAGE OF PELHAM, WESTCHESTER COUNTY, NEW YORK, MAP 163.51, DATE OF MAP 03/26/1990, LAST REVISED 01/19/2016.
- 3. "101 WOLFS LANE, SECTION NO. 163.44, BLOCK NO. 01, LOT NO. 2.1, VILLAGE OF PELHAM, WESTCHESTER, NEW YORK, ACCESS & UTILITY EASEMENT PLAN", PREPARED BY LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C., DATED 10/23/2018, LAST REVISED 01/14/2019.
- 4. "MAP OF PELHAMVILLE, WESTCHESTER COUNTY, NEW YORK", SURVEYED BY WILLIAM BRYSON, ARCHITECT & CIVIL ENGINEER, NEW ROCHELLE, SURVEY COMPLETED 08/04/1857, FILED MAP NO. 205.

OFF-SITE REFERENCE DATA

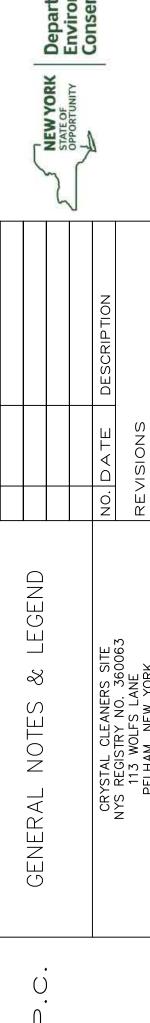
- 1. TAX MAP- TOWN OF PELHAM, VILLAGE OF PELHAM, WESTCHESTER COUNTY, NEW YORK, MAP 163.51, DATE OF MAP 03/26/1990, LAST REVISED 01/19/2016.
- "RESUBDIVISION OF LOTS 3,4,5,6,7,8,9,10,11,12,13,14, REVISED MAP OF MANNING TERRACE, PELHAM, N.Y.", PREPARED BY JOHN F. FAIRCHILD, C.E., DATED 03/24/1931, FILED IN THE OFFICE OF THE REGISTER OF WESTCHESTER COUNTY ON 01/14/1932, MAP NO. 3842.
- "REVISED MAP OF MANNING TERRACE, PELHAM, N.Y.", PREPARED BY JOHN F. FAIRCHILD, C.E., DATED 05/02/1930. FILED IN THE OFFICE OF THE REGISTER OF WESTCHESTER COUNTY ON 05/09/1930, MAP NO. 3601.
- 4. "MAP OF MANNING TERRACE, PELHAM, N.Y.", PREPARED BY JOHN F. FAIRCHILD, C.E., DATED 03/17/1924, FILED IN THE OFFICE OF THE REGISTER OF WESTCHESTER COUNTY ON 03/31/1924 MAP NO. 2594.
- "SUBDIVISION OF PROPERTY BELONGING TO THE WOLFS LANE IMPROVEMENT CO. INC., PELHAM, N.Y.", PREPARED BY JOHN F. FAIRCHILD, C.E., DATED 03/08/1923, FILED IN THE OFFICE OF THE REGISTER OF WESTCHESTER COUNTY ON 04/12/1923, MAP NO. 2495.
- "MAP OF PELHAMVILLE, WESTCHESTER COUNTY, NEW YORK", SURVEYED BY WILLIAM BRYSON, ARCHITECT & CIVIL ENGINEER, NEW ROCHELLE, SURVEY COMPLETED 08/04/1857, FILED MAP NO. 205.

OFF-SITE GENERAL NOTES

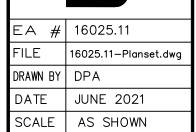
- ABSTRACT OF TITLE NOT PROVIDED AT THE TIME OF SURVEY AND MAY CONTAIN SPECIFIC TITLE INFORMATION.
- 2. CERTIFICATE OF TITLE NOT PROVIDED AT THE TIME OF SURVEY AND MAY CONTAIN SPECIFIC TITLE INFORMATION.
- 3. NYSGIS 2016 ORTHOIMAGERY WAS USED AS THE BASIS FOR SHOWING THE LOCATION OF CERTAIN FEATURES (EXCLUDING BOUNDARIES) WHERE GROUND MEASUREMENTS ARE NOT OTHERWISE NECESSARY TO LOCATE THOSE FEATURES TO AN APPROPRIATE AND ACCEPTABLE ACCURACY RELATIVE TO A NEARBY BOUNDARY.
- 4. POTENTIAL ENCROACHMENT SOUTHEAST CORNER OF PLAYGROUND ON TMN 163.51-1-41 ONTO TMN 163.51-1-34 ALONG THE NORTH LINE BY UP TO 0.4 FEET.

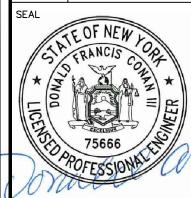
	LEGEND
•	R.O.W. MONUMENT FOUND (AS NOTED) MONUMENTATION FOUND (AS NOTED)
<u>CC</u>	PROPERTY LINE CURB CUT
OU	
	UNDERGROUND UTILITIES (PAINT)
UT	UNDERGROUND COMMUNICATIONS LINE (PAINT)
	GAS LINE (PAINT)
W	WATER LINE (PAINT)
CPP	CORRUGATED PLASTIC PIPE STORM SEWER (OBSERVED)
——————————————————————————————————————	POLYVINYL CHLORIDE PIPE STORM SEWER (OBSERVED)
***************************************	PLANTINGS
× × ×	FENCE LINE (AS NOTED)
	WOODS LINE
31 30 29	1' CONTOUR INTERVAL
\triangle	BASELINE POINT
•	BENCH MARK
A	BORING
۵	BUSH
\odot	DECIDUOUS TREE (SIZE NOTED)
-0-	UTILITY POLE
⊙ ¬	LIGHT POLE
E	ELECTRIC METER
0	MISCELLANEOUS MANHOLE
	GAS METER
	GAS VALVE
© ~	GAS PUMP
Ø	FIRE HYDRANT
⊗	WATER VALVE
0	DRAINAGE STRUCTURE GATE/FENCE POST
ORD)	ROOF DRAIN TO 4" PVC
	MISCELLANEOUS UTILITY
•	MONITORING WELL
-	SIGN (AS NOTED)
©	SANITARY MANHOLE
©	STORM DRAINAGE MANHOLE
(T)	TELEPHONE MANHOLE
	ADA TACTILE WARNING TILE
+	SPOT ELEVATION

PIPE INVERT



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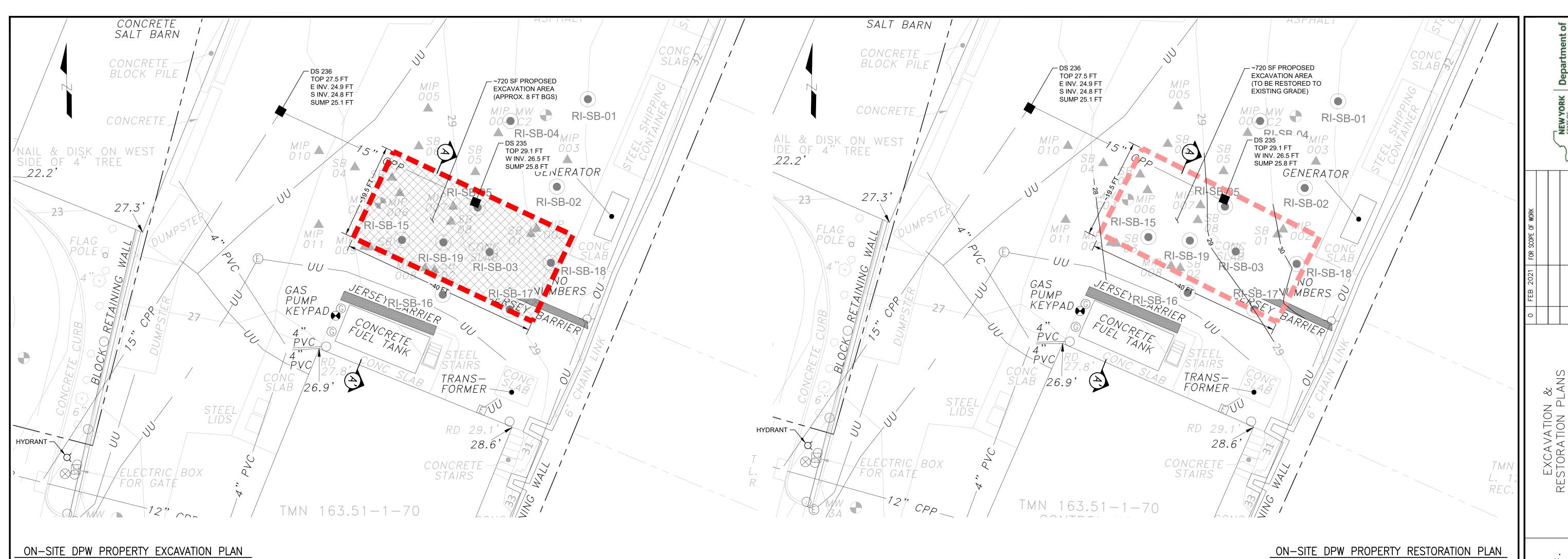
WARNING - IT IS A VIOLATION OF NEW YORK EDUCATION LAW, ARTICLE 145, SECTION 7209.2, FOR ANY PERSON, UNLESS HE OR SHE IS ACTING UNDER THE DIRECTION OF A LICENSED SHEET # PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED, THE ALTERING ENGINEER OR LAND SURVEYOR SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW, ARTICLE 145, SECTION 7209.2.



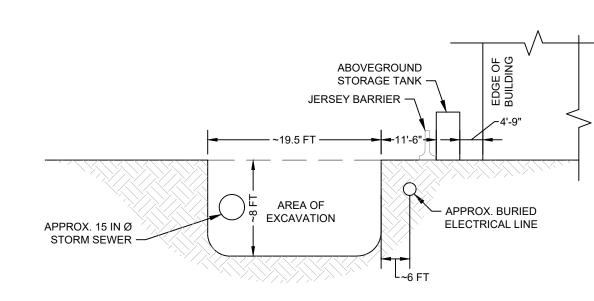
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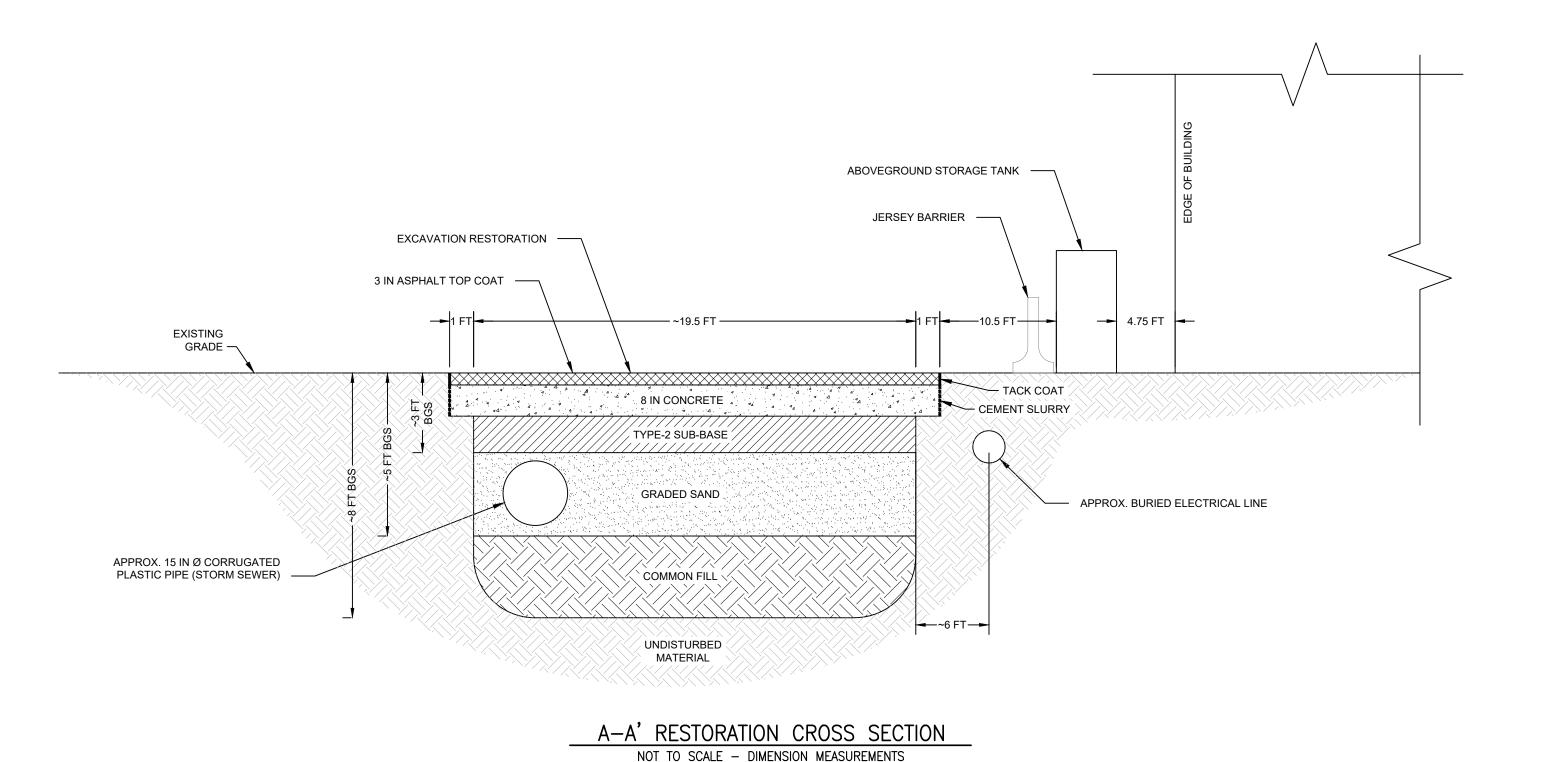




- ALL WORK AND EXCAVATIONS SHOULD BE CONDUCTED IN ACCORDANCE WITH OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION SPECIFICATIONS (29 CFR PART 1926) AND BE PROTECTIVE OF ADJACENT STRUCTURES (E.G., FORMER CRYSTAL CLEANERS BUILDING, DPW BUILDINGS, SUBSURFACE UTILITIES, ETC.).
- THE EXCAVATION FOOTPRINT MAY BE EXTENDED BASED ON VISUAL AND OLFACTORY EVIDENCE OF IMPACTED SOIL. THE REMEDIAL CONTRACTOR MAY BE INSTRUCTED BY EA AND NYSDEC TO EXPAND THE EXCAVATION HORIZONTALLY AND/OR VERTICALLY. THE REMEDIAL CONTRACTOR SHALL MAKE PROVISIONS TO HAVE MEANS TO REMOVE IMPACTED GROUNDWATER OR CONSTRUCTION WATER IF EXCAVATION DEWATERING IS REQUIRED. ANY WATER REMOVED FROM THE EXCAVATION SHALL BE DISPOSED OFFSITE AT AN APPROVED FACILITY.
- DEPTH OF EXCAVATION SHOULD NOT EXTEND BELOW THE WATER TABLE TO AVOID WATER ACCUMULATION IN THE EXCAVATION.
- A 15-IN CORRUGATED PLASTIC STORM SEWER WATER CONVEYANCE PIPING AND DROP INLET IS LOCATED NEAR THE NORTHERN PORTION OF THE EXCAVATION. THE CONTRACTOR SHALL REMOVE THE PIPING AND DROP INLET DURING EXCAVATION AND REINSTALL/RECONNECT THE COMPONENTS IN KIND DURING RESTORATION.



A-A' EXCAVATION CROSS SECTION NOT TO SCALE - DIMENSION MEASUREMENTS





RESTORATION NOTES

- 1. IF THE EXCAVATION IS DRY, THE REMEDIAL CONTRACTOR SHALL BACKFILL THE EXCAVATED AREAS FIRST WITH 3-FT. OF CERTIFIED CLEAN COMMON FILL MEETING THE REQUIREMENTS OF NYSDEC DER-10 5.4€ AND 6 NYCRR PART 375 6.7 D(1)9II)(C). SHOULD WATER BE PRESENT IN THE BOTTOM OF THE EXCAVATION, 1-IN. WASHED STONE ORIGINATING FROM A VIRGIN SOURCE SHALL BE PLACED IN THE EXCAVATION AND EXTEND 1 FT ABOVE THE WATER LEVEL.
- 2. TWENTY-FOUR INCHES OF CLEAN GRADED SAND WILL BE PLACED ON TOP OF THE COMMON FILL AND COMPACTED IN 12-IN. LIFTS. THE REPLACEMENT STORMWATER PIPING (15-IN CORRUGATED PLASTIC PIPE) SHALL BE PLACED SO THAT AT LEAST 4-IN OF GRADED SAND ARE ABOVE AND BELOW THE PIPE.
- 3. THE REMAINING ANNULUS WILL BE BACKFILLED WITH NYS DOT ITEM 304.02 TYPE 2 SUBBASE TO WITHIN 11-IN. OF FINAL GRADE.
- 4. THE EXCAVATION WILL BE TEMPORARILY COVERED WITH POLY SHEETING AND SECURED. INJECTIONS WILL BE PERFORMED WITHIN THE RESTORED EXCAVATION AREA PRIOR TO FINAL SURFACE COMPLETION WITH CONCRETE AND ASPHALT. INJECTION DETAILS ARE DESCRIBED ON SHEET 5.
- 5. FINAL SURFACE COMPLETION WILL BE COMPLETED FOLLOWING INJECTIONS.
- 6. A CEMENT SLURRY SHALL BE APPLIED TO THE EXISTING CONCRETE PRIOR TO PLACING NEW CONCRETE. 8-IN. OF CONCRETE MEETING THE REQUIREMENTS OF NEW YORK STATE DEPARTMENT OF TRANSPORTATION SECTION 608 AND HAVE A COMPRESSIVE STRENGTH NOT LESS THAN 4,000 POUNDS PER SQUARE INCH WITH FIBER REINFORCEMENT MEETING THE REQUIREMENTS OF NYSDOT STANDARD SPECIFICATIONS §711-01 FIBERS FOR CONCRETE REINFORCEMENT WILL BE INSTALLED ON TOP OF THE TYPE 2 SUBBASE.
- 7. TACK COAT SHALL BE APPLIED TO EXISTING ASPHALT AT LEAST 30 MINUTES PRIOR TO PLACING THE NEW ASPHALT SURFACE.
- 8. THE RESTORATION OF THE SURFACE WILL BE COMPLETED WITH A 3-IN ASPHALT TOP COAT OF NYS TYPE 6, OR EQUIVALENT, AND COMPACTED TO ENSURE A TIGHT SURFACE CONFORMING TO ADJACENT UNDISTURBED ASPHALT SURFACE.

WARNING - IT IS A VIOLATION OF NEW YORK EDUCATION LAW, ARTICLE 145, SECTION 7209.2, FOR ANY PERSON, UNLESS HE OR SHE IIS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR LAND SURVEYOR, TO ALTER THIS DOCUMENT IN ANY WAY. IF ALTERED, THE ALTERING ENGINEER OR LAND SURVEYOR SHALL COMPLY WITH THE REQUIREMENTS OF NEW YORK EDUCATION LAW, ARTICLE 145, SECTION 7209.2.

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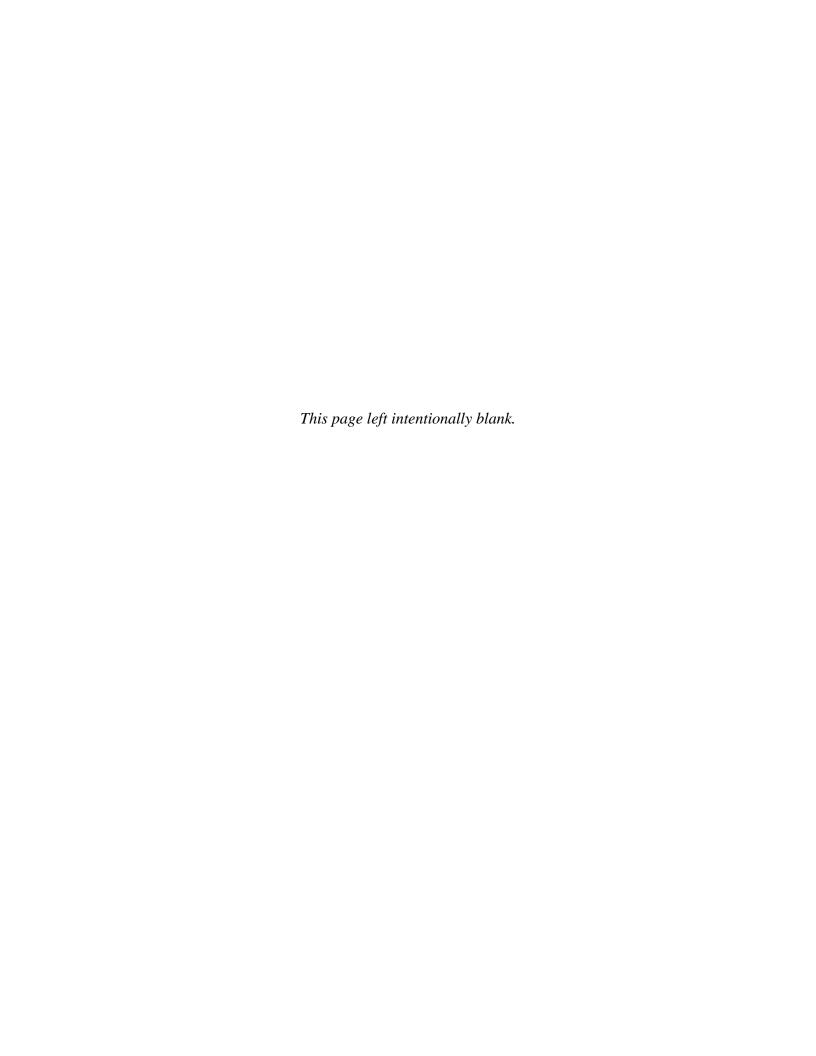


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ATF	JUNE 2021

SCALE | AS SHOWN







Appendix C Carbon Vendor Proposal Packages



PROPOSAL FOR IN-SITU TREATMENT SERVICES & PRODUCTS

CRYSTAL CLEANERS SITE
NYSDEC SITE NO. 36005
WOLFS LANE VICINITY
PELHAM, NY

FEBRUARY 23, 2021

PREPARED FOR

EA SCIENCE AND TECHNOLOGY 269 W. JEFFERSON STREET SYRACUSE, NEW YORK 13202

ON BEHALF OF

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ISOTEC Proposal No. 802850

In-Situ Oxidative Technologies, Inc. 11 Princess Road, Suite A Lawrenceville, New Jersey 08648 Phone: (609) 275-8500, Fax: (609) 275-9608

www.ISOTEC-INC.com

SBA Certified Small Business



duplicated of Environi restriction	u Oxidative Technologies, Inc. (ISOTEC) document includes proprietary data that shall nod, used, or disclosed outside EA Science and Technology (EA) and New York State Departmental Conservation (NYSDEC) for any purpose other than to evaluate this document. In does not limit right to use information contained in this document if it is obtained ficurce without restriction.	nent This

TABLE OF CONTENTS

1.0	PROPOSAL OVERVIEW	1
1	.1.1 Site Setting	2
2.0	WHY ISOTEC?	3
3.0	TECHNICAL APPROACH AND METHODOLOGY	5
3.1 3.2	Injectable Activated Carbon & Abiotic Reductive Dechlorination	
4.0	TREATMENT PLAN	9
•	Site Access and Usage for Remediation Source Area Excavation & Reagent Placement. Overburden Groundwater Injection Approach Waste Management 4.4.1 Site Restoration. 4.4.2 Performance Monitoring	10 12 13
5.0	PROJECT COORDINATION	14
5.1	Project Reporting	14
6.0	HEALTH AND SAFETY	14
6.1	Novel Coronavirus (Covid-19)	15
7.0	LIST OF ASSUMPTIONS AND EXCEPTIONS	15
8.0	PROJECT COSTS	16
8.1	STANDARD TERMS AND CONDITIONS	16

TABLES

TABLE 1	
TABLE 2	Treatment Design Summary
FIGURES	
FIGURE 1	PROPOSED TREATMENT AREA LOCATIONS
APPENDICES	
APPENDICES	
APPENDIX A	ISOTEC CASE STUDIES

1.0 PROPOSAL OVERVIEW

In-Situ Oxidative Technologies, Inc., (ISOTEC) is pleased to offer this proposal to EA Science and Technology (EA) on behalf of the New York State Department of Environmental Conservation (NYSDEC) under Work Assignment Number (No.) D009806-11 for In-Situ Treatment Services & Products at the Crystal Cleaners Site (No. 360053) located in the Village of Pelham, Westchester County, New York.

The Record of Decision (ROD) for the site calls for in-situ enhanced biodegradation to be employed to treat contaminants in groundwater near the source and at downgradient locations. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by the addition of colloidal activated carbon (or equivalent products) injections which adsorb the contamination and promote the growth of bacteria to further stimulate biological breakdown of contaminants. Primary contaminants of concern (COCs) consist of chlorinated compounds identified as tetrachloroethene (PCE) and three associated daughter products: trichloroethene (TCE), cis-1,2-dichloroethene (DCE) and vinyl chloride (VC).

EA is requesting remedial treatment estimates that fit within the ROD established for the site with amendments to be applied to the bottom of the source area excavation prior to backfilling to aid in the remediation of residual source area groundwater contamination, and also injected into two target areas with overburden groundwater PCE impacts greater than 500 parts per billion (ppb).

EA provided to ISOTEC preliminary design details regarding the estimated size and depth of the source area excavation and overburden groundwater treatment areas as well as historical and most recent soil and groundwater data available for each area. Upon reviewing the provided data, ISOTEC developed an approach that conforms to the ROD and recommended treatment consisting of an equivalent activated carbon technology for the target areas referred to as BOS 100®. The recommended approach will provide comprehensive groundwater treatment based on demonstrated results with the selected technology.

Some key aspects of the BOS 100® approach that will increase treatment effectiveness in the overburden groundwater impacted areas are listed below.

- Unique to BOS 100® is the reactive iron impregnated into the activated carbon which destroys CVOCs that sorb to carbon replenishing sorption sites for continuous "trap and treat" of CVOCs. Additional details are provided in Section 3.0.
- Use of activated carbon slurry that will not migrate upon emplacement will establish a stable target area treatment that will have much longer persistence compared to liquid carbon.
- The recommended "trap and treat" BOS 100® dosage loading is designed to have an active treatment lifetime over multiple years and possibly significantly longer for extended groundwater treatment. Incorporating more injection locations with closer spacing in our design will guarantee better contact in-situ between impacted groundwater and the injected carbon for an overall robust treatment.
- Removal of impacted source area soils in the on-site target area will also significantly reduce the potential for CVOCs migrating off-site over time.

- The in-situ remedial approach will be effective for the range of CVOC concentrations in groundwater, for site groundwater pH conditions, and for treatment of the selected areas.
- BOS 100® has been utilized to target select hot-spot treatment areas similar to the Crystal Cleaners site as well as targeting large groundwater plumes via installation of permeable reactive barriers (PRBs) to reduce CVOC concentrations to below federal Maximum Contaminant Levels (MCLs).

Additional details are provided within the proposal in sections below.

1.1.1 Site Setting

The Crystal Cleaners site is a single story commercial building located on Wolfs Lane in the Village of Pelham, New York. The site has been used as a dry cleaner for several decades. The source area and on-site portion of proposed groundwater treatment reside within the immediate property boundaries on land currently being utilized by the Village's Department of Public Works (DPW). The off-site target treatment area resides in between a residential home and apartment building off of Manning Circle.

CVOCs have been documented in the unsaturated overburden, overburden groundwater and underlying bedrock groundwater. Contamination has also been observed in soil vapor at concentrations which exceed standards, criteria or guidance (SCGs). The plume originates in the vicinity of the dry cleaner building and flows to the southwest away from the site. PCE, TCE, DCE and VC have been detected at maximum concentrations of 2,200 parts per billion (ppb), 620 ppb, 1,900 ppb and 170 ppb, respectively, during historical and more recent sampling events conducted in the on-site target area from monitoring well location MW-C04. Historical samples from other wells (MW-3A and MW-9) in that area have indicated PCE concentrations greater than 500 ppb. Concentrations from temporary well points (TWPs) located in the off-site target area (TWP-1 and TWP-7) have also indicated PCE concentrations greater than 500 ppb in samples collected back in 2012 and 2013. No recent samples have been collected in this area. In the proposed target excavation source area, soil impacts within the estimated 600 square foot (ft²) area were recently detected as high as 18-45 milligrams per kilogram (mg/kg) for PCE from location PDI-SB-01 at a depth between 7-8 feet (ft) below ground surface (bgs). Historical soil sample location SB-03 also indicated elevated PCE impacts of 17 mg/kg at a depth between 5.0-5.3 ft bgs. CVOC impacts are also noted in the underlying bedrock but are not proposed for treatment under the current RFP issued for the site.

General subsurface lithology at the site consists of a mixture of fill, sands, silts, some clays and gravels in the overburden underlain by bedrock (schist). Depth to bedrock and groundwater varies across the site based on the elevation changes noted. In the target source excavation area, the depth to water (DTW) measured from nearby monitoring well MW-C03 is between ~14.8-14.9 ft bgs; in the on-site target groundwater treatment area the DTW was referenced as ~13.2 ft bgs with depth to bedrock at ~22.0 ft bgs; and in the off-site target groundwater treatment area the DTW was referenced as ~13.0 ft bgs with depth to bedrock at ~19.0 ft bgs.

2.0 WHY ISOTEC?

Founded in 1995, ISOTEC has over 26 years of environmental remediation experience and is among the first firms to pioneer the transformation of ISCO from a laboratory technology to field-scale applications. ISOTEC's team of engineers, geologists, and scientists offer a full suite of in-situ remediation technologies and have demonstrated successful applications using bioremediation, soil mixing reagent delivery, thermal remediation, metals remediation, and offers laboratory services to enhance projects and achieve successful outcomes. ISOTEC does not advocate any single technology or amendment line and can offer the optimal technologies/amendments to match site setting, contaminants and concentrations, objectives, and timelines. ISOTEC specializes in the combined or sequential application of various remediation technologies and amendments to achieve optimal treatment results.

- ISOTEC has experience implementing more than 1,000 field scale applications and over 500 bench scale studies with a broad suite of treatment amendments, including liquids, slurries, chemical oxidants, amendments to enhance biodegradation, including numerous large volume injections (see example projects in **Table 1**).
- ISOTEC has significant experience with target area treatment applications and permeable reactive barrier (PRB) approaches using electron donors, activated carbon amendments, chemical oxidants in a wide range of hydrogeologic environments (see **Table 1** and case studies in **Appendix A**).
- The off-site area is located within a residential neighborhood. ISOTEC has significant
 experience implementing remediation at active sites, including in the parking lot and drivethrough lane of a fast-food restaurant, installing a PRB pilot test in a school parking lot while
 school was in session, in-situ chemical oxidation injection in a busy downtown area north of
 Boston, numerous active construction sites, and in residential neighborhoods.
- ISOTEC is committed to maintaining the highest-level health and safety protocols. ISOTEC has 26 years of performing chemical injections with zero accidents/OSHA reportable incidents safety record. ISOTEC has a Grade A rating with ISNetworld.
- The ISOTEC team for this project (including Technical Director Prasad Kakarla, Senior Remediation Engineer Paul Dombrowski, Senior Project Manager Mike Temple, Senior Scientist Scott Pittenger) will have more than 75 years of combined experience designing and implementing in-situ remediation. Our field staff will be comprised of injection specialists, including a site supervisor who has more than 10 years of focused injection experience with ISOTEC.
- ISOTEC's team of engineers, geologists, scientists, and field service technicians offer a full suite of implementation, design assistance, and data evaluation tools to projects. The team routinely supports clients in making adjustments during a remedial program based on field observations.
- One of ISOTEC's partners operates a laboratory, and through this partnership ISOTEC can offer laboratory analyses at no cost for Remedial Design Characterization and performance evaluation. This value-added service is vital to optimize remedial dosage and assess performance. ISOTEC would utilize this service for analyzing soil samples and groundwater samples from monitoring wells and injection wells before, during, and after injections. This

effort would support assessment and attainment of remedial performance and goals and help optimize the injection program.

Table 1: Relevant Project List

Site	Description
Former Manufacturing Facility, NJ	ISOTEC implemented a series of PRBs for treatment of a large, dilute plume using BOS 100®, injectable activated carbon with reactive metallic iron, for dechlorination of PCE and TCE (10 to 120 ug/L). Groundwater treatment was performed for two separate plumes with low pH groundwater using 8 permeable reactive barriers. Two years after injection PCE and TCE concentrations were reduced to EPA MCL concentrations.
Active Warehouse, Dighton, MA	ISOTEC designed and implemented a remediation approach utilizing Trap and Treat injectable activated carbon (BOS 100®) for source mass reduction of tetrachloroethene (PCE). Injections were performed inside and outside an active warehouse. ISOTEC completed a grid treatment with 175 injections points over a 19-day injection period. Three months after injection, monitoring wells within the treatment areas were all below the PCE goal with 88% to greater than 99% reduction in PCE concentrations.
Active Gasoline Service Station, Northern, NJ	ISOTEC implemented a BOS 200® Trap and Treat remediation program at an active gasoline station targeting BTEX impacts in soil and groundwater. Three separate areas totaling ~1,200 ft² were targeted based on a remedial design characterization (RDC) used to finalize treatment extents. Approximately 4,250 lbs. of BOS200 (along with additional gypsum) injected within 1,940 gallons or reagent slurry into a network of 48 temporary DPT locations.
NJ Department of Transportation Facility, Central, NJ	ISOTEC implemented a Trap and Treat® pilot test at a state transportation facility to address impacts of petroleum compounds and chlorinated solvents including tertiary butyl alcohol (TBA), benzene, PCE, TCE, and vinyl chloride. The pilot test reagents consist of three technologies to trap contaminant via carbon adsorption, abiotic degradation of CVOCs within BOS100®, and enhanced bioremediation.
Active Warehouse, Manchester, CT	BOS 200® source area treatment combined with 150 linear foot downgradient PRB for petroleum hydrocarbon treatment. Combined extensive remediation design characterization with design of source treatment and plume capture. A fifteen-day field program resulted in BOS 200® being installed in 38 points in the source area and 96 points in the deep barrier wall. Most of the work was completed inside an active warehouse without disruption.
Former MGP Site. Ithaca MGP Site, NY	ISOTEC injected MFR and BASP in an active roadway in an urban, residential neighborhood for treatment of petroleum hydrocarbons and LNAPL. Oxidants and dosages selected based on bench-scale studies managed by ISOTEC's Senior Remediation Engineer. ISOTEC actively collaborated with client/consultant in optimization efforts to improve performance and safety during the three rounds of injection. Three injection events were conducted over a 16-month time period within a very sensitive site setting.
Town of Orleans, MA	ISOTEC installed a Denitrification PRB demonstration test to quantify nitrate removal. PRB length was ~110 ft targeting the ~36-68 ft bgs interval. A specially designed, blend of EVO for use in high flow aquifers was injected into an active school parking lot located between the building and athletic fields while school was in session. An initial injection event installed the denitrification PRB, and a second injection extended the PRB.

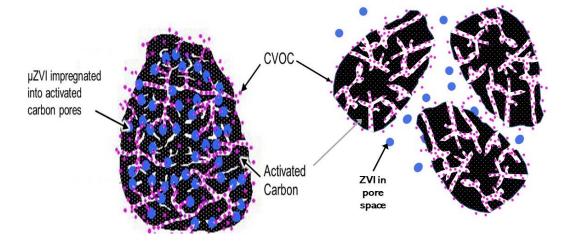
3.0 TECHNICAL APPROACH AND METHODOLOGY

The proposed remediation approach for the Crystal Cleaners site involves injectable activated carbon with abiotic dechlorination. ISOTEC's treatment approach will use a robust Trap & Treat® injectable carbon and reactive metallic iron reagent that are co-located and designed for long-term capture and management of dilute chlorinated solvents and as prevention from migrating past the installed target area barriers.

3.1 Injectable Activated Carbon & Abiotic Reductive Dechlorination

BOS 100® is an effective remediation amendment that provides many benefits compared to other insitu remediation technologies as well as other injectable activated carbon products.

- BOS 100® combines injectable granular activated carbon and reactive, metallic iron in a single product. The food grade carbon is impregnated with metallic iron formed under reducing conditions at a temperature of ~850°C, when the iron partially dissolves into the carbon forming a new and unique material with properties of both the carbon and iron.
- BOS 100® can achieve rapid reductions in parent chlorinated VOC (PCE & TCE) concentrations (days to months).
- The co-located metallic iron treats the sorbed CVOCs through abiotic dechlorination (Trap & Treat®) that does not generate partially dechlorinated daughter products (e.g., vinyl chloride).
- BOS 100® is a slurry and will not migrate from its emplacement location after injection, which
 can occur with liquid activated carbon amendments. Therefore, a BOS 100® application will
 provide consistent target area treatment for an attenuated time frame and in the case of the
 on-site target area, can help reduce any upgradient source area groundwater moving through
 the treated area to mitigate continued off-site migration of CVOC impacted groundwater.
- The co-location of iron and carbon ensures that the treatment mechanism is present when chlorinated compounds gets sorbed to the carbon. Abiotic dechlorination by the iron mineralizes contaminants freeing up sorption sites to remove more CVOCs from groundwater.
 - Alternative approaches incorporating injectable activated carbon and enhanced in-situ dechlorination require multiple, separate amendments which achieve less efficient treatment since the sorbed CVOCs are not in the same location as the treatment amendments. When CVOCs load carbon sorption sites without a treatment mechanism the system will be prematurely ineffective limiting the lifespan of the injected reagent.
 - The co-location of activated carbon and reactive iron prevents or extends the time to sorption site saturation and subsequent desorption of CVOCs over time. If desorption of CVOCs from activated carbon does occur, those CVOCs can be sorbed to nearby nonmobile activated carbon with the target area.

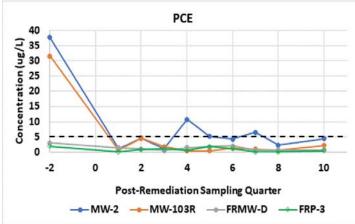


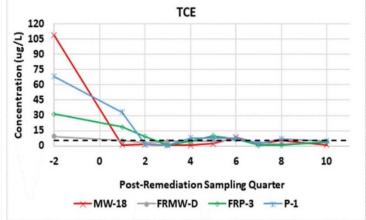
BOS 100® features reactive iron cooked onto the surface of activated carbon. CVOCs adsorb to the activated carbon and subsequently are dechlorinated abiotically by the iron. The dechlorination reactions destroy the CVOCs creating new sorption sites to remove additional CVOCs from groundwater.

Non-BOS 100® injectable activated carbon alternatives use separate activated carbon and reactive iron reagents. CVOCs either adsorb to activated carbon or react with ZVI. Sorbed CVOCs remail on the activated carbon until they are desorbed by competing organic molecules or through equilibrium with the aqueous phase. If ZVI is remaining near the activated carbon, those CVOCs may be abiotically dechlorinated.

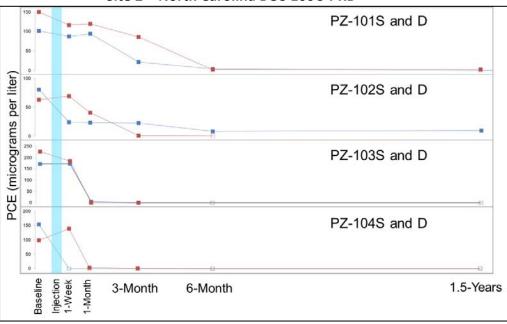
The approach is effective for treating site contaminants in the range of detected concentrations
at the site and can effectively treat low concentrations of CVOCs. The graphics below show
CVOC concentrations in groundwater downgradient from BOS 100® barriers at two different
sites. Reductions in CVOC concentrations in groundwater are rapid and maintained
downgradient of the barrier.

Site 1 – New Jersey BOS 100® PRB





ISOTEC



Site 2 - North Carolina BOS 100® PRB

- BOS 100® applications can be designed to ensure extended active lifetime. Therefore, there is
 often no need for additional injections than could be expected with other in-situ carbon
 amendments. Upgradient CVOCs in groundwater flowing through target treatment areas will
 continue to be removed and dechlorinated over many years.
- BOS 100® amendment is not sensitive to groundwater conditions (pH, oxidation-reduction potential, dissolved oxygen), in contrast with many enhanced reductive dechlorination amendments (carbon substrate electron donors, ZVI). Adsorption reactions of activated carbon for removing CVOCs from groundwater are not changed by oxidizing or reducing environments.
- BOS 100® Trap & Treat® processes have provided long-term CVOC plume management in numerous PRB applications and hot-spot targeted applications.

3.2 Remedial Design Characterization

ISOTEC recommends that a remedial design characterization (RDC) be performed prior to field implementation. The RDC is a crucial step towards developing and implementing a cost effective and successful injection project. The goal of the RDC is to develop a robust set of data that will be used to supplement and update the existing site data to:

- -Determine the mass of contamination in the soil and groundwater as a function of depth and location in order to refine the preliminary injection design; and
- -Determine the appropriate means of accessing the impacted area and applicable installation techniques required for future in-situ treatment.

In order to better quantify the total mass present at the site, the collection of soil samples from minimum 10-20 boring locations is recommended. There is not much soil data available for this site except for the vadose zone source area that was recently sampled. There are no saturated soil samples from the two proposed impacted areas designated for treatment, or in between the areas. In addition to the soil samples, groundwater samples should be collected (if possible) prior to abandonment of the completed boreholes. MW-C04 was recently sampled in 2020 but much of the remaining data is old and in the case of the off-site target area, were collected from temporary well points in 2012 and 2013. The remedial design characterization will extend to ~25 ft bgs (or depth of refusal which is currently assumed to be ~22 ft bgs). The scope of work associated with the characterization effort is as follows. For the purpose of this proposal, it is assumed that sample collection and shipment to RPI's laboratory will be performed by ISOTEC, or others.

Soil Sampling

--Minimum 10-20 soil borings (where site access allows) to 22-25 ft bgs will be advanced using dual tube direct push drilling. Additional borings should be advanced and samples collected if time allows. Soils will be analyzed every 2 feet starting at 12 feet bgs and from discrete intervals identified to be visibly stained or with elevated PID readings.

Groundwater Sampling

- -At each of the soil boring locations, groundwater samples will be collected from temporary wells installed in the same borehole.
- -The existing monitoring wells in the area of will be developed/purged and sampled.

In order to reduce the cost of the total project remediation effort, the RDC samples can be analyzed by the Remediation Products, Inc. (RPI) Group Project Support Laboratory in Golden, Colorado for volatile organic compounds (VOCs) using Method 8260B. The groundwater samples will also be sampled for Anions using Method 300.1 Ion Chromatography. The laboratory analysis is for remedial design use only and is not for regulatory compliance. The analytical services performed by RPI Group are provided at no cost to the client.

It will require multiple days to collect the soil and groundwater samples. The results of this characterization will be used to refine and finalize the BOS 100® loadings throughout the impacted areas. Historically, preliminary remedial designs have been reduced in overall scale both laterally and vertically by implementing an RDC. The final design loadings will vary with depth and location based on the distribution of contaminants' mass. Soil and groundwater analysis and subsequent laboratory result evaluation will require approximately 3-4 weeks to complete before implementing a Final Injection Design. The Proposed RDC sampling is intended to supplement the existing data and refine the Preliminary Design.

RDC will provide high resolution evaluation of COC locations both vertically and horizontally, which allows ISOTEC to have more spatial certainty for remediation targeting. Therefore, ISOTEC can better predict quantities of reagent and level of effort needed to achieve goals, which enables us to provide significantly tighter cost proposals. If requested, ISOTEC can supply estimated costs for the RDC which will include a drilling subcontractor and ISOTEC personnel on site for a few days to collect the samples.

4.0 TREATMENT PLAN

4.1 Site Access and Usage for Remediation

The scope of work calls for excavation of source area soils (to be completed by others) followed by placement of a suitable remedial substrate to be applied to the bottom of the excavation pit to aid in the remediation of residual groundwater contamination; and injection of colloidal activated carbon (or equivalent products) in two hot-spot areas of the site with overburden groundwater concentrations greater than 500 ppb. A detailed utility mark out will be performed (by others) in all proposed work areas prior to any excavating or drilling occurring at the site.

Based on review of the site settings, proposed treatment areas reside within an active DPW parking lot (source area excavation limits and on-site impacted overburden groundwater area) and also within a sensitive residential setting located off of Manning Circle (off-site impacted overburden groundwater area). Utmost care will be taken to minimize all impacts to the surrounding community and sensitive areas and ISOTEC will work with EA/NYSDEC to set up staging areas for trailers and injection equipment, personnel, and chemical deliveries. EA/NYSDEC will secure any required traffic control measures and access agreements to perform work in the designated areas and allow adequate room for storage of ISOTEC equipment and reagents during field activities. There are multiple fire hydrants located near the respective treatment areas and ISOTEC is assuming that access to the hydrants will be allowed for a continued water source during the proposed field work. While working in the DPW yard areas, water can also be obtained from the active building if allowed. Any costs or permitting required for access to water will obtained by EA/NYSDEC.

Because the actual off-site area is not clearly defined in the RFP documents and access for equipment and personnel is not understood, the actual staging areas to be utilized during field implementation are unknown. As such, any costs and scope of work required for site restoration are not included in this proposal and are assumed to be completed by others. ISOTEC will take steps to minimize any disturbance to grassy or landscaped areas in the active work zones to mitigate the extent of restoration efforts (if required) following the injections in this area.

Amendment Staging and Injection Set-Up. All amendments will be purchased by ISOTEC. Delivered amendments will be stored in a secure on-site staging area agreed upon by ISOTEC and EA/NYSDEC. BOS 100® solutions will be batched within ISOTEC's mobile trailer.

The trailer and associated crew will focus on injecting into one target area at a time and will re-locate the trailer to the next area when treatment in the first area is complete. At the end of each injection day, ISOTEC will roll-up all hoses and put the equipment away. ISOTEC has completed numerous projects in a similar manner where all equipment had to be kept inside the box truck/trailer, and all supplies had to be removed from the site/street at the end of the workday (Photograph to the right is from a project where ISCO was injected into 4 wells simultaneously within the street in a residential neighborhood where no residual supplies could be left at the end of the workday).





Temporary staging areas will be finalized on-site in discussion with all project related stakeholders. Ideally, the staging areas will be located near to each respective target area, but materials and equipment may be located in a box truck to maximize mobility and minimize site disruption. It is anticipated that the staging areas may need to be moved around from time to time within each area due to the extensive aerial size of the proposed target areas. To minimize the number of staging areas required, ISOTEC is assuming that injections into the source area excavation pit and on-site groundwater area will occur from the same setup area. Temporary perimeter boundaries will be established around active injection areas using a combination of delineators, caution tape/rope, cones, or temporary snow fencing. ISOTEC will supply hose ramps if needed if the injection lines need to be run across active roadways.

4.2 Source Area Excavation & Reagent Placement

The proposed plan for the impacted source area soils is for a targeted excavation of an $^{\sim}600 \text{ ft}^2$ area. The impacted soils will be removed from the site. Excavation work and transportation and disposal of impacted soils is to be performed by others. Upon completion of the excavation down to the target depth, the ROD calls for placement of a remedial substrate (colloidal activated carbon, or equivalent) to be applied to the open pit area to aid in the remediation of residual groundwater contamination.

The extent of the proposed excavation area surrounds recently collected (July and November 2020) PDI soil boring locations SB-01, SB-05, SB-06, SB-07 and SB-08. Soil impacts in this area were recently detected as high as 18-45 mg/kg for PCE from location PDI-SB-01 at a depth between 7-8 ft below bgs. Review of the boring log from this location, as well as other nearby locations indicated that the soils were wet at depths between 7-9 ft bgs. Based on the elevated PCE concentrations noted between 7-8 ft bgs and the boring logs noting wet soils between 7-9 ft bgs in the area, the depth for excavation was determined at 8 ft bgs and appears to assume that the water table was also in this vertical interval.

The nearest monitoring well location in this area is MW-C03. Depth to water (DTW) readings from this well in 2011 and 2012 (there are no recent samples collected from this well location) indicate the top of the water table is approximately 14.8-14.9 ft bgs. It may be possible that site conditions related to depth to groundwater in this area have changed since MW-C03 was last sampled in 2012 but based on the historical DTW measurements noted, the bottom of the proposed excavation limit of 8 ft bgs would sit approximately 5-6 above the water table in this area.

Placing an amendment in the bottom of the excavation prior to backfilling has been applied at sites as a remediation practice for some time now. Typically, in these situations however, the excavation is completed down to the approximate water table/smear zone where introduced amendments can potentially interact and treat residual impacts that were not addressed during the excavation and removal of site soils. This approach is usually applied at petroleum based contamination sites where lighter impacted contaminants reside at the smear zone and shallow groundwater depths. When applied, the amendments are usually sprayed or dumped into the excavation pit and slowly mixed in with the excavator bucket (or other tooling) to maximize contact with residual remaining impacts and introduced reagents. At this site however, the contaminants are heavier CVOC compounds and the depth of the proposed excavation will not extend down to the inferred depth to water as intended, and specified in the RFP.

The proposed reagent is typically applied to saturated zone aquifers where groundwater provides a medium of transport for dissolved impacts to contact the injected/placed BOS 100® amendments. As discussed above, it appears that the placement of reagent at this site will be in the vadose zone soils above the water table. There is evidence that injection of BOS products completed in the vadose zone can act as a protective barrier for infiltration of additional contamination from shallow horizons that may eventually migrate down to the underlying groundwater, and any residual vapors remaining in the impacted vadose zone can be readily absorbed by activated carbon. Water infiltration can provide another transport mechanism (assumed to be a much slower process than if you have natural groundwater movement). If the distribution of the BOS 100® applied to the bottom of the pit is spread out and covers the extent of the hole, there is still potential added benefits related to adsorption of any residual vapors and barrier protection to the underlying groundwater if contamination from adjacent areas eventually migrates downward at the site through the placed amendment.

There are a few options for this area to be considered based on the above discussion.

- An alternative to ensure the placement of BOS 100® is applied at the smear would be to extend the excavation limits down to the water table depth noted at the site during fieldwork. Based on available information from MW-C03, the DTW in this area is ~14.8-14.9 ft bgs. This approach would incur additional soil mass to be excavated along with increased transportation and disposal costs.
- Continue with the proposed scope of work as intended and place BOS 100® amendments at the bottom of the pit to be blended in with the excavator bucket. Potential benefits would be absorption of any remaining vapors in the area by the activated carbon and also a long term barrier to prevent downward future migration of contamination from shallower horizons. It is being assumed that ~400 lbs. of BOS 100® will be applied to the open pit area over 1 day.

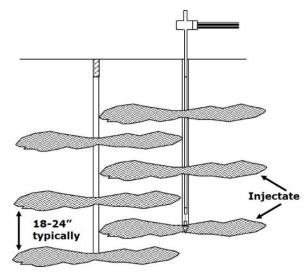
• If after further review of site data, EA/NYSDEC deems the proposed remedy in this area to be a non-effective treatment option due to the significant difference in the actual DTW from where the bottom of the excavation is planned, remove this portion of the scope of work and allow the excavation of impacted soils in the source area to be the complete remedy for this area. Although MW-C03 is located in the suspected source area, PCE groundwater data collected from this well in 2012 was only 53 ppb, which is well below the concentration of 500 ppb being addressed by the overburden groundwater remedy in the 2 target areas.

If the placement of BOS 100® is performed, it is being assumed that it will occur during the same mobilization as the groundwater injections. The mixing trailer will be positioned so that extended hose runs can reach both the excavation area as well as the on-site groundwater treatment area. Different batching/dosing will be applied to the two different areas so there will be some down time associated with cleaning out the mixing tanks before moving to the next area. ISOTEC will spray the prepared BOS 100® batches to the excavation pit. Others will be responsible for mixing the product with the backfill material once applied into the hole.

4.3 Overburden Groundwater Injection Approach

BOS 100® is injected under pressure as a slurry amendment. Pressurized injections allow for distribution of slurry reagents into the subsurface and to establish desired radius of influence to establish overlapping reactive zones within the treatment areas. Injection points within the target areas will be located on a closely spaced grid using 7.5-foot spacing.

Injection points will be installed using direct-push point technology. A top-down approach will be utilized for the BOS 100® slurry injections, with the shallow discrete interval at each location completed first. Subsequent injections within the same direct push point will follow every two-foot interval until all the proposed injection intervals within a given location are completed. Injections are delivered as a discrete interval with two-feet between each vertical interval at each point, with adjacent points having injection intervals off-set by one foot. As shown in the image to the right this top-down injection strategy is aimed at applying the amendment uniformly, throughout the entire impacted vertical interval.



ISOTEC will connect to each point via a dedicated injection point head, which will consist of an influent injection port, ball valves, quick disconnect cam fittings and a pressure gauge. Approximately 15-30 gallons of fluid applied in each discrete interval.

All temporary DPT injection points will be abandoned the same day injection activities have been completed by filling with bentonite chips and hydrating with water.

Treatment areas design details are provided in **Table 2** including both conforming and recommended dosing rates.

Injection **BOS 100®** Spacing Size Interval **BOS 100®** AOC (lbs.) Days (ft²) (ft bgs) (ft) **Points** Recommended On-Site 1,400 13-22 7.5 25 4 1,300 Area Off-Site 3,000 13-19 7.5 54 6 1,900 Area **Total** 4,400 79 10 3,200

Table 2: Treatment Design Summary

4.4 Waste Management

ISOTEC will minimize generation of decontamination waste and maximize recycling of materials. Using direct-push injection point technique, no soil is generated that will require off-site disposal. The only wastewater anticipated to be generated during proposed field work will be from decontamination of injection tooling at the end of the project. ISOTEC will containerize any decontamination water generated for future off-site disposal by EA/NYSDEC.

Wastes generated during proposed work will primarily be containers/packaging for delivery of remedial amendments. This can be disposed of as municipal waste and will be disposed appropriately as needed or at the end of the treatment program.

4.4.1 Site Restoration

Site restoration work will include removal of all site related trash following completion of the injection program (or on a daily basis as needed) and abandonment of each borehole using hydrated bentonite to the surface. ISOTEC will coordinate with EA for surface restoration for each injection point based on the area (e.g., asphalt cold patch, topsoil, grass seed). Any additional restoration related to work vehicles/drill rigs disturbing portions of the site will be the responsibility of EA/NYSDEC (if required). To the extent possible ISOTEC will minimize disturbing existing conditions at the site.

4.4.2 Performance Monitoring

Baseline, interim and post-treatment performance monitoring is assumed to be performed by EA/NYSDEC.

ISOTEC can offer additional laboratory analyses at no cost for performance evaluation through the RPI Group laboratory in Colorado (RPI is the manufacturer of BOS 100®). In addition to CVOCs, analyses will include ethane/ethene and chloride (breakdown products of CVOC). This value-added service has been used on numerous ISOTEC injection programs to provide a more thorough evaluation of remediation effectiveness.

5.0 PROJECT COORDINATION

The ISOTEC team will provide comprehensive support and services to complete the scope of work.

ISOTEC's Senior Project Manager Mike Temple and Technical Director Prasad Kakarla, P.E. will be the primary points of contact with EA and will provide office support and will directly oversee all ISOTEC field staff and subcontractors. Additional support will be provided by Senior Remediation Engineer Paul Dombrowski, P.E., who has direct experience designing and/or implementing a broad range of insitu groundwater technologies including numerous BOS 100® and permeable reactive barrier projects.

The only subcontractor to be used on the project under the supervision of ISOTEC will be a New York licensed Direct Push Technology (DPT) drilling contractor. EA/NYSDEC will procure a separate crew for the excavation work and for a detailed utility mark out in the proposed injection areas.

ISOTEC (or ISOTEC's subcontracted driller) will contact Safe Dig New York prior to on-site drilling activities.

ISOTEC anticipates working during normal business hours from 7:00 AM to 5:00 PM, Monday through Friday. ISOTEC will conduct the injections using our specialized injection system trailer supported by a 4-5 person injection crew (including the driller).

ISOTEC will interface directly with EA/NYSDEC regarding schedules, mobilization, on-site health and safety, injection progress reporting, and overall technical strategy. Due to the sensitive site setting in a residential neighborhood, communication between ISOTEC, EA/NYSDEC and neighborhood property owners will be maintained to minimize disruption to neighborhood activities and traffic patterns.

5.1 Project Reporting

ISOTEC will record all field notes including names of all on-site personnel, hours worked, equipment used, well construction logs, boring logs, injection point ID, injection start time, injection stop time, volume, flow rate, well head pressures, any health and safety instances/meetings, deliveries that occurred, groundwater sampling activities performed, meetings attended, and any other pertinent information during each day of injections. All details will be presented in the Daily Reports submitted electronically to EA the following day. Following completion of all proposed field work a summary report will be submitted detailing all field related activities, summary of injection totals, summary of chemical shipments delivered to the site and any other pertinent information related to the injection program.

6.0 HEALTH AND SAFETY

Health and safety for ISOTEC employees, our subcontractors, site workers, and the public are a top priority to ISOTEC. ISOTEC processes are some of the safest treatment processes due to the use of stabilized reagents injected in a controlled manner to reduce the possibility of any hazard occurring. **ISOTEC has not had a significant health and safety incident in over 26 years of field application.** The injection and amendment handling processes have been designed with health and safety as a prime consideration. All members of the ISOTEC team have completed health and safety training consistent

with the Occupational Safety and Health Act (Title 29 of the Code of Federal Regulations 1910.120) with current certificates. All employees receive an annual physical, drug screening and 8-hour safety refresher course. Site supervisors complete an additional eight hours of OSHA training. The site supervisor has completed an additional eight hours of OSHA supervisor training. As with any activity, by applying safety measures, plus understanding how a process works, limits the potential for unwanted incidents to occur.

A site-specific HASP will be prepared and submitted prior to field mobilization. A detailed Activity Hazard Analysis (AHA) for major activities will be prepared to identify any potential hazards related to field implementation activities. All ISOTEC Team staff (ISOTEC and team subcontractors) will operate under this single site-specific HASP. All ISOTEC Team staff (ISOTEC and team subcontractors) will have stop-work authority to correct or modify site operations. The site-specific HASP and/or JHAs will be modified due to changing conditions or field modifications to improve safety.

ISOTEC will designate an on-site health and safety officer (HSO) who will be responsible for ensuring that all on-site personnel (ISOTEC, ISOTEC team subcontractors, oversight, visitors, etc.) operate according to safety policies and regulations as detailed in the HASP and task AHA. Daily health and safety tailgate meetings will be conducted by the ISOTEC HSO prior to starting each day's field activities to discuss AHA, potential hazards, and identify any new hazards that were encountered during previous day's activities. Part of the ISOTEC HSO's role will be to assess inventory of PPE, safety supplies, first aid kits, and other safety materials as part of daily activities; ISOTEC staff would bring new supplies to the site the following day, as needed.

6.1 Novel Coronavirus (Covid-19)

COVID-19 is a new respiratory disease, caused by a virus (novel coronavirus) that has not previously been encountered in humans. Reported illnesses have ranged from mild symptoms to severe illness and death for confirmed COVID-19 cases. Primary symptoms of this infection may appear 2-14 days after exposure and include fever, cough, and shortness of breath, and in severe cases, pneumonia (fluid in the lungs). ISOTEC has created operating procedures for implementing site remediation activities related to COVID-19, including an ISOTEC Coronavirus Action Plan. The ISOTEC COVID-19 procedures have been revised multiple times as additional information has become available. ISOTEC, in coordination with EA, will verify that all work is completed in accordance with all federal, state, and local guidelines and using safe work practices for the health of site workers and the general public.

7.0 LIST OF ASSUMPTIONS AND EXCEPTIONS

Besides the technical design assumptions stated above, the following items are excluded from the proposed costs, which are assumed to be the responsibility of EA or client.

- > Site access, traffic control, injection permits, water supply, any required pre-clearing, and private utility mark out.
- > Baseline and post-treatment performance monitoring and analysis.
- Secure staging area(s) for ISOTEC reagents and equipment.

- Disposal of any IDW.
- ➤ Regarding site restoration, ISOTEC's proposed scope of work includes backfilling each injection borehole to ~4-inches below grade with bentonite and finishing the top 4 inches with an asphalt patch, concrete patch or similar to match the surrounding ground surface. Any additional site restoration work, if required, is assumed to be completed by EA.

8.0 PROJECT COSTS

Item (description)	Quantity	Unit	Unit Cost	Cost
Injection and Placement of BOS 100®	1	LS	\$161,640	\$161,640
 Mobilization/demobilization of staff, equipment, and materials to the site to perform the work. Procurement and delivery of BOS 100® reagents (3,600 lbs. total for all 3 areas) into the excavation source pit area and two 				
 overburden groundwater target areas (see Table 2 for details) NY State licensed driller with direct-push drill rig. Field Implementation – includes site supervisor and 2 technicians and field injection. Estimated 10-11 days of injections (plus one mobilization day) Project Management, Health and Safety Plan, and Daily Reporting. Box truck for storage of reagents and equipment. 				
Temporary bathroom rental.				
Additional Injection Days		Day	\$8,950	
 If additional injections days are required to inject proposed amendments and/or volumes they will be billed for ~\$8,950/day (as needed), which includes ISOTEC personnel, equipment, drill rig/operator. 				

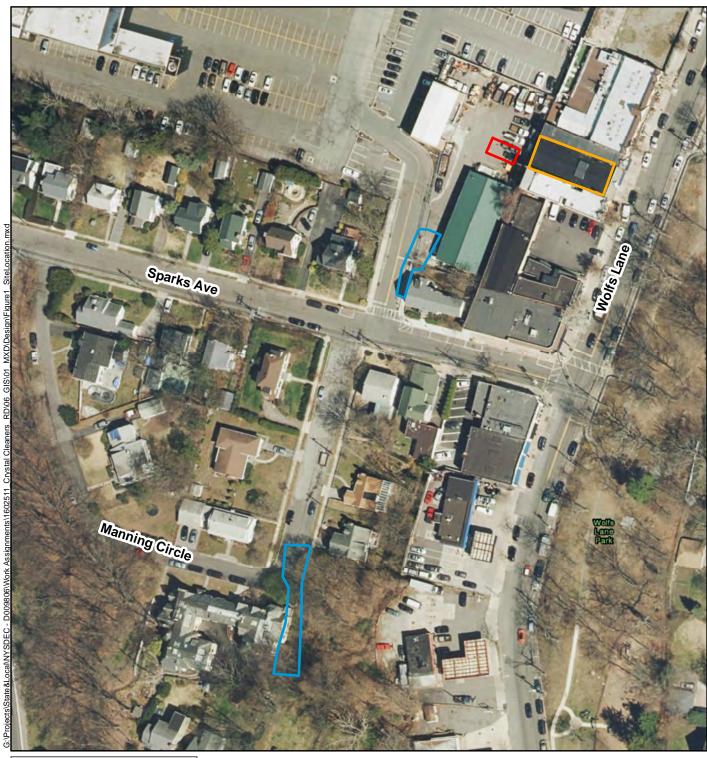
8.1 Standard Terms and Conditions

- 1. The above quote is not a guaranteed price to clean up the contamination noted at the referenced site. The number of ISOTEC treatments will be dependent on the amount of contamination and site geology. The higher the concentration of contamination and the tighter the geology, the greater the number of necessary treatments.
- 2. Treatment program reagent volumes and concentrations presented within this proposal are based on information provided by the consultant.
- 3. Scheduling is based on a first come first serve basis, with an authorized proposal (or subcontract) being the primary basis for scheduling, followed by payment history. ISOTEC will not schedule fieldwork without an authorized proposal (or subcontract), or outstanding receivables over 30 days.

- 4. Work to be performed in modified Level D personal protective equipment (PPE). Higher-level PPE requires a change order for additional costs associated with such.
- 5. Regulatory approval will be the responsibility of Client.
- 6. Site monitoring and pre- and post-treatment sampling will be the responsibility of Client.
- 7. Cancellation of a scheduled treatment program within 3 weeks of authorized program start will be subject to a \$10,000 cancellation fee.
- 8. ISOTEC will require adequate and secure staging areas for chemical preparation and storage.
- 9. Traffic control, if required will be the responsibility of Client.
- 10. Access to an available nearby water source and any associated costs will be the responsibility of the client.
- 11. Work performed will be completed during regular business hours (Monday through Friday) between 8 AM and 5 PM. Alternative scheduling will require a change order.
- 12. Disposal of hazardous wastes and/or reagents collected will be handled by the client. The potential for reagent channeling along utility corridors and other preferential pathways exists with any injection program. ISOTEC is not responsible for seepage or surfacing of reagents and/or hazardous materials into any utility corridor, subsurface collection system or other preferential pathway, nor any costs associated with collection and disposal of such.
- 13. An initial invoice for reagent procurement will be issued upon approval and authorization of this proposal. Payment terms for this initial invoice is net 30 days. Remaining balance invoices will be submitted monthly proportional to the amount of work performed. Payment terms are net 30 days (unless other terms and conditions apply), 1.5% interest per month will be added to any outstanding balances that exceed 60 days. Price quotations are valid for 90 days. Any legal or other costs incurred in collecting delinquent amounts shall be incurred by the Client.
- 14. Information included within this proposal is to be considered confidential and for Client use only without written authorization by ISOTEC.
- 15. Without the prior consent of ISOTEC, Client and any affiliated or related companies will not for a period of 2 years from the date of this proposal and/or signed contract, directly or indirectly solicit for employment or engage as a consultant any person who is now employed by ISOTEC.



FIGURES





Legend

Crystal Cleaners Property Boundary

CS Proposed Excavation Area

Overburden Groundwater Remedial Area

Figure 1 SITE LAYOUT AND AREAS OF CONCERN Crystal Cleaners Pelham, New York

Map Date: 12/7/2020 Projection: NAD_1983_StatePlane_New_York_East_FIPS_3101_Feet







APPENDIX A

ISOTEC CASE STUDIES

In-Situ Oxidative Technologies, Inc.



EISD Treatment Program: PRBs to Treat PCE and CVOCs Plumes

<u>Site</u>

• Former Manufacturing Facility Site, New Jersey

Contaminants of Concern

- CVOCs primarily PCE and TCE.
- Large dilute plumes with PCE and TCE concentrations ranging from 2 to 120 μg/l.

Geology/ Hydrology

- Low pH groundwater regionally
- Site geology was mostly overburden sand in deep target treatment area identified as plating & solvent handling area.
- Differential layers of constituent clay, silt, and fine sand was seen in treatment area identified as firing range area.

EISD BOS 100® Treatment Program

- Multiple permeable reactive barriers (PRB) were constructed across the treatment area for effective CVOC plume reduction.
- An approach involving the pressurized injection of slurry amendments was implemented to create close grid overlapping barriers
- 6 PRBs with a total length of 750 feet were installed in the two areas.
- A total of 228 temporary DPT injection points were utilized to inject ~ 124,740 gallons of BOS 100® amendments in two major treatment areas over the course of the injection event.
- Following the construction of reactive barriers in the two treatment areas, most performance monitoring wells were reduced to low criteria for PCE and TCE

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ISOTEC Case Study No. 93

EISD TREATMENT PROGRAM: IMPACTED GROUNDWATER TREATMENT UTILIZING BOS 100® PRBs

Former Manufacturing Facility Site New Jersey

INTRODUCTION

ISOTEC was retained to implement an enhanced in-situ dechlorination (EISD) treatment program at former manufacturing site located in New Jersey to address impacted soil and groundwater. Treatment was performed in two separate plume areas of concern: plating and solvent handling area (3.5) acres) and a firing range area (0.7 acres). Primary contaminants of concern at the site include chlorinated volatile organic compounds (CVOCs), primarily tetrachloroethene (PCE) and trichloroethene (TCE). ISOTEC developed a remedial approach for treatment of a large plume in a permeable, low-pH aquifer with a goal of attaining low drinking water criteria. The EISD remedial approach chosen for the site, BOS 100TM Trap & Treat, consisted of injecting a slurry of activated carbon impregnated with reactive iron metal, bacterial culture, and carbon substrate. BOS 100® was selected to remediate groundwater through multiple processes (adsorption to activated carbon, abiotic dechlorination). A series of permeable reactive barriers (PRBs) were placed selectively in the large dilute plumes and oriented perpendicular to groundwater flow to capture and treat CVOCs for site-wide plume reduction.



SITE BACKGROUND/GEOLOGY

Baseline concentrations of CVOCs measured prior to injection in groundwater from monitoring wells on site ranged from less than 10 to 120 micrograms per liter (μ g/l). The property is an unoccupied open area with some portions currently in use for



agricultural purposes, with future use proposed as residential development. Depth to groundwater ranged from 12 to 18 feet below ground surface (bgs), and site soils consists of sand in the plating and solvent handling areas. The plume thickness varied at different injection locations, and vertical target treatment zone ranged from 12 to 55 feet bgs. The soil in firing range area is heterogeneous with clay, silts, and fine sands encountered at differential depth intervals. Depth to groundwater was at ~18 bgs and the target treatment layer thickness was approximately 25 to 27 feet bgs.



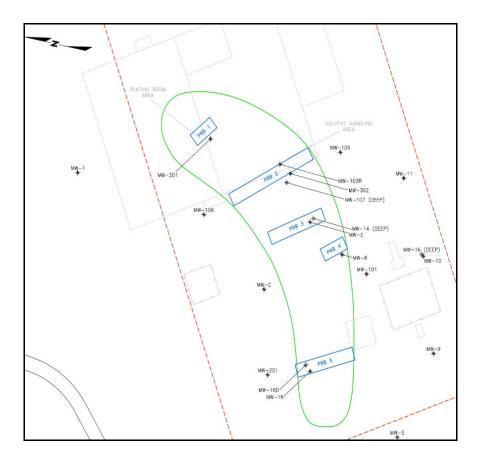
ENHANCED IN-SITU DECHLORINATION TREATMENT PROGRAM AND IMPLEMEMENTATION

The full-scale treatment program was performed in two areas of concern over a 30-days event from November to December 2017. A total of 111,780 gallons (~31,527 lbs.) of BOS 100® were injected in plating & solvent handling area into 180 injection points to create five PRBs across an estimated area of 17,700 square feet. A total of 12,960 gallons (~3,618 lbs.) of BOS 100® were injected in fire ranging area into 48 injection wells to create a PRB across an estimated area of 2,400 square feet. The constructed reactive barriers have an extended treatment longevity for continued treatment of low concentration residual CVOCs in groundwater through sorption to activated carbon and abiotic and biotic dechlorination. Pressurized injection approach was implemented to distribute slurry reagents into the subsurface and to produce the desired radius of influence to develop overlapping reactive zones within the barriers. All injection points were temporary points installed using direct-push point technology.

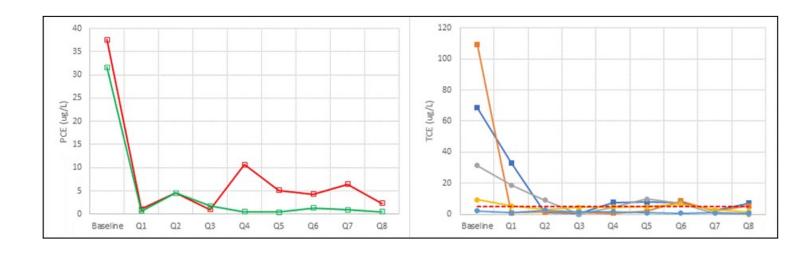
CURRENT PROJECT STATUS

The overall objective was to treat CVOCs plume area and accelerate in achieving New Jersey Groundwater Quality Standards in the performance monitoring wells across the site. Groundwater samples collected at three, six, nine and twelve months after injection indicate a significant decrease in PCE and TCE concentrations compared to pre-injection period. Concentrations downgradient of treatment areas were below site cleanup levels for most of the groundwater monitoring wells with other wells downgradient of the PRBs typically showing downward trending results.





Permeable Reactive Barriers (PRBs) in plating and solvent handling area located to capture directional groundwater flow





EISD Treatment Program: PRBs to Treat PCE and CVOCs Plumes

<u>Site</u>

Active Warehouse Facility, Massachusetts

Contaminants of Concern

• PCE (2,200 – 12,000 μg/L)

Geology/ Hydrology

• Low permeability silt and till

BOS 100® Treatment Program

- Grid treatment with 175 injection points
- Injections performed inside and outside active warehouse and coordinated to not disrupt operations
- Significant decrease in PCE concentrations recorded in samples collected after injection with 88 to greater than 99 percent reduction.

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ISOTEC Case Study No. 92

INJECTABLE ACTIVATED CARBON: PCE SOURCE AREA TREATMENT UTILIZING BOS 100® TECHNOLOGY

Active Warehouse Facility Massachusetts

INTRODUCTION

ISOTEC was retained to implement groundwater remediation at an active warehouse and distribution facility utilizing BOS 100® injectable activated carbon, which consists of a slurry based activated carbon impregnated with reactive iron metal. The objective of the remediation program was source area mass reduction of tetrachloroethene (PCE) and downgradient residual PCE concentrations. The groundwater remediation was performed as part of a combined remedy program that also included soil vapor extraction.

ISOTEC supported the consultant in performing a comparative evaluation of different in-situ remediation approaches, including chemical oxidation, enhanced bioremediation, and injectable activated carbon. BOS 100® was selected based on site objectives, cost, and other site-specific factors.

SITE BACKGROUND/GEOLOGY

Past manufacturing operations at the site resulted in soil and groundwater impacts with chlorinated volatile organic compounds (CVOCs). PCE concentrations had been detected as high as 47,000 $\mu g/L$ historically. Injection baseline concentrations of PCE measured in groundwater monitoring wells within the treatment area ranged from 2,200 to 12,000 $\mu g/L$. Site soils consist of dense, low permeability silt and till. Depth to groundwater is approximately 8 feet below ground surface (bgs), and the injections targeted impacted soils above an aquitard at approximately 20 feet bgs.

IN-SITU TREATMENT PROGRAM

The groundwater treatment program was implemented both inside and outside an active warehouse facility over 19 injection days. ISOTEC injected BOS 100® into 90 locations outside the building



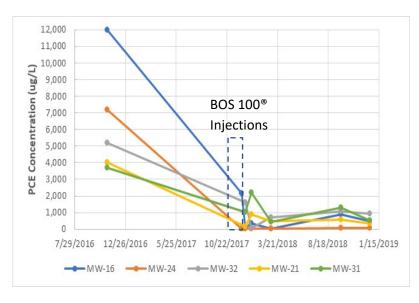


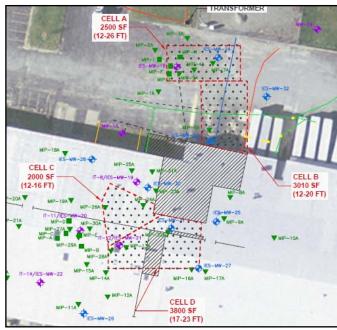
and 106 locations inside the building; with injection points divided into four subareas. All injection points were temporary points installed using direct-push point technology. ISOTEC subcontracted a concrete coring firm to efficiently core through the concrete slab for the inside points. Injection operations and sequencing was coordinated around minimizing disturbance of warehouse operations and maintaining active forklift lanes through the treatment area. A total of 16,900 pounds of BOS 100® was injected.



CURRENT PROJECT STATUS

The overall objective of remediation was to reduce PCE concentrations in groundwater to less than 1,000 μ g/L in the treatment zones. Groundwater samples collected approximately three weeks after injections indicated rapid decrease in PCE concentrations. Quarterly samples collected for 12 months after injection demonstrated PCE in monitoring wells within the injection areas were all below the goal of 1,000 μ g/L. Ethene was detected in multiple monitoring wells as a product of reductive dechlorination.







EISBR Pilot Program:

Site

• Denitrification Demonstration Test Cape Cod, MA.

Contaminants of Concern

Nitrate

Geology/ Hydrology

- Site geology consists of mostly medium to coarse sands with gravel and silt lens.
- Depth to water at approximately 35 feet bgs.

Treatment Program

- Denitrification PRB through application of Terra Systems SRS-NR (Slow Release Substrate-Nitrate Removal) EVO and sodium bicarbonate.
- PRB length of 110 feet, consisting of 17 directpush injection points (7 points in a single row and 10 points in a pair of rows).
- Injection interval from 36 to 68 feet bgs.
- Total solution volume injected was ~11,000 gallons.
- Field monitoring data during the injections indicated negligible change to turbidity and conductivity in downgradient monitoring wells achieving project objective to minimize migration of EVO and establish a robust PRB.

Project Status

 SRS-NR EVO is anticipated to last in the aquifer and support denitrification for 3+ years.
 Quarterly performance monitoring will be conducted starting in 2017 to evaluate performance including nitrate removal, EVO migration and persistence.

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ISOTEC Case Study No. 80

ENHANCED IN-SITU BIOREMEDIATION (EISBR): DENITRIFCIATION PERMEABLE REACTIVE BARRIER UTILIZING EMULSIFIED VEGETABLE OIL

Nitrate Plume Demonstration Test Cape Cod, Massachusetts

SITE BACKGROUND

ISOTEC was retained to implement a Denitrification Permeable Reactive Barrier (PRB) demonstration test for the treatment of nitrate in groundwater using Emulsified Vegetable Oil (EVO). Septic systems are used to manage nearly 85 percent of the wastewater flow from residences and businesses on Cape Cod. As a result, nitrate emanating from septic systems travels as a plume without significant attenuation in groundwater to coastal waters. The Project represented the first to implement a "Hybrid" approach under the Cape Cod 208 Water Quality Plan, approved by both the USEPA and Massachusetts Department of Environmental Protection, which uses non-traditional technologies including PRBs. Application of EVO introduces a carbon food substrate into the subsurface to enhance activity of naturally occurring denitrifying bacteria.

Site soils consist of sandy formation with high groundwater flow velocities (1 to 2 feet per day). Gravel and clayed silt lenses exist within the subsurface. Groundwater is encountered at approximately 35 feet bgs, with the nitrate plume extending at least to 70 feet bgs.

TREATMENT PROGRAM AND IMPLEMEMENTATION

The demonstration test PRB was approximately 110 feet long and consisted of 17 direct push injection points. The vertical injection interval was 36 to 68 feet bgs. This PRB was established utilizing the first ever use of a custom Terra Systems EVO solution formulated specifically for extended longevity in a permeable aquifer with high groundwater flow velocity.



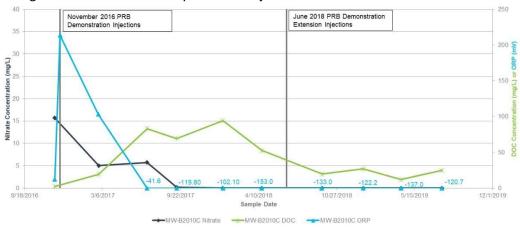


Total volume of EVO injected for the PRB was ~11,000 gallons (approximately 14% effective pore volume), applied at a 4:1 ratio with sodium bicarbonate as pH buffer. Performance monitoring conducted during the injection program indicated negligible changes in turbidity or conductivity in monitoring wells 7 and 10 feet downgradient, which achieved the treatment objective to minimize migration of EVO and to establish a robust PRB.



PROJECT STATUS

PRB performance and longevity is being assessed through a quarterly monitoring program. SRS-NR EVO is anticipated to last in the aquifer and support denitrification for 5+ years. Quarterly performance monitoring to evaluate performance including nitrate removal, EVO migration and persistence has demonstrated the effectiveness to reduce nitrate to low concentrations to significantly reduce the nitrogen mass flux through a PRB for more than 4 years after injection.





ISCO Treatment Program: MGP Related Impacts

<u>Site</u>

Former Manufacturing Gas Plant, Upstate, NY

Contaminants of Concern

- VOCs/SVOCs
- PAHs
- TPH-GRO
- TPH-DRO
- NAPL

Geology/Hydrology

 Site geology consists of a very thin coarse gravel and fine sand layer located in between two confining layers of silty clay. Majority of remaining COCs were believed to be present within the thin gravel/sand layer.

ISCO Treatment Program

- MFR and BASP treatments.
- Three treatment events.
- Treatment Area = 4,900 ft²
- Treatment interval 9-18 ft bgs.
- Injection pathway system consisted of 43 permanent well injection locations installed in an active roadway.
- A total of 38,693 gallons of reagents were injected over the course of three events.
- Continuous air/dust monitoring was performed due to the sensitivity of the location.

Results

- MFR and BASP treatments.
- Three treatment events.

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ISOTEC Case Study No. 83

ISCO TREATMENT PROGRAM: MGP RELATED IMPACTS VIA MODIFIED FENTON'S REAGENT (MFR) AND BASE ACTIVATED SODIUM PERSULFATE (BASP)

Former Manufacturing Gas Plant Upstate, New York

INTRODUCTION

ISOTEC was retained to implement an *In-Situ Chemical Oxidation* (ISCO) treatment program within the downgradient residual plume area of a former Manufactured Gas Plant (MGP) site utilizing a combination of modified Fenton's reagent (MFR) and base activated sodium persulfate (BASP) to address impacted soils and groundwater. The oxidants and dosages were selected based on bench scale testing that ISOTEC collaborated on. Target contaminants of concern (COCs) included volatile organic contaminants (VOCs), semi-volatile organic contaminants (SVOCs), poly-aromatic hydrocarbons (PAHs), total petroleum hydrocarbon gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) and free-phase NAPL impacts.

SITE BACKGROUND/GEOLOGY

Past MGP operations at the site resulted in soil and groundwater COC impacts. The ISCO target treatment area was located on an neighborhood roadway/ sidewalk lined with residential and commercial properties. Numerous



subsurface utilities existed within the target area and each proposed injection point location was initially pre-cleared down to ~5 feet (ft) below ground surface (bgs) to ensure that no lines were damaged during drilling. The treatment area was approximately 4,900 square feet (ft²) and targeted a very narrow layer (0.5 to 4 feet) of coarse gravel/fine sand located in between two confining layers of silty clay. Injection well screens were selectively placed within the overall 9-18 ft bgs depth interval based on data collected from past soil borings and from new soil borings overseen by ISOTEC during the injection well installation. Selective placement of each well screen allowed for an effective method of delivering injected ISCO reagents where the significant mass of MGP impacts were located and traveling within the narrow coarse gravel/fine sand layer.



ISCO TREATMENT PROGRAM AND IMPLEMEMENTATION



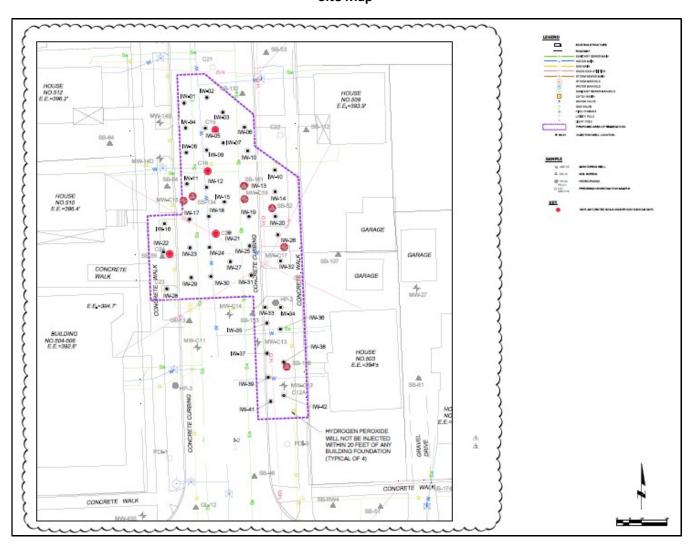
The ISCO treatment program was implemented over three planned injection events lasting 15-20 injection days per event. A total of 43 PVC permanent injection were installed at a spacing of approximately 12 feet. Due to the sensitive site setting located within an active neighborhood roadway and along portions of the adjacent sidewalks, extreme caution and thorough planning of the injection approach was taken into account for the actual field implementation. Through coordination with the City DPW and first responders, daily road closure of the targeted area was implemented during each injection event to minimize contact between field personnel/chemicals and both pedestrian and vehicular traffic. As an added precaution, chemicals were staged within a fenced area each day/night and the injection equipment/process was staged within a box truck that contained all regents and chemicals to minimize contact with

nearby residents and allowed for quicker daily equipment setup and breakdown each day. All pumps and batching were conducted from the back of a box truck with hoses out to active injection wells that were designed to allow for quick disassembly in case emergency personnel/vehicles needed to access the work zone roadway. For added precaution to protect the surrounding community, dust/air monitoring was performed every day, active injection points were covered up with poly-sheeting to prevent accidental spraying of reagents, and venting of completed injection points through a carbon knock-out drum was performed to mitigate release of impacted vapors into the breathing zone. To minimize disruption to nearby residents, the impacted work areas were opened back up each night to allow normal vehicular/pedestrian activity to commence. Modifications to the ISCO strategy, oxidant sequencing, and amendment dosages were made in collaboration with the consultant during and between events to improve remedial performance and maintain safety working in a high-profile, residential road.

Three injection events were conducted over a 16 month time period with a total of 38,693 gallons safely injected into the subsurface within a very sensitive site setting. Upon completion of the 3 full-scale injection applications, a significant reduction of total BTEX and PAHs was noted across the treatment area. Following ISCO, groundwater concentrations reduced sufficiently to transition to long-term monitoring consistent with the Record of Decision.



Site Map





To: Emily Cummings (EA Science and Engineering) 2/24/2021

sent via email

From: Keith M Gaskill, LPG, Sr Design Specialist

kgaskill@regenesis.com 317-800-4529

Subject: Preliminary Design and Cost Estimate

Site: *Crystal Cleaners*

Pelham, NY

<u>Applicable Product(s)</u> <u>Links to View/Download Product Information</u>

Bio-Dechlor INOCULUM® Plus

PlumeStop® Liquid Activated Carbon™ PlumeStop

PlumeStop

Hydrogen Release Compound® HRC

REGENESIS is pleased to present you with this design and cost estimate for the proposed treatment at your site utilizing the remediation technologies presented above. Included within this document you will find the following attachments supporting the proposed approach:

- Map Depicting Treatment Areas
- Remedial Design and Cost Estimate
- Product Technical Sheets
- Standard Assumptions
- Terms and Conditions

Remedial Approach

We are proposing application of PlumeStop® Liquid Activated Carbon™ (PlumeStop) and Hydrogen Release Compound (HRC®) to treat residual chlorinated solvents. PlumeStop is a colloidal form of activated carbon with a surface treatment which reduces its interactions with the soil matrix. This allows it to move through soil pores leaving a coating on the soil matrix as it distributes from the injection point. This provides a very large sorption surface which will result in immediate reduction of these contaminants while concentrating contaminants to allow for more efficient and controlled remediation through destructive technologies like HRC. HRC will provide a controlled release of hydrogen to stimulate anaerobic bioremediation. As contaminants are degraded to non-toxic and non-sorptive end products, the PlumeStop sorption surface will be regenerated. This allows for further sorption and treatment of contaminants which may diffuse back into the groundwater from the soil matrix over time. Bio-Dechlor INOCULUM® Plus is added to provide a live microbial culture that is known to fully degrade these compounds.

PlumeStop was developed specifically to allow for the activated carbon particles to flow into and through contaminated aquifer flux zones in a "flooding" delivery fashion. Because PlumeStop particles are so small (1 to 2 micrometers and the size of a red blood cell) they can flow into silty soils without fracturing. Once in the formation they "paint" the aquifer and eventually become positionally stable with no occlusion of aquifer pore-space. In comparison, other carbon products use a "fine grained" activated carbon that is larger than the pore-space diameter of most soils and must be fractured at high pressures (commonly 200 to 600 psi or higher) for delivery into the



formation. Such high pressure fracturing is an uncontrolled process that frequently results in short circuiting, random fractured directions, and preferential flow into wells and utility corridors. Fractures must also be placed every 2 or 3 vertical feet which leaves ample opportunity for missed flow paths between those fractures. In comparison, PlumeStop is a liquid carbon suspension that injects under low-pressure (usually less than 60 psi) and high volumes to flood conductive zones of an aquifer and the end results is a "painting" of all conductive soils as compared to intermittent carbon seams (roughly 1 cm or smaller) as seen with other carbon injections. During PlumeStop application, real-time field verification is performed where soil cores are taken to confirm distribution and microadjustments to volumes and pressures are made to ensure product overlap. As a result, PlumeStop provides complete capture zones and greater design flexibility which results in much more consistent and predictable results.

The costs presented assume the proposed remediation technologies will be applied by our Remediation Services Division (RRS). RRS will provide all personnel and equipment to complete the application including subcontracting of a direct push drilling rig and operator. Please refer to the attached standard RRS' assumptions for remedial applications.

Assumptions

In generating this design proposal REGENESIS relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site. The attached design summary tables specify the assumptions used in preparation of this technical design. We request that these modeling input assumptions be verified by your firm.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.

Closing

Please feel free to contact me if you need additional information or have any questions regarding our evaluation and/or this correspondence (contact info listed above). Thank you for considering REGENESIS as part or your remedial solution for this project.





Crystal Cleaners Property Boundary

Proposed Excavation Area

Overburden Groundwater Remedial Area

Figure 1 SITE LAYOUT AND AREAS OF CONCERN Crystal Cleaners Pelham, New York

Map Date: 12/7/2020 Projection: NAD_1983_StatePlane_New_York_East_FIPS_3101_Feet





Groundwater Treatment Grid Areas



	ct Info		PlumeStop® Application	· ·			
Crystal Cleaners		Saturated Sand					
	am, NY		PlumeStop		Technical Notes		
Saturated Sand Unit		Treatment Type	Grid				
Prepared For:		Treatment Areal Extent (sq ft)	4400	Injection Radius for Soil Coverage (ft-est.avg.)			
Emily Cummings (EA Science and Engineering)		Spacing Within Rows (ft)	9	5.7			
Target Treatment Zone (TTZ) Info	Unit	Value	Spacing Within Rows (ft) Spacing Between Rows (ft)	9	3.7		
Grid Treatment Areal Extent	sq ft	4,400	DPT Injection Points	54	PlumeStop Inject. Conc. (mg/L)		
Top Treat Depth	sq rt ft	8.0	Top Application Depth (ft bgs)	8	5,000		
Bot Treat Depth	ft	20.0	Bottom Application Depth (ft bgs)	20	3,000		
Vertical Treatment Interval	ft	12.0	PlumeStop to be Applied (lbs)	9,200			
	ft ³	52,800	PlumeStop to be Applied (Ids)				
Treatment Zone Volume			Plumestop to be Applied (gals)	1,021	Consist Instructions		
Treatment Zone Volume	су	1,956			Special Instructions:		
Soil Type	3, 3	silty sand					
Porosity	cm ³ /cm ³	0.40					
Effective Porosity	cm ³ /cm ³	0.20		PlumeStop Volume Totals			
Treatment Zone Pore Volume	gals	157,989	Mixing Water (gal)	43,077			
Treatment Zone Effective Pore Volume	gals	78,994	Total Application Volume (gals)	44,098			
Freatment Zone Pore Volume	liters	598,050	Injection Volume per Point (gals)	817			
Freatment Zone Effective Pore Volume	liters	299,025	Anaerobic Bioremedi				
Fraction Organic Carbon (foc)	g/g	0.003	HRC Application Points	54			
Soil Density	g/cm ³	1.6	HRC to be Applied (lbs)	1,560			
Soil Density	lb/ft ³	100	HRC per point (lbs)	29			
Soil Weight	lbs	5.3E+06	Total Application Volume (gals)	144			
Hydraulic Conductivity	ft/day	10.0	Injection Volume per Point (gals)	2.7			
Hydraulic Conductivity	cm/sec	3.53E-03	Bioaugmentation -	BDI Plus			
Hydraulic Gradient	ft/ft	0.005	BDI Plus Application Points	54			
GW Velocity	ft/day	0.25	BDI Plus to be Applied (Liters)	19			
GW Velocity	ft/yr	91	BDI Plus per point (Liters)	0.4			
Sources of Hydrogen Demand	Unit	Value		Assumptions/Q	ualifications		
Dissolved Phase Contaminant Mass	lbs	5					
Sorbed Phase Contaminant Mass	lbs	12	In concreting this proliminary action to December 1	ad upon professional index	and site appoints information provided by athers. United this information provided by		
Competing Electron Acceptor Mass	lbs	119	0 0 1 , , 0		and site specific information provided by others. Using this information as input		
Total Mass Contributing to H2 Demand	lbs	136	we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement require to affect remediation of the site.				
Mass Flux and HRC Demand	Unit	Value	and the steel				
Groundwater Mass Flux through TTZ	L/day	1,699					
Stoichiometric HRC Demand	lbs	762	REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing				
Mass Flux HRC Demand	lbs	773					
Total HRC Demand	lbs	1,535	guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement				
Application Dosing	Unit	Value	fund (the "Government"). In any circumstance where	REGENESIS may serve as a suppl	ier or subcontractor to an entity which seeks reimbursement from the		
			·		SIS, it is the sole responsibility of the entity seeking reimbursement to ensure th		
PlumeStop to be Applied	lbs	9,200	Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Governmen				
HRC to be Applied	lbs	1.560					
BDI Plus to be Applied	Liters	19	Prepared by: Keith M Gaskill, LPG, Sr Design Specialist Date: 2/24/2021				

Groundwater Treatment Grid Areas



Purchasing Information		Currently Available Packaging Options				
Crystal Cleaners		Saturated Sand Unit				
			Package Type***	# of packages	lbs required	
PlumeStop Required	lbs	9,200	PlumeStop-2,000 lb reinf. plastic totes	4	8,000	
			PlumeStop-400 lb poly drums	3	1,200	
HRC to be Applied	lbs	1,560	HRC-40 lb HDPE Pails	39	1,560	
BDI Plus to be Applied	Liters	19	BDI-18 Liter kegs	1	19	
Estimated Tax and Freight %*	%	18%				
Estimated Tax and Freight Cost	\$	\$16,456				
Estimated Total Product Cost	\$	\$107,875				
Estimated RRS Application Cost	\$	\$69,056				
Total Estimated Project Cost**	\$	\$176,931				
Estimated RRS Days to Apply		14				
*Note that the combined tax and freight costs			**Total Project cost is only an estimate; actua	I project cost may change as the final sco	pe and/or RRS proposal are developed.	
contact your local sales manager or Customer		•				
quote. You will be asked to provide a ship-to	address and esti	mated time of delivery.	***Available Package Types are subject to change.			

Source Treatment Area



Proje	ct Info		PlumeStop® Application I	Design Summary			
Crystal Cleaners		Saturated Sand Unit					
Pelha	am, NY		PlumeStop		Technical Notes		
	Sand Unit		Treatment Type	Grid			
Saturated Sand Offic		Treatment Type		Injection Radius for Soil Coverage (ft-est.avg.)			
•	red For:		Treatment Areal Extent (sq ft)	600			
Emily Cummings (EA Science and Engineering)		Spacing Within Rows (ft)	9	6.6			
Target Treatment Zone (TTZ) Info	Unit	Value	Spacing Between Rows (ft)	9			
Grid Treatment Areal Extent	sq ft	600	DPT Injection Points	7	PlumeStop Inject. Conc. (mg/L)		
Top Treat Depth	ft	8.0	Top Application Depth (ft bgs)	8	5,000		
Bot Treat Depth	ft	20.0	Bottom Application Depth (ft bgs)	20			
Vertical Treatment Interval	ft	12.0	PlumeStop to be Applied (lbs)	1,600			
Treatment Zone Volume	ft ³	7,200	PlumeStop to be Applied (gals)	178			
Treatment Zone Volume	су	267			Special Instructions:		
Soil Type		silty sand					
Porosity	cm ³ /cm ³	0.40					
Effective Porosity	cm ³ /cm ³	0.20	PlumeStop Volume	e Totals			
Treatment Zone Pore Volume	gals	21,544	Mixing Water (gal)	7,492			
Treatment Zone Effective Pore Volume	gals	10,772	Total Application Volume (gals)	7,669			
Treatment Zone Pore Volume	liters	81,552	Injection Volume per Point (gals)	1,096			
Treatment Zone Effective Pore Volume	liters	40,776	Anaerobic Bioremedi				
Fraction Organic Carbon (foc)	g/g	0.003	HRC Application Points	7			
Soil Density	g/cm ³	1.6	HRC to be Applied (lbs)	920			
Soil Density	lb/ft ³	100	HRC per point (lbs)	131			
Soil Weight	lbs	7.2E+05	Total Application Volume (gals)	85			
Hydraulic Conductivity	ft/day	10.0	Injection Volume per Point (gals)	12.1			
Hydraulic Conductivity	cm/sec	3.53E-03	Bioaugmentation -				
Hydraulic Gradient	ft/ft	0.005	BDI Plus Application Points	7			
GW Velocity	ft/day	0.25	BDI Plus to be Applied (Liters)	19			
GW Velocity	ft/yr	91	BDI Plus per point (Liters)	2.7			
Sources of Hydrogen Demand	Unit	Value	BDI Flus per politi (Liters)	Assumptions/Q	ualifications		
Dissolved Phase Contaminant Mass	lbs	value 1		Assumptions/ Q	udillications—		
Sorbed Phase Contaminant Mass	lbs	2					
Competing Electron Acceptor Mass	lbs	16	In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required				
Total Mass Contributing to H2 Demand	lbs	19					
•	Unit	Value	to affect remediation of the site.				
Mass Flux and HRC Demand Groundwater Mass Flux through TTZ	L/day	1,699					
Stoichiometric HRC Demand	L/day lbs	1,699					
Mass Flux HRC Demand		104 773	REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement				
	lbs lbs	877					
Total HRC Demand		Value			nt directly from any government agency or any governmental reimbursement ier or subcontractor to an entity which seeks reimbursement from the		
Application Dosing	Unit	value			·		
PlumeStop to be Applied	lbs	1,600	Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to are entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.				
UDC to be Applied			chart, when seeks reimbursement from the doverning	eng nederless does not knowing	by present of sause to be presented any dain for payment to the dovernment.		
HRC to be Applied	lbs	920					
BDI Plus to be Applied	Liters	19	Prepared by: Keith M Gaskill, LPG, Sr Design Specialist Date: 2/24/2021				

Source Treatment Area



Purchasing Information		Currently Available Packaging Options				
Crystal Cleaners		Saturated Sand Unit				
			Package Type***	# of packages	lbs required	
PlumeStop Required	lbs	1,600	PlumeStop-2,000 lb reinf. plastic totes	4	8,000	
			PlumeStop-400 lb poly drums	3	1,200	
HRC to be Applied	lbs	920	HRC-40 lb HDPE Pails	23	920	
BDI Plus to be Applied	Liters	19	BDI-18 Liter kegs	1	19	
Estimated Tax and Freight %*	%	18%				
Estimated Tax and Freight Cost	\$	\$4,549				
Estimated Total Product Cost	\$	\$29,822				
Estimated RRS Application Cost	\$	\$21,360				
Total Estimated Project Cost**	\$	\$51,182				
Estimated RRS Days to Apply		3				
*Note that the combined tax and freight costs		The state of the s	**Total Project cost is only an estimate; actua	I project cost may change as the final sco	pe and/or RRS proposal are developed.	
contact your local sales manager or Customer S						
quote. You will be asked to provide a ship-to a	quote. You will be asked to provide a ship-to address and estimated time of delivery.			***Available Package Types are subject to change.		



PlumeStop[®] Liquid Activated Carbon[™] Technical Description

PlumeStop Liquid Activated Carbon is an innovative groundwater remediation technology designed to rapidly remove and permanently degrade groundwater contaminants. PlumeStop is composed of very fine particles of activated carbon (1-2 μ m) suspended in water through the use of unique organic polymer dispersion chemistry. Once in the subsurface, the material behaves as a colloidal biomatrix, binding to the aquifer matrix, rapidly removing contaminants from groundwater, and promoting permanent contaminant biodegradation.

This unique remediation technology accomplishes treatment with the use of highly dispersible, fast-acting, sorption-based technology, capturing and concentrating dissolved-phase contaminants within its matrix-like structure. Once contaminants are sorbed onto the regenerative matrix, biodegradation processes achieve complete remediation.



Distribution of PlumeStop in water

To see a list of treatable contaminants with the use of PlumeStop, view the Range of Treatable Contaminants Guide.

Chemical Composition

- Water CAS# 7732-18-5
- Colloidal Activated Carbon ≤2.5 CAS# µm 7440-44-0
- Proprietary Additives

Properties

- Physical state: Liquid
- Form: Aqueous suspension
- Color: Black
- Odor: Odorless
- pH: 8 10

Storage and Handling Guidelines

Storage

Store in original tightly closed container

Store away from incompatible materials

Protect from freezing

Handling

Avoid contact with skin and eyes

Avoid prolonged exposure

Observe good industrial hygiene practices

Wash thoroughly after handling

Wear appropriate personal protective equipment



PlumeStop® Liquid Activated Carbon™ Technical Description

Applications

PlumeStop is easily applied into the subsurface through gravity-feed or low-pressure injection.

Health and Safety

Wash hands after handling. Dispose of waste and residues in accordance with local authority requirements. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: <u>PlumeStop SDS</u>.





HRC® Technical Description

HRC® is an engineered, hydrogen release compound designed specifically for enhanced, *in situ* anaerobic bioremediation of chlorinated compounds in groundwater or highly saturated soils. Upon contact with groundwater, this viscous, polylactate ester material becomes hydrated and subject to microbial breakdown producing a controlled-release of hydrogen for periods of up to 18-24 months on a single application.

HRC enables enhanced anaerobic biodegradation by adding hydrogen (an electron donor) to groundwater and/or soil to increase the number and vitality of indigenous microorganisms able to perform the naturally occurring process of enhanced reductive dechlorination. During this process, certain naturally occurring microorganisms replace chlorine atoms on chlorinated contaminants with the newly available hydrogen effectively reducing the contaminant to a less harmful substance with the preferred and innocuous endpoints of ethene or ethane.



Example of HRC

For a list of treatable contaminants with the use of HRC, view the Range of Treatable Contaminants Guide.

Chemical Composition

- Glycerol Tripolylactate- CAS #201167-72-8
- Glycerin- CAS #56-81-5
- Lactic acid- CAS #50-21-5

Properties

- pH 3 (10% solution/water)
- Appearance Viscous gel/liquid. Amber color
- Odor Odorless

Storage and Handling Guidelines

Storage

Store away from incompatible materials Store in original tightly closed container Store in a cool, dry, well-ventilated place

Handling

Wash thoroughly after handling
Wear appropriate personal protective equipment
Wear eye/face protection

Provide adequate ventilation

Observe good industrial hygiene practices



HRC® Technical Description

Applications

- Permanent injection wells
- Direct-push injection (barriers and grids)
- Recirculating wells
- Soil borings
- Excavation applications into soil or on top of bedrock
- Gravity feed into bedrock wells

Application instructions for this product are contained in the HRC Application Instructions.

Health and Safety

Avoid contact with eyes, skin, and clothing. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Please review the <u>HRC Safety Data Sheet</u> for additional storage, usage, and handling requirements.





BDI PLUS[®] Technical Description

Bio-Dechlor INOCULUM Plus (BDI PLUS®) is an enriched natural consortium containing species of Dehalococcoides sp. (DHC). BDI PLUS has been shown to simulate the rapid and complete dechlorination of chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC) to non-toxic end products, ethene, carbon dioxide and water.

The culture also contains microbes capable of dehalogenating halomethanes (e.g., carbon tetrachloride and chloroform) and haloethanes (e.g., 1,1,1-TCA and 1,1-DCA) as well as mixtures of these contaminants.



Species of Dehalococcoides sp. (DHC)

For a list of treatable contaminants with the use of BDI PLUS, view the Range of Treatable Contaminants Guide

Chemical Composition

• Non-hazardous, naturally-occurring, non-altered anaerobic microbes and enzymes in a water-based medium.

Properties

- Appearance Murky, yellow to grey water
- Odor Musty
- pH 6.0 to 8.0
- Density Approximately 1.0 grams per cubic centimeter (0.9 to 1.1 g/cc)
- Solubility Soluble in Water
- Vapor Pressure None
- Non-hazardous

Storage and Handling Guidelines

Storage

Store in original tightly closed container

Store away from incompatible materials

Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass

Store in a cool, dry area at 4-5°C (39 - 41°F)

Material may be stored for up to 3 weeks at 2-4°C without aeration

Handling

Avoid prolonged exposure

Observe good industrial hygiene practices

Wear appropriate personal protective equipment



BDI PLUS® Technical Description

Applications

- BDI PLUS is delivered to the site in liquid form and is designed to be injected directly into the saturated zone requiring treatment.
- Most often diluted with de-oxygenated water prior to injection into either hydraulic push injection points or properly constructed injection wells.
- The typical dilution rate of the injected culture is 10 gallons of deoxygenated water to 1 liter of standard BDI PLUS culture.

Application instructions for this product are contained here **BDI PLUS Application Instructions**.

Health and Safety

Material is non-hazardous and relatively safe to handle; however avoid contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including: vinyl or rubber gloves and safety goggles or a splash shield are recommended when handling this product. An eyewash station is recommended. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: <u>BDI PLUS SDS</u>.





Remedial Design Assumptions and Qualifications

Cost Estimate Disclaimer: The cost listed assumes conditions set forth within the proposed scope of work and assumptions and qualifications. Changes to either could impact the final cost of the project. This may include final shipping arrangements, sales tax or application related tasks such as product storage and handling, access to water, etc. If items listed need to be modified, please contact Regenesis for further evaluation.

Shipping Estimates: Shipping estimates are valid for 30 days. All shipping charges are estimates and actual freight charges are calculated at the time of invoice. Additional freight charges may be assessed for any accessorial requested at the time of delivery. The estimate included within assumes standard shipping.

Standard delivery is between 8am -5pm Monday –Friday. *accessorial – can include, but not limited to lift gate and pallet jack at delivery, inside delivery, time definite deliveries, and delivery appointments.

Please communicate any requirements for delivery with the customer service department at the time the order is placed.

Return Policy: To initiate a return please contact your local sales manager for an RMA. A 15% re-stocking fee will be charged for all returned goods. Return freight must be prepaid. All requests to return product must be in original condition and no product will be accepted for return after 90 days from date of delivery.

Professional Judgement: In generating this estimate, REGENESIS relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s), and in reliance upon REGENESIS' prior experience on similar project sites. The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, <u>it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission</u>. When serving as a supplier or subcontractor to an entity which seeks reimbursement from Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the government.



RRS Assumptions and Qualifications

- Cost outlined will be valid for 60 days from date of proposal. If beyond 60 days, REGENESIS
 reserves the right to update cost.
- If applicable, sales tax charges for product, freight, and services are considered estimated at the time of proposal submittal. The appropriate sales tax category (i.e., product, freight, and services) and actual sales tax rate is finalized at the time of invoice and may change from date of proposal submittal.
- Client personnel will take delivery of the remediation chemistry prior to RRS mobilization and arrange for secure storage where the material will not be affected by inclement weather.
 During application activities, the Client will locate the product within 10 feet of the RRS injection trailer.
- Client is responsible for disposal or recycling of totes, drums, pails and pallets. All
 nonhazardous refuse will be collected and placed in a Client-provided on-site refuse
 container for disposal. RRS will collect project related refuse and empty treatment chemistry
 containers daily to keep the site clean.
- A high volume water source (e.g. hydrant) capable of producing at least 30 gpm will be available to RRS for the duration of the project within 300' of the project staging area, at no cost to RRS. RRS will supply 300 linear feet of 1.5 inch National Standard Thread fire hose.
- RRS will have access to the site for equipment operation and secure storage of materials and equipment throughout the duration of the project. All access to each work area location will be clear and free of obstructions. RRS also assumes the injection trailer will be staged within 80 feet of the furthest injection point location.
- Client will provide field water quality meter similar to a YSI 556 with a down-hole sensor, a
 water level meter, bailers and a technician while on-site for injection activities to assist RRS
 in assessing groundwater from monitoring wells.
- Client is responsible for securing any permits prior to mobilizing to the site.
- Client is responsible for all soil, air, and groundwater sampling and analysis.
- Client is responsible for transportation and disposal of any contaminated waste generated on-site, though we do not anticipate generating any such waste during direct push injection activities.
- For safety reasons, access to the treatment area will be limited to RRS and Client personnel.
- The remediation design and injection procedures contain the necessary precautions to minimize the likelihood of surfacing of the treatment chemistry. RRS will monitor treatment chemistry application flow rates and pressures as well as observe for signs of reagent surfacing around active injection areas. If surfacing is detected, RRS will stop or slow down injection activities at that location to stop additional surfacing and remove/vacuum up recoverable surfaced fluid. RRS is not be responsible for treatment chemistry infiltration into undesired locations beyond our visible control.



- RRS will call in a public utility locate for the injection area. Private utility locates will be the Client's responsibility. RRS is not responsible for damage to unmarked utilities and subsurface structures. Client will review as-built drawings with RRS to confirm clearance prior to advancing DPT injection tooling and marking injection point locations.
- RRS personnel will have access to the site for work up to 12 hours per day Monday through Friday (daylight hours). However, the standard workday does not exceed 10 hours with travel time Monday through Friday. A 10-hour workday does not mean 10 hours on-site and/or injection pumping. Additional charges may apply for Saturday and/or Sunday work schedules.
- Pricing and work schedule assume union labor and prevailing wages (Davis-Bacon) are not required.
- Proposal assumes standard probing and drilling will begin at ground surface. If hand augering, concrete coring, or air knife services will be required, additional charges will apply.
- RRS assumes that direct-push style drill rig can access all injection point locations and drive
 injection tooling to the required depth. If site conditions limit the use of the provided directpush rig for any injection point and other drilling methods are required to complete the task,
 additional charges will apply.
- All traffic control requirements will be provided by the Client.
- All injection points will be closed/backfilled with bentonite to ground surface by RRS.
 Additional costs associated with restoration of the ground surface have not been included. If restoration of the ground surface is needed, additional charges will apply.
- Site conditions can change over time and should be monitored post injection. REGENESIS is not responsible for changing site conditions after completing the scope of work and demobilizing from the site. This includes but is not limited to changes related to borehole abandonment (i.e., swelling of backfill material), surface restoration, well conditions, and onsite utilities.
- In generating this estimate, REGENESIS relied upon professional judgment and site-specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.



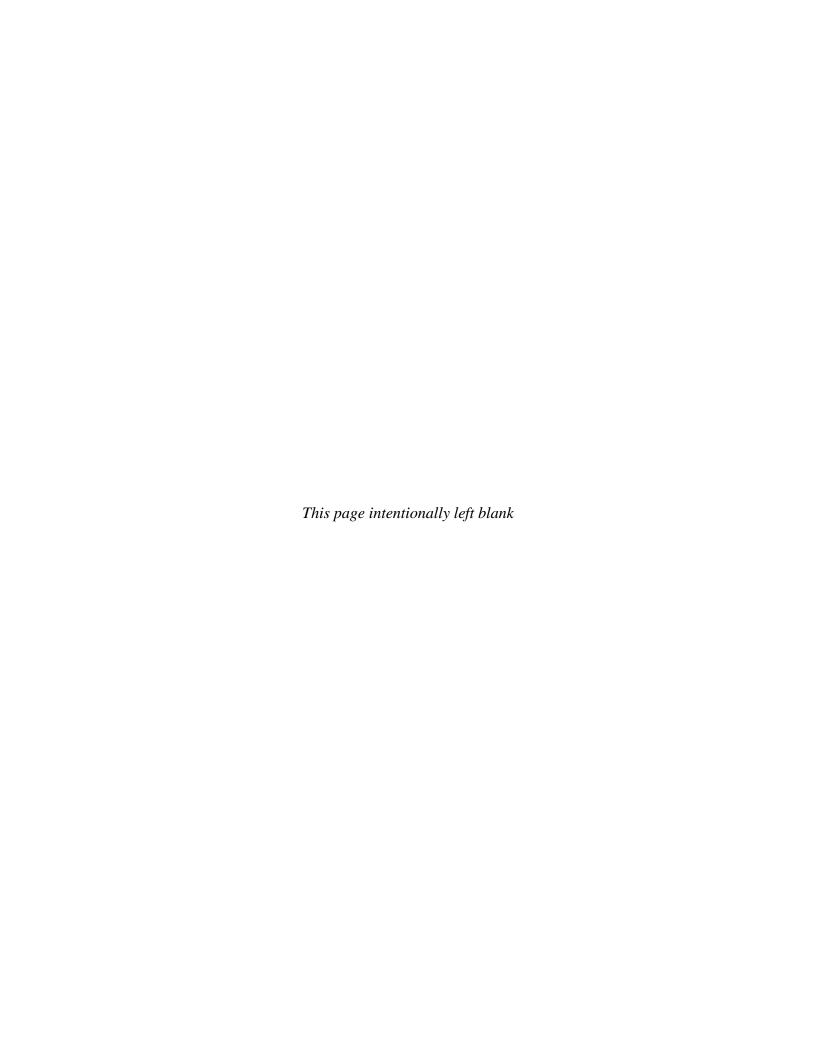
1011 Calle Sombra San Clemente, CA 92673-6244 Tel: 949.366.8000 • Fax: 949.366.8090

Terms and Conditions Products and Services

- **1. PAYMENT TERMS.** Net 30 Days. Accounts outstanding after 30 days will be assessed 1.5% monthly interest. Volume discount pricing will be rescinded on all accounts outstanding over 90 days. An early payment discount of 1.5% Net 10 is available for cash or check payments only. We accept Master Card, Visa and American Express.
- **2. RETURN POLICY.** A 15% re-stocking fee will be charged for all returned goods. All requests to return product must be pre-approved by seller. Returned product must be in original condition and no product will be accepted for return after a period of 90 days.
- **3 FORCE MAJEURE.** Seller shall not be liable for delays in delivery or services or failure to manufacture or deliver due to causes beyond its reasonable control, including but not limited to acts of God, acts of buyer, acts of military or civil authorities, fires, strikes, flood, epidemic, war, riot, delays in transportation or car shortages, or inability to obtain necessary labor, materials, components or services through seller's usual and regular sources at usual and regular prices. In any such event Seller may, without notice to buyer, at any time and from time to time, postpone the delivery or service dates under this contract or make partial delivery or performance or cancel all or any portion of this and any other contract with buyer without further liability to buyer. Cancellation of any part of this order shall not affect Seller's right to payment for any product delivered or service performed hereunder.
- **4. LIMITED WARRANTY.** Seller warrants the product(s) sold and services provided as specified on face of invoice, solely to buyer. Seller makes no other warranty of any kind respecting the product and services, and expressly DISCLAIMS ALL OTHER WARRANTIES OF WHATEVER KIND RESPECTING THE PRODUCT AND SERVICES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE AND NON-INFRINGEMENT.
- **5. DISCLAIMER.** Where warranties to a person other than buyer may not be disclaimed under law, seller extends to such a person the same warranty seller makes to buyer as set forth herein, subject to all disclaimers, exclusions and limitations of warranties, all limitations of liability and all other provisions set forth in the Terms and Conditions herein. Buyer agrees to transmit a copy of the Terms and Conditions set forth herein to any and all persons to whom buyer sells, or otherwise furnishes the products and/or services provided buyer by seller and buyer agrees to indemnify seller for any liability, loss, costs and attorneys' fees which seller may incur by reason, in whole or in part, of failure by buyer to transmit the Terms and Conditions as provided herein.
- **6. LIMITATION OF SELLER'S LIABILITY AND LIMITATION OF BUYER'S REMEDY.** Seller's liability on any claim of any kind, including negligence, for any loss or damage arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair or use of any goods or performance of any services covered by or furnished hereunder, shall in no case exceed the lesser of (1) the cost of repairing or replacing goods and repeating the services failing to conform to the forgoing warranty or the price of the goods and/or services or part thereof which gives rise to the claim. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, OR FOR DAMAGES IN THE NATURE OF PENALTIES.
- **7. INDEMNIFICATION.** Buyer agrees to defend and indemnify seller of and from any and all claims or liabilities asserted against seller in connection with the manufacture, sale, delivery, resale or repair or use of any goods, and performance of any services, covered by or furnished hereunder arising in whole or in part out of or by reason of the failure of buyer, its agents, servants, employees or customers to follow instructions, warnings or recommendations furnished by seller in connection with such goods and services, by reason of the failure of buyer, its agents, servants, employees or customers to comply with all federal, state and local laws applicable to such goods and services, or the use thereof, including the Occupational Safety and Health Act of 1970, or by reason of the negligence or misconduct of buyer, its agents, servants, employees or customers.
- **8. EXPENSES OF ENFORCEMENT.** In the event seller undertakes any action to collect amounts due from buyer, or otherwise enforce its rights hereunder, Buyer agrees to pay and reimburse Seller for all such expenses, including, without limitation, all attorneys and collection fees.
- **9. TAXES.** Liability for all taxes and import or export duties, imposed by any city, state, federal or other governmental authority, shall be assumed and paid by buyer. Buyer further agrees to defend and indemnify seller against any and all liabilities for such taxes or duties and legal fees or costs incurred by seller in connection therewith.

- **10. ASSISTANCE AND ADVICE.** Upon request, seller in its discretion will furnish as an accommodation to buyer such technical advice or assistance as is available in reference to the goods and services. Seller assumes no obligation or liability for the advice or assistance given or results obtained, all such advice or assistance being given and accepted at buyer's risk.
- **11. SITE SAFETY.** Buyer shall provide a safe working environment at the site of services and shall comply with all applicable provisions of federal, state, provincial and municipal safety laws, building codes, and safety regulations to prevent accidents or injuries to persons on, about or adjacent to the site.
- **12. INDEPENDENT CONTRACTOR.** Seller and Buyer are independent contractors and nothing shall be construed to place them in the relationship of partners, principal and agent, employer/employee or joint ventures. Neither party will have the power or right to bind or obligate the other party except as may be expressly agreed and delegated by other party, nor will it hold itself out as having such authority.
- 13. REIMBURSEMENT. Seller shall provide the products and services in reliance upon the data and professional judgments provided by or on behalf of buyer. The fees and charges associated with the products and services thus may not conform to billing guidelines, constraints or other limits on fees. Seller does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where seller may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by seller, it is the sole responsibility of the buyer or other entity seeking reimbursement to ensure the products and services and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, seller does not knowingly present or cause to be presented any claim for payment to the Government.
- **14. APPLICABLE LAW/JURISDICTION AND VENUE**. The rights and duties of the parties shall be governed by, construed, and enforced in accordance with the laws of the State of California (excluding its conflict of laws rules which would refer to and apply the substantive laws of another jurisdiction). Any suit or proceeding hereunder shall be brought exclusively in state or federal courts located in Orange County, California. Each party consents to the personal jurisdiction of said state and federal courts and waives any objection that such courts are an inconvenient forum.
- **15. ENTIRE AGREEMENT.** This agreement constitutes the entire contract between buyer and seller relating to the goods or services identified herein. No modifications hereof shall be binding upon the seller unless in writing and signed by seller's duly authorized representative, and no modification shall be effected by seller's acknowledgment or acceptance of buyer's purchase order forms containing different provisions. Trade usage shall neither be applicable nor relevant to this agreement, nor be used in any manner whatsoever to explain, qualify or supplement any of the provisions hereof. No waiver by either party of default shall be deemed a waiver of any subsequent default.

Appendix D Relevant Site Data Documents





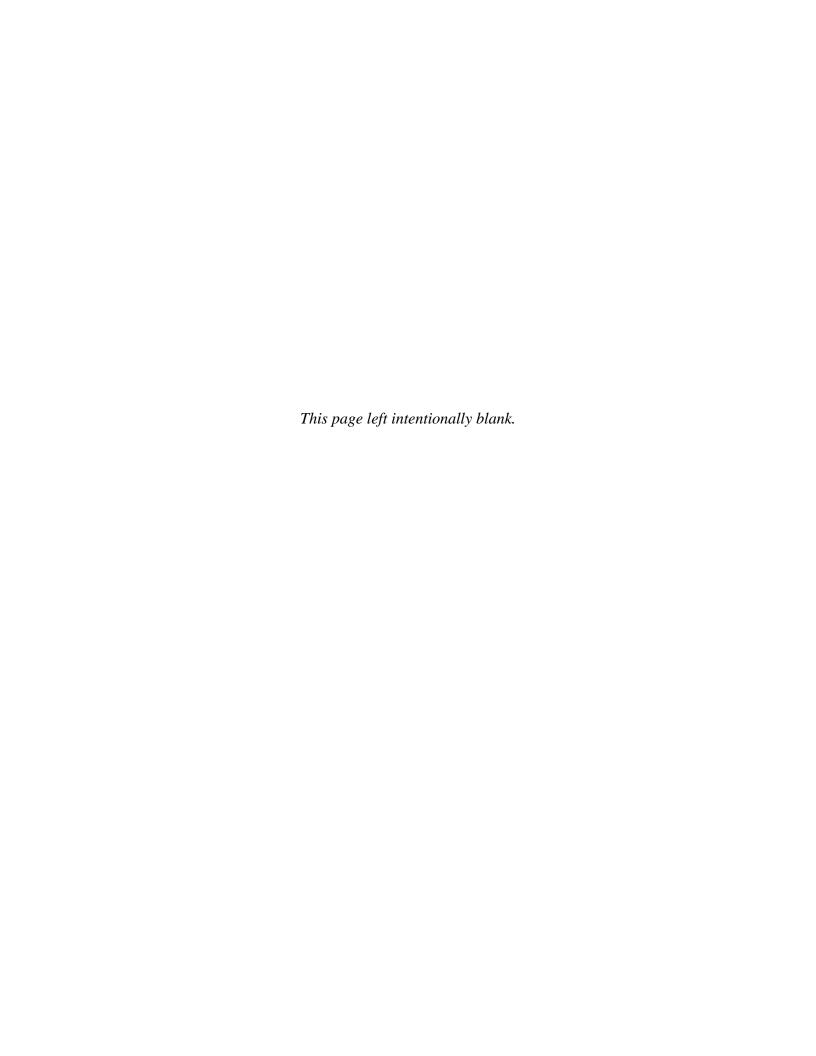


- Crystal Cleaners Property Boundary
- Department of Public Works Property

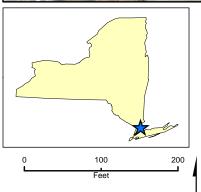
Figure 1 Site Vicinity Map Crystal Cleaners Basis of Design Report Pelham, New York











Site Location



1

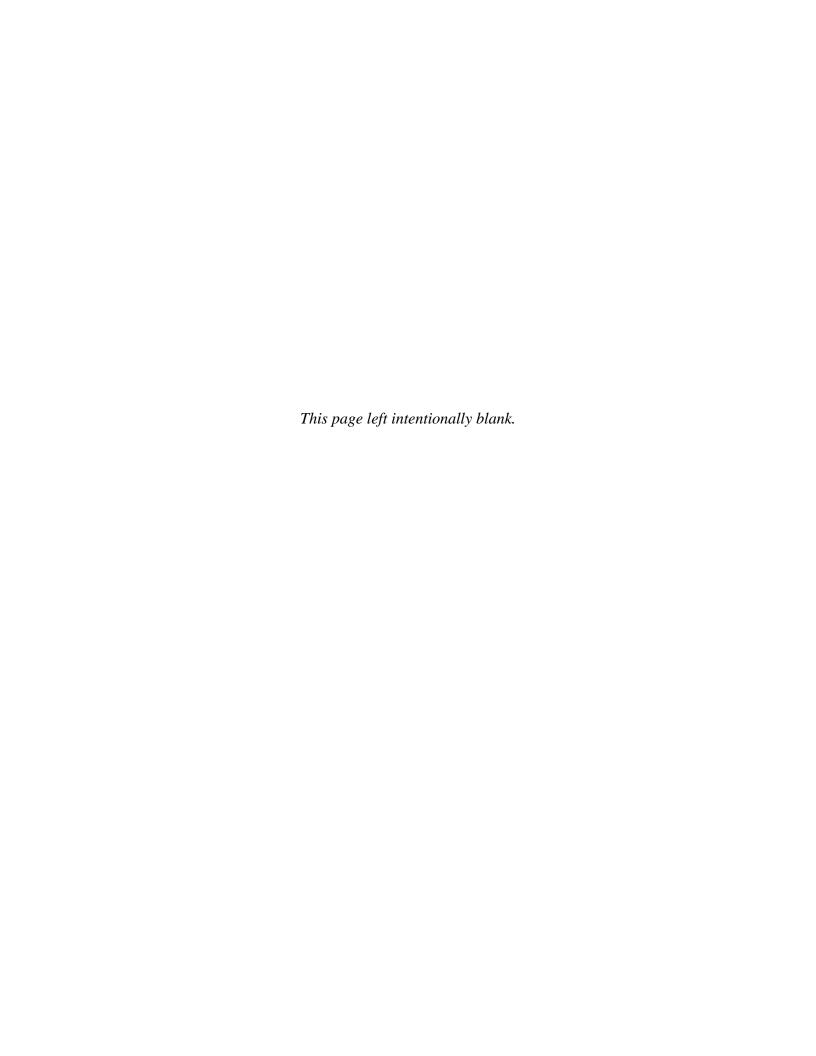
Co-Located Overburden/Bedrock Well

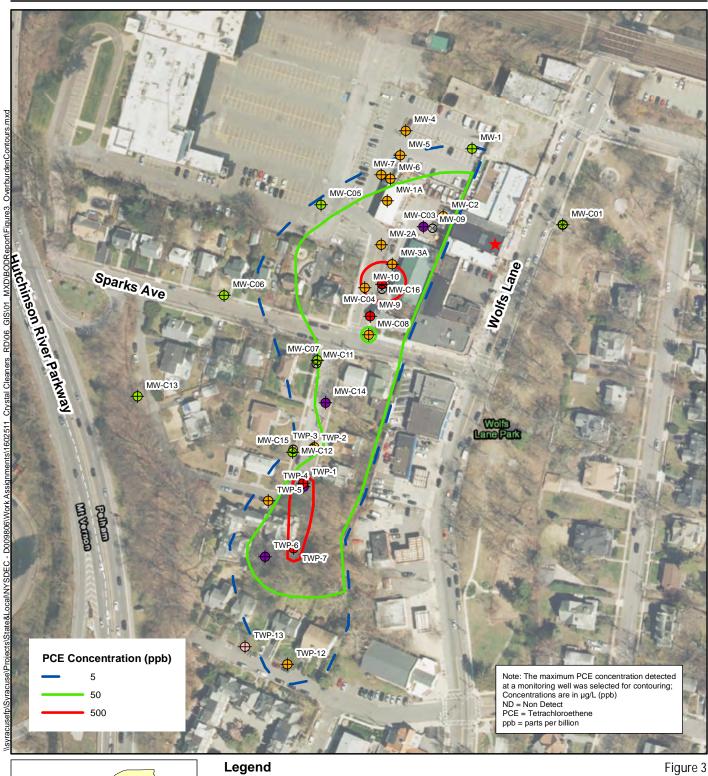
Overburden

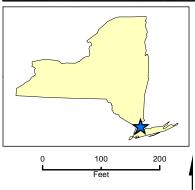
Monitoring Well Network
Crystal Cleaners
Basis of Design Report
Pelham, New York











★ Site Location

⊗ Bedrock

Bedrock/Overburden (ND)

Overburden (>5)

Overburden (>50)

Overburden (>500)

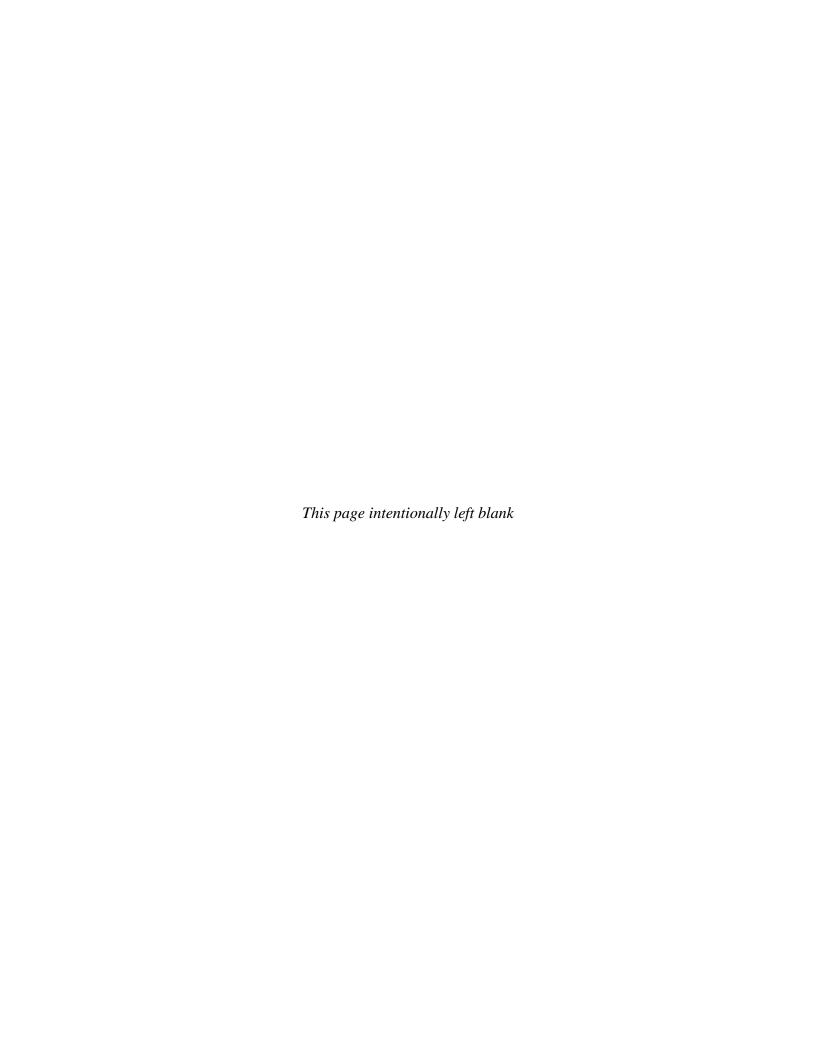
Overburden (ND)

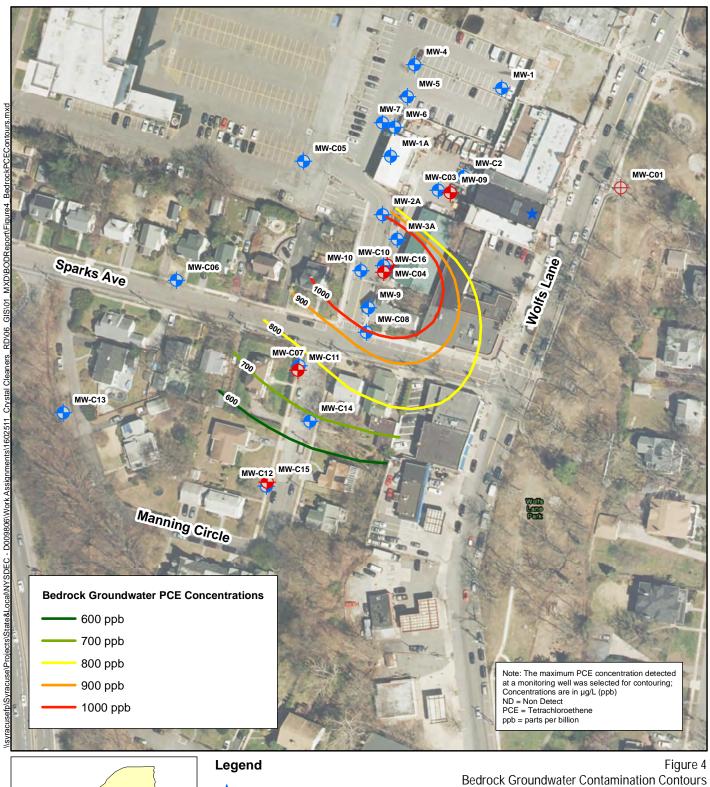
Overburden (ND, 10U)

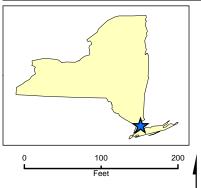
Overburden Groundwater Contamination Contours
Crystal Cleaners
Basis of Design Report
Pelham, New York











Site Location

Bedrock Well

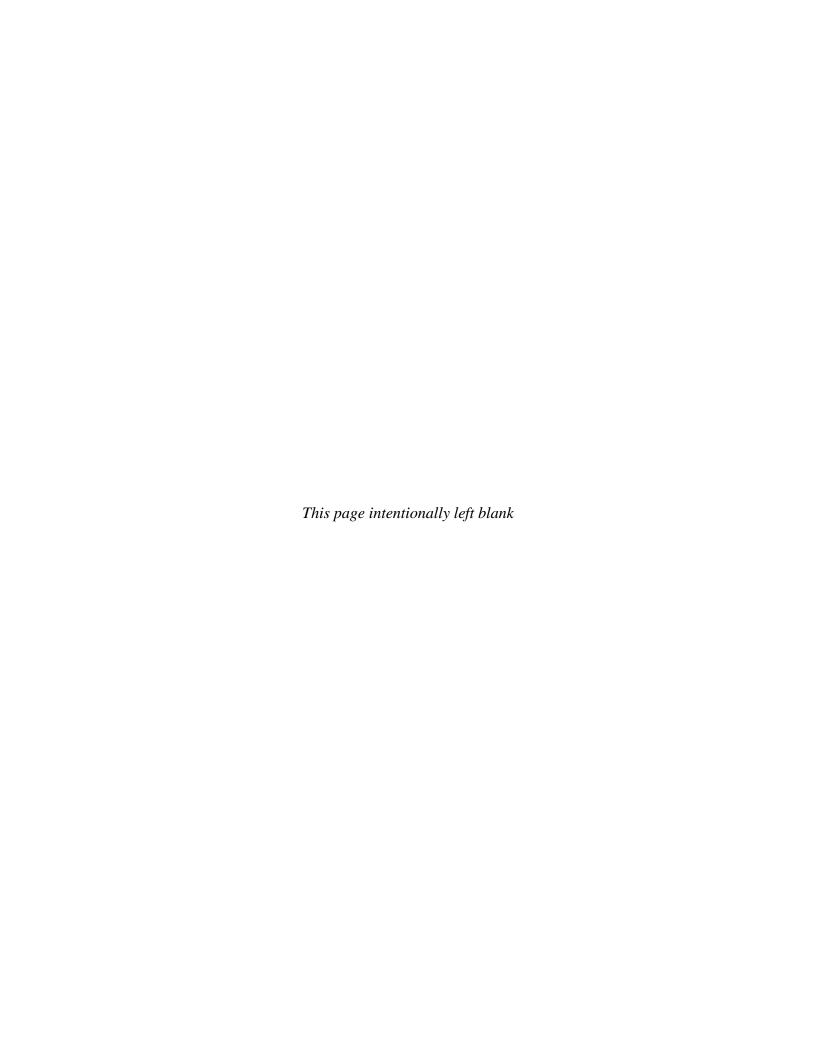
Co-Located Overburden/Bedrock Well

Overburden Well

Figure 4 Bedrock Groundwater Contamination Contours Crystal Cleaners Basis of Design Report Pelham, New York











Site Location

Groundwater Elevation Contour

Well Type



Bedrock Well



Co-Located Overburden/Bedrock Well

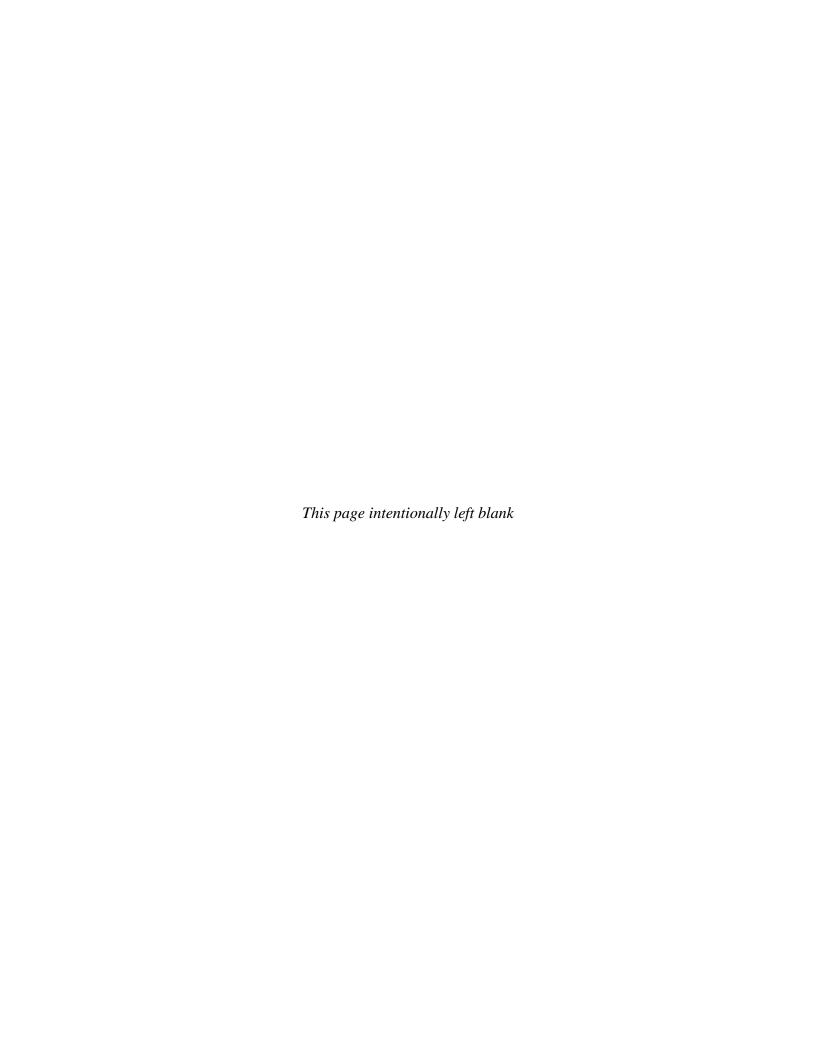


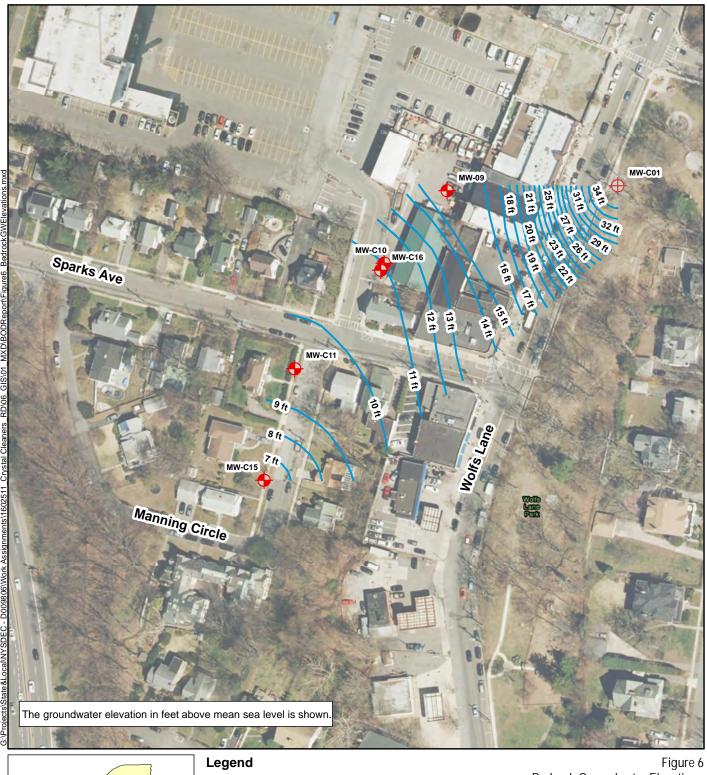
Overburden

Overbuden Groundwater Elevations Crystal Cleaners
Basis of Design Report
Pelham, New York











Bedrock Well

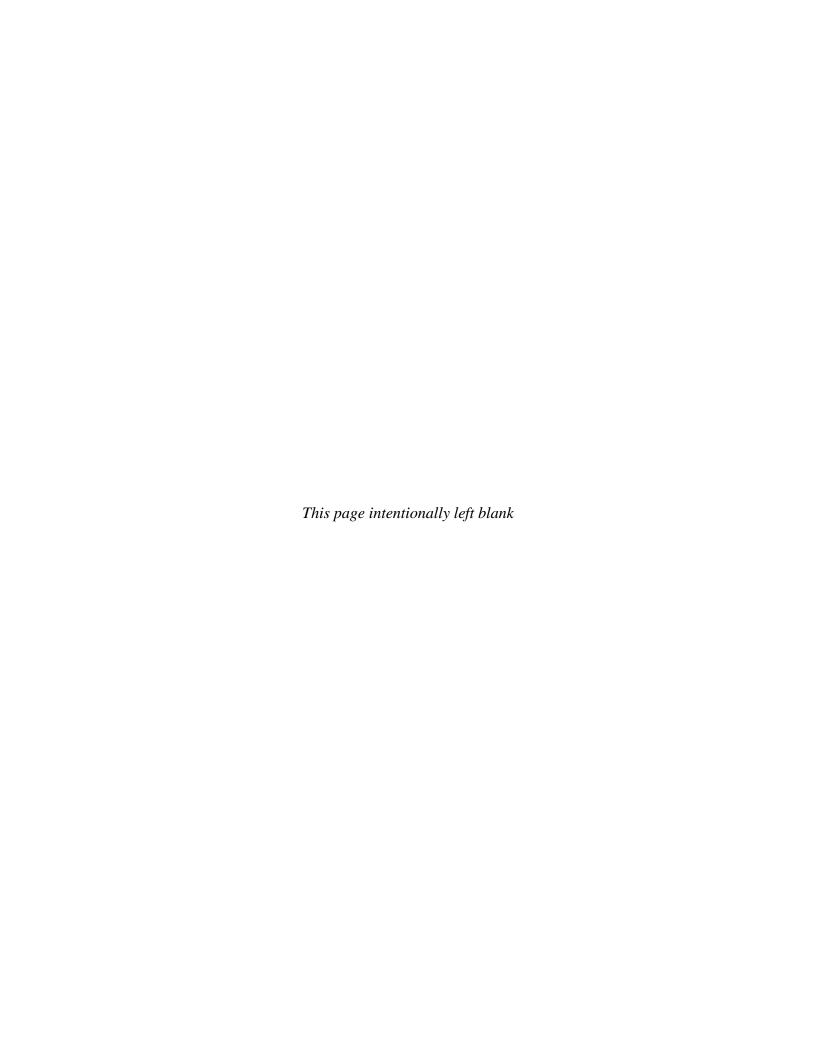
Co-Located Overburden/Bedrock Well

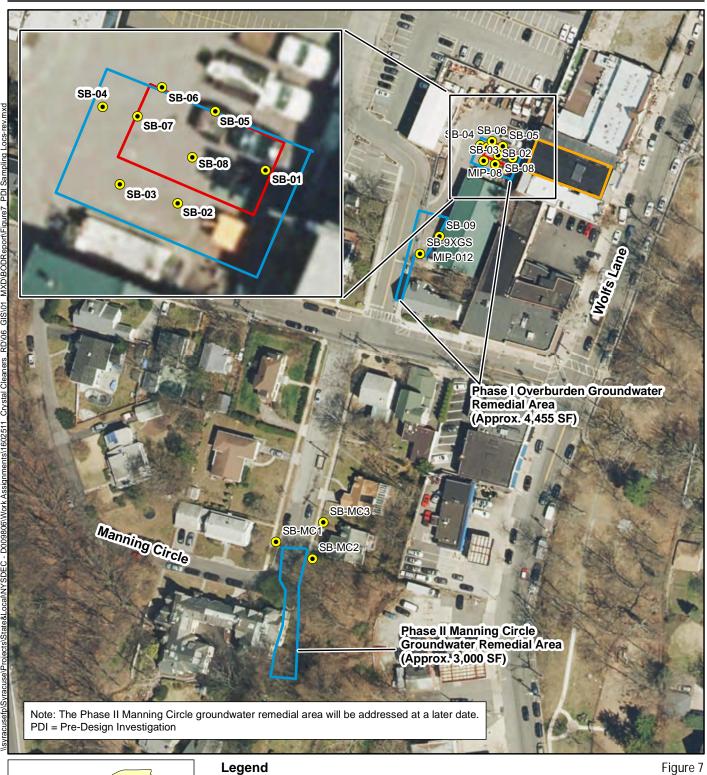
Bedrock Groundwater Elevations (November 2012)

Figure 6 Bedrock Groundwater Elevations Crystal Cleaners Basis of Design Report Pelham, New York











PDI Soil Boring Locations

Crystal Cleaners Property Boundary

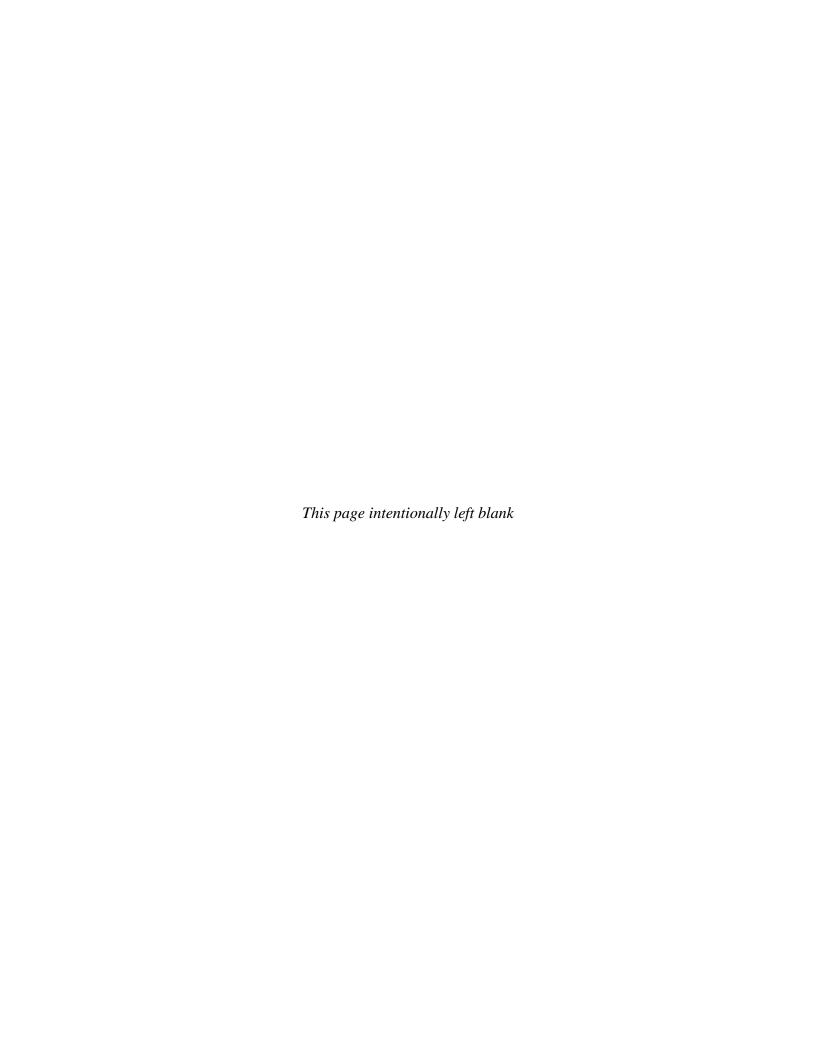
Proposed Excavation Area

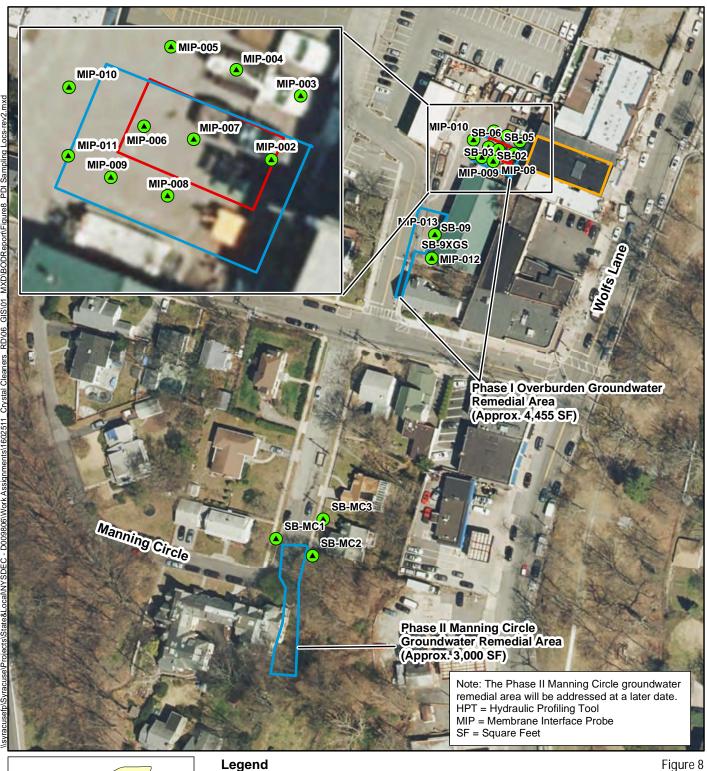
Overburden Groundwater Remedial Area

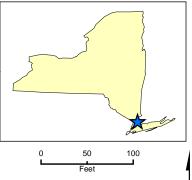
Figure 7 PDI Soil Boring Locations Crystal Cleaners Basis of Design Report Pelham, New York











MIP/HPT Drilling Locations

Crystal Cleaners Property Boundary

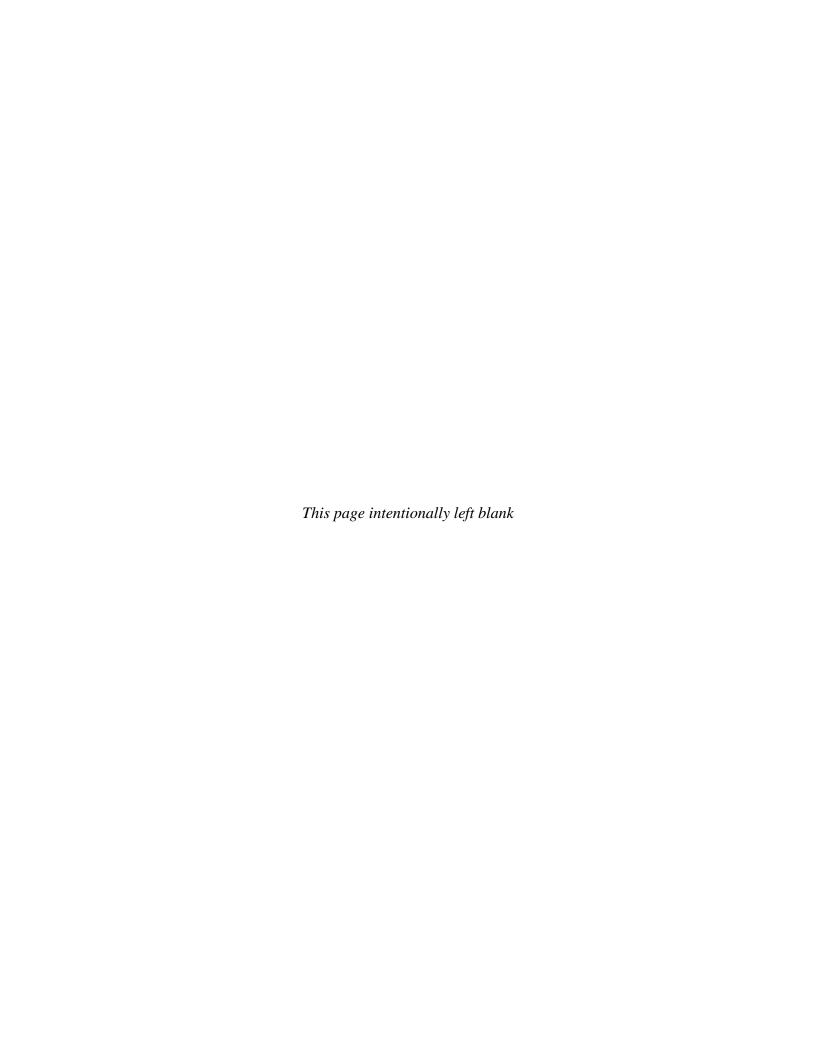
Proposed Excavation Area

Overburden Groundwater Remedial Area

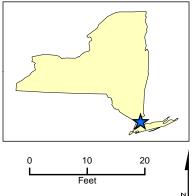
MIP/HPT Boring Locations Crystal Cleaners Basis of Design Report Pelham, New York











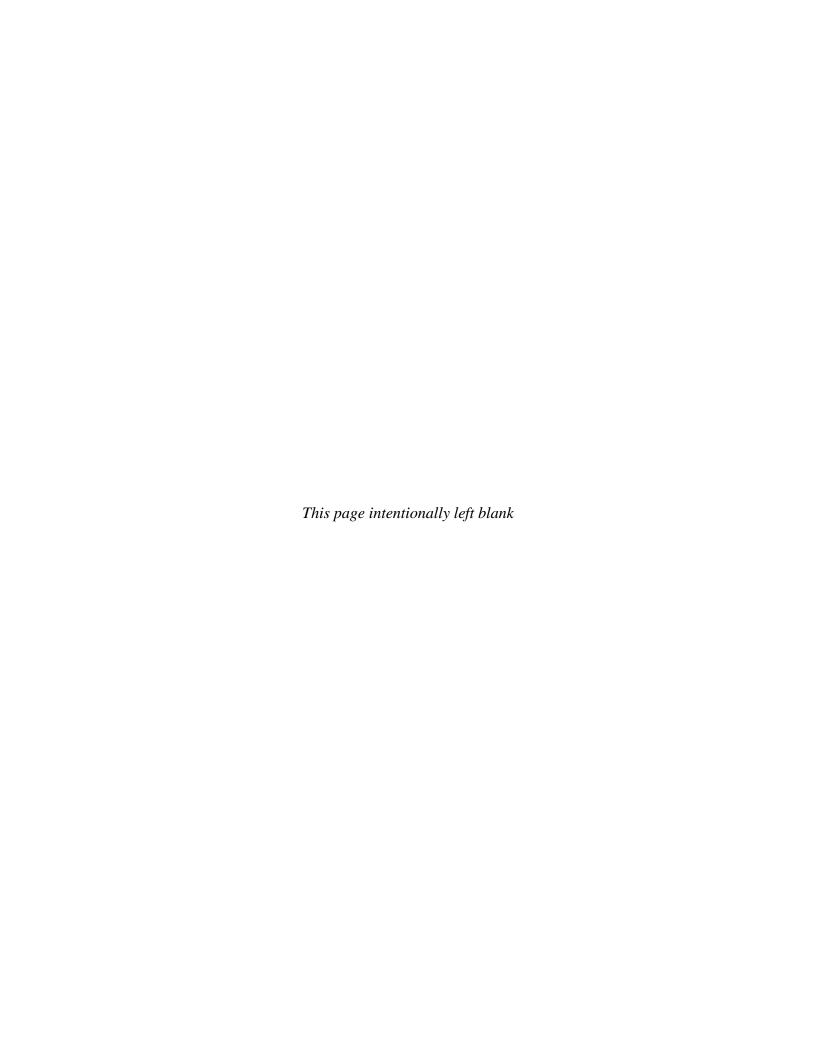
Soil Boring Location

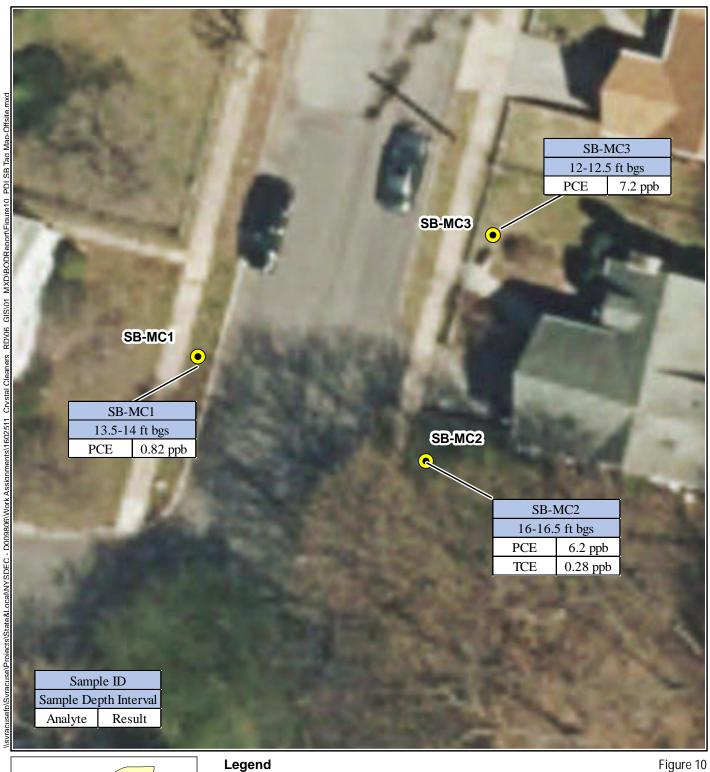
Figure 9
PDI Soil Boring Tag Map (Onsite)
Crystal Cleaners
Pre-Design Investigation
Pelham, New York

Note: Concentrations are presented in parts per billion (ppb) bgs = below ground surface ft = feet PDI = Pre-Design Investigation SCO = Soil Cleanup Objectives











Crystal Cleaners Property Boundary

PDI Soil Boring Locations

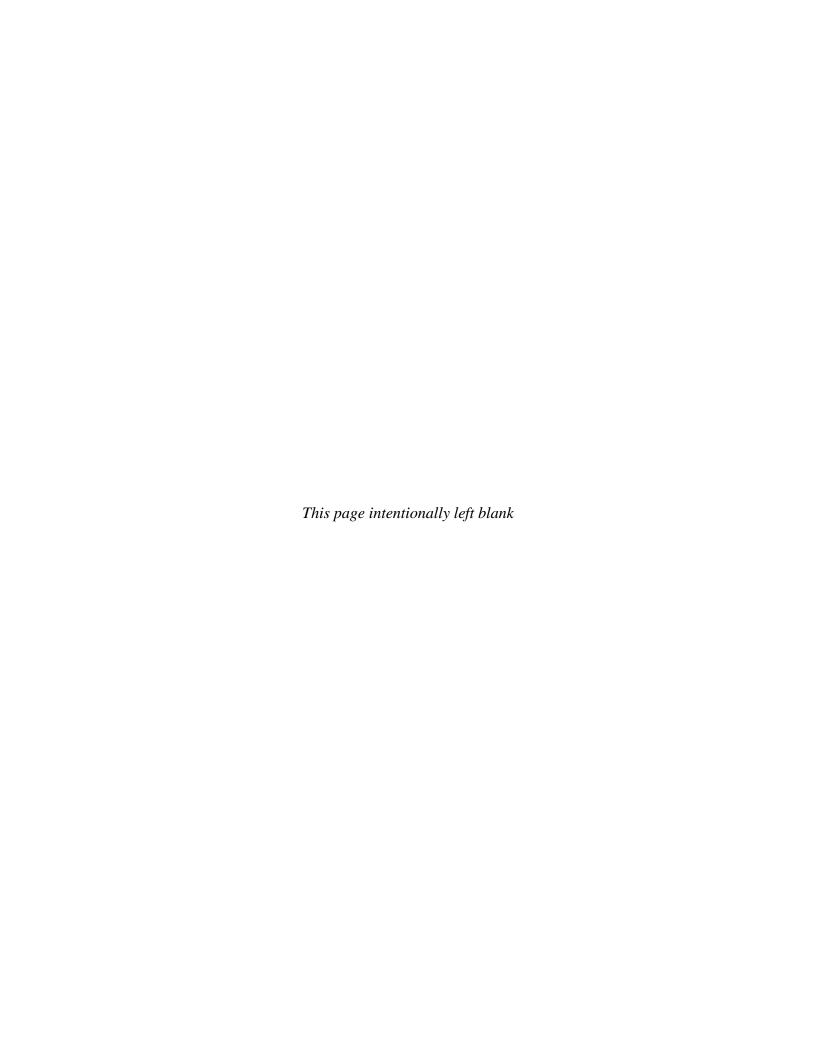
Note: Concentrations are presented in parts per billion (ppb) bgs = below ground surface

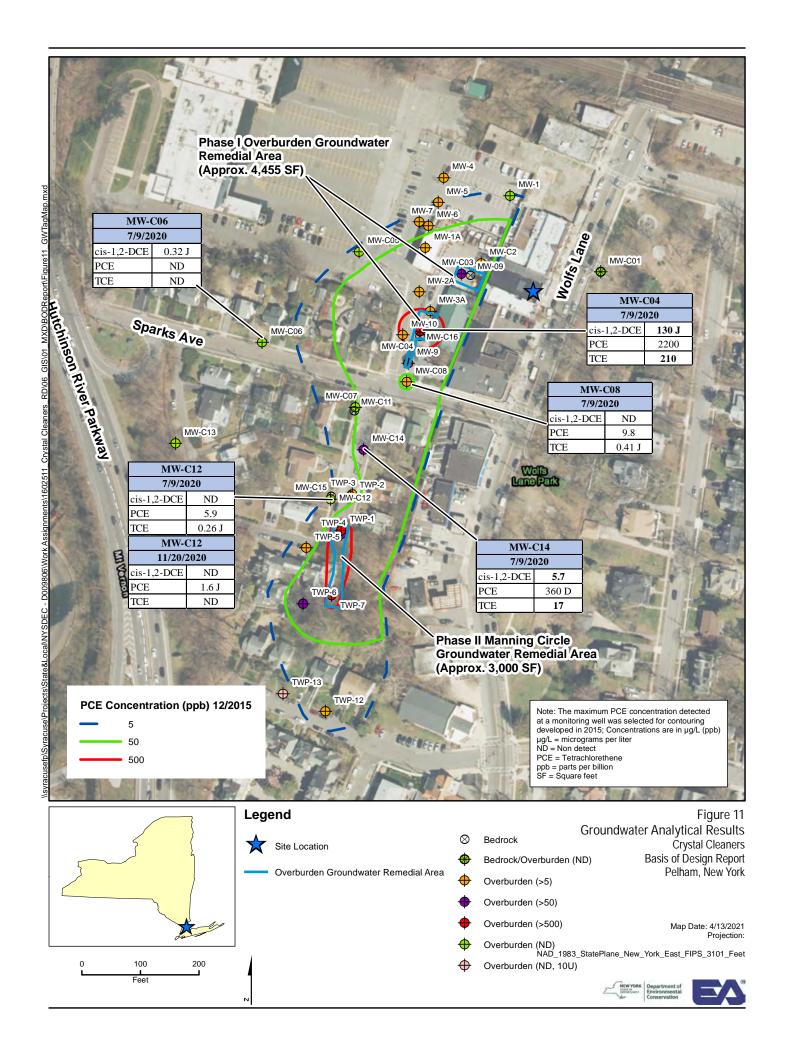
PDI = Pre-Design Investigation SCO = Soil Cleanup Objectives

Figure 10 PDI Soil Boring Tag Map (Offsite) Crystal Cleaners Basis of Design Report Pelham, New York









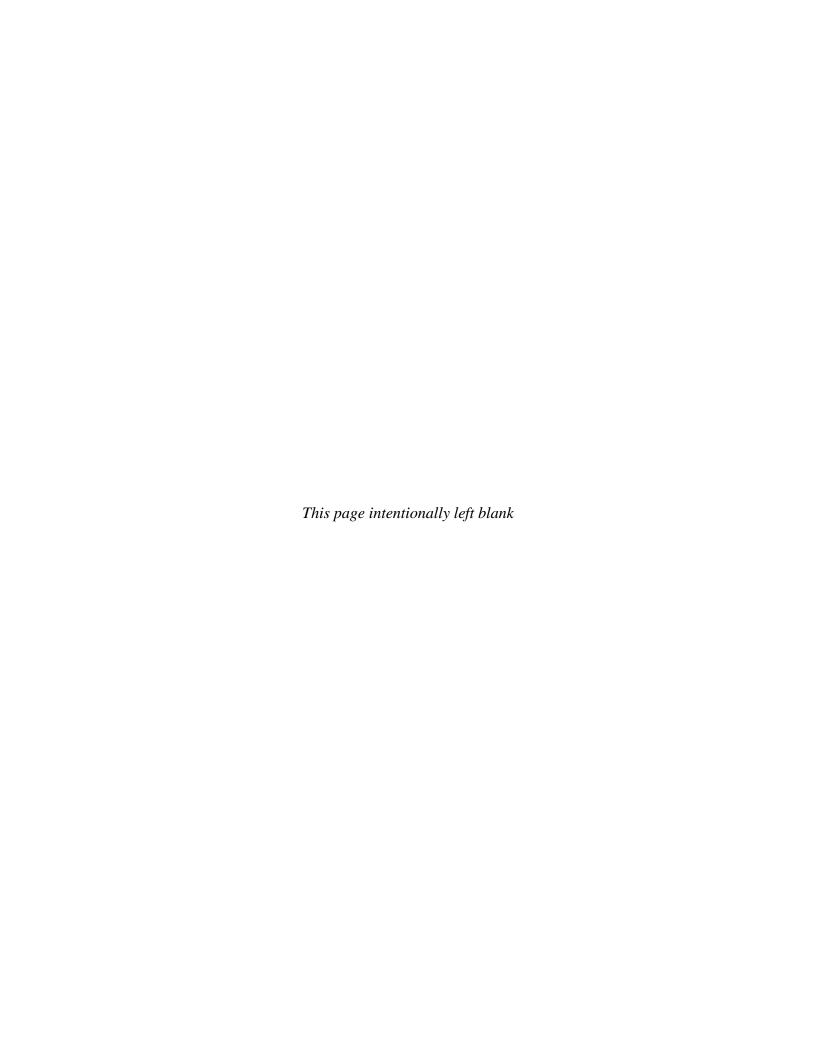


Table 1 Summary of Votile Organic Compounds in Soil Samples

						T HOTE T	summary or voine	8								
	Sample ID	PDI-SB-01-7-8	SB-1X	PDI-SB-02-7.5-8.5	PDI-SB-03-12-13	PDI-SB-Duplicate	PDI-SB-04-11-12	PDI-SB-05-7-8	PDI-SB-06-6-7	PDI-SB-07-7-8	PDI-SB-08-8-9	SB-8X	SB-MC1	SB-MC2	SB-MC3	
	Parent sample	NA	NA	NA	NA	PDI-SB-03-12-13	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	Laboratory ID	R2005991-001	R2011143-01	R2005991-002	R2005991-003	R2005991-004	R2005991-005	R2005991-006	R2005991-007	R2005991-009	R2005991-010	R2011143-02	R2011143-04	R2011143-05	R2011143-06	Unrestricted Use
	Interval (ft bgs)	7-8	7-8	7.5-8.5	12-13	12-13	11-12	7-8	6-7	7-8	8-9	8-9				SCOs ¹ (µg/kg)
	Sample Date	7/9/2020	11/19/2020	7/9/2020	7/9/2020	7/9/2020	7/9/2020	7/9/2020	7/9/2020	7/9/2020	7/9/2020	11/19/2020	11/19/2020	11/19/2020	11/19/2020	
Analyte	Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
							VOCs by I	EPA Method 8260C								
2-Butanone (MEK)	μg/kg	13 U	530 J	12 U	2.3 U	2.5 U	2.3 U	2.4 U	2.5 U	3.4 J	2.8 U	2.5 U	2.2 U	2.4 U	2.4 U	120
Acetone	μg/kg	110	780 U	100	14	14	15	33	15	34	35	5.8 U	5.2 U	5.6 U	5.7 U	50
Chloroform	μg/kg	1.3 U	34 U	1.2 U	0.23 U	0.25 U	0.23 U	0.24 U	0.25 U	0.27 U	0.28 U	0.39 J	0.22 U	0.33 J	0.73 J	370
Dichloromethane	μg/kg	18 U	470 U	18 J	3.3 U	3.4 J	4.7 J	3.6 J	4.5 J	5.2 J	5.8 J	3.5 U	0.22 U	0.24 U	0.24 U	50
Tetrachloroethene (PCE)	μg/kg	18,000 D	45,000 E	470	0.27 U	0.28 U	15	4 ј	96	89	170	460 E	0.82 J	6.2	7.2	1300
Toluene	μg/kg	4.8 J	34 U	1.2 U	0.23 U	0.25 U	1.4 J	0.5 J	0.87 J	1.1 J	1.4 J	0.43 J	0.22 U	0.24 U	0.24 U	700
Trichloroethene (TCE)	μg/kg	5.2 J	77 J	1.3 U	0.26 U	0.27 U	0.25 U	0.26 U	0.61 J	0.35 J	0.45 J	1.3 J	0.25 U	0.28 J	0.27 U	470
Vinyl Chloride	μg/kg	3.0 U	77 U	2.7 U	0.53 U	0.56 U	0.52 U	0.53 U	0.57 U	0.61 U	0.63 U	0.56 U	0.51 U	0.55 U	0.55 U	20
cis-1,2-Dichloroethene	μg/kg	1.3 U	34 U	1.2 U	0.23 U	0.25 U	0.23 U	0.24 U	0.25 U	0.27 U	0.25 U	0.25 U	0.22 U	0.24 U	0.24 U	250
m,p-Xylenes	μg/kg	2.4 U	62 U	2.1 U	0.43 U	0.45 U	0.42 U	0.43 U	0.46 U	0.49 U	0.51 U	0.58 J	0.41 U	0.44 U	0.45 U	
o-Xylene	μg/kg	1.3 U	34 U	1.2 U	0.23 U	0.25 U	0.23 U	0.24 U	0.25 U	0.27 U	0.28 U	0.25 J	0.22 U	0.24 U	0.24 U	
Xylenes, total	μg/kg	3.7 U	96 U	3.3 U	0.66 U	0.70 U	0.65 U	0.67 U	0.71 U	0.76 U	0.79 U	0.83 J	0.22 U	0.24 U	0.24 U	1600
trans-1,2-Dichloroethene	μg/kg	1.3 U	34 U	1.2 U	0.23 U	0.25 U	0.23 U	0.24 U	0.25 U	0.27 U	0.28 U	0.25 U	0.22 U	0.24 U	0.24 U	190
trans-1,3-Dichloropropene	μg/kg	1.3 U	34 U	1.2 U	0.23 U	0.25 U	0.23 U	0.24 U	0.25 U	0.27 U	0.28 U	0.25 U	0.22 U	0.24 U	0.24 U	

NOTES:

1 New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation, 6 New York Code of Rules and Regulations Part 375 Environmental Remediation Programs Objectives (2006).

ID = Identification

EPA = U.S. Environmental Protection Agency

SCO = Soil Cleanup Objective

VOC = Volatile organic compound

ft bgs = Foot (feet) below ground surface

lt ogs – root (eet) below ground statace
µg/kg = Microegrams(s) per kilogram
% = Percent
U = Analyte not detected above method detection limit.

E = Concentration has exceeded the calibration range for that specific analysis.

J = Result is estimated.

B = Analyte was also detected in the associated method blank.

Shaded cells indicate that the analyte was detected greater than the NYSDEC Unrestricted Use Soil Cleanup Objective.

Analytical results provided by ALS Environmental.



Table 2 Summary of Grain Size in Soil Samples

	Sample ID	PDI-SB-	09-9.5-24	SB-	9GS	SB-N	MC2	
	Laboratory ID			R20111	43-003	R2011143-005		
	Interval (ft bgs)	9.5	- 24	8 -	20	12 - 20 11/19/2020		
	Sample Date	7/9/2	2020	11/19	/2020	11/19		
Analyte	Sample Type	Soil		Soil		Soil		
Parti								
Description	Sieve Size	Retained wt%	Passing wt%	Retained wt%	Passing wt%	Retained wt%	Passing wt%	
Gravel, Coarse	No. 3/4"	12.7	87.3	10.9	89.1	7.1	92.9	
Gravel, Medium	No. 3/8"	2.6	84.7	11.6	77.8	7.5	85.5	
Gravel, Fine	No. 4	7.2	77.5	8.8	68.6	7.9	77.5	
Sand, Coarse	No. 10	10.7	66.9	12.5	56.1	12.7	64.8	
Sand, Medium (#20)	No. 20	12.7	54.2	8.5	47.6	12.3	52.5	
Sand, Medium (#40)	No. 40	16.7	37.5	20.7	27	24.7	27.8	
Sand, Fine (#60)	No. 60	13.8	23.7	14.7	12.3	18.9	8.9	
Sand, Fine (#140)	No. 140	12.7	11.0	7.8	4.5	6.3	2.6	
Sand, Fine (#200)	No. 200	2.9	8.0	0.9	3.6	0.5	2.1	

NOTES:

ID = Identification

ASTM = ASTM International

ft bgs = Foot (feet) below ground surface

% = Percent

%wt = percent weight

Analytical results provided by ALS Environmental.

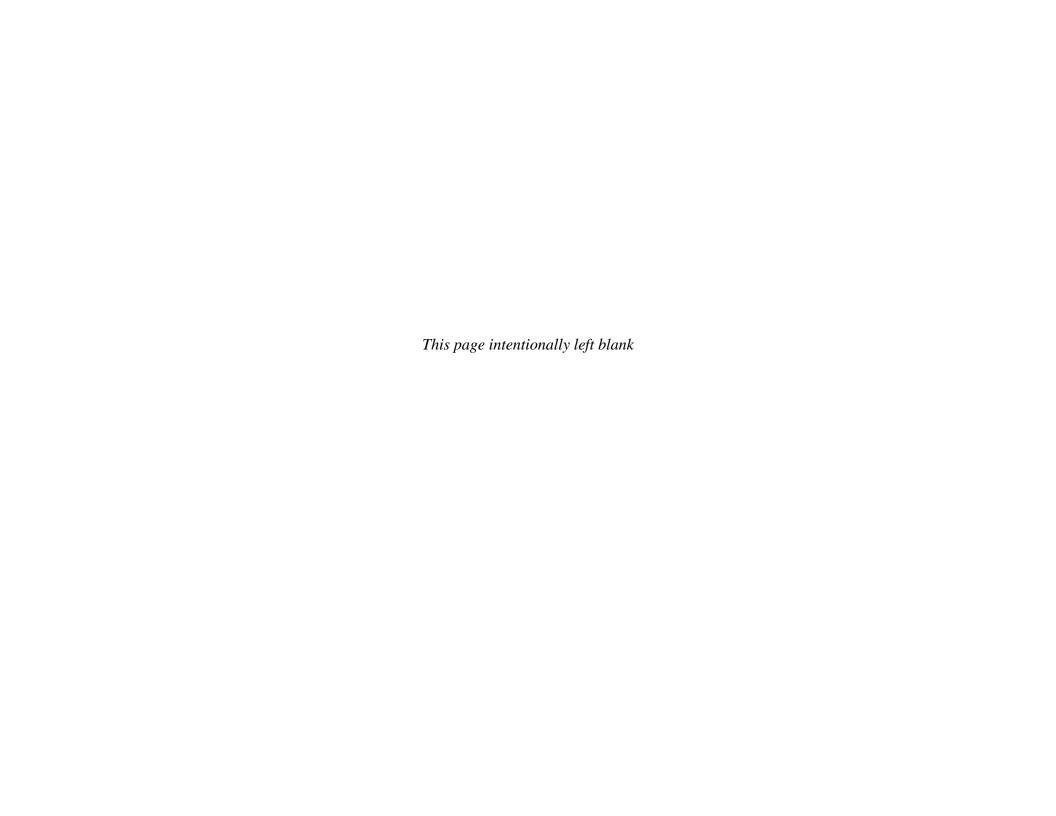


Table 3 Summary of Volatile Organic Compounds in Groundwater Samples

	Sample ID	MW-C06	MW-C		MW-C		MW-C14	MW-C	12	MW-C	12	NYSDEC Ambient
	Laboratory ID	R2005995-003	R200599		R2005995		R2005841-001	R2005841		R2001114		Water Quality
Analyte	-	7/9/2020	7/9/20		7/9/202		7/7/2020	7/7/202		11/20/20		Standards or
	Sample Date											Guidance Values ¹
	Sample Type	Groundwater	Groundy		Groundw	vater	Groundwater	Groundw	ater	Groundw	ater	Guidance values
			VOCs via E	PA Met	hod 8260							
1,1,1-Trichloroethane (TCA)	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
1,1,2,2-Tetrachloroethane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
1,1,2-Trichloroethane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	1
1,1,2-Trichloro-1,2,2-trifluoroethane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
1,1-Dichloroethane (1,1-DCA)	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
1,1-Dichloroethene (1,1-DCE)	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
1,2,4-Trichlorobenzene	μg/L	0.34 U	0.34	U	8.5	U	0.34 U	0.34	U	0.34	U	5
1,2-Dibromo-3-chloropropane (DBCP)	μg/L	0.45 U	0.45	U	12	U	0.45 U	0.45	U	0.45	U	NS
1,2-Dibromoethane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
1,2-Dichlorobenzene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	3
1,2-Dichloroethane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	0.6
1,2-Dichloropropane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	1
1,3-Dichlorobenzene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	3
1,4-Dichlorobenzene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	3
2-Butanone (MEK)	μg/L	0.78 U	0.78	U	20	U	0.78 U	0.78	U	0.78	U	NS
2-Hexanone	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
4-Methyl-2-pentanone	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Acetone	μg/L	5.0 U	8.9	J	130	U	5.0 U	5.0	U	5.0	U	NS
Benzene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	1
Bromodichloromethane	μg/L	0.20 U	0.20	U	5.0	U	0.77 J	0.20	U	0.20	U	NS
Bromoform	μg/L	0.25 U	0.25	U	6.3	U	0.25 U	0.25	U	0.25	U	NS
Bromomethane	μg/L	0.70 U	0.70	U	18	U	0.70 U	0.70	U	0.70	U	NS
Carbon Disulfide	μg/L	0.42 U	0.42	U	11	U	0.42 U	0.42	U	0.42	U	120
Carbon Tetrachloride	μg/L	0.34 U	0.34	U	8.5	U	0.34 U	0.34	U	0.34	U	5
Chlorobenzene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Chloroethane	μg/L	0.23 U	0.23	U	5.8	U	0.23 U	0.23	U	0.23	U	NS
Chloroform	μg/L	0.24 U	0.24	U	6.0	U	9.6	0.28	J	0.24	U	7
Chloromethane	μg/L	0.28 U	0.28	U	7.0	U	0.40 BJ	0.37	BJ	0.28	U	NS
Cyclohexane	μg/L	0.26 U	0.26	U	6.5	U	0.26 U	0.26	U	0.26	U	NS
Dibromochloromethane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Dichlorodifluoromethane (CFC 12)	μg/L	0.21 U	0.21	U	5.3	U	0.21 U	0.21	U	0.21	U	NS
Dichloromethane	μg/L	0.65 U	0.65	U	17	U	0.65 U	0.65	U	0.65	U	5
Ethylbenzene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Isopropylbenzene (Cumene)	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Methyl Acetate	μg/L	0.33 U	0.33	U	8.3	U	0.33 U	0.33	U	0.33	U	NS
Methyl tert-Butyl Ether	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Methylcyclohexane	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Styrene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.20	U	0.20	U	NS
Tetrachloroethene (PCE)	μg/L	0.21 U	9.8		2200		360 D	5.9		1.60	J	NS
Toluene	μg/L	0.20 U	0.22	J	5.0	U	0.20 U	0.20	U	0.20	U	NS
Trichloroethene (TCE)	μg/L	0.20 U	0.41	J	210		17	0.26	J	0.20	U	5
Trichlorofluoromethane (CFC 11)	μg/L	0.24 U	0.24	U	6.0	U	0.24 U	0.24	U	0.24	U	NS
Vinyl Chloride	μg/L	0.20 U	0.20	U	6.5	J	0.20 U	0.20	U	0.20	U	2
cis-1,2-Dichloroethene	μg/L	0.32 J	0.23	U	130	J	5.7	0.23	U	0.23	U	5
cis-1,3-Dichloropropene	μg/L	0.20 U	0.20	U	5.0	U	0.20 U	0.23	U	0.20	U	NS
m,p-Xylenes	μg/L	0.20 U	0.20	U	5.0	U	0.23 U	0.23	U	0.20	U	5
o-Xylene	μg/L	0.20 U	0.20	U	5.0	U	0.23 U	0.23	U	0.20	U	5
trans-1,2-Dichloroethene	μg/L	0.20 U	0.20	U	9.7	J	0.28 J	0.2	U	0.20	U	5
trans-1,3-Dichloropropene	μg/L	0.23 U	0.23	U	5.8	U	0.23 U	0.23	U	0.23	U	0.4
NOTES:		-					•					

*New York Code of Rules and Regulations Part 703.5 Class GA Groundwater Quality Regulations, as presented in the Division of Water Technical and Operational Guidance Series 1.1.1, 1998, as amended. ID = Identification

Bold and shaded values indicate that the analyte was detected greater than the NYSDEC Ambient Water Quality Standards or Guidance Values.

If the method detection limit for a non-detect (U) result was greater than the corresponding standard or guidance value, then the result was flagged as an exceedance.

Analytical data results provided by ALS Environmental.

 $[\]mu g/L = Microgram(s)$ per liter

U = Analyte was not detected; method detection limit indicated in parenthesis.

B = Analyte was also detected in the associated method blank.

J = Result is estimated.

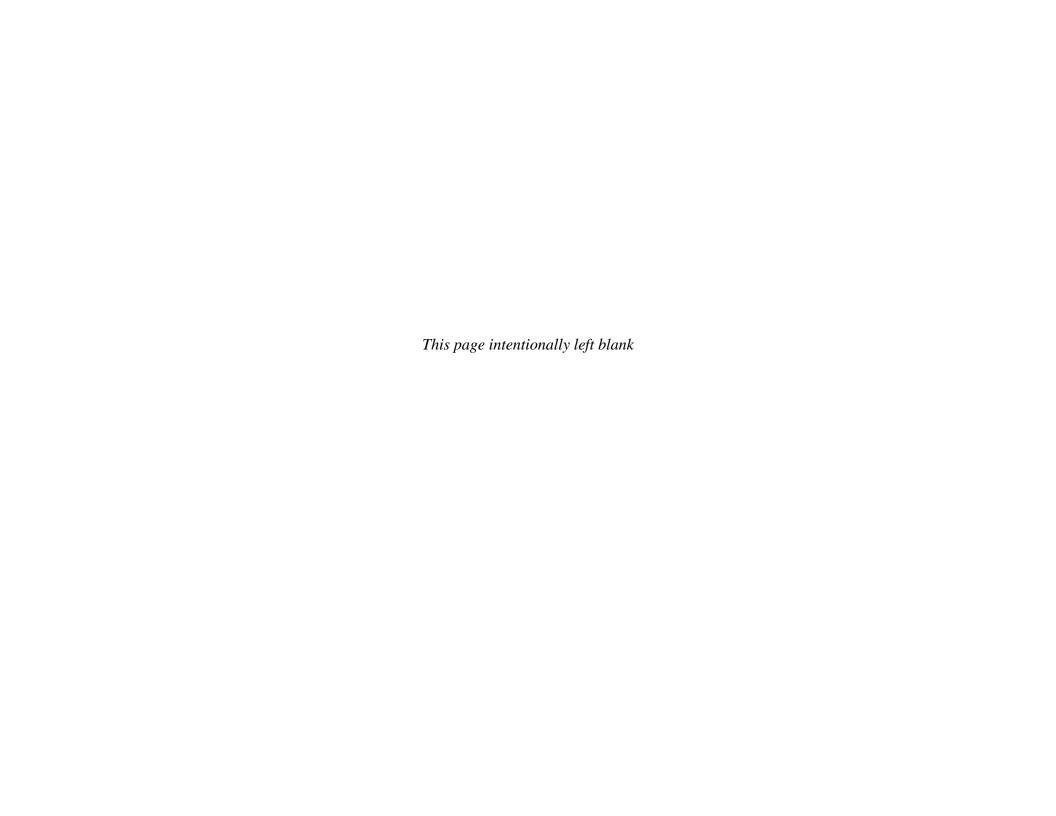


Table 4 Summary of Monitored Natural Attenuation Parameters in Groundwater Samples

Table 4 Summary of Monteon	Sample ID	MW-C0		MW-C		MW-C12		
	Laboratory ID	_	R2005995-005		R2005995-001		R2011142-001	
	Sample Date	7/10/202	20	7/9/202	20	11/20/2020		
Analyte	Sample Type	Water			r	Water	•	
	ters		<u> </u>					
Ethane	μg/L	0.17	U	0.17	U	0.17	U	
Ethylene	μg/L	0.35	U	0.35	U	0.35	U	
Methane	μg/L	0.75	U	0.75	U	0.75	U	
Propane	μg/L	0.28	U	0.28	U	0.28	U	
Ammonia as Nitrogen	mg/L	0.026	U	0.026	U	0.026	U	
Phosphorus, Total	mg/L	0.778		0.043	J	0.124		
Chemical Oxygen Demand, Total	mg/L	5.3		9.7		5.9		
Iron, total	μg/L	8,830		3,260		22,900		
Iron, dissolved	μg/L	77.4	J	100	U	100	U	
Manganese, total	μg/L	1,110		4,510		3,360		
Manganese, dissolved	μg/L	647		967		692		
Sulfide, Acid-Soluble	mg/L	1.0	U	1.0	U	1.0	U	
Chloride	mg/L	284		704		475		
Nitrate as Nitrogen	mg/L	0.2	U	3.7		2.7		
Sulfate	mg/L	30.7		47.6		45.1		
Alkalinity, total as CaCO3	mg/L	120		104		117		
Biochemical Oxygen Demand (BOD)	mg/L	2.0	U	2.0	U	2.0	U	
Total Organic Carbon (TOC)	mg/L	1.5		1.4		1.7		

NOTES:

MNA = Monitored natural attenuation

 μ g/L = Milligram(s) per liter

mg/L = Milligram(s) per liter

U = Analyte was not detected; method detection limit is shown.

J = Result is estimated.

Analytical data results provided by ALS Environmental.

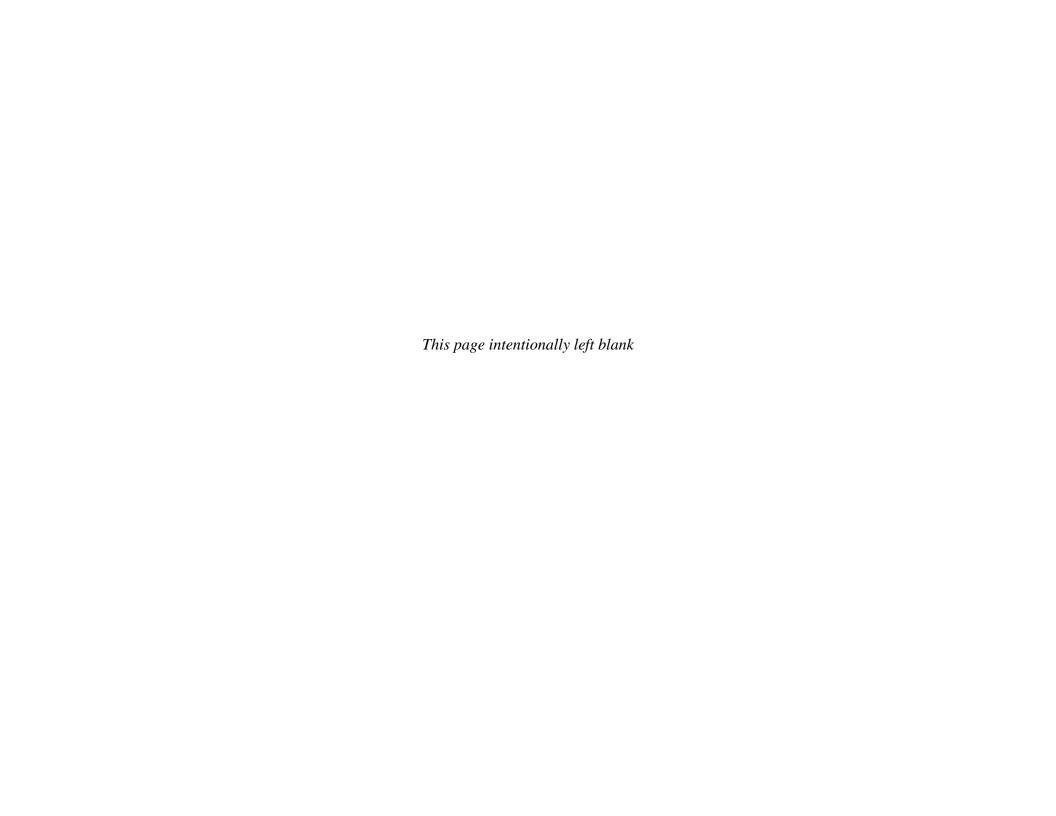


Table 5 Toxicity Characteristic Leaching Procedure Analytical Results

		Sample ID	PDI-SB-07-4-6	PDI-SB-08-8-9	SB-1X	SB-8X	
		Laboratory ID	3114717001	3114717002	R2011143-001	R2011143-002	
		Sample Date	7/9/2020	7/9/2020	11/19/2020	11/19/2020	
Analyte	RCRA TCLP	Unit	Result	Result	Result	Result	
·	ROLL FOLL	Cint	Kesuit	Result	Result	Result	
Metals (6010C)			(.0.040.77		(0 0 1 0 1 1	(.0.040 77	
Arsenic	5.0	mg/L	(<0.046) U	(<0.046) U	(<0.046) U	(<0.046) U	
Barium	100.0	mg/L	(<0.94) U	(<0.94) U	(<0.94) U	(<0.94) U	
Cadmium, Total	1.0	mg/L	0.0067 J	(<0.94) U	(<0.0037) U	0.038	
Chromium, Total	5.0	mg/L	(<0.010) U	(<0.0037) U	(<0.010) U	(<0.010) U	
ead	5.0	mg/L	0.028 J	0.027 J	(<0.011) U	0.15	
Mercury	0.2	mg/L	(<0.00066) U	(<0.00066) U	(<0.00066) U	(<0.00066) U	
elenium	1.00	mg/L	(<0.037) U	(<0.037) U	(<0.037) U	(<0.037) U	
ilver	5.0	mg/L	(<0.0070) U	(<0.0070) U	(<0.0070) U	(<0.0070) U	
CPA Pesticides (8081B)	5.0	mg L	('0.0070) C	(10.0070) 0	(10.0070) 0	(0.0070) C	
amma-BHC		ma/I	(<0.0001) U	(<0.0001) U	(<0.00096) U	(<0.00096) U	
	0.03	mg/L	(<0.0001) U	(<0.0032) U	(<0.0016) U	(<0.0016) U	
Clordane		mg/L	· /	` /	, ,	,	
Indrin	0.02	mg/L	(<0.000060) U	(<0.000060) U	(<0.00012) U	(<0.00012) U	
Ieptachlor	0.008	mg/L	(<0.000080) U	(<0.000080) U	(<0.00012) U	(<0.00012) U	
Ieptachlor Epoxide		mg/L	(<0.000080) U	(<0.000080) U	(<0.000080) U	(<0.000080) U	
Methoxychlor	10.0	mg/L	(<0.00020) U	(<0.00020) U	(<0.00027) U	(<0.00027) U	
oxaphene	0.5	mg/L	(<0.0106) U	(<0.0106) U	(<0.0038) U	(<0.0038) U	
PA Herbicides (8151A)	10.0		(0.0122) 11		(-0.0120) **	(.0.0122) 77	
,4-D .4.5-TP	10.0	mg/L	(<0.0132) U	(<0.0132) U	(<0.0132) U	(<0.0132) U	
/olatile Organic Compounds (8260C)	1.00	mg/L	(<0.0018) U	(<0.0018) U	(<0.0018) U	(<0.0018) U	
Benzene	0.5	mg/L	(<0.0080) U	(<0.0080) U	(<0.0080) U	(<0.0080) U	
-Butanone (MEK)	200.0	mg/L	(<0.060) U	(<0.060) U	(<0.060) U	(<0.060) U	
Carbon tetrachloride	0,5	mg/L	(<0.0040) U	(<0.0040) U	(<0.0040) U	(<0.000) U	
hlorobenzene	100.0	mg/L	(<0.0040) U	(<0.0040) U	(<0.0040) U	(<0.0040) U	
Chloroform	6.0	mg/L	0.0227	0.0225	(<0.0040) U	(<0.0040) U	
,4-Dichlorobenzene	7.5	mg/L	(<0.0040) U	(<0.0040) U	(<0.0040) U	(<0.0040) U	
,2-Dichloroethane	0.5	mg/L	(<0.0040) U	(<0.0040) U	(<0.0040) U	(<0.0040) U	
,1-Dichloroethene	0.7	mg/L	(<0.0040) U	(<0.0040) U	(<0.0040) U	(<0.0040) U	
etrachloroethene	0.7	mg/L	(<0.0040) U	0.0122 J	(<0.0080) U	(<0.0080) U	
richloroethene	0.5	mg/L	(<0.0040) U	(<0.0040) U	(<0.0040) U	(<0.0040) U	
'inyl Chloride	0.2	mg/L	(<0.0040) U	(<0.0040) U	(<0.0040) U	(<0.0040) U	
Semi-Volatile Organic Compounds (827			(-0.0050) TT	(0 0050) 77	(-0.0050) ***	(:0.0050) 11	
,4-Dichlorobenzene	7.5 0.13	mg/L	(<0.0050) U (<0.0052) U	(<0.0050) U (<0.0052) U	(<0.0050) U (<0.0052) U	(<0.0050) U (<0.0052) U	
,4-Dinitrotoluene lexachloro-1,3-butadiene	0.13	mg/L mg/L	(<0.0052) U (<0.0082) U	(<0.0052) U (<0.0082) U	(<0.0052) U (<0.0082) U	(<0.0052) U (<0.0082) U	
lexachlorobenzene	0.13	mg/L mg/L	(<0.0082) U	(<0.0082) U	(<0.0082) U	(<0.0082) U	
lexachloroethane	3.0	mg/L mg/L	(<0.0030) U	(<0.0030) U (<0.0060) U	(<0.0050) U	(<0.0030) U	
-Methylphenol(o-Cresol)	200.0	mg/L	(<0.010) U	(<0.010) U	(<0.000) U	(<0.010) U	
&4-Methylphenol(m&p Cresol)	200.0	mg/L	(<0.010) U	(<0.010) U	(<0.010) U	(<0.010) U	
litrobenzene	2.0	mg/L	(<0.0050) U	(<0.0050) U	(<0.0050) U	(<0.0050) U	
entachlorophenol	100.0	mg/L	(<0.010) U	(<0.010) U	(<0.010) U	(<0.010) U	
yridine	5.0	mg/L	(<0.0092) U	(<0.0092) U	(<0.0092) U	(<0.0092) U	
4,5-Trichlorophenol	400.0	mg/L	(<0.010) U	(<0.010) U	(<0.010) U	(<0.010) U	
,4,6-Trichlorophenol	2.0	mg/L	(<0.010) U	(<0.010) U	(<0.010) U	(<0.010) U	
VET CHEMISTRY							
yanide, Reactive		mg/kg	(0.011) U			(0.011) U	
lalogen, Total Reactive (TOX)		mg/kg	6.3			8.1	
gnitability		Deg. F	not ignitable			not ignitable	
Sulfide, Reactive Notes:		mg/kg	7.2			10.4	

Notes:
Deg. F = Degrees Fahrenheit
EPA = United State Environmental Protection Agency
mg/L = milligram(s) per liter
mg/kg = milligram(s) per kilogram
J = Estimated concentration
U = Indicates the compound was analyzed for, but not detected above the method detection limit.
Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP), October 2019, https://www.epa.gov/sites/production/files/2016-01/documents/hw-char.pdf
Analytical results provided by ALS Environmental.

