August 30, 2024

Wendi Zheng
New York State Department of Environmental Conservation
Division of Environmental Remediation
47-40 21st Street
Long Island City, NY 11101

Re: Supplemental Remedial Design Work Plan
Willets Point Development SCA School
38-15 126th Lane, Queens, New York
Langan Project No.: 170197605
NYSDEC BCP Site No.: C241146D

Dear Ms. Zheng:

On behalf of the Volunteers (Queens Development Group, LLC [QDG]; QDG Hotel Partners, LLC; QDG 126th Street Partners, LLC; QDG Parking Partners, LLC; and QDG Retail Partners, LLC), Langan prepared this Supplemental Remedial Design Work Plan to present the remedial design for additional groundwater treatment at the Willets Point Development SCA School Brownfield Cleanup Program (BCP) site located at 38-15 126th Lane in Queens, New York (the Site). The remedial elements described herein include a remedial technology evaluation, in-situ groundwater treatment implementation, and remedial performance soil and groundwater sampling. Additional groundwater treatment is being performed at the direction of the New York State Department of Environmental Conservation (NYSDEC) because of the presence of target compounds in remaining soil and groundwater at the Site.

BACKGROUND

Site Description

The Site is located in a former industrial zone in the County of Queens, New York and is identified as a part of Block 1833, Lot 143. The Site is situated on an approximately 0.857-acre area bounded by the Willets Point L-Parcel BCP Site (Site No. C241146H) and automotive and wrecking facilities to the north; by future roadways to the east; by future roadways followed by the Willets Point Development Phase 1 Senior Housing BCP Site (Site No. C241146B) to the south; and Willets Point Boulevard followed by the Willets Point Development Stadium BCP Site (Site No. C241146C) to the west. The Site will be redeveloped with a public school operated by the New York City School Construction Authority (SCA). A Site Location and Layout Plan is provided as Figure 1.

Site History

The Site was accepted into the BCP as part of the former Willets Point Development BCP Site (Site No. C241146), which encompassed a total area of approximately 17.900 acres. The Willets Point Development BCP Site was remediated as two operable units (OU-1 and OU-2), in accordance with two NYSDEC-approved Remedial Action Work Plans (RAWP). The Site was remediated as part of former OU-1. Following completion of the OU-1 remedial excavation in March 2022, the results of post-excavation documentation soil sampling at the Site identified petroleum-related compounds in soil at concentrations exceeding the NYSDEC Part 375 Protection of Groundwater (PGW) Soil Cleanup Objectives (SCOs). From November 28, 2022 to January 17, 2023, in-situ groundwater treatment was implemented to address remaining contamination and included direct mixing of 9,200 pounds of PetroFix™ and 5,920 pounds of Oxygen Release Compound (ORC) Advanced® into saturated soil and groundwater to promote aerobic and anaerobic biodegradation of target contaminants. The in-situ mixing and treatment area was about 15,100 square-feet and is shown on Figure 2.

On October 31, 2023, the BCA was amended (together with seven new BCAs) to divide the Willets Point Development BCP Site into eight separate BCP sites (BCP Site Nos. C241146 and C241146B through C241146H) and remove future roadway and sliver lot parcels (Block 1833, Lots 111, 112, 141, 151 and 155) from the BCP. In connection with the Amended BCA for the Willets Point Development BCP Site, the Volunteers entered into a BCA for this BCP Site No. C241146D (BCP Index No. C241146D-09-23), effective as of December 16, 2013. Langan submitted a draft of the Final Engineering Report (FER) for the Site on April 30, 2024. On July 3, 2024, NYSDEC provided comments to the draft FER and requested additional groundwater treatment at the Site due to the presence of volatile organic compounds (VOC) and semivolatile organic compounds (SVOC) exceeding NYSDEC PGW SCOs in soil and concentrations in groundwater above the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (SGVs) for Class GA Water.

The Volunteers, Langan, and NYSDEC held a conference call on August 13 and 16, 2024 to discuss the preliminary approach for groundwater treatment, performance monitoring, and remedial closure. The NYSDEC informed the Volunteers and Langan that, based on the remedial excavations and remedial progress made during the initial groundwater treatment, a certificate of completion could be issued following successful completion of groundwater injections, with performance monitoring occurring during the site management phase.

Groundwater Conditions

Groundwater monitoring at the Site and at former OU-1 is occurring on a quarterly basis pursuant to the NYSDEC-approved August 9, 2024 Interim Site Management Plan. There are three monitoring wells existing on the Site (C-MW201, C-MW206, and C-RMW01).

After the initial post-remediation groundwater sampling in August 2022, six groundwater sampling events were completed in February, May, August, and December 2023, and March and July 2024. Groundwater sample data is documented in Quarterly Groundwater Monitoring Reports submitted to NYSDEC. The July 2024 groundwater sample results indicate that up to thirteen VOCs and six SVOCs were detected at concentrations exceeding the NYSDEC SGVs.

The concentration of total VOCs at monitoring wells C-MW201, C-MW206, and C-RMW01 are 140 µg/L, 1,797 µg/L, and 133 µg/L, respectively. The July 2024 analytical results are shown on Figure 2.

REMEDIAL TECHNOLOGY EVALUATION

Several remedial technologies are being evaluated for in-situ groundwater treatment. The remedial technologies, treatability sampling, and technology selection is discussed below.

Remedial Technology Options

This work plan considers the following remedial technologies:

- In-situ Chemical Oxidation (ISCO) via Klozur SP®
- Self-Activating ISCO and Enhanced Bioremediation via Provect-OX®
- In-Situ Sorption and Biodegradation via PetroFix™ and ORC Advanced®

These treatment technologies are discussed below and product information is provided in Attachment 1.

In-Situ Chemical Oxidation (ISCO)

ISCO involves application of a chemical oxidant (e.g., sodium persulfate) for rapid degradation of the targeted contaminants. During the oxidation reaction, electrons are transferred from the contaminant to the oxidant, which oxidizes the contaminant and reduces the electron acceptor (i.e., oxidant). In turn, the contaminant is degraded or destroyed. Sodium persulfate is selected for use based upon its effectiveness for the contaminants of concern, minimal production of heat and pressure, and ease of handling.

Klozur SP® maximizes ISCO performance through the use of activated sodium persulfate. The oxidant degrades pollutants through direct oxidation, while generating free radicals, which work to oxidize recalcitrant contaminants, such as 1,2,4- and 1,3,5-trimethylbenzene. In addition, Klozur SP® has the ability to destroy the fraction organic carbon on the soil and in doing so, facilitate the desorption of contaminants adhered to soil from previous PetroFix™ application and into pore water where they are treated.

Self-Activating ISCO and Enhanced Bioremediation

The second remedial option is an oxidation technology with rebound management. Provect-OX®, a dual function remedial product: the first component, persulfate, is activated by ferric iron (Fe III) to generate a persulfate radical and an iron cation (ferrate) and oxidize contaminants in soil and groundwater. The second component is an attenuation process and provides rebound management. After dissolved oxygen is depleted, by-products from the oxidation process (sulfate residuals and ferric iron) will remain in the treatment zone and provide a terminal electron acceptor and promote anaerobic biodegradation of target contaminants. Together, sulfide and iron form a third by-product, pyrite, which is an iron bearing soil mineral that provides further

reductive capacity for decay of target compounds. Provect-OX® is an effective, single component solution, that provides several mechanisms for treatment.

In-Situ Sorption and Biodegradation

The third remedial technology being evaluated is a continuation of the 2022-2023 in-situ groundwater treatment program and includes the in-situ sorption and biodegradation via PetroFix™ and ORC Advanced®. PetroFix™ is an activated carbon remedial fluid paired with soluble, anaerobic electron acceptors designed to remediate dissolved hydrocarbons. ORC Advanced® supplies a controlled release of oxygen for 9 to 12 months in the target treatment zone to create and support aerobic biodegradation of contaminants, as oxygen is the preferred natural electron acceptor for hydrocarbon bioremediation based on the standard free energy available for oxidation. Additionally, the nitrate and sulfate electron acceptor blend that is part of the PetroFix™ application promotes anaerobic degradation once oxygen is depleted in the subsurface. Therefore, with the combination of reagents, aerobic degradation will occur for the first 9 to 12 months while oxygen is present from the ORC Advanced® placement. Enhanced biodegradation will then continue under anaerobic conditions with the electron acceptor blend for an additional 3 to 6 months and then natural anaerobic degradation will continue, if needed.

Treatability Soil and Groundwater Sampling

On August 21, 2024 Langan collected eight composite treatability soil samples and one groundwater sample to evaluate the feasibility of ISCO. The samples will be analyzed for soil oxidation demand by Evonik Corporation and Provectus Environmental Products. The results of the treatability study will be used to evaluate dosage and support selection of a remedial technology.

Remedial Technology Selection

One of the three remedial technology options presented above will be selected for in-situ groundwater treatment at the Site. The results of treatability sampling, proposed reagent dosages, and treatment timeframe will support the selection of remedial technology. The reagent selection and dosage will be provided to NYSDEC under separate cover as a technical memorandum. Implementation of the in-situ treatment will be through groundwater injections and is described in the following section.

SUPPLEMENTAL REMEDIAL DESIGN IMPLEMENTATION

Supplemental remedial design implementation will be in accordance with the forthcoming NYSDEC-approved Site Management Plan for the Willets Point Development SCA School Site.

Groundwater Injections

Application of the selected chemical reagent will be accomplished using direct-push technology at 46 injection points. The remedial application will target the 8 to 20 feet below grade surface (bgs) interval where the soil and groundwater contaminants remain, based on the elevation of soil documentation samples and screened intervals of existing monitoring wells. The treatment interval consists of varying soil strata, including compacted non-native fill and previously backfilled 0.75-inch stone. The 0.75-inch stone interval is present within the extents of the 2022-2023

treatment area (Figure 2) at about elevation (el) 6 to 2 and varies in thickness of about one to four feet. The anticipated radius of influence for the chemical reagent via direct push is conservatively estimated at 12 to 15 feet. Injection points are proposed in a distributed array designed to deliver the remediation chemicals evenly across the treatment area, but with a higher concentration of treatment planned in the vicinity of C-MW206. Injections will start along the eastern Site boundary and proceed west. The injection locations are shown on Figure 3.

A flexible hose will be extended from a mixing tank to the injection pump and then to an injection manifold at the drill rig. Injection of reagent will be performed using a direct-push rig and will consist of either advancing drill rods with a retractable stainless steel screen to the bottom of the target interval and gradually pulling upward or advancing drill rods to a target interval and applying reagent to the open hole. The chemical reagent will be applied via low-pressure pumps set to a maximum design pressure that will not significantly alter groundwater elevation and prevent daylighting. The maximum design pressure will vary depending on the varying soil characteristics within the treatment zone. Reagent will be applied at a medium injection pressure (50 to 100 pounds per square inch [psi]) in compacted fill intervals and at a low injection pressure (0 to 50 psi) in 0.75-inch stone intervals. To avoid mounding and daylighting in localized areas during the injection, an alternating injection sequence shall be applied, meaning that the adjacent injection points should not be injected without lag between the injections. The alternating injections will allow the aquifer to have time to equilibrate with the surroundings. If daylighting is observed, injections will be paused, injection procedures will be reevaluated, and injection pressures adjusted to mitigate daylighting. The injection record should include the rate, pressure, and volume at each location.

As a contingency measure, the injection contractor will be prepared to install temporary injection wells if direct push is unable to reach the targeted injection depths due to refusal. The temporary injection wells will be installed using a solid-point drill rod and constructed of either one-inch or two-inch pipe with a banded screen at the targeted injection interval. The temporary wells will be removed following completion of injections.

Community Air Monitoring Program

Community air monitoring will be conducted in accordance with the Community Air Monitoring Program (CAMP) described in Appendix D (Excavation Work Plan [EWP]) of the forthcoming NYSDEC-approved SMP for the Willets Point Development SCA School Site, which is in accordance with the requirements of NYSDEC DER-10 – Technical Guidance for Site Investigation and Remediation and with the provisions of the NYSDOH Generic CAMP included as Appendix 1A in DER 10. The CAMP will be implemented to prevent off-site receptors, including residences and businesses, from exposure to potential airborne contaminant releases during intrusive field activities.

REMEDIAL PERFORMANCE MONITORING

Performance monitoring will consist of post-treatment soil and groundwater sampling and detailed in the following subsections. Proposed soil and groundwater sampling locations are shown on Figure 4.

Soil Sampling

Documentation of soil quality following groundwater treatment will include the following tasks.

- Completion of 13 soil borings within the treatment area where soil documentation samples were previously collected (EPB185, EPB186, EPB187, EPB214A, EPB216A, EPB217A, EPB218A, EPB219A, EPB220A, EPB221A, EPB222A, EPS306A, and EPB307A). Soil borings will be advanced to depths needed to collect soil samples at the elevations within the treatment area.

- Collection of 13 soil samples (plus quality assurance/quality control [QA/QC] samples) for laboratory analysis. One grab soil sample will be collected from each soil boring, from a discrete location within the treatment zone. The proposed sample intervals will be consistent with the same sampling intervals where previous soil sampling occurred, as described in the NYSDEC-approved February 13, 2023 Sampling Plan Addendum, and where PGW SCO exceedances were detected. The intervals of the sample locations will range between el 6 and -1.

- Submittal of soil samples for laboratory analysis for the NYSDEC Part 375 VOCs and SVOCs, using the methods specified in Appendix H (Quality Assurance Project Plan) of the Site Management Plan for the Site. Remedial performance in soil will be evaluated based on the analytical results for VOCs and SVOCs. VOC and SVOC results will be compared to PGW and RURR SCOs; applicability of PGW SCOs will be evaluated based on Part 375-6.5(a)(1).

Soil borings will be advanced using a Sonic drill rig. Continuous soil samples will be collected using 5-foot long sample sleeves. The soil/fill retrieved from each sampler will be field screened with a photoionization detector (PID) for VOCs and described by Langan field personnel. Soil descriptions will be recorded on boring logs. One duplicate sample, one field blank, and one trip blank per day will be analyzed for QA/QC. The investigative-derived waste (IDW) generated during this investigation will be contained in Department of Transportation (DOT)-approved 55-gallon drums for off-site transportation and disposal.

Soil samples will be collected in laboratory-supplied containers and will be sealed, labeled, and placed in an ice-chilled cooler (to maintain a temperature of about 4°C), in accordance with the SMP's chain of custody procedures, for delivery to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. Laboratory analysis of VOCs and SVOCs will be submitted under a standard 5-day turnaround time (TAT).

Groundwater Sampling

Groundwater sampling at the Site will continue following the completion of injections, pursuant NYSDEC-approved August 9, 2024 Interim Site Management Plan. To assess efficacy of groundwater treatment, the results from the July 2024 groundwater sampling event will be used as a baseline (Figure 2). The targeted treatment goal is an 80% reduction in groundwater contaminants that exceed the NYSDEC SGVs in monitoring wells C-MW206 and C-RMW01. Remedial performance monitoring wells are shown on Figure 4.

The monitoring wells will be sampled to evaluate the effectiveness of the additional groundwater treatment. Depth to groundwater will be measured using a Solinst® oil/water interface probe and the wells will be gauged for potential free product. Head space readings will be measured for organic vapors with a PID. Monitoring wells will be purged using a peristaltic pump and dedicated, disposable polyethylene tubing. During purging, the turbidity, pH, temperature, conductivity, redox potential, and dissolved oxygen of the groundwater will be recorded and monitored using a Horiba U-52 Water Quality meter with a flow-through cell.

Groundwater samples will be collected into laboratory-prepared containers, tightly sealed, uniquely labeled, and stored on ice for transport to Alpha Analytical, Inc., a NYSDOH ELAP-certified laboratory in Westborough, Massachusetts (ELAP No. 11148), under standard chain-of-custody procedures. Samples will be analyzed for NYSDEC Part 375 List and TCL VOCs and SVOCs.

SCHEDULE

The groundwater injections will commence in October 2024 and a technical memorandum detailing reagent selection and dosage will be submitted to NYSDEC 2 weeks prior to field implementation. Remedial performance monitoring, including collection of groundwater and soil samples, will be completed 30 to 60 days after the final injection event. Additionally, groundwater sampling will continue on a quarterly basis through 2025. The FER will be revised to describe completion of the groundwater treatment and will be submitted to NYSDEC in November 2024. A detailed schedule is provided as Attachment 2.

CERTIFICATION

I, Gerald F. Nicholls, certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Supplemental Remedial Design Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

NYS Professional Engineer 092433	08/30/2024 Date	Signature

Enclosure(s):

Figure 1 – Site Location and Layout Plan
Figure 2 – Groundwater Sample Analytical Results
Figure 3 – Groundwater Treatment Plan
Figure 4 – Remedial Performance Sampling Plan

Table 1 – Proposed Soil Sample Summary

Attachment A – Remedial Product Sheets
Attachment B – Schedule

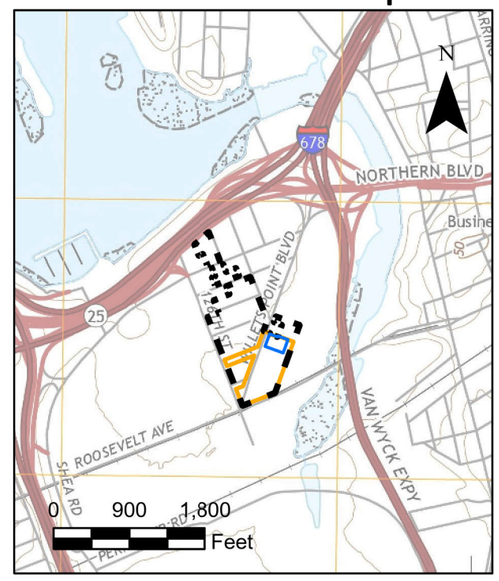
cc: A. Lipman, J. Strobel, S. Bernstein, E. Saretsky – Queens Development Group, LLC
E. Burgess, N. Palumbo, E. Seery – Langan

FIGURES

Legend

- Approximate BCP Site Boundary
- Former Willets Point Development BCP Site Boundary
- Former OU-1 Boundary
- Tax Lot

Reference Map



Notes:
1. Light Gray Canvas basemap provided through Langan's Esri and ArcGIS software licensing and ArcGIS Online.
2. Topographic basemap adapted from United States Geological Survey (USGS) 7.5-Minute Series Topographical Maps, Flushing, New York, Quadrangle.
3. Tax parcel data provided by the New York City Department of City Planning, MapPLUTO 23v2, and a survey prepared by Langan, July 28, 2023.

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SCALE IN FEET

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Project
WILLETS POINT DEVELOPMENT SCA SCHOOL
BCP SITE NO. C241146D
QUEENS NEW YORK

Figure Title
SITE LOCATION AND LAYOUT PLAN

Project No. 170197605	Figure No. 1
Date 8/29/2024	
Scale 1"=250'	
Drawn By PDT	Figure 1 of 4

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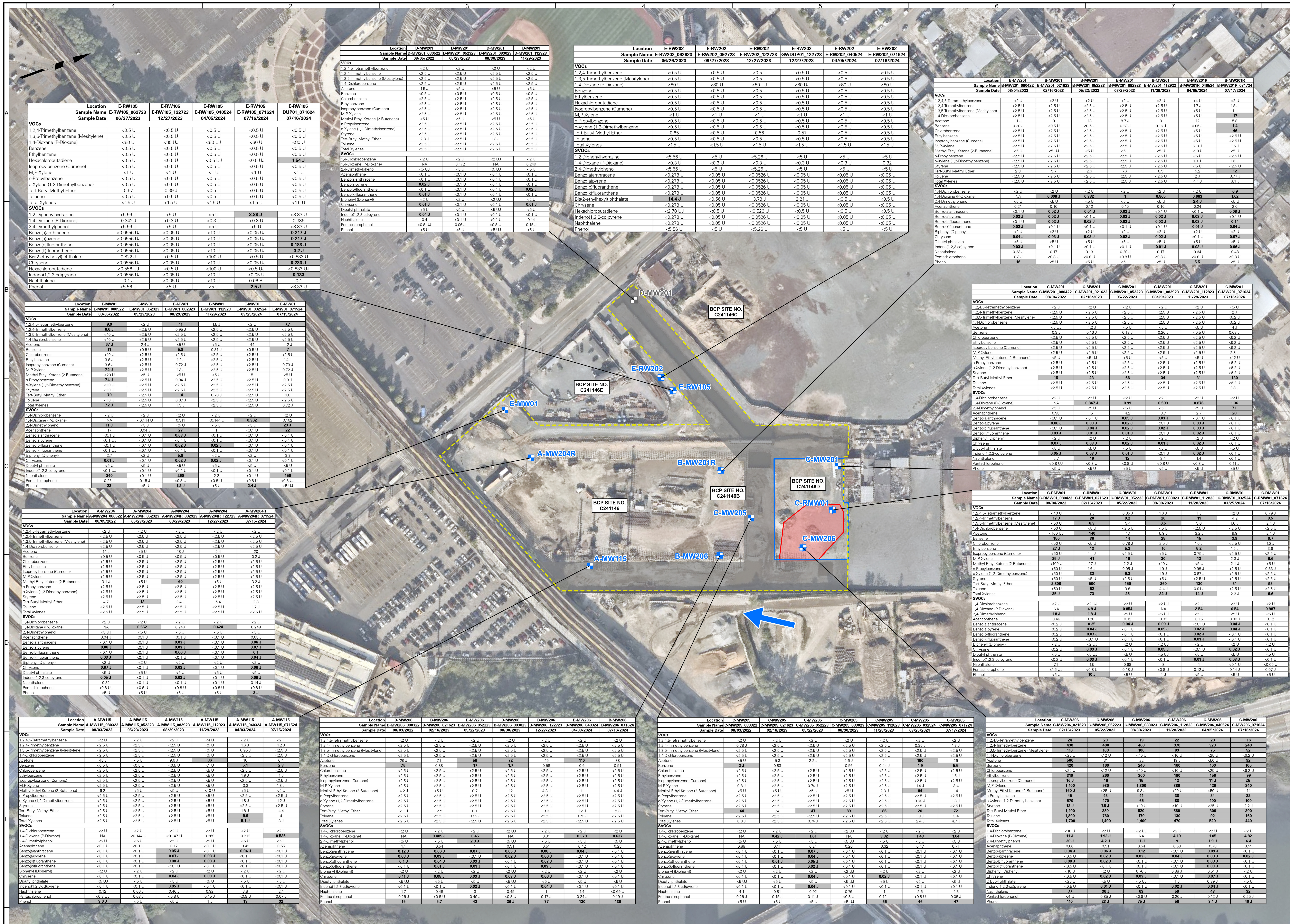
LANGAN



Location	E-RW105	E-RW105	E-RW105	E-RW105	E-RW105
Sample Name	E-RW105_062723	E-RW105_122723	E-RW105_040524	E-RW105_071624	DUP01_071624
Sample Date	06/27/2023	12/27/2023	04/05/2024	07/16/2024	07/16/2024
VOCs					
1,2,4-Trimethylbenzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-Dioxane (P-Dioxane)	<80 U	<80 UJ	<80 UJ	<80 U	<80 U
Benzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Ethylbenzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Hexachlorobutadiene	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	**1.54 J**
Isopropylbenzene (Cumene)	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
M,P-Xylene	<1 U	<1 U	<1 U	<1 U	<1 U
n-Propylbenzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tert-Butyl Methyl Ether	0.67	0.39 J	<0.5 U	<0.5 U	<0.5 U
Toluene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Total Xylenes	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U
SVOCs					
1,2-Diphenylhydrazine	<5.56 U	<5 U	<5 U	**3.88 J**	<8.33 U
1,4-Dioxane (P-Dioxane)	0.342 J	<0.3 U	<0.3 U	<0.3 U	0.336
2,4-Dimethylphenol	<5.56 U	<5 U	<5 U	<5 U	<8.33 U
Benzo(a)anthracene	<0.0556 UJ	<0.05 U	<10 U	<0.05 UJ	**0.217 J**
Benzo(a)pyrene	<0.0556 UJ	<0.05 U	<10 U	<0.05 UJ	**0.217 J**
Benzo(b)fluoranthene	<0.0556 UJ	<0.05 U	<10 U	<0.05 UJ	**0.183 J**
Benzo(k)fluoranthene	<0.0556 UJ	<0.05 U	<10 U	<0.05 UJ	**0.2 J**
Bis(2-ethylhexyl) phthalate	0.822 J	<0.5 U	<100 U	<0.5 U	<0.833 U
Chrysene	<0.0556 UJ	<0.05 U	<10 U	<0.05 UJ	**0.233 J**
Hexachlorobutadiene	<0.556 UJ	<0.5 U	<100 U	<0.5 UJ	<0.833 UJ
Indeno(1,2,3-cd)pyrene	<0.0556 UJ	<0.05 U	<10 U	<0.05 U	**0.133**
Naphthalene	0.1 J	<0.05 U	<10 U	0.06 B	0.1
Phenol	<5.56 U	<5 U	<5 U	**2.5 J**	<8.33 U

Location	D-MW201	D-MW201	D-MW201	D-MW201
Sample Name	D-MW201_080522	D-MW201_052323	D-MW201_083023	D-MW201_112923
Sample Date	08/05/2022	05/23/2023	08/30/2023	11/29/2023
VOCs				
1,2,4,5-Tetramethylbenzene	<2 U	<2 U	<2 U	<2 U
1,2,4-Trimethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,4-Dichlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Acetone	1.5 J	<5 U	<5 U	<5 U
Benzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Chlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Ethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Isopropylbenzene (Cumene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U
M,P-Xylene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Methyl Ethyl Ketone (2-Butanone)	<5 U	<5 U	<5 U	<5 U
n-Propylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Styrene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	2.3 J	<2.5 U	1.3 J	<2.5 U
Toluene	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Total Xylenes	<2.5 U	<2.5 U	<2.5 U	<2.5 U
SVOCs				
1,4-Dichlorobenzene	<2 U	<2 U	<2 UJ	<2 U
1,4-Dioxane (P-Dioxane)	NA	0.172	NA	0.249
2,4-Dimethylphenol	<5 UJ	<5 U	<5 UJ	<5 U
Acenaphthene	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(a)anthracene	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(a)pyrene	**0.02 J**	<0.1 U	<0.1 U	<0.1 U
Benzo(b)fluoranthene	<0.1 U	<0.1 U	<0.1 U	**0.02 J**
Benzo(k)fluoranthene	**0.01 J**	<0.1 U	<0.1 U	<0.1 U
Biphenyl (Diphenyl)	<2 U	<2 U	<2 UJ	<2 U
Chrysene	**0.01 J**	<0.1 U	<0.1 U	**0.01 J**
Dibutyl phthalate	<5 U	<5 U	<5 UJ	<5 U
Indeno(1,2,3-cd)pyrene	**0.04 J**	<0.1 U	<0.1 U	<0.1 U
Naphthalene	0.4	<0.1 U	<0.1 U	0.14
Pentachlorophenol	<0.8 UJ	0.06 J	<0.8 U	0.15 J
Phenol	<5 U	<5 U	<5 UJ	<5 U

Location	E-RW202	E-RW202	E-RW202	E-RW202	E-RW202	E-RW202
Sample Name	E-RW202_062623	E-RW202_092723	E-RW202_122723	GWDUP01_122723	E-RW202_040524	E-RW202_071624
Sample Date	06/26/2023	09/27/2023	12/27/2023	12/27/2023	04/05/2024	07/16/2024
VOCs						
1,2,4-Trimethylbenzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
1,4-Dioxane (P-Dioxane)	<80 U	<80 U	<80 UJ	<80 UJ	<80 U	<80 U
Benzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Ethylbenzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Hexachlorobutadiene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Isopropylbenzene (Cumene)	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
M,P-Xylene	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
n-Propylbenzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
o-Xylene (1,2-Dimethylbenzene)	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Tert-Butyl Methyl Ether	0.65	<0.5 U	0.56	0.57	<0.5 U	<0.5 U
Toluene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Total Xylenes	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U	<1.5 U
SVOCs						
1,2-Diphenylhydrazine	<5.56 U	<5 U	<5.26 U	<5 U	<5 U	<5 U
1,4-Dioxane (P-Dioxane)	<0.3 U	<0.3 U	<0.3 U	<0.3 U	<0.3 U	0.32
2,4-Dimethylphenol	<5.56 U	<5 U	<5.26 U	<5 U	<5 U	<5 U
Benzo(a)anthracene	<0.278 U	<0.05 U	<0.0526 U	<0.05 U	<0.05 U	<0.05 U
Benzo(a)pyrene	<0.278 U	<0.05 U	<0.0526 U	<0.05 U	<0.05 U	<0.05 U
Benzo(b)fluoranthene	<0.278 U	<0.05 U	<0.0526 U	<0.05 U	<0.05 U	<0.05 U
Benzo(k)fluoranthene	<0.278 U	<0.05 U	<0.0526 U	<0.05 U	<0.05 U	<0.05 U
Bis(2-ethylhexyl) phthalate	**14.4 J**	<0.56 U	3.73 J	2.21 J	<0.5 U	<0.5 U
Chrysene	<0.278 U	<0.05 U	<0.0526 U	<0.05 U	<0.05 U	<0.05 U
Hexachlorobutadiene	<2.78 UJ	<0.5 U	<0.526 U	<0.5 U	<0.5 U	<0.5 U
Indeno(1,2,3-cd)pyrene	<0.278 U	<0.05 U	<0.0526 U	<0.05 U	<0.05 U	<0.05 U
Naphthalene	<0.278 U	<0.05 U	<0.0526 U	<0.05 U	<0.05 U	<0.05 U
Phenol	<5.56 U	<5 U	<5.26 U	<5 U	<5 U	<5 U

Location	B-MW201	B-MW201	B-MW201	B-MW201	B-MW201	B-MW201R	B-MW201R
Sample Name	B-MW201_080422	B-MW201_021623	B-MW201_052223	B-MW201_082923	B-MW201_112923	B-MW201R_040524	B-MW201R_071724
Sample Date	08/04/2022	02/16/2023	05/22/2023	08/29/2023	11/29/2023	04/05/2024	07/17/2024
VOCs							
1,2,4,5-Tetramethylbenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<4 U	<2 U
1,2,4-Trimethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	1.7 J	1.8 J
1,3,5-Trimethylbenzene (Mesitylene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<5 U	1 J
1,4-Dichlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<5 U	**17**
Acetone	11 J	9	13	8.7 J	9	12	5.8
Benzene	0.38 J	<0.5 U	<0.5 U	0.23 J	0.16 J	0.86 J	**1.4**
Chlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<5 U	**46**
Ethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U
Isopropylbenzene (Cumene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U
M,P-Xylene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	2.3 J	1.5 J
Methyl Ethyl Ketone (2-Butanone)	<5 U	<5 UJ	<5 U	<5 U	<5 U	<10 U	<5 U
n-Propylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	1.8 J	1.6 J
Styrene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U
Tert-Butyl Methyl Ether	2.8	3.7	2.6	7.6	6.3	5.2	**12**
Toluene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	2 J	0.77 J
Total Xylenes	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	4.1 J	3.1 J
SVOCs							
1,4-Dichlorobenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	**6.9**
1,4-Dioxane (P-Dioxane)	NA	**0.608 J**	**0.382**	**1**	**0.865**	**0.683**	**1.62**
2,4-Dimethylphenol	<5 U	<5 U	<5 U	<5 U	<5 U	**2.4 J**	<5 U
Acenaphthene	0.21	0.16	0.12	0.15	0.16	0.24	2.6
Benzo(a)anthracene	<0.1 U	**0.02 J**	**0.04 J**	**0.03 J**	<0.1 U	<0.1 U	**0.08 J**
Benzo(a)pyrene	**0.02 J**	**0.02 J**	<0.1 U	**0.02 J**	**0.02 J**	**0.03 J**	<0.1 U
Benzo(b)fluoranthene	<0.1 U	**0.02 J**	**0.02 J**	**0.02 J**	**0.02 J**	**0.03 J**	**0.14**
Benzo(k)fluoranthene	**0.02 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U	**0.01 J**	**0.04 J**
Biphenyl (Diphenyl)	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Chrysene	**0.04 J**	**0.03 J**	**0.02 J**	**0.02 J**	**0.02 J**	<0.1 U	**0.07 J**
Dibutyl phthalate	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	**0.03 J**	<0.1 U	<0.1 U	<0.1 U	**0.01 J**	**0.02 J**	**0.06 J**
Naphthalene	0.23 J	0.17	0.13	0.29 J	0.17	0.64	0.48
Pentachlorophenol	0.3 J	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Phenol	**16**	<5 U	<5 U	<5 U	<5 U	**5.5**	<5 U

Location	E-MW01	E-MW01	E-MW01	E-MW01	E-MW01	E-MW01
Sample Name	E-MW01_080522	E-MW01_052323	E-MW01_082923	E-MW01_112923	E-MW01_032524	E-MW01_071524
Sample Date	08/05/2022	05/23/2023	08/29/2023	11/29/2023	03/25/2024	07/15/2024
VOCs						
1,2,4,5-Tetramethylbenzene	**9.9**	<2 U	**11**	1.5 J	<2 U	**7.7**
1,2,4-Trimethylbenzene	**6.6 J**	<2.5 U	0.95 J	<2.5 U	<2.5 U	<2.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<10 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,4-Dichlorobenzene	<10 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Acetone	**67 J**	2.4 J	<5 U	<5 U	44	4.2 J
Benzene	**11**	<0.5 U	**5.8**	0.31 J	<0.5 U	**7**
Chlorobenzene	<10 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Ethylbenzene	3.8 J	<2.5 U	1.2 J	<2.5 U	<2.5 U	1.4 J
Isopropylbenzene (Cumene)	3.6 J	<2.5 U	0.72 J	<2.5 U	<2.5 U	0.73 J
M,P-Xylene	**7.2 J**	<2.5 U	1.3 J	<2.5 U	<2.5 U	0.72 J
Methyl Ethyl Ketone (2-Butanone)	<20 U	<5 U	<5 U	<5 U	5	<5 U
n-Propylbenzene	**7.4 J**	<2.5 U	0.94 J	<2.5 U	<2.5 U	0.9 J
o-Xylene (1,2-Dimethylbenzene)	<10 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Styrene	<10 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	**70**	<2.5 U	**14**	0.78 J	<2.5 U	9.8
Toluene	<10 U	<2.5 U	0.87 J	<2.5 U	<2.5 U	<2.5 U
Total Xylenes	**7.2 J**	<2.5 U	1.3 J	<2.5 U	<2.5 U	0.72 J
SVOCs						
1,4-Dichlorobenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	NA	<0.144 U	0.311	<0.144 U	**0.362**	0.162
2,4-Dimethylphenol	**11 J**	<5 U	<5 U	<5 U	<5 U	**23 J**
Acenaphthene	17	0.04 J	**27**	1	<0.1 U	**22**
Benzo(a)anthracene	<0.1 U	<0.1 U	**0.03 J**	<0.1 U	<0.1 U	<0.1 U
Benzo(a)pyrene	<0.1 UJ	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(b)fluoranthene	<0.1 U	<0.1 U	**0.02 J**	**0.02 J**	<0.1 U	<0.1 U
Benzo(k)fluoranthene	<0.1 UJ	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Biphenyl (Diphenyl)	2.7	<2 U	**5.9**	<2 U	<2 U	3.3
Chrysene	**0.01 J**	<0.1 U	**0.02 J**	**0.02 J**	<0.1 U	<0.1 U
Dibutyl phthalate	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	<0.1 UJ	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Naphthalene	**240**	<0.1 U	**260**	2.2	<0.1 U	**150**
Pentachlorophenol	0.25 J	0.15 J	<0.8 U	<0.8 U	<0.8 U	<0.8 UJ
Phenol	**23**	<5 U	**1.2 J**	<5 U	**2.4 J**	<5 UJ

Location	C-MW201	C-MW201	C-MW201	C-MW201	C-MW201	C-MW201
Sample Name	C-MW201_080422	C-MW201_021623	C-MW201_052223	C-MW201_082923	C-MW201_112823	C-MW201_071624
Sample Date	08/04/2022	02/16/2023	05/22/2023	08/29/2023	11/28/2023	07/16/2024
VOCs						
1,2,4,5-Tetramethylbenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<5 U
1,2,4-Trimethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	2 J
1,3,5-Trimethylbenzene (Mesitylene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
1,4-Dichlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
Acetone	<5 UJ	4.2 J	<5 U	<5 U	<5 U	4 J
Benzene	0.3 J	0.16 J	0.18 J	0.26 J	<0.5 U	0.68 J
Chlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
Ethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
Isopropylbenzene (Cumene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
M,P-Xylene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	2.8 J
Methyl Ethyl Ketone (2-Butanone)	<5 U	<5 UJ	<5 U	<5 U	<5 U	<12 U
n-Propylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
o-Xylene (1,2-Dimethylbenzene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
Styrene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
Tert-Butyl Methyl Ether	**15**	**23**	**66**	**34**	**31**	**130**
Toluene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<6.2 U
Total Xylenes	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	2.8 J
SVOCs						
1,4-Dichlorobenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	NA	**0.847 J**	**0.99**	**0.599**	**0.876**	**1.36**
2,4-Dimethylphenol	<5 U	<5 U	<5 U	<5 U	<5 U	**7.1**
Acenaphthene	0.98	5	4.2	3.7	2.7	**28**
Benzo(a)anthracene	<0.1 U	<0.1 U	**0.05 J**	**0.03 J**	<0.1 U	<0.1 U
Benzo(a)pyrene	**0.06 J**	**0.03 J**	**0.02 J**	<0.1 U	**0.03 J**	<0.1 U
Benzo(b)fluoranthene	<0.1 U	**0.04 J**	**0.02 J**	**0.02 J**	**0.03 J**	<0.1 U
Benzo(k)fluoranthene	**0.03 J**	**0.01 J**	**0.01 J**	<0.1 U	**0.02 J**	<0.1 U
Biphenyl (Diphenyl)	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Chrysene	**0.07 J**	**0.03 J**	**0.02 J**	**0.01 J**	**0.02 J**	<0.1 U
Dibutyl phthalate	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	**0.05 J**	**0.03 J**	**0.01 J**	<0.1 U	**0.02 J**	<0.1 U
Naphthalene	2.7	**19**	**12**	8.4	1.4	<0.1 U
Pentachlorophenol	<0.8 UJ	<0.8 U	<0.8 U	<0.8 U	<0.8 U	0.11 J
Phenol	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U

Location	A-MW204	A-MW204	A-MW204	A-MW204	A-MW204R
Sample Name	A-MW204_080522	A-MW204R_052323	A-MW204R_082923	A-MW204R_122723	A-MW204R_071524
Sample Date	08/05/2022	05/23/2023	08/29/2023	12/27/2023	07/15/2024
VOCs					
1,2,4,5-Tetramethylbenzene	<2 U	<2 U	<2 U	<2 U	<2 U
1,2,4-Trimethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,4-Dichlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Acetone	14 J	<5 U	48 J	5.4	20
Benzene	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.2 J
Chlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Ethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Isopropylbenzene (Cumene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
M,P-Xylene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Methyl Ethyl Ketone (2-Butanone)	3.1 J	<5 U	**60**	<5 U	3.2 J
n-Propylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Styrene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	4.7	**13**	2.4 J	5.4	2.8
Toluene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	1.7 J
Total Xylenes	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
SVOCs					
1,4-Dichlorobenzene	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	NA	**0.552**	0.248	**0.424**	0.249
2,4-Dimethylphenol	<5 UJ	<5 U	<5 U	<5 U	<5 U
Acenaphthene	0.04 J	<0.1 U	<0.1 U	<0.1 U	0.05 J
Benzo(a)anthracene	<0.1 U	<0.1 U	**0.03 J**	<0.1 U	**0.06 J**
Benzo(a)pyrene	**0.06 J**	<0.1 U	**0.03 J**	<0.1 U	**0.07 J**
Benzo(b)fluoranthene	<0.1 U	<0.1 U	**0.06 J**	<0.1 U	**0.1**
Benzo(k)fluoranthene	**0.03 J**	<0.1 U	<0.1 U	<0.1 U	**0.04 J**
Biphenyl (Diphenyl)	<2 U	<2 U	<2 U	<2 U	<2 U
Chrysene	**0.07 J**	<0.1 U	**0.03 J**	<0.1 U	**0.06 J**
Dibutyl phthalate	<5 U	<5 U	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	**0.05 J**	<0.1 U	**0.03 J**	<0.1 U	**0.06 J**
Naphthalene	0.32	<0.1 U	<0.1 U	<0.1 U	0.14 J
Pentachlorophenol	<0.8 UJ	<0.8 U	<0.8 U	<0.8 U	<0.8 U
Phenol	<5 U	<5 U	<5 U	<5 U	**3 J**

Location	C-RMW01	C-RMW01	C-RMW01	C-RMW01	C-RMW01	C-RMW01	C-RMW01
Sample Name	C-RMW01_080422	C-RMW01_021623	C-RMW01_052223	C-RMW01_083023	C-RMW01_112823	C-RMW01_032524	C-RMW01_071624
Sample Date	08/04/2022	02/16/2023	05/22/2023	08/30/2023	11/28/2023	03/25/2024	07/16/2024
VOCs							
1,2,4,5-Tetramethylbenzene	<40 U	2 J	0.85 J	1.6 J	1 J	<2 U	0.79 J
1,2,4-Trimethylbenzene	**17 J**	**20**	**9.2**	**20**	**11**	4.2	**8.5**
1,3,5-Trimethylbenzene (Mesitylene)	<50 U	**8.3**	3.4	**6.5**	3.6	1.6 J	2.4 J
1,4-Dichlorobenzene	<50 U	<5 U	<2.5 U	<5 U	<2.5 U	<2.5 U	<2.5 U
Acetone	<100 UJ	**140**	13	5.9 J	3.2 J	9.9	2.1 J
Benzene	**150**	**36**	**14**	**28**	**15**	**3.9**	**9.7**
Chlorobenzene	<50 U	<5 U	0.78 J	2.5 J	1.6 J	<2.5 U	1.2 J
Ethylbenzene	**27 J**	**13**	**5.3**	**10**	**5.2**	1.5 J	3.6
Isopropylbenzene (Cumene)	<50 U	1.4 J	<2.5 U	<5 U	0.75 J	<2.5 U	<2.5 U
M,P-Xylene	**35 J**	**41**	**16**	**30**	**13**	2.3 J	**6.6**
Methyl Ethyl Ketone (2-Butanone)	<100 U	27 J	2.2 J	<10 U	<5 U	2.1 J	<5 U
n-Propylbenzene	<50 U	1.6 J	0.95 J	1.9 J	0.98 J	<2.5 U	0.83 J
o-Xylene (1,2-Dimethylbenzene)	<50 U	**32**	**9.3**	1.9 J	0.87 J	<2.5 U	<2.5 U
Styrene	<50 U	<5 U	<2.5 U	<5 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	**2,800**	**500**	**150**	**260**	**130**	**31**	**93**
Toluene	<50 U	**62**	3.8	4.4 J	0.91 J	<2.5 U	<2.5 U
Total Xylenes	**35 J**	**73**	**25**	**32 J**	**14 J**	2.3 J	**6.6**
SVOCs							
1,4-Dichlorobenzene	<2 U	<2 UJ	<2 U	<2 UJ	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	NA	**4.9 J**	**0.854**	NA	**2.54**	**0.54**	**0.987**
2,4-Dimethylphenol	**1.8 J**	**1.8 J**	<5 U	<5 UJ	<5 U	<5 U	<5 U
Acenaphthene	0.46	0.28 J	0.12	0.33	0.16	0.08 J	0.12
Benzo(a)anthracene	<0.2 U	**0.25**	**0.04 J**	**0.09 J**	<0.1 U	**0.04 J**	<0.1 U
Benzo(a)pyrene	<0.2 U	**0.04 J**	<0.1 U	**0.05 J**	**0.02 J**	**0.04 J**	<0.1 U
Benzo(b)fluoranthene	<0.2 U	**0.07 J**	<0.1 U	<0.1 U	**0.02 J**	<0.1 U	<0.1 U
Benzo(k)fluoranthene	<0.2 U	<0.1 U	<0.1 U	<0.1 U	**0.01 J**	<0.1 U	<0.1 U
Biphenyl (Diphenyl)	<2 U	<2 UJ	<2 U	<2 UJ	<2 U	<2 U	<2 U
Chrysene	<0.2 U	**0.03 J**	<0.1 U	**0.05 J**	<0.1 U	**0.02 J**	<0.1 U
Dibutyl phthalate	<5 U	<5 UJ	<5 U	<5 UJ	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	<0.2 U	**0.03 J**	<0.1 U	<0.1 U	**0.01 J**	**0.03 J**	<0.1 U
Naphthalene	7.1	1.5	0.68	3	1	<0.1 U	<0.65 U
Pentachlorophenol	<1.6 UJ	<0.8 U	0.18 J	<0.8 U	0.12 J	0.14 J	0.07 J
Phenol	<5 U	**10 J**	<5 U	1 J	<5 U	<5 U	<5 U

Location	A-MW115	A-MW115	A-MW115	A-MW115	A-MW115	A-MW115
Sample Name	A-MW115_080322	A-MW115_052323	A-MW115_082923	A-MW115_112923	A-MW115_040324	A-MW115_071524
Sample Date	08/03/2022	05/23/2023	08/29/2023	11/29/2023	04/03/2024	07/15/2024
VOCs						
1,2,4,5-Tetramethylbenzene	<2 U	<2 U	<2 U	<4 U	<2 U	<2 U
1,2,4-Trimethylbenzene	<2.5 U	<2.5 U	<2.5 U	<5 U	1.6 J	1.2 J
1,3,5-Trimethylbenzene (Mesitylene)	<2.5 U	<2.5 U	<2.5 U	<5 U	0.95 J	<2.5 U
1,4-Dichlorobenzene	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U	<2.5 U
Acetone	45 J	<5 U	9.6 J	**86**	16	6.4
Benzene	<0.5 U	<0.5 U	<0.5 U	<1 U	**5.1**	**2.3**
Chlorobenzene	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U	<2.5 U
Ethylbenzene	<2.5 U	<2.5 U	<2.5 U	<5 U	1.9 J	1 J
Isopropylbenzene (Cumene)	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U	<2.5 U
M,P-Xylene	<2.5 U	<2.5 U	<2.5 U	<5 U	3.3	1.8 J
Methyl Ethyl Ketone (2-Butanone)	6.2	<5 U	<5 U	<10 U	<5 U	<5 U
n-Propylbenzene	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	<2.5 U	<2.5 U	<2.5 U	<5 U	1.8 J	1.2 J
Styrene	<2.5 U	<2.5 U	<2.5 U	<5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	<2.5 U	<2.5 U	<2.5 U	<5 U	1.8 J	4.4
Toluene	<2.5 U	<2.5 U	<2.5 U	<5 U	**9.9**	4
Total Xylenes	<2.5 U	<2.5 U	<2.5 U	<5 U	**5.1 J**	3 J
SVOCs						
1,4-Dichlorobenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	NA	<0.144 U	<0.147 U	0.269	0.212	**0.535**
2,4-Dimethylphenol	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Acenaphthene	<0.1 U	<0.1 U	0.12	<0.1 U	0.42	0.55
Benzo(a)anthracene	<0.1 U	<0.1 U	**0.05 J**	<0.1 U	**0.04 J**	<0.1 U
Benzo(a)pyrene	<0.1 U	<0.1 U	**0.07 J**	**0.03 J**	<0.1 U	<0.1 U
Benzo(b)fluoranthene	<0.1 U	<0.1 U	**0.08 J**	**0.03 J**	<0.1 U	<0.1 U
Benzo(k)fluoranthene	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Biphenyl (Diphenyl)	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
Chrysene	<0.1 U	<0.1 U	**0.04 J**	**0.03 J**	<0.1 U	<0.1 U
Dibutyl phthalate	<5 UJ	<5 U	<5 U	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	<0.1 U	<0.1 U	**0.05 J**	<0.1 U	<0.1 U	<0.1 U
Naphthalene	0.12	0.06 J	0.46 J	0.92	3.8	2.1
Pentachlorophenol	<0.8 UJ	0.08 J	<0.8 U	0.15 J	<0.8 U	0.07 J
Phenol	**3.6 J**	<5 U	<5 U	1 J	**13**	**32**

Location	B-MW206	B-MW206	B-MW206	B-MW206	B-MW206	B-MW206	B-MW206
Sample Name	B-MW206_080322	B-MW206_021623	B-MW206_052223	B-MW206_083023	B-MW206_122723	B-MW206_040324	B-MW206_071624
Sample Date	08/03/2022	02/16/2023	05/22/2023	08/30/2023	12/27/2023	04/03/2024	07/16/2024
VOCs							
1,2,4,5-Tetramethylbenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,2,4-Trimethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,3,5-Trimethylbenzene (Mesitylene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,4-Dichlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Acetone	26 J	7.1	**56**	**72**	45	**110**	38
Benzene	**7.5**	0.88	**17**	**1.7**	0.58	0.6	0.51
Chlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Ethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Isopropylbenzene (Cumene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
M,P-Xylene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Methyl Ethyl Ketone (2-Butanone)	4.2 J	<5 UJ	9.7	12	4.3 J	11	4.4 J
n-Propylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Styrene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	2.1 J	2.5	8.1	<2.5 U	3.3	1.2 J	5.3
Toluene	<2.5 U	<2.5 U	0.92 J	<2.5 U	<2.5 U	0.73 J	<2.5 U
Total Xylenes	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
SVOCs							
1,4-Dichlorobenzene	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	NA	**0.485 J**	**0.45**	NA	0.31	**0.378**	**0.627**
2,4-Dimethylphenol	<5 U	<5 U	**2.8 J**	<5 UJ	<5 U	<5 U	<5 U
Acenaphthene	1.1	0.54	1	0.31	0.51	0.42	0.28
Benzo(a)anthracene	**0.12 J**	**0.06 J**	**0.07 J**	**0.05 J**	**0.08 J**	**0.04 J**	<0.1 U
Benzo(a)pyrene	**0.08 J**	**0.03 J**	<0.1 U	**0.02 J**	**0.06 J**	<0.1 U	<0.1 U
Benzo(b)fluoranthene	**0.1 J**	**0.04 J**	**0.03 J**	<0.1 U	**0.07 J**	<0.1 U	<0.1 U
Benzo(k)fluoranthene	<0.1 U	**0.01 J**	**0.01 J**	<0.1 U	**0.03 J**	<0.1 U	<0.1 U
Biphenyl (Diphenyl)	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U
Chrysene	**0.11 J**	**0.05 J**	**0.03 J**	**0.03 J**	**0.06 J**	<0.1 U	<0.1 U
Dibutyl phthalate	<5 UJ	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	<0.1 U	<0.1 U	**0.02 J**	<0.1 U	**0.04 J**	<0.1 U	<0.1 U
Naphthalene	1.7	0.48	3	0.45	1	1.4	<0.69 U
Pentachlorophenol	0.26 J	<0.8 U	0.49 J	<0.8 U	0.17 J	0.24 J	0.19 J
Phenol	**15**	**5.7**	**42**	**36 J**	**77**	**130**	**130**

Location	C-MW205	C-MW205	C-MW205	C-MW205	C-MW205	C-MW205	C-MW205
Sample Name	C-MW205_080322	C-MW205_021623	C-MW205_052223	C-MW205_083023	C-MW205_112823	C-MW205_032524	C-MW205_071724
Sample Date	08/03/2022	02/16/2023	05/22/2023	08/30/2023	11/28/2023	03/25/2024	07/17/2024
VOCs							
1,2,4,5-Tetramethylbenzene	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U
1,2,4-Trimethylbenzene	0.78 J	<2.5 U	<2.5 U	<2.5 U	<2.5 U	0.85 J	1.3 J
1,3,5-Trimethylbenzene (Mesitylene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
1,4-Dichlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Acetone	<5 U	5.3	2.2 J	2.6 J	24	**100**	26
Benzene	**2 J**	0.83	1	0.56	0.44 J	**1.9**	**5.5**
Chlorobenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Ethylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	1.5 J
Isopropylbenzene (Cumene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
M,P-Xylene	0.8 J	<2.5 U	0.74 J	<2.5 U	<2.5 U	1.4 J	3.4
Methyl Ethyl Ketone (2-Butanone)	<5 U	<5 UJ	<5 U	<5 U	2.3 J	**84**	14
n-Propylbenzene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
o-Xylene (1,2-Dimethylbenzene)	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	0.99 J	1.3 J
Styrene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U
Tert-Butyl Methyl Ether	**44**	7.4	**47**	**89**	**86**	**20**	**72**
Toluene	<2.5 U	<2.5 U	<2.5 U	<2.5 U	<2.5 U	1.9 J	3.4
Total Xylenes	0.8 J	<2.5 U	0.74 J	<2.5 U	<2.5 U	2.4 J	4.7 J
SVOCs							
1,4-Dichlorobenzene	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	NA	**0.42 J**	**1.61**	NA	**3.32**	**1.43**	**1.84**
2,4-Dimethylphenol	<5 U	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U
Acenaphthene	0.88	0.11	0.21	0.26	0.32	0.47	0.71
Benzo(a)anthracene	<0.1 U	<0.1 U	**0.07 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(a)pyrene	<0.1 U	<0.1 U	**0.04 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(b)fluoranthene	<0.1 U	**0.01 J**	**0.05 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Benzo(k)fluoranthene	<0.1 U	<0.1 U	**0.02 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Biphenyl (Diphenyl)	<2 U	<2 U	<2 U	<2 UJ	<2 U	<2 U	<2 U
Chrysene	<0.1 U	<0.1 U	**0.04 J**	<0.1 U	**0.02 J**	<0.1 U	<0.1 U
Dibutyl phthalate	<5 UJ	<5 U	<5 U	<5 UJ	<5 U	<5 U	<5 U
Indeno(1,2,3-cd)pyrene	<0.1 U	<0.1 U	**0.04 J**	<0.1 U	<0.1 U	<0.1 U	<0.1 U
Naphthalene	4.1	0.81	0.92	0.76	1	2.6	4.3
Pentachlorophenol	0.26 J	0.15 J	0.11 J	<0.8 U	0.12 J	<0.8 U	0.08 J
Phenol	<5 U	<5 U	<5 U	<5 UJ	**66**	**46**	**47**

Location	C-MW206	C-MW206	C-MW206	C-MW206	C-MW206	C-MW206
Sample Name	C-MW206_021623	C-MW206_052223	C-MW206_083023	C-MW206_112823	C-MW206_040524	C-MW206_071624
Sample Date	02/16/2023	05/22/2023	08/30/2023	11/28/2023	04/05/2024	07/16/2024
VOCs						
1,2,4,5-Tetramethylbenzene	**24**	**20**	**19**	**22**	**20**	**16**
1,2,4-Trimethylbenzene	**430**	**400**	**460**	**370**	**320**	**240**
1,3,5-Trimethylbenzene (Mesitylene)	**110**	**100**	**100**	**83**	**75**	**52**
1,4-Dichlorobenzene	<25 U	<12 U	<10 U	<10 U	<25 U	<6.2 U
Acetone	**500**	31	22	19 J	<50 U	**92**
Benzene	**420**	**160**	**240**	**160**	**100**	**100**
Chlorobenzene	<25 U	<12 U	<10 U	<10 U	<25 U	<6.2 U
Ethylbenzene	**310**	**260**	**300**	**180**	**150**	**99**
Isopropylbenzene (Cumene)	**16 J**	**16**	**15**	**13**	**11 J**	**7.5**
M,P-Xylene	**1,100**	**930**	**1,300**	**380**	**420**	**340**
Methyl Ethyl Ketone (2-Butanone)	**160 J**	<25 U	9.3 J	<20 U	<50 U	14
n-Propylbenzene	**45**	**43**	**41**	**38**	**34**	**22**
o-Xylene (1,2-Dimethylbenzene)	**570**	**470**	**66**	**88**	**100**	**100**
Styrene	**12 J**	**7.5 J**	<10 U	<10 U	<25 U	2.2 J
Tert-Butyl Methyl Ether	**1,100**	**280**	**520**	**580**	**300**	**300**
Toluene	**1,800**	**760**	**170**	**130**	**92**	**160**
Total Xylenes	**1,700**	**1,400**	**1,400**	**470**	**520**	**440**
SVOCs						
1,4-Dichlorobenzene	<10 U	<2 U	<2 UJ	<2 U	<2 U	<2 U
1,4-Dioxane (P-Dioxane)	**11 J**	**1.93 J**	NA	**4.19**	**1.05**	**4.82**
2,4-Dimethylphenol	**20 J**	**4.2 J**	**11 J**	**9**	**1.9 J**	**6.4**
Acenaphthene	0.66	0.51	0.54	0.53	0.78	0.59
Benzo(a)anthracene	**0.34 J**	**0.06 J**	**0.12**	<0.1 U	**0.09 J**	<0.1 U
Benzo(a)pyrene	<0.5 U	**0.02 J**	**0.03 J**	**0.04 J**	**0.08 J**	**0.02 J**
Benzo(b)fluoranthene	**0.08 J**	**0.02 J**	<0.1 U	<0.1 U	**0.08 J**	<0.1 U
Benzo(k)fluoranthene	<0.5 U	<0.1 U	<0.1 U	<0.1 U	**0.03 J**	<0.1 U
Biphenyl (Diphenyl)	<10 U	<2 U	0.76 J	0.88 J	0.51 J	<2 U
Chrysene	<0.5 U	**0.02 J**	**0.03 J**	<0.1 U	**0.07 J**	<0.1 U
Dibutyl phthalate	<25 U	<5 U	<5 UJ	1 J	0.89 J	<5 U
Indeno(1,2,3-cd)pyrene	<0.5 U	**0.01 J**	<0.1 U	**0.02 J**	**0.04 J**	<0.1 U
Naphthalene	**77**	**36 J**	**63**	**59**	**43**	**32**
Pentachlorophenol	<4 U	0.85 J	<0.8 U	0.26 J	0.12 J	0.25 J
Phenol	**110**	**23 J**	**75 J**	**58**	**3.1 J**	**40 J**

Legend

- Approximate BCP Site Boundary
- Approximate Former OU-1 Boundary
- Future roadways and sliver lot parcels removed from BCP Site No. C241146
- In-Situ Groundwater Treatment Area (2022-2023)
- Approximate Location of Existing Monitoring Well
- Approximate Location of Monitoring Well to be Decommissioned
- Inferred Groundwater Flow Direction

Analyte	NYSDEC SGVs
VOCs	
1,2,4,5-Tetramethylbenzene	5
1,2,4-Trimethylbenzene	5
1,3,5-Trimethylbenzene (Mesitylene)	5
1,4-Dichlorobenzene	3
Acetone	50
Benzene	1
Chlorobenzene	5
Ethylbenzene	5
Isopropylbenzene (Cumene)	5
M,P-Xylene	5
Methyl Ethyl Ketone (2-Butanone)	50
n-Propylbenzene	5
o-Xylene (1,2-Dimethylbenzene)	5
Styrene	5
Tert-Butyl Methyl Ether	10
Toluene	5
Total Xylenes	5
SVOCs	
1,4-Dichlorobenzene	3
1,4-Dioxane (P-Dioxane)	0.35
2,4-Dimethylphenol	1
Acenaphthene	20
Benzo(a)anthracene	0.002
Benzo(a)pyrene	0
Benzo(b)fluoranthene	0.002
Benzo(k)fluoranthene	0.002
Biphenyl (Diphenyl)	5
Chrysene	0.002
Dibutyl phthalate	50
Indeno(1,2,3-cd)pyrene	0.002
Naphthalene	10
Pentachlorophenol	1
Phenol	1

Exceedance Summary:

10 - Result exceeds NYSDEC SGVs

Notes:
1. Basemap imagery provided through Langan's subscription to Near Map, dated 09/05/2023.
2. OU = Operable Unit
3. VOCs = Volatile Organic Compounds
4. SVOCs = Semi-Volatile Organic Compounds
5. NYSDEC SGVs = New York State of Environmental Conservation Standard Guidance Values
6. Sample concentrations are in microgram per Liter (µg/L).

100 0 100
SCALE IN FEET

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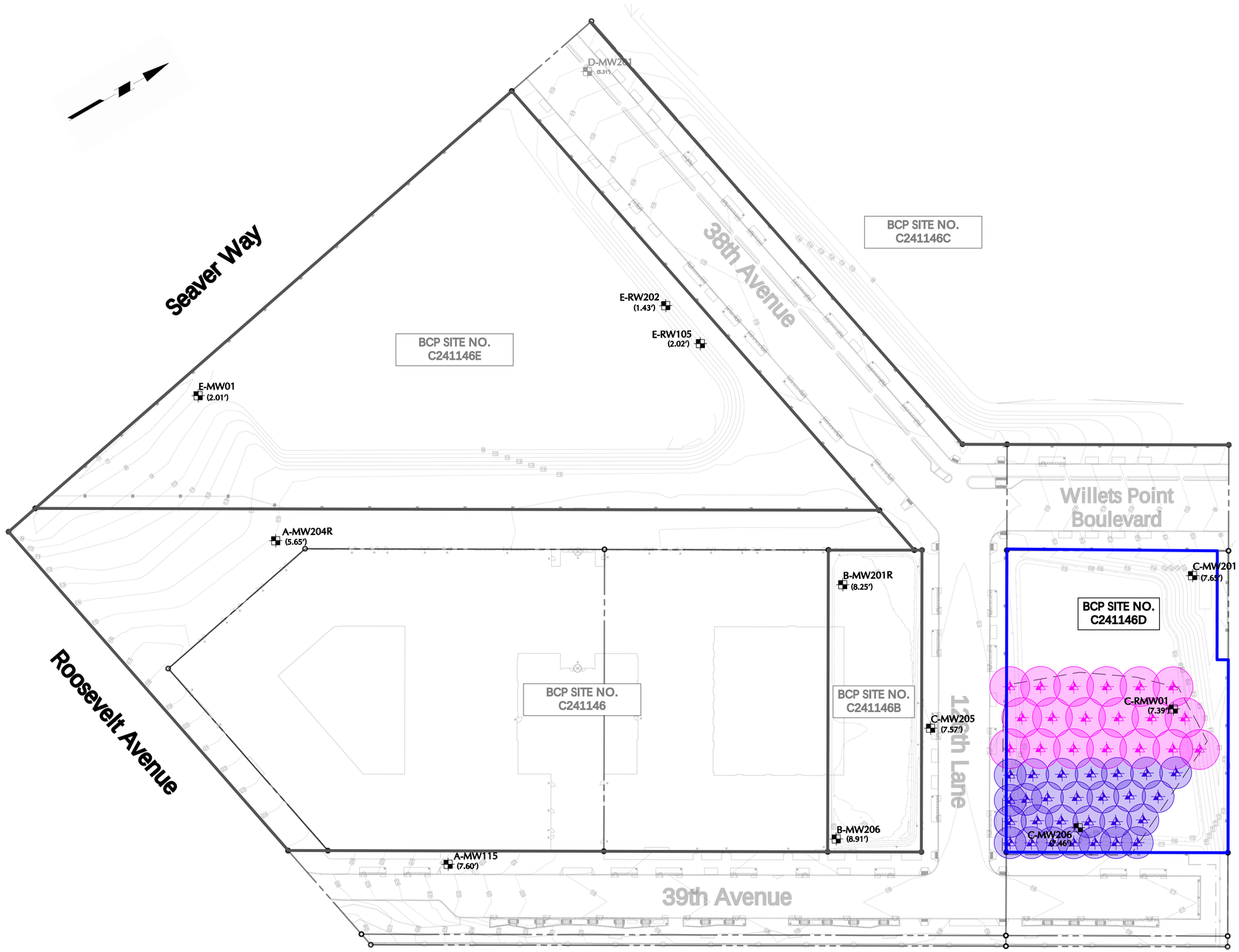
Project
WILLETS POINT DEVELOPMENT SCA SCHOOL (C241146D)
QUEENS NEW YORK

Figure Title
GROUNDWATER SAMPLE ANALYTICAL RESULTS MAP

Project No.	170197605
Date	8/30/2024
Scale	1" = 100 feet
Drawn By	PDT
Submission Date	

Drawing No.
2

Path: \\Langan.com\data\NY\data6\170197601\ArcGIS\APRX\170197601\170197601 v4.aprx



Legend

- Approximate BCP Site Boundary
- Existing Monitoring Well Location
- Monitoring Well to be Decommissioned
- Proposed Injection Point with 12-foot ROI
- Proposed Injection Point with 15-foot ROI
- Proposed Supplemental Groundwater Treatment Area
- Inferred Groundwater Flow Direction (Q4 2023 Groundwater Monitoring Event)
- (X.XX') Groundwater Elevation in Feet (NAVD88) (Q4 2023 Groundwater Monitoring Event)

Notes:

1. Base map depicts anticipated grade elevations during groundwater injections.
2. Groundwater treatment area extents are based on endpoint samples that exceed the New York State Department of Environmental Conservation (NYSDEC) Part 375 Protection of Groundwater (PGW) Soil Cleanup Objectives (SCOs).
3. BCP - Brownfield Cleanup Program
4. ROI - Radius of Influence

40 0 10 25 40
SCALE: 1 INCH = 40 FEET

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Project	WILLETS POINT DEVELOPMENT SCA SCHOOL (C241146D)
	QUEENS NEW YORK
Figure Title	*GROUNDWATER TREATMENT PLAN*
Project No.	170197601
Figure No.	3
Date	08/08/2024
Scale	1" = 40'
Drawn By	NP
Submission Date	-

Figure 3 of 4

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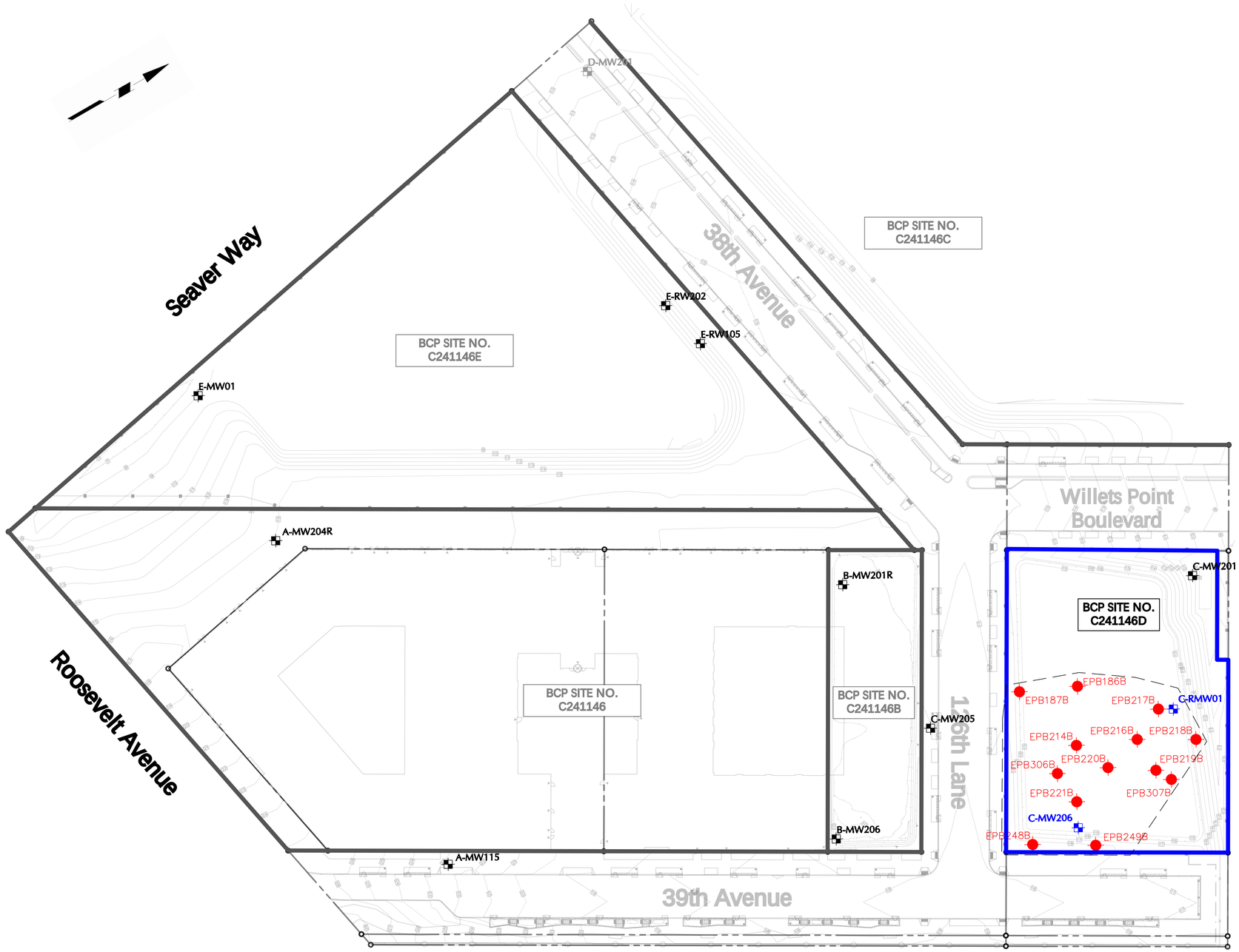

Legend

- Approximate BCP Site Boundary
- Existing Monitoring Well Location
- Monitoring Well to be Decommissioned
- Remedial Performance Monitoring Well Location
- Post-Treatment Soil Boring and Sample Location
- Proposed Supplemental Groundwater Treatment Area

Notes:

1. Base map depicts anticipated grade elevations during groundwater injections.
2. BCP - Brownfield Cleanup Program

40 0 10 25 40
SCALE: 1 INCH = 40 FEET

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Project: WILLETS POINT DEVELOPMENT SCA SCHOOL (C241146D)
QUEENS NEW YORK

Figure Title: REMEDIAL PERFORMANCE SAMPLING PLAN

Project No.	170197601
Date	08/08/2024
Scale	1" = 40'
Drawn By	NP
Submission Date	-

Figure No. 4

Figure 4 of 4

Filename: \\langan.com\data\NYC\data6\170197601\Engineering Data\Environmental\SCA Groundwater Treatment_CAD\Supplemental Remedial Design Work Plan\Figure 4 - Remedial Performance Sampling Plan.dwg Date: 8/30/2024 Time: 13:21 User: npalumbo Style Table: Langan.stb Layout: Figure 4

TABLES

Table 1
Proposed Soil Sample Summary
Supplemental Remedial Design Work Plan
Willets Points Development SCA School
BCP Site No. C241146D
Langan Project No.: 170197605

Location	No.	Sample Elevation (NAVD88)	Sample ID	Previous Documentation Soil Sample ID[1]	Type	Analysis
SOIL[2]						
EPB186	1	3	EPB186B_EL3	EPB186_EL3	Grab	TCL VOCs TCL SVOCs
EPB187	2	6	EPB187B_EL6	EPB187_EL6		
EPB214	3	1.5	EPB214B_EL1.5	EPB214A_EL1.5		
EPB216	4	0	EPB216B_EL0	EPB216A_EL0		
EPB217	5	-1	EPB217B_EL-1	EPB217A_EL-1		
EPB218	6	-1	EPB218B_EL-1	EPB218A_EL-1		
EPB219	7	1.5	EPB219B_EL1.5	EPB219A_EL1.5		
EPB220	8	1	EPB220B_EL1	EPB220A_EL1		
EPB221	9	-0.5	EPB221B_EL-0.5	EPB221A_EL-0.5		
EPB248	10	1	EPB248B_EL1	EPB248A_EL1		
EPB249	11	2	EPB249B_EL2	EPB249A_EL2		
EPB306	12	0.5	EPB306B_EL0.5	EPB306A_EL0.5		
EPB307	13	1	EPB307B_EL1	EPB307A_EL1		
SOIL QA/QC						
DUPLICATE	1	The same elevation as the corresponding parent sample	DUP01_date	N/A	Grab	TCL VOCs, SVOCs
FIELD BLANK	2	N/A	FB01_date	N/A	Deioniozed	
TRIP BLANK	3	N/A	TB01_date	N/A	N/A	TCL VOCs

Notes:
[1]ID of documentation soil sample collected during remedial action implementation, or during the sampling addendum at the proposed sampling location.
[2]Soil sampling will be a one-time sampling event and occur 30-60 days following injections.

GW = Groundwater
N/A = Not Applicable
QA/QC = Quality Assurance/ Quality Control
NYSDEC = New York State Department of Environmental Conservation
TCL = Target Contaminant List
TAL = Target Analyte List

ATTACHMENT 1

REMEDIAL PRODUCT SHEETS

LANGAN

Product Sheet

KLOZUR® SP

THE FIELD PROVEN AND VERSATILE ISCO SOLUTION TO ADDRESS SOIL & GROUNDWATER CONTAMINATION

KLOZUR® SP is the oxidant of choice for in situ chemical oxidation (ISCO), because of its proven ability to treat a wide range of contaminants including chlorinated solvents, petroleum and PAHs. Based upon an environmental grade of sodium persulfate (SP), KLOZUR® SP is ideal for contaminated source zones and hot spots that require rapid treatment. When properly activated, KLOZUR® SP provides an unmatched combination of oxidative power, versatility, and control that can be delivered both safely and cost effectively. Successful field applications of KLOZUR® activated persulfate have been performed globally. These applications demonstrate the ability of KLOZUR® activated persulfate to treat diverse organic contaminants of concern including: chlorinated ethenes (TCE, PCE, DCE and vinyl chloride), chlorinated ethanes (TCA and DCA), chlorinated methanes (carbon tetrachloride and methylene chloride), BTEX, MTBE, polyaromatic hydrocarbons (PAHs), petroleum hydrocarbons (TPHs, GRO, DRO), 1,4-dioxane and pesticides.

KEY BENEFITS

When used with Evonik's patented activation methods, KLOZUR® SP produces the powerful oxidative ($SO_4^{-}\bullet$, $OH\bullet$) and reductive ($O_2^{-}\bullet$) radicals creating a multi-radical attack for the rapid destruction of recalcitrant compounds.

$S_2O_8^{-2}$ + Activator → $SO_4^{-}\bullet$, $OH\bullet$, $O_2^{-}\bullet$

Multiple activation options and methods of delivery provide for a flexible and custom solution based on site conditions. With a solubility limit of up to 40 wt%, KLOZUR® SP can be applied as a fully soluble solution. KLOZUR® SP is a stable oxidant given its high oxidation potential, with a typical active lifetime in the subsurface of weeks to months, providing an extended radius of influence. KLOZUR® SP is safe to handle with Evonik's recommended use guidelines and does not generate heat or gas.

EXAMPLES OF CONTAMINANTS OF CONCERN
CHLORINATED SOLVENTS PCE, TCE, DCE, VC, TCA, DCA, methylene chloride, carbon tetrachloride, chlorobenzene
PETROLEUM TPH, BTEX, DRO, GRO
PAHs creosote, MGP residuals 1,4-dioxane, MTBE, TBA, energetics, chlorinated pesticides

THE SOUND SCIENCE OF KLOZUR® ACTIVATED PERSULFATE

KLOZUR® activated persulfate has a long history of documented success having been used at thousands of sites to remediate contaminants of concern around the world. The field application of KLOZUR® activated persulfate has been scientifically validated in hundreds of independent peer-reviewed journal articles and conference presentations.

APPLICATION METHODS

- Direct push injection
- Fixed well injection
- Soil blending

For more information and detailed case studies, please visit our website.

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Soil & Groundwater Remediation

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EVONIK
Leading Beyond Chemistry

Provect-OX®
Self-Activating ISCO / Enhanced Bioremediation Reagent

TECHNOLOGY DESCRIPTION

Provect-OX® is an *in situ* chemical oxidation (ISCO) / enhanced bioremediation reagent that uses ferric iron (Fe III) as a safe and effective means of activating persulfate (US Patent No. 9,126,245; patents pending). Provect-OX oxidizes a wide variety of organic compounds present in impacted soil, sediment and groundwater, including chlorinated solvents, petroleum hydrocarbons, and pesticides. Rodriquez *et al., (*2014) recently reported that 2 mM Fe(III) and 6 mM persulfate was very effective in rapidly mineralizing even recalcitrant organic compounds such as the synthetic azo dye Orange G ($C_{16}H_{10}N_2Na_2O_7S_2$).

Provect-OX is the only ISCO technology designed to actively manage rebound. The advanced activation catalyst is further unique considering its ability to enhance bioremediation processes. This is accomplished via the subsequent utilization of sulfate and iron as terminal electron acceptors for facultative reductive processes. Degradation intermediates generated during pollutant oxidation may act as electron shuttles, allowing the reduction of Fe(III) to Fe(II) in the redox cycling of iron and continued activation of persulfate. This combined remedy provides supplemental treatment mechanisms thereby allowing for more cost-efficient dosing of the product.

Like all Provectus products, Provect-OX was developed by experienced practitioners who understand real-world field applications. For example, persulfate oxidant and its activator are conveniently packaged in a single, pre-mixed bag for ease of use and safe handling. Moreover, due to its safe and non-extreme activation chemistry, Provect-OX will not generate excessive heat / off-gases, nor will it mobilize heavy metals or lead to the generation of secondary impact issues, such as elevated arsenic, chromium, or pH.

TRADITIONAL ACTIVATION CHEMISTRIES

Heretofore, sodium persulfate has been activated via heat, chelated metals, hydrogen peroxide, ZVI/surface catalysis and/or pH extremes in order to generate sulfate radicals, hydroxyl radicals, etc. (Tsitonaki *et al.,* 2010). Not only do these systems require the addition of other products or energy, they tend to disregard the many biologically mediated processes possible as a consequence of the decomposition products of persulfate.

Divalent metal activation: The utilization of ferrous iron, usually as a chelated cation consumes the oxidant (persulfate) in a conversion of the ferrous iron to ferric iron. Additionally, the presence of the chelant inhibits biological utilization of the generated ferric species as a biological terminal electron acceptor and consumes oxidant. Over dosing of the chelated ferrous iron further consumes the oxidant.

Caustic Activation: The utilization of caustic (high pH) activation of persulfate presents inherit health and safety issues while creating an unsuitably high pH environment for biological attenuation. Further, within this activation mechanism is a self-limiting biological attenuation process once the pH returns to suitable levels. The sulfate, when used as a

biological terminal electron acceptor, transitions to sulfite and finally sulfide. This final product forms hydrogen sulfide which inhibits further biological activity.

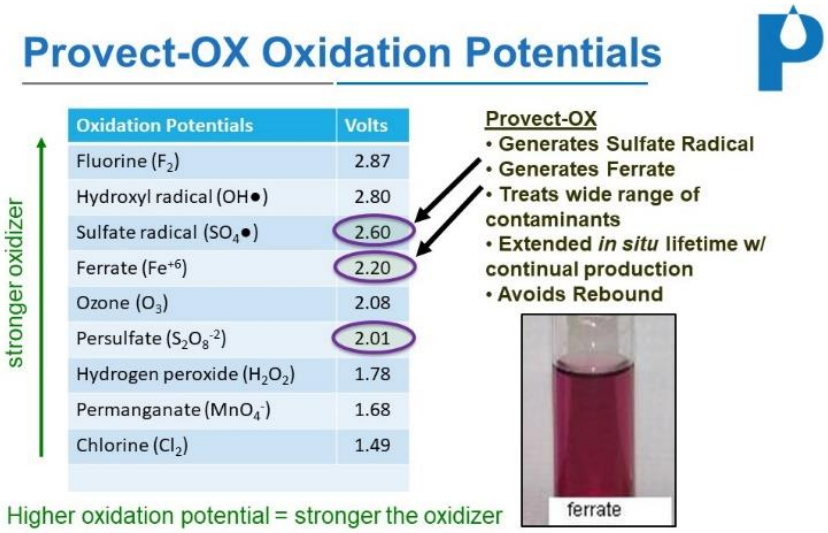
Heat Activation: The utilization of heat as an activation mechanism is generally difficult to implement, and it incurs high implementation costs while not addressing the hydrogen sulfide issue.

Hydrogen Peroxide Activation: The use of peroxide as an activating mechanism again does not address the hydrogen sulfide generation problem while having limited efficacy on many targeted compounds.

MODE OF ACTION

ISCO: Under the Provectus approach, persulfate is activated by Fe III (pre-mixed formulation) which requires a lower activation energy than alternative mechanisms while not consuming the persulfate oxidant. The mechanism is believed to elevate the oxidation state of the iron transiently to a supercharged iron ion which in itself may act as an oxidant. As this supercharged iron cation is consumed, the resulting ferric species can act as a terminal electron acceptor for biological attenuation. Coincidentally, the generated sulfate ion from the decomposition of the persulfate provides a terminal electron acceptor for sulfate reducers which may further remediate the targeted compounds in the groundwater and soils. The reactions that occur in the chemical oxidation include persulfate radicals and ferrate, as summarized below (Equation 1):

$$S_2O_8^{-2} + Fe^{+3} \text{ ---------> } Fe^{(+4 \text{ to } +6)} + SO_4^{2-} + SO_4^{2-\bullet} \quad \text{(Eq. 1)}$$



SECONDARY ATTENUATION PROCESS **(Biologically Mediated):**

1) Sulfate Residual

After dissolved oxygen has been depleted in the treatment area, sulfate (a by-product of the persulfate oxidation) may be used as an electron acceptor for anaerobic biodegradation by indigenous microbes. This process is termed sulfidogenesis and results in the production of sulfide. Stoichiometrically, each 1.0 mg/L of sulfate consumed by microbes results in the destruction of approximately 0.21 mg/L of BTEX compounds. Sulfate can play an important role in bioremediation of petroleum products, acting as an electron acceptor in co-metabolic processes as well. For example, the basic reactions for the mineralization of benzene and toluene under sulfate reducing conditions are presented in equations 2 and 3:

$$C_6H_6 + 3.75\ SO_4^{2-} + 3\ H_2O \dashrightarrow 0.37\ H^+ + 6\ HCO_3^- + 1.87\ HS^- + 1.88\ H_2S^-$$ (Eq. 2)

$$C_7H_8 + 4.5\ SO_4^{2-} + 3\ H_2O \dashrightarrow 0.25\ H^+ + 7\ HCO_3^- + 2.25\ HS^- + 2.25\ H_2S^-$$ (Eq. 3)

2) Ferric Iron:

Ferric iron is also used as an electron acceptor during anaerobic biodegradation of many contaminants, sometimes in conjunction with sulfate. During this process, ferric iron is reduced to ferrous iron, which is soluble in water. Hence, ferrous iron may be used as an indicator of anaerobic activity. As an example, Stoichiometrically, the degradation of 1 mg/L of BTEX results in the average consumption of approximately 22 mg/L of ferric iron (or "production" of ferrous iron) as shown below (equations 4-6).

$$C_6H_6 + 18\ H_2O + 30\ Fe^{3+} \text{-------}> 6\ HCO_3^- + 30\ Fe^{2+} + 36\ H^+$$ (Eq. 4)

$$C_7H_8 + 21\ H_2O + 36\ Fe^{3+} \text{-------}> 7\ HCO_3^- + 36\ Fe^{2+} + 43\ H^+$$ (Eq. 5)

$$C_8H_{10} + 24\ H_2O + 42\ Fe^{3+} \text{-------}> 8\ HCO_3^- + 42\ Fe^{2+} + 50\ H^+$$ (Eq. 6)

3) Pyrite Formation:

While ferrous iron is formed as a result of the use of the ferric species as a terminal electron acceptor, residual sulfate is utilized as a terminal electron acceptor by facultative organisms thereby generating sulfide under these same conditions. Together, the ferrous iron and the sulfide promote the formation of pyrite as a remedial byproduct (equation 7). This reaction combats the toxic effects of sulfide and hydrogen sulfide accumulation on the facultative bacteria, while also providing a means of removing targeted organic and inorganic COIs via precipitation reactions. Moreover, pyrite possesses a high number of reactive sites that are directly proportional to both its reductive capacity and the rate of decay for the target organics.

$$Fe^{2+} + 2S^{2-} \text{-------}> FeS_2 + 2e$$ (Eq. 7)

PRIMARY FEATURES:

This technique maximizes the synergy between persulfate and iron for coupled oxidation and enhanced bioremediation: i) sulfate is generated from persulfate, i) Ferric iron (Fe III) is microbiologically reduced to ferrous iron (Fe II) readily supplying electrons to exchange and react with sulfide. Together, sulfide and iron form pyrite, an iron bearing soil mineral with a favorable reductive capacity.

- Effective: Promotes multiple free radical based *in situ* oxidation of a wide-range of organic contaminants. Also provides a unique microbiological component for multiple accelerated attenuation processes.
- Efficient: Significantly lower costs as a result of sub-stoichiometric dosing requirements.
- Safe: Fewer health and safety concerns as compared with use of traditional activation methods such as heat, chelated metals, hydrogen peroxide or pH extremes. Contains built-in activation which eliminates the need for additional and potentially hazardous chemicals required to achieve traditional persulfate activation.

- Ease of Use: Single component product with integrated activator results in simplified logistics and application. No additional containers or multi-step mixing ratios required prior to application. Fewer material compatibility issues.
- Improved Performance: Combined remedy prevents "rebound" which is often seen in other oxidation processes. Maximizes the inherent geochemistry of a "post-oxidation" environment for biologically based attenuation.
- Patented Technology: US Patent No. 9,126,245 (international filings in EU, Australia, Brazil, Canada, China, Colombia, Japan and Mexico) and others pending allow us to freely market this advanced persulfate-based ISCO technology globally, using our choice of suppliers.

LITERATURE CITED:

Rodriguez S, L. Vasquez, D. Costa D, A. Romero and A. Santos. 2014. Oxidation of Orange G by Persulfate activated by Fe(II), Fe(III) and zero valent iron (ZVI). Chemosphere 101:86-92.

Scalzi, M. and A. Karachalios. 2013. Chemical Oxidation and Biological Attenuation Process for the Treatment of Contaminated Media. US PTO 9,126,245.

Tsitonaki, A., B.Petri, M. Crimi, H.Mosbaek, R. Siegrist and P. Berg. 2010. *In Situ* Chemical Oxidation of Contaminated Soil and Groundwater using Persulfate: A Review. Critical Rev. Environ. Sci and Technol. 40: 55-91.

PetroFIX™ Remediation Fluid

PetroFix Fluid Chemical Composition	Properties
Activated Carbon - CAS 7440-44-0 > 30% Calcium Sulfate Dihydrate - CAS 10101-41-4 < 10%	**Appearance:** Black Fluid **Viscosity:** 1500-3500 cP (corn syrup-like) **pH:** 8-10

PetroFix Electron Acceptor Powder Chemical Composition	Properties
OPTION 1 - EA Blend (preferred) Sodium Nitrate - CAS 7631-99-4, 50% Ammonium Sulfate - CAS 7783-20-2, 50% OPTION 2 - EA Blend NF Potassium Sulfate - CAS 7778-80-5, 50% Ammonium Sulfate - CAS 7783-20-2, 50%	**Appearance:** White Powder

Storage and Handling Guidelines

Storage:

- Store away from incompatible materials
- Store in original closed container
- Store at temperatures between 40°F and 95°F
- Do not allow material to freeze or store in direct sunlight.
- Freezing and hot weather technical memo can be accessed at www.petrofix.com/resources or at this ***link*** here.
- Dispose of waste and residues in accordance with local authority requirements

Handling:

- Never add additives to solution prior to mixing with water
- Wear appropriate personal protective equipment
- Do not taste or ingest
- Observe good industrial hygiene practices
- Wash hands after handling

Applications

PetroFix is mixed with water on-site and easily applied onto the sub-surface using low pressure injections, or mixed in excavations. PetroFix is compatible with and can be used with ORC Advanced® to expedite rates of biodegradation. For more information about co-application with ORC Advanced, contact REGENESIS.

REGENESIS®

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OXYGEN RELEASE COMPOUND

ORC Advanced® Technical Description

ORC Advanced® is an engineered, oxygen release compound designed specifically for enhanced, *in situ* aerobic bioremediation of petroleum hydrocarbons in groundwater and saturated soils. Upon contact with groundwater, this calcium oxyhydroxide-based material becomes hydrated producing a controlled release of molecular oxygen (17% by weight) for periods of up to 12 months on a single application.

Example of ORC Advanced

ORC Advanced decreases time to site closure and accelerates degradation rates up to 100 times faster than natural degradation rates. A single ORC Advanced application can support aerobic biodegradation for up to 12 months with minimal site disturbance, no permanent or emplaced above ground equipment, piping, tanks, power sources, etc are needed. There is no operation or maintenance required. ORC Advanced provides lower costs, greater efficiency and reliability compared to engineered mechanical systems, oxygen emitters and bubblers.

ORC Advanced provides remediation practitioners with a significantly faster and highly effective means of treating petroleum contaminated sites. Petroleum hydrocarbon contamination is often associated with retail petroleum service stations resulting from leaking underground storage tanks, piping and dispensers. As a result, ORC Advanced technology and applications have been tailored around the remediation needs of the retail petroleum industry and include: tank pit excavations, amending and mixing with backfill, direct-injection, bore-hole backfill, ORC Advanced Pellets for waterless and dustless application, combined ISCO and bioremediation applications, etc.

For a list of treatable contaminants with the use of ORC Advanced, view the Range of Treatable Contaminants Guide

Chemical Composition

- Calcium hydroxide oxide
- Calcium hydroxide

Properties

- Physical state: Solid
- Form: Powder
- Odor: Odorless
- Color: White to pale yellow
- pH: 12.5 (3% suspension/water)

OXYGEN RELEASE COMPOUND

ORC Advanced® Technical Description

Storage and Handling Guidelines

Storage
Store in a cool, dry place out of direct sunlight
Store in original tightly closed container
Store in a well-ventilated place
Do not store near combustible materials
Store away from incompatible materials
Provide appropriate exhaust ventilation in places where dust is formed

Handling
Minimize dust generation and accumulation
Keep away from heat
Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces
Observe good industrial hygiene practices
Take precaution to avoid mixing with combustibles
Keep away from clothing and other combustible materials
Avoid contact with water and moisture
Avoid contact with eyes, skin, and clothing
Avoid prolonged exposure
Wear appropriate personal protective equipment

Applications

- Slurry mixture direct-push injection through hollow rods or direct-placement into boreholes
- *In situ* or *ex situ* slurry mixture into contaminated backfill or contaminated soils in general
- Slurry mixture injections in conjunction with chemical oxidants like RegenOx or PersulfOx
- Filter sock applications in groundwater for highly localized treatment
- *Ex situ* biopiles

Health and Safety

Wash thoroughly after handling. Wear protective gloves, eye protection, and face protection. Please review the ORC Advanced Safety Data Sheet for additional storage, usage, and handling requirements.

REGENESIS®

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949.366.8000

PetroFix™ Specification Sheet

PetroFix Technical Description

PetroFix is a new remedial technology designed to treat petroleum fuel spills in soil and groundwater. A simple-to-use fluid that can be applied under low pressure into the subsurface or simply poured into open excavations, PetroFix offers a cost-effective solution for environmental practitioners and responsible parties to address petroleum hydrocarbon contaminants quickly and effectively.

PetroFix has a dual function; quickly removing hydrocarbons from the dissolved phase, by absorbing them onto the activated carbon particles, while added electron acceptors stimulate hydrocarbon biodegradation in-place. PetroFix does not require high pressure "fracking" for application and can be applied with ease using readily available equipment associated with direct push technology.

The remedial fluid is a highly concentrated water-based suspension consisting of micron-scale activated carbon and biostimulating electron acceptors. PetroFix has a viscosity higher than water and is black in appearance. Its environmentally-compatible formulation of micron-scale activated carbon (1-2 microns) is combined with both slow and quick-release inorganic electron acceptors. A blend of additional electron acceptors is included along with the PetroFix fluid. Practitioners can select between a sulfate and nitrate combination blend (recommended), or sulfate only for the additional electron acceptors required.

PetroFix Design Assistant

REGENESIS has developed a proprietary web-based design assistant called PetroFix Design Assistant™ that provides environmental professionals the ability to input their site parameters, determine the required product amount, and order the product through REGENESIS' customer service. The PetroFix Design Assistant includes defaults and warnings throughout the process to guide users toward effective designs that will offer best results.

To access the PetroFix Design Assistant, create an account and login at www.PetroFix.com

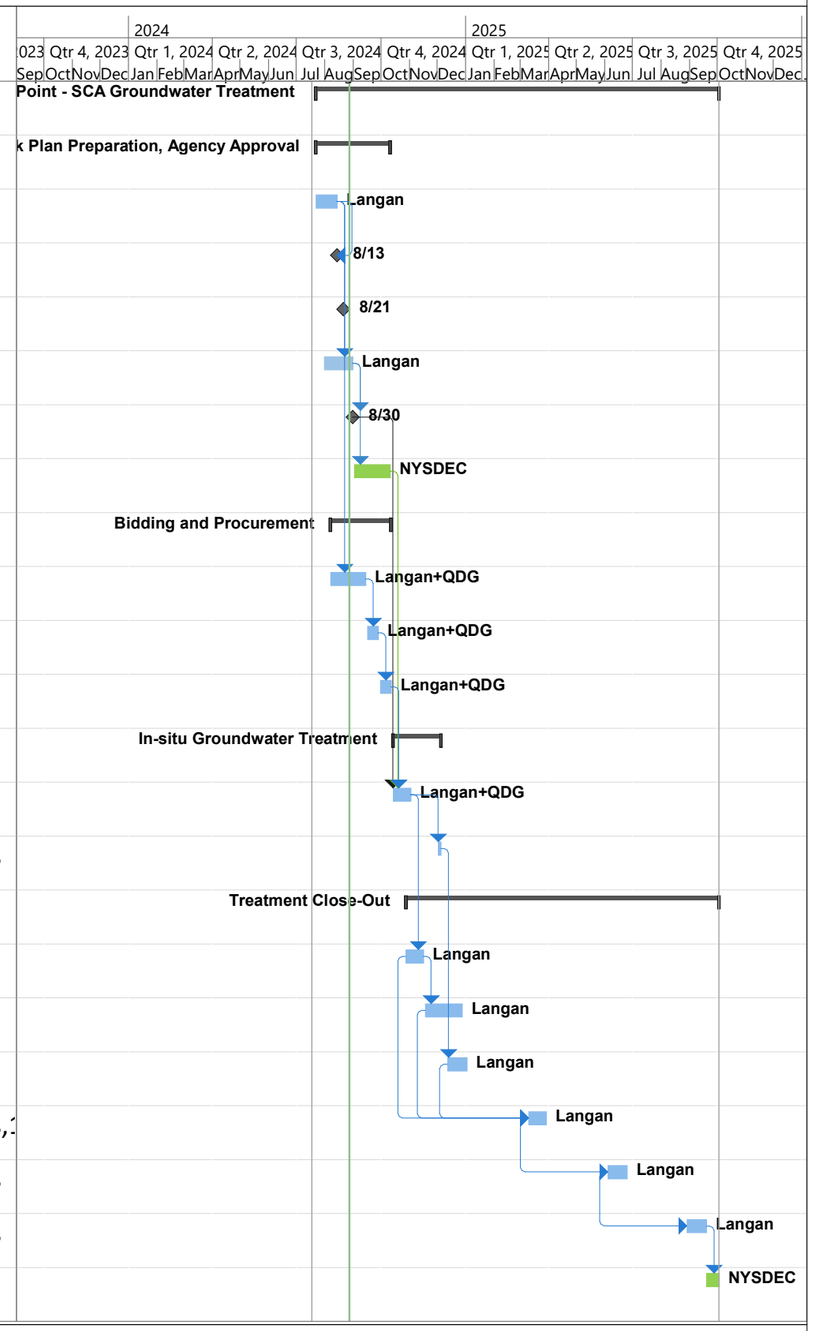
ATTACHMENT 2

SCHEDULE

LANGAN

In-Situ Groundwater Treatment Schedule
Willets Point Development SCA School
Brownfield Cleanup Program Site No.: C241146D
Langan Project No. 170197605

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Willets Point - SCA Groundwater Treatment**	**314 days**	**Mon 7/22/24**	**Thu 10/2/25**	
2	**Design, Work Plan Preparation, Agency Approval**	**59 days**	**Mon 7/22/24**	**Thu 10/10/24**	
3	Design (Langan and Remedial Contractor)	17 days	Mon 7/22/24	Tue 8/13/24	
4	Scoping Call with NYSDEC	0 days	Tue 8/13/24	Tue 8/13/24	3FF
5	Treatability Sampling	0 days	Wed 8/21/24	Wed 8/21/24	
6	Preparation and Submittal of Work Plan to QDG (Langan)	23 days	Wed 7/31/24	Fri 8/30/24	3FS-10 days
7	Submittal of Work Plan to NYSDEC (Langan)	0 days	Fri 8/30/24	Fri 8/30/24	6
8	Work Plan Review, Comment and Approval (NYSDEC)	29 days	Mon 9/2/24	Thu 10/10/24	6
9	**Bidding and Procurement**	**48 days**	**Wed 8/7/24**	**Fri 10/11/24**	
10	Bid Document Prepartion (Langan)	28 days	Wed 8/7/24	Fri 9/13/24	3FS-5 days
11	Treatment Subcontractor Bidding and Procurement (Langan+QDG)	10 days	Mon 9/16/24	Fri 9/27/24	10
12	In-Situ Treatment Preparation (Remedial Contractor)	10 days	Mon 9/30/24	Fri 10/11/24	11
13	**In-situ Groundwater Treatment**	**38 days**	**Mon 10/14/24**	**Wed 12/4/24**	
14	In-Situ Injections (Remedial Contractor)	15 days	Mon 10/14/24	Fri 11/1/24	12,8,7
15	Monitoring Well Re-installation (Langan)	3 days	Mon 12/2/24	Wed 12/4/24	14FS+20 days
16	**Treatment Close-Out**	**244 days**	**Mon 10/28/24**	**Thu 10/2/25**	
17	FER Revisions and Resubmission (Langan)	15 days	Mon 10/28/24	Fri 11/15/24	14FS-5 days
18	Issue FER Approval and COC (NYSDEC)	30 days	Mon 11/18/24	Fri 12/27/24	17
19	Q1 Post-Treatment Soil and Groundwater Sampling and Reporting	15 days	Thu 12/12/24	Wed 1/1/25	15FS+5 days
20	Q2 Post-Treatment Groundwater Sampling and Reporting	15 days	Mon 3/10/25	Fri 3/28/25	19SS+62 days,1
21	Q3 Post-Treatment Groundwater Sampling and Reporting	15 days	Wed 6/4/25	Tue 6/24/25	20SS+62 days
22	Q4 Post-Treatment Groundwater Sampling and Reporting	15 days	Fri 8/29/25	Thu 9/18/25	21SS+62 days
23	Groundwater Report Review and Approval (NYSDEC)	10 days	Fri 9/19/25	Thu 10/2/25	22



Date: Wed 8/28/24

"day(s)" in the Duration Column are working (business) days

LANGAN