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# DRAFT
# REMEDIAL INVESTIGATION WORK PLAN

**Industrial Overall Service Corp. - Site # 360109**
10 Bartels Place
New Rochelle, New York

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HRP #: DEC1031.P3

Issued On: November 14, 2022

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# 1.0 INTRODUCTION

On March 16, 2022, HRP Associates, Inc. (HRP) was authorized to complete this New York State Department of Environmental Conservation (NYSDEC) Work Assignment (WA) No. 31 (D009808-31) for Remedial Investigation/Feasibility Study (RI/FS) at the Industrial Overall Service Corp. Site, located at 10 Bartels Place, New Rochelle, New York ("Site"). The scope of work (SOW) for the RI portion of the WA, discussed herein, was developed based on HRP's review of documents detailing previous subsurface investigations completed at the property between 2012 and 2019, as well as discussions and planning with NYSDEC staff.

## 1.1 Purpose and Objectives

This site-specific Remedial Investigation Work Plan (RIWP) describes the details of the SOW, including proposed field activities, laboratory analyses, and data QA/QC evaluation that will be associated with the RI at the Site. This document is intended to supplement information provided in the NYSDEC-approved *Generic Field Activities Plan for Work Assignments*, completed by HRP on August 8, 2019 and provided in **Appendix A** of this RIWP.

The purpose of the RI is to define the nature and extent of groundwater impacts associated with Operable Unit #2 (OU-2) the Site. In accordance with the NYSDEC the Division of Environmental Remediation Program Policy #10 (DER-10) *Technical Guidance for Site Investigation and Remediation (May 2010),* the primary objectives of this RI SOW are to:

- Delineate the areal and vertical extent of contaminants in groundwater emanating from the Site.
- Determine the surface and subsurface characteristics of the Site, including topography, geology, and hydrogeology, including depth to groundwater and groundwater flow gradients.
- Identify the migration pathways, and actual or potential receptors of contaminants on or through air, soil, bedrock, groundwater, utilities, and structures at the Site, without regard to property boundaries.
- Collect and evaluate the data necessary to evaluate the actual and potential threats to public health and the environment.
- Collect the data necessary to evaluate and develop remedial alternative(s) to address the release.

## 1.2 Site Description and Background Information

The Industrial Overall Service Corp. Site (#360109) is located at 10 Bartels Place Avenue, New Rochelle, New York, (**Figure 1**), and is the focus of this investigation. The Site is approximately 0.5 acres in size, according to the survey included in the Site Environmental Easement (EE), established on September 17, 2019, and the NYSDEC Site Briefing Report, received by HRP on March 16, 2022.

The Site is connected to the municipal water supply and serviced by the municipal sanitary sewer. No records of septic systems at the Site have been identified in available records. The Site and surrounding properties are zoned for light industry (LI), according to the New Rochelle Municipal Geographic Information System (GIS) Tax Parcel Viewer.

According to the previously completed RI (MACTEC, 2016) the Site previously operated between approximately 1956-2010 as a uniform and industrial clothing laundering facility (Industrial Overall Services). Based on a Sanborn Fire Insurance map from 1931, the Site previously operated as an automobile garage, with the capacity to store/service 275 cars and housed four gasoline tanks on the northeastern corner of the property. In 1980, Workingman's Closet, a direct factory sales division of Industrial Overall Services which sells new and reclaimed work clothes, was opened.

Two businesses currently operate at the Site; one launders linens and uniforms for restaurant and other businesses, and the other is a retail division selling uniforms.

Previous environmental investigations identified chlorinated solvents in soil and groundwater above NYSDEC Standards, Criteria, and Guidance (SCGs). Data collected during previous investigations is available online using the NYSDEC InfoLocator GIS Viewer.

## 1.3 Surficial and Bedrock Geology

Overburden soils previously identified at the Site consist of urban fill, and varying amounts of bricks, ash, coal, slag, glass, and metal from surface to 5 feet below grade (ft bg). Soil beneath the fill layer generally consisted of red-brown fine to coarse sand with little fine gravel, and varying amounts of silt and cobbles, underlain by olive-brown till and fine gravel. Overburden soil at the Site was generally present from grade to approximately 24.5 ft bg.

Bedrock encountered during the 2016 MACTEC RI was described to be undulating in nature, and present at depths ranging from 2.2 to 24.5 ft bg. A bedrock ridge was observed beneath the northern portion of the Site building, present at 1.8 ft bg. Bedrock was described in the 2016 MACTEC RI report as grey to dark grey to greenish, medium grained, well foliated gneissic/schistosic rock, with some quartz/feldspar veins/layers. Based field observations during the RI, bedrock consisted of two distinctly different physical properties, and was referred to as highly weathered and weathered bedrock units.

The United States Geological Survey describes bedrock at the Site as the Hartland Formation, an Ordovician amphibolite, which consists of crystalloblastic rock consisting mainly of amphibole and

plagioclase with little or no quartz. The Hartland Formation also consists of a schistose metamorphic rock derived by metamorphism of an argillaceous or fine-grained aluminous sediment.

## 1.4 Site Hydrology and Hydrogeology

Surface water hydrology at the Site and surrounding areas includes stormwater runoff and surface water. The majority of stormwater runoff flows to the southwest and is collected by the stormwater and sanitary drainage system at the Site. The drainage system discharges to Burling Brook, approximately 1 mile to the south-southwest of the Site, which flows into New Rochelle Harbor. The nearest waterbody to the Site is Titus Millpond, located approximately 2,000 feet southeast of the Site.

Based on information from the 2016 MACTEC RI shallow groundwater in the overburden aquifer was encountered at depths ranging from 0.2 to 10 ft bg and mapped to flow to the southwest. MACTEC calculated a horizontal hydraulic gradient of 0.031 feet/foot for the localized on-site groundwater flow. Overburden hydraulic conductivity ("k") was measured at the Site to be 1.1 to 2.9 ft/day during the previous MACTEC RI. The porosity of overburden soils was estimated at 25%. Groundwater velocity was estimated to be approximately 80 ft/year.

Bedrock hydraulic conductivity was calculated during the MACTEC RI to be approximately 0.09 to 2.28 ft/day. The horizontal bedrock hydraulic gradient was calculated to be 0.03 ft/ft, and porosity of bedrock was estimated at 1%. Bedrock groundwater velocity was estimated at 300 ft/year. A downward vertical gradient was noted upgradient of the Site, adjacent to MW-26/B. Vertical gradients range from downward to flat, in the immediate vicinity of the Site. The vertical gradient downgradient of the Site is generally flat.

## 1.5 Areas of Concern

According to previous environmental reports and limited available historic Site records, the following areas of concern (AOCs) were identified that had the potential to impact environmental media at the Site and require further characterization. AOCs during the previous MACTEC RI and supplemental RI included:

- Trench and floor drains.
- Former dry-cleaning equipment.
- Loading/unloading areas.
- Utility trenches and clean outs.

The contaminants that were identified during previous investigations consist of volatile organic compounds (VOCs), including 1,1,1-trichloroethane (TCA), cis-1,2-dichloroethene (1,2-DCE), tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride. The presence of PFAS and 1,4-dioxane has not been previously investigated.

Samples collected from below the south-central portion of the building, near the former lint trap reported the highest concentrations of VOCs (predominately chlorinated VOCs). This area below the

central portion of the building is suspected to be a primary release area of these substances to the subsurface soils and groundwater.

To define the nature and extent of environmental impacts at the Site, HRP will collect groundwater samples for laboratory analysis of the known Contaminants of Concern (COCs), in addition to PFAS and 1,4-dioxane.

## 2.0 REMEDIAL INVESTIGATION (RI) SCOPE OF WORK

This SOW has been designed to gather data to evaluate each project objective listed in **Section 1.1**. The following sections provide specifics regarding the SOW developed under this NYSDEC-approved WA (D009808-31) in support of the RI at the Site.

### 2.1 Preliminary Activities

As part of the SOW, the following documents have been prepared under this WA:

- Project-specific Work Plan (this document) to accompany the Generic Field Activities Plan (FAP) (included as **Appendix A** of this RIWP).
- Site-specific Health and Safety Plan (HASP) (included as **Appendix B** of this RIWP).
- Generic Quality Assurance Project Plan (QAPP) (included as **Appendix C** of this RIWP).

These NYSDEC-approved generic FAP, HASP, and QAPP are on file with the NYSDEC. The site-specific elements are provided below.

#### 2.1.1 Work Plan

This RIWP has been prepared for use in performing the RI and will serve as the "Site-specific FAP". Components of the RI and a description of the tasks to be performed including the specific methods or procedures that will be used has been identified by this RIWP and are included in the following sections. A proposed project schedule is included in **Section 5.1** of this RIWP.

#### 2.1.2 Health and Safety Plan

A site-specific HASP is included as **Appendix B** of this RIWP and provides guidance to maximize health and safety of on-site workers during RI. Included in the site-specific HASP is a Community Air Monitoring Plan (CAMP) that details procedures for air monitoring during intrusive activities. The CAMP will be implemented during intrusive activities, described in **Appendix B** of this RIWP.

#### 2.1.3 Quality Assurance Project Plan

A site-specific QAPP has been prepared and is included in **Section 4** of this RIWP. The site-specific QAPP was prepared as a supplement to the Generic QAPP (**Appendix C**) with necessary site-specific information. Deviations from the protocols specified in the QAPP will be subject to the NYSDEC approval.

The Generic QAPP provides general information related to quality assurance and quality control (QA/QC) procedures associated with the collection and analysis of samples of environmental media and includes specific representative Standard Operating Procedures (SOPs) applicable to sample handling and field instrumentation use. Information provided in the Generic QAPP includes definitions and generic goals for data quality and required types and quantities of QA/QC samples. The procedures address field documentation; sample handling, custody, and shipping; instrument

calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and Quality Assurance/Quality Control (QA/QC) reporting specific to the analyses performed by the laboratories under NYSDEC Standby Contract No. D009808.

Laboratory analytical work will be performed by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) approved laboratory certified in Contract Laboratory Protocol (CLP) and Solid and Hazardous Waste analytical testing. A Data Usability Summary Report (DUSR) will be included in the Remedial Investigation Report (RIR) for each round of analytical work. Category B deliverables will be retained in the project files and available for full data validation by a qualified, independent third party.

### 2.1.4 Permits and Access Agreements

Permits, access agreements, and permissions will need to be acquired by NYSDEC and HRPs contractors prior to the start of intrusive activities at the Site and may include (but not limited to): private property access, Amtrak property access, Metro-North Transit Authority (MTA) access, and City of New Rochelle public works access. Necessary permissions are described below and included as **Table 1**.

Private Property Access
NYSDEC will send a voluntary access agreement to individual private property owners. Access agreements will be forwarded to HRP prior to the start of intrusive activities at the Site.

Metro-North Transit Authority
Public or private-sector entities engaging in construction activities within 200 feet of MTA property must file their plans with the MTA to ensure MTA-owned infrastructure is protected and preserved.

Amtrak
A license agreement for occupancy must be obtained through Amtrak prior to initiating intrusive activities at the Site. Once the license agreement is executed, a temporary Permit-To-Enter must be secured to enter onto railroad property.

City of New Rochelle
A public works permit is required by the City of New Rochelle for use, occupation, or activity in a public ROW.

## 2.2 Investigation, Environmental Sampling, and Implementation

The RI will include the components described below and will consist of characterizing and sampling soil vapor and groundwater to meet project objectives. The number and type of samples to be collected is discussed below. Field investigation tasks to be completed during the RI are listed below in the order that they will be completed:

1. Underground Utility Identification, Clearance and, Location using Ground-Penetrating Radar (GPR)

2. Groundwater Characterization
    a. Drilling and Well Installation
    b. Borehole Geophysical Logging
    c. Cased Hole System Well Installation
    d. Well Development
    e. Groundwater Sampling
3. Decontamination Procedures
4. Characterization and Disposal of Investigation Derived Waste
5. Soil Vapor Intrusion Investigation
6. Analytical Data Validation and Analysis
7. Site Survey

### 2.2.1 Underground Utility Clearance and Ground Penetrating Radar (GPR)

Prior to implementing intrusive activities, a utility clearance will be conducted by American Geophysics Inc., a GPR contractor. The GPR contractor will rely upon multiple lines of evidence to ensure to the maximum extent practicable that subsurface features are identified prior to commencement of intrusive work. The drilling contractor will request public utility mark outs through NYS Code Rule 753/Dig Safe System.

GPR is a non-destructive and non-intrusive geophysical exploration technique that uses radar waves to detect subsurface objects, such as tanks, drums, and piping. The GPR is also capable of detecting discontinuities in the subsurface materials indicative of excavated and backfilled areas. The objective of performing this survey is to not only make the subsurface investigation as safe as possible for the field staff, but also to identify potential source areas and migration pathways (utility corridors, etc.).

A subsurface interface radar system and a 400 MHz antenna will be used to provide real time data during the survey. The system will be equipped with a video display microprocessor-controlled module, used to convert the subsurface interface radar data to video, which will be displayed on a self-contained monitor.

An electromagnetic (EM) survey will be conducted in conjunction with the GPR survey, to locate potentially buried metal objects (drums, tanks, etc.), and to better define subsurface features at the Site. Anomalies identified during the GPR survey will be marked by the contractor using paint, and may include buried natural gas, electric, water, communication, and sewer utilities.

HRP will also attempt to identify a knowledgeable party (i.e., Site owner) to provide available Site utility information prior to underground utility clearance. If necessary, the upper 5-feet at selected boring locations will be cleared of underground utilities by non-mechanical means, such as hand-digging methods.

### 2.2.2 Groundwater Characterization

For the purpose of evaluating groundwater quality and to obtain groundwater flow information, a total of 16 groundwater monitoring wells (anticipated to be three shallow overburden, 11 single cased bedrock wells and two multi-level FLUTe® wells) are proposed for installation as part of the RI. The proposed locations were selected based on a previously mapped southwesterly overburden groundwater flow direction. The proposed locations of each well are presented on **Figure 2**. Groundwater monitoring wells will be constructed according to the details presented as **Table 2**. Samples will be collected from the newly installed wells in addition to viable existing wells (**Figure 3**) at the Site and surrounding properties.

#### 2.2.2.1. Drilling and Well Installation

Borings for the wells will be advanced using a rotary-vibratory (sonic) drilling rig to collect continuous soil samples and to characterize subsurface lithology. The sonic core barrel will be advanced in 10-foot intervals, or shorter intervals to reach the target depth. After the core barrel is in place, outer casing will override the core barrel, to preserve the sample. Once the override casing is set, the core barrel will be retrieved, and soil will be extruded into a clear polyethylene bag for logging.

The soil will be logged to describe soil lithology and identify changes in stratigraphy related to overburden, weathered rock and bedrock. Soil will also be screened every foot vertically for volatile organic vapors using a 10.6 electron volt (eV) photoionization detector (PID) using headspace measurement techniques.

If grossly impacted soil is encountered (strong odor, staining), NYSDEC will be notified. Soil samples may be collected and submitted for analysis at the direction of NYSDEC.

Overburden Monitoring Wells

Permanent 2.0-inch diameter overburden monitoring wells (OB-1, OB-2, and OB-3) are to be installed using Sonic drilling methods. Monitoring wells are to be constructed of 2.0-inch diameter schedule-40 PVC riser and schedule-40 PVC 10-slot screen. Monitoring wells should be constructed in accordance with **Table 2**. The annular space around the well screen will be filled with #1 sand pack from the well bottom to two feet above the screen. A two-foot-thick bentonite seal will be placed above the sand pack and clean drill cuttings will be set to one ft bg. A manhole will be installed when the wells are completed, and finished at grade with concrete.

Bedrock Monitoring Wells

Eleven bedrock monitoring wells (MW-201 through MW-211) will be installed at the Site using Sonic drilling methods (**Figure 2**). Boreholes will be 6-inch diameter to produce a sufficient annular space to support the installation of a 2.0-inch diameter PVC bedrock monitoring well. Once the target depth has been reached, the well will be constructed using a 2-inch diameter schedule-40 PVC screen and 2-inch Schedule-40 PVC riser. The annular space around the well screen will be filled with #1

sand pack from the well bottom to 2-feet above the screen. A 2-foot-thick bentonite seal will be placed above the sand pack, and a bentonite-grout will be used to grout the casing to the surface. Target depths and screened intervals are provided as **Table 2.**

Three bedrock monitoring wells (MW-202, MW-203, and MW-210), and two multi-channel bedrock monitoring wells (MW-212 A/B/C and MW-213 A/B/C) will be installed as open holes to allow for borehole geophysical logging to be completed prior to well installation. Various geophysical logging tools will be used to define water-bearing zones, and are further described below in **Section 2.2.2.2.**

Monitoring wells MW-202, MW-203, and MW-210 will be drilled using a method similar to the bedrock monitoring wells described above, but for these locations, the sonic casing will remain in place to temporarily isolate the bedrock from the overburden while the borehole geophysical logging is completed. Once the geophysics is completed and the screened intervals have been selected, the wells will be completed using the materials and procedures described above.

MW-212 A/B/C and MW-213 A/B/C will be installed as a double-cased well to provide a permanent casing that allows for both geophysical logging and water FLUTe® installation. The initial installation will include a 6-inch steel casing that will be set at least 5-feet into competent bedrock. The casing will be grouted into place and the grout will be allowed to set for 24 hours before proceeding with rock drilling. Once the grout is cured, the bedrock will be drilled to the target depth using 6-inch sonic tooling and remain as a open-holed bedrock well until the geophysical logging is completed and the FLUTe® well can be installed. Details on the FLUTe® monitoring system installation and sampling details are described **Section 2.2.2.3**.

### 2.2.2.2. Borehole Geophysical Logging

Borehole geophysical logging will be completed during the RI to evaluate bedrock fracture characteristics such as: size, frequency, aperture, and orientation. Geophysical data will be collected by the geophysics contractor, American Geophysics. A final summary report will be completed by American Geophysics, and will be provided in a separate report to HRP.

It is estimated that approximately 210 linear feet will be logged from MW-202, MW-203, MW-210, MW-212 A/B/C, and MW-213 A/B/C. The geophysical logging suite will include the following:

- Optical Televiewer (OTV);
- Acoustic Televiewer (ATV);
- Caliper;
- Polyelectric Probe/Conductivity; and
- Heat Pulse Flowmeter (HPFM).

A brief summary of the geophysical methods to be implemented during the RI is presented below.

Optical Televiewer (OTV)

An optical televiewer will be used to produce a high-resolution 360-degree image of the borehole. A ring of lights is used to illuminate the borehole, and a charge-coupled device (CCD) camera will be used as the imaging system. The CCD camera measures the intensity of the color spectrum in red, green, and blue, and the reflector focuses a 360º slice of the borehole wall in the camera's lens. The logging speed of the OTV system is expected to be approximately 3 ft/min.

Subsurface lithology and features (i.e. fractures, fracture infillings, foliation, and bedding planes) will be presented directly on the OTV images. OTV images will be collected in air-filled and clear-water-filled intervals of boreholes. Unflushed drilling mud, chemical precipitation, bacterial growth, and other conditions that affect the clarity of the borehole water will be minimized prior to the initiation of logging.

Acoustic Televiewer (ATV)

An acoustic televiewer (ATV) will be used to provide high-resolution information on the location and orientation of fractures and solution openings. The ATV will also provide the strike and dip of planar features, such as fractures and bedding planes. The ATV will employ a rotating high-frequency transducer that functions as both transmitter and receiver. The piezoelectric transducer will rotate at three or more revolutions per second and will pulse approximately 1,200 times per second. High-frequency acoustic energy will be reflected from the borehole wall to produce a 360º scan of the borehole wall.

Caliper Log

Caliper logs will be used to record borehole diameter. Changes in borehole diameter are related fracturing or caving along the borehole wall. Because borehole diameter commonly affects log response, the caliper log will be useful in the analysis of other geophysical logs, including interpretation of the Heat-Pulse Flowmeter log.

Polyelectric Probe/Conductivity

Fluid-resistivity logs will be used to record the electrical resistivity of water in the borehole. Changes in fluid resistivity reflect differences in dissolved-solids concentration of water. Fluid-resistivity logs will be used to delineate water-bearing zones and vertical flow within the borehole.

Electrical conductivity and resistivity are affected by the porosity, permeability, and clay content of the rocks and by the dissolved-solids concentration of the water within the rocks. The electromagnetic-induction probe is designed to maximize vertical resolution and depth of investigation and will be used to minimize the effects of groundwater and drilling fluids.

Heat Pulse Flowmeter (HPFM)

The HPFM consists of a probe constructed with a wire heat grid, located between two thermistors, and is heated by a 1-ms pulse of electric current, which is triggered from the surface. The heated sheet of water moves toward one of the thermistors under the influence of the vertical component

of flow in the well. The arrival of the heat pulse will be plotted and used to indicate upward flow and downward flow within the borehole.

The HPFM will be completed in two runs. The first run will be under static conditions to measure the natural vertical flow along the length of the borehole. Once completed, the well will be stressed by pumping and the same zones will be tested to further evaluate the flow intervals within the borehole.

#### 2.2.2.3. Cased-Hole System Well Installation

Two groundwater monitoring wells (MW-212 A/B/C and MW-213 A/B/C) will be installed using a Water FLUTe® multi-level cased-hole system (CHS). Each CHS will include three sampling intervals, which will be determined based on the observed drilling conditions and analysis of the borehole geophysical logging results.

The CHS wells will be installed approximately three weeks after the borehole geophysical logging is completed. This lag is due to the time needed for analysis and subsequent fabrication of the CHS wells by FLUTe®. Installation includes attaching a weight to the base of the liner and lowering the CHS to the base of the well. Once the liner is set on the base of the well, potable water will be added to the inside of the liner, allowing the liner to inflate and seal against the borehole wall. Spacers present at the target sampling intervals allow water to flow into the sample points, providing three discrete points for collecting groundwater samples.

Groundwater samples will be collected through each of the ports using the dedicated tubing internally piped through the CHS. Purging can be completed using a peristaltic pump, for shallower depths to water, or pneumatic displacement (i.e., bladder pump) for deeper depths to water. The appropriate purging method will be determined based on the details of the final installation.

#### 2.2.2.4. Well Development

Each newly-installed well will be developed by the contractor, for a minimum of 24 hours after completion by pumping and surging for two hours or until the field parameters stabilize for a minimum of three consecutive readings of 10 percent variability of less. Field parameters to be noted during development include: temperature, pH and specific conductance. In addition, the turbidity of the groundwater must achieve a reading of 50 Nephelometric Turbidity Units (NTUs) or less during the field parameter readings.

Purge water obtained during well development and sampling will be containerized and disposed of in accordance with NYSDEC DER-10. If impacts are observed, the contaminated groundwater will be segregated and handled as described in **Section 2.2.4**. Sampling equipment will be appropriately decontaminated between sampling locations or disposed of after a one-time use.

#### 2.2.2.5. Groundwater Sampling

Depth to water measurements will be collected from new and existing monitoring wells to the nearest 0.01 foot prior to sampling activities. Data will be used to construct a groundwater contour map to determine the direction of groundwater flow and the hydraulic gradient on the Site. Until deemed unnecessary, in addition to measuring the water level, the wells will be checked for both light and dense non-aqueous phase liquids (LNAPLs and DNAPLs) using an interface probe.

Groundwater samples will be collected from 16 newly installed wells (20 samples) and 23 existing monitoring wells, assuming viability, (assumes 55 total samples [including QA/QC]). Groundwater samples will be collected from the newly installed wells a minimum of seven days after well development has been completed. Groundwater samples will be collected in accordance with low-flow groundwater sampling procedures and will be submitted to Pace Analytical, an NYSDOH ELAP-certified laboratory for analysis. Duplicate, matrix spike, and matrix spike duplicates will be collected at a frequency of 1 per 20 samples. Groundwater samples (including QA/QC samples) will be collected and analyzed for the following:

- Target Compound List VOCs +10 by EPA Method 8260
- PFAS Analyte list compounds by modified EPA Method 1633
- 1,4-dioxane by EPA Method 8270 SIM

A summary of samples to be collected during the RI is presented as **Table 3**, and a summary of analytical methods and QA/QC samples is presented as **Table 4**.

### 2.2.3 Decontamination Procedures

Non-dedicated sampling equipment (i.e., submersible pumps, water level indicators, etc.) will be subject to decontamination procedures prior to each sample collected to reduce the potential for cross-contamination, as described in the Generic FAP (included as **Appendix A** of this RIWP). The decontamination procedures will include the use of a scrub wash with a solution consisting of Alconox® detergent and potable water followed by a rinse with deionized (DI) water. Liquinox will not be used during decontamination, as it can contain low levels of both 1,4-dioxane and PFAS compounds. The decontaminated equipment will be stored in clean environments (i.e., the manufacturer's storage case). Decontamination fluids will be properly labeled and securely stored in the designated waste-container staging area.

### 2.2.4 Characterization and Disposal of Investigation Derived Waste

Investigation Derived waste (IDW) that is generated from the subsurface characterization, monitoring well installation, and the development of monitoring wells will be handled in accordance with NYSDEC DER-10. The drilling contractor will be responsible for supplying the equipment and materials necessary for the proper handling and storage of the IDW, such as Department of Transportation (DOT)-approved 55-gallon drums, roll-off containers and/or holding tanks. IDW containers will be properly labeled and staged by the drilling contractor.

Soil will be handled and disposed of in accordance with DER-10. If off-site disposal of IDW is required, it will be disposed of or treated according to applicable local, state and federal regulations.

It is anticipated that purge water generated during the development of the monitoring wells will require off-site disposal based on the previous Site data. Groundwater that exhibits obvious indications of impacts will be segregated from groundwater that does not exhibit evidence of apparent contamination.

Decontamination fluids will be containerized separately from other RI derived waste, and decontamination fluids that do not exhibit obvious indications of impacts will be containerized and separated.

### 2.2.5 Soil Vapor Intrusion Investigation

In an effort to assess the migration of gaseous vadose zone impacts, and verify previous data, an off-site soil vapor intrusion (SVI) investigation will be performed at surrounding properties downgradient of the Site to the south and southwest. The SVI investigation will consist of sub-slab soil vapor sample (SS), indoor air sample (IA), and ambient outdoor air (OA) samples during the heating season along with a chemical inventory of the rooms where samples will be collected from each structure / dwelling.

SVI samples will be collected in accordance with the NYSDOH Guidance for Evaluating SVI in the State of New York, October 2006. The proposed locations of the SVI investigation are provided as **Figure 4**. Specific locations will be chosen with consultation with the NYSDEC and the NYSDOH and as field conditions allow, and may be completed at up to 26 locations, including resampling of 10 previously sampled residences near the Site. It is estimated that the SVI will require of a total of 62 samples (26 sub-slab, 26 indoor air, up to four outdoor ambient air, two duplicate, two MS and two MSD). Samples will be submitted to Pace Analytical, an ELAP-certified laboratory, for analysis of VOCs via EPA Method TO-15.

HRP will install a new sub-slab access point in an adequate location beneath the concrete slab using a 3/8-in. diameter drill bit, and will drill completely through the concrete floor slab using an electric hammer drill. The NYSDEC and NYSDOH will be contacted, should HRP be unable to advance through the subfloor. HRP will install the SVI sampling point in an adequate location beneath the concrete slab per the manufacturer's (Vapor Pin™) SOP. Helium leak detection testing will be implemented to confirm the competency of each newly installed vapor point. Prior to sampling, the integrity of the seal will be evaluated using a helium tracer gas. In the event that the probe fails the tightness test, the subsurface probe seal will be modified and the integrity testing repeated.

Air samples will be collected simultaneous to sub-slab samples, and will be placed at a height corresponding to the average breathing level (i.e. approximately 5-feet above the ground surface). Samples will be collected at a flow rate of less than 0.2 liters/minute. Soil gas and air samples will be collected in batch-certified Summa canisters. SVI air and soil vapor samples will be collected

using 6-liter summa canisters fitted with an 8-hour regulator (for commercial properties) or 24-hour regulator (for residential properties).

### 2.2.6 Analytical Data Validation and Analysis

This RIWP and the associated site-specific QAPP Section detail the data quality objectives and analytical requirements needed for this WA. Quality assurance protocols will be provided in the Generic QAPP (**Appendix C**).

During the final review period, the site-specific QAPP Section and RIWP will be reviewed and modified according to NYSDEC requirements and comments. Once the plans are finalized, deviations, if required, from protocols specified in the plans will be approved in advance by NYSDEC. As required, the selected analytical laboratory will maintain NYSDOH ELAP certification in CLP and Solid and Hazardous Waste analytical testing for the duration of the project.

Pace Analytical will supply required data deliverables (USEPA CLP and NYSDEC Analytical Service Protocol [ASP] deliverable format) to enable the data to be validated. Environmental data will be submitted electronically in a specified format named 'NYSDEC' in accordance with the data submission procedures outlined on the NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html). HRP will provide an EQuIS approved EDD to the Department and NYSDEC Project Manager.

Upon receipt of the sample data, the validation contractor will quantitatively and qualitatively validate the laboratory data. The validation of the analytical data will be performed according to the protocols and Quality Control (QC) requirements of the analytical methods, the USEPA CLP, National Functional Guidelines for Organic and Inorganic Data Review (February 1994), the USEPA Region II CLP Data Review SOP, and the reviewer's professional judgment. A Review Category B data to complete a DUSR in accordance with DER-10 guidance.

### 2.2.7 Site Survey

The subject property and surrounding areas will be surveyed by a New York State licensed professional land surveyor (PLS). The field survey will include establishing project horizontal control and the collection of planimetric features for the development of 2D mapping. Subsequently, a base map of the Site will be developed using Computer Aided-Design (CAD) software that will be utilized to place sampling locations from previous on-site and off-site investigations. The sample locations will be placed on the base map by geo-referencing previous figures into the local CAD coordinate system, and will include new and existing monitoring wells, and soil gas points. Data received by HRP will be in GPS format for inclusion to GIS and the EQuIS database.

Upon completion of the investigation fieldwork, a survey will be conducted in order to properly locate sampling points such as monitoring wells, soil borings, and SVI sample points. The elevations of monitoring well casings will be established to within an accuracy of plus or minus 0.01 feet based on an arbitrary local vertical benchmark. A notch will be etched in all interior casings, or a permanent black mark, to provide a reference point for future groundwater elevation measurements.

### 2.2.8 Electronic Data Delivery

In addition to appropriate data summary tables and boring logs included in the report, environmental data will be submitted electronically in a specified Electronic Data Deliverable (EDD) format named in accordance with the data submission procedures outlined on the NYSDEC's website (http://www.dec.ny.gov/chemical/62440.html).

## 2.3 Remedial Investigation Report

The RIR will be prepared as part of this WA following completion of the field activities. A draft RIR will be submitted within 90 days after HRP receives the last round of analytical data from the laboratory. A second draft RIR will be submitted, if needed, within two weeks after the data validation company has reviewed the final analytical submitted for the investigation. A final version of the RIR will be submitted within 2-4 weeks after the NYSDEC PM's comments on both draft reports are received by HRP. The RIR will include the required information and elements described in Section 3.14 of DER 10.

The RIR will provide a description of the field activities, present data collected during field characterization, present a physical description of the Site including geology and hydrogeology, and provide an analysis and interpretation of the available data in the context of existing Site conditions. The report will include tabulated laboratory analytical results, Site maps and a discussion of contaminant concentrations, including a comparison to NYSDEC SCGs as described in Section 3.14 of DER-10. The results of the RI will be used to evaluate and select a remedial plan of action for the Site.

The submitted report will include the report text, appropriate tables, figures, photographs, data summary tables, and boring logs in a PDF format. The electronic file will contain 'bookmarks' and will be sent via electronic mail.

## 2.4 Feasibility Study

A feasibility study (FS) will be conducted to evaluate remediation alternatives for the Site and select the preferred remedial approach. A draft version of the FS report will be submitted to NYSDEC to review and comment within 60 days after HRP receives approval of the Final RIR. A final version of the FS will be submitted within two weeks after the NYSDEC PM's comments on the draft report are received by HRP. The FS report will include the required information and elements described in Sections 4.4(b) and (c) of DER-10.

## 3.0 GREEN AND SUSTAINABLE REMEDIATION BEST MANAGEMENT PRACTICES

While the NYSDEC's goal is to address unacceptable risk from hazardous substance releases, consideration of the cleanup activities broader impacts on the community and the environment is consistent with the NYSDEC sustainability and Greenhouse Gas (GHG) reduction goals as outlined in NYSDEC policies (e.g., CP-75-DEC Sustainability, DER-31 Green Remediation, CP-49 Climate Change Climate Change and DEC Action and CP-75 Sustainability). During site investigation and remediation HRP will identify, quantify, and document Green and Sustainable Remediation principals and techniques to the extent feasible including but not limited to:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long-term when choosing a Site remedy.
- Reducing direct and indirect GHG and other emissions.
- Increasing energy efficiency and minimizing use of non-renewable energy.
- Conserving and efficiently managing resources and materials.
- Reducing waste, increasing recycling, and increasing reuse of materials which would otherwise be considered a waste.
- Maximizing habitat value and creating habitat when possible.
- Fostering green and healthy communities and working landscapes which balance ecological, economic, and social goals.
- Integrating the remedy with the Site's end use where possible and encouraging green and sustainable re-development.

To achieve this objective HRP will:

1) Evaluate Green and Sustainable Remediation options at each step of site investigation and remediation process.
2) Quantify impacts and reductions.
3) Implement the most effective principals and techniques with NYSDEC approval within the selected remedy.
4) Document the reduced impacts.

Green and Sustainable Remediation principals and techniques will be incorporated throughout the site investigation process and will be documented in the RIR.

## 4.0 SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN

The Site specific QAPP has been prepared and is included below. Deviations from the protocols specified in the QAPP will be subject to approval by the NYSDEC.

The Generic QAPP (**Appendix C**) provides general information related to QA/QC procedures associated with the collection and analysis of samples of environmental media and includes specific representative SOPs applicable to sample handling and field instrumentation use. Information provided in the Generic QAPP includes definitions and generic goals for data quality and required types and quantities of QA/QC samples. The procedures address field documentation; sample handling, custody, and shipping; instrument calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and QA/QC reporting specific to the analyses performed by the laboratories that are used for analysis of environmental media collected under Standby Contract No. D009808.

Laboratory analytical work will be performed by a NYSDOH ELAP approved laboratory certified in CLP and solid and hazardous waste analytical testing. A DUSR will be included in the RIR for each round of analytical work. Category B deliverables will be retained in the project files and available for full data validation by a qualified, independent third party.

### 4.1 Site Specific Sampling

Groundwater and air samples will be collected during this RI. Detailed sampling procedures are detailed in Section 4.0 of the Generic QAPP (included as **Appendix C** of this RIWP). Matrix types, number of samples (including QA/QC) and analytical details are summarized in **Table 3**. Proposed sample locations are depicted on **Figure 2** and **Figure 4.**

#### 4.1.1 PFAS Sampling

Sampling for PFAS will occur at the Site during the planned activities covered in this RIWP. Specific requirements for field sampling procedures including precautions to be taken, pump and equipment types, decontamination procedures, and a list of approved materials to be used during sampling for PFAS compounds are included in Section 14.1 of HRP's Generic FAP (included as **Appendix A** of this RIWP). Only regular ice will be used in the transport of samples being analyzed for PFAS.

The PFAS compounds will be analyzed by methods based on EPA Method 1633. Specific PFAS compounds to be analyzed include:

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Perfluoroalkyl sulfonic acids | Perfluorobutanesulfonic acid | PFBS | 375-73-5 |
| | Perfluoropentanesulfonic acid | PFPeS | 2706-91-4 |
| | Perfluorohexanesulfonic acid | PFHxS | 355-46-4 |
| | Perfluoroheptanesulfonic acid | PFHpS | 375-92-8 |
| | Perfluorooctanesulfonic acid | PFOS | 1763-23-1 |
| | Perfluorononanesulfonic acid | PFNS | 68259-12-1 |
| | Perfluorodecanesulfonic acid | PFDS | 335-77-3 |
| | Perfluorododecanesulfonic acid | PFDoS | 79780-39-5 |
| Perfluoroalkyl carboxylic acids | Perfluorobutanoic acid | PFBA | 375-22-4 |
| | Perfluoropentanoic acid | PFPeA | 2706-90-3 |
| | Perfluorohexanoic acid | PFHxA | 307-24-4 |
| | Perfluoroheptanoic acid | PFHpA | 375-85-9 |
| | Perfluorooctanoic acid | PFOA | 335-67-1 |
| | Perfluorononanoic acid | PFNA | 375-95-1 |
| | Perfluorodecanoic acid | PFDA | 335-76-2 |
| | Perfluoroundecanoic acid | PFUnA | 2058-94-8 |
| | Perfluorododecanoic acid | PFDoA | 307-55-1 |
| | Perfluorotridecanoic acid | PFTrDA | 72629-94-8 |
| | Perfluorotetradecanoic acid | PFTeDA | 376-06-7 |
| Per- and Polyfluoro-ether carboxylic acids | Hexafluoropropylene oxide dimer acid | HFPO-DA | 13252-13-6 |
| | 4,8-Dioxa-3H-perfluorononanoic acid | ADONA | 919005-14-4 |
| | Perfluoro-3-methoxypropanoic acid | PFMPA | 377-73-1 |
| | Perfluoro-4-methoxybutanoic acid | PFMBA | 863090-89-5 |
| | Nonafluoro-3,6-dioxaheptanoic acid | NFDHA | 151772-58-6 |
| Fluorotelomer sulfonic acids | 4:2 Fluorotelomer sulfonic acid | 4:2-FTS | 757124-72-4 |
| | 6:2 Fluorotelomer sulfonic acid | 6:2-FTS | 27619-97-2 |
| | 8:2 Fluorotelomer sulfonic acid | 8:2-FTS | 39108-34-4 |
| Fluorotelomer carboxylic acids | 3:3 Fluorotelomer carboxylic acid | 3:3 FCTA | 356-02-5 |
| | 5:3 Fluorotelomer carboxylic acid | 5:3 FCTA | 914637-49-3 |
| | 7:3 Fluorotelomer carboxylic acid | 7:3 FCTA | 812-70-4 |
| Perfluorooctane-sulfonamides | Perfluroroctane sulfonamide | PFOSA | 754-91-6 |
| | N-methylperfluorooctane sulfonamide | NMeFOSA | 31506-32-8 |
| | N-ethylperfluorooctane sulfonamide | NEtFOSA | 4151-50-2 |

| Group | Chemical Name | Abbreviation | CAS Number |
|---|---|---|---|
| Perfluorooctane-sulfonamidoacetic acids | N-methyl perfluorooctanesulfonamidoacetic acid | N-MeFOSAA | 2355-31-9 |
| | N-ethyl perfluorooctanesulfonamidoacetic acid | N-EtFOSAA | 2991-50-6 |
| Perfluorooctane sulfonamide ethanols | N-methylperfluorooctane sulfonamidoethanol | MeFOSE | 24448-09-7 |
| | N-ethylperfluorooctane sulfonamidoethanol | EtFOSE | 1691-99-2 |
| Ether sulfonic acids | 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major) | 9Cl-PF3ONS | 756426-58-1 |
| | 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor) | 11Cl-PF3OUdS | 763051-92-9 |
| | Perfluoro(2-ethoxyethane) sulfonic acid | PFEESA | 113507-82-7 |

The laboratory SOP for PFAS analysis is attached (included as **Appendix D** of this RIWP)**.**

### 4.1.2 1,4-Dioxane Sampling

Sampling for 1,4-dioxane will occur at the Site during the planned activities covered in this RIWP. Specific requirements for field sampling procedures include precautions to be taken, pump and equipment types, detailed decontamination procedures, a prohibition on using Liquinox, and approved materials only to be used for 1,4-dioxane are included in Section 14.2 of HRP's Generic FAP.

The minimum method achievable Reporting Limits for 1,4-dioxane will be less than or equal to 0.2 µg/L (ppb) for aqueous samples. The laboratory SOP for 1,4-dioxane analysis is included in **Appendix D** of this RIWP.

Laboratory provided specifics for 1,4-dioxane sampling MDL and RL is as follows:

| Method | Analyte | Matrix | RL |
|---|---|---|---|
| 8270D SIM | 1,4-Dioxane | Water | 0.2 µg/L |

## 4.2 Data Quality Assessment and Usability

Data quality objectives for the Industrial Overall Services Site are focused towards 1) the characterization of releases of hazardous substances impacting environmental media at the Site and surrounding properties 2) the evaluation of the requirements and feasibilities of remediation in significantly impacted areas and/or a specific source area, if defined.

To achieve these objectives, QA/QC measures will be implemented throughout the RI investigation to provide input as to the validity and usability of data generated through soil, groundwater, soil gas, and indoor air sampling. The procedures for data QA/QC management includes field documentation; sample handling, custody, and shipping; instrument calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and QA reporting specific to the analyses performed by the laboratory under subcontract to HRP. **Table 4** lists the sample containers, preservation, and holding time requirements for the parameters specific to this Site, and will be referenced by HRP personnel during field activities.

A category B Data package and DUSR will be prepared to provide a thorough evaluation of analytical data generated during the RI, utilizing third-party data validation. Maxine Wright-Walters, Ph.D, of Environmental Data Validation will be the third-party data validator for this project. Dr. Wright-Walter's qualifications are attached (included as **Appendix E** of this RIWP).

## 5.0 PROJECT MANAGEMENT

HRP has the responsibility of the overall management of this project and will respond to NYSDEC's requests. A proposed project schedule, key milestones, key project personnel, and project-specific subcontractors follow.

### 5.1 Project Schedule and Key Milestones

The proposed project schedule for this WA is outlined below. Key milestones are identified to monitor work progress. The following milestones will be applicable for this project:

| Project Milestones Est. | | Start Date |
|---|---|---|
| • Milestone 1: | Notice to Proceed (NTP), RI FAP development | Completed |
| • Milestone 2: | NYSDEC review of site-specific plans | November 2022 |
| • Milestone 3: | Off-site SVI Investigation (Heating Season) | January 2023 |
| • Milestone 4: | Installation and sampling of monitoring wells | April /May 2023 |
| • Milestone 5: | Removal of IDW | May/June 2023 |
| • Milestone 6: | Complete Data Validation | Summer 2023 |
| • Milestone 7: | RIR | Fall 2023 |
| • Milestone 8: | FS | Winter 2023/Spring 2024 |

The field work associated with the off-site SVI work (Milestone 3) will be completed prior to implementing the drilling activities. Field sampling for the SVI work will begin within 30 days of NYSDEC review and approval of this RIWP. Drilling activities (Milestone 4) will begin in the Spring of 2023, following the snow melt and removal of any potential snow piles that could limit access to the drilling locations. The timeframe of pickup and removal of the IDW (Milestone 5) will be determined by the contractor upon scheduling. Data validation (Milestone 6) will begin upon receipt of the first set of laboratory results, and will continue to be submitted for validation as the results are received from the laboratory. Data validation is expected within a four-week timeframe. Milestone 6 will not be considered complete until all groundwater data have been validated.

The RIR (Milestone 7) will be submitted as a draft report within 90 days after HRP receives the last round of analytical data from the laboratory. A second draft RIR will be submitted, if needed, within two weeks after the data validation company has reviewed the final analytical submitted for the investigation. A final version of the RIR will be submitted within two weeks after the NYSDEC Project Manager's comments on both draft reports are received by HRP.

## 5.2 Key Project Personnel

A list of the project personnel of the prime consultant and contractors responsible for performance of the investigation has been submitted to the NYSDEC for approval and is provided below.

| Personnel | Company | Role | Responsibility |
|---|---|---|---|
| Thomas Darby P.G. (Project Manager) | HRP Associates, Inc. (Prime Consultant) | Project Manager | Overall management of the WA |
| Bryan Sherman CSP (Project Manager) | HRP Associates, Inc. | Office Health & Safety Manager | Approval of HASP and responsible for overall health and safety issues with the WA |
| Michael Varni P.G. (Senior Project Geologist) | HRP Associates, Inc. | Corporate QA/QC Officer | Responsible for QA/QC on the WA |
| Reed Lewandowski (Project Consultant) | HRP Associates, Inc. | Field Manager and Site Health & Safety Officer | Responsible for the on-site sampling and investigative tasks |

Contractors for this project will include:

- Survey - Ferrantello Land Surveying
- GPR - American Geophysics, Inc.
- Drilling - Aquifer Drilling and Testing (ADT, A Cascade Company)
- Laboratory - Pace Analytical
- Data Validation - Environmental Data Validation (EDV, Inc.)
- IDW - ACV Enviro

# FIGURES

# TABLES

# APPENDIX A
## Generic Field Activities Plan

# APPENDIX B
## Site-Specific Health and Safety Plan

# APPENDIX C
## Generic Quality Assurance Project Plan

# APPENDIX D
## Laboratory Standard Operating Procedures

# APPENDIX E
## Resumes of Key Project Personnel