SESI
CONSULTING ENGINEERS

ALTERNATIVES ANALYSIS REPORT

For:

Former Yonkers Firehouse Site
32 John Street
Yonkers, Westchester County, New York
BCP # C360191

Prepared for:

32 John Street Yonkers AMS, LLC
595 Madison Avenue, Suite 1101
New York, New York 10022

Prepared by:

SESI CONSULTING ENGINEERS, D.P.C.
959 Route 46E, Floor 3, Suite 300
Parsippany, New Jersey 07054

APRIL 2024
REVISED AUGUST 2024

CERTIFICATIONS

I, Fuad Dahan, certify that I am currently a NYS registered professional engineer and that this Alternatives Analysis Report 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.

Fuad Dahan	11/19/2024	
NYS Professional Engineer (# 090531)	Date	Signature

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

TABLE OF CONTENTS

LIST OF ACRONYMS ..... **I**

EXECUTIVE SUMMARY **1**

1.0 INTRODUCTION **3**

2.0 BACKGROUND **4**

2.1 SITE DESCRIPTION AND HISTORY 4

2.2 DESCRIPTION OF SURROUNDING PROPERTIES 4

3.0 REMEDIAL INVESTIGATION SUMMARY **5**

3.0 CONCEPTUAL SITE MODEL **6**

4.0 HUMAN HEALTH EXPOSURE ASSESSMENT **7**

4.1 SOILS CONTAMINATION SUMMARY 7

4.2 GROUNDWATER CONTAMINATION SUMMARY 8

4.3 SURFACE WATER AND SEDIMENT CONTAMINATION 8

4.4 SOIL VAPOR CONTAMINATION 8

5.0 FISH AND WILDLIFE ANALYSIS **10**

6.0 REMEDIAL ACTION OBJECTIVES **11**

6.1 GROUNDWATER 11

6.2 SOIL 11

6.3 SOIL VAPOR RAOs 11

7.0 PRE-DESIGN INVESTIGATION **12**

7.1 PDI SOIL SAMPLING 12

7.2 PDI GROUNDWATER SAMPLING 12

8.0 EVALUATION OF REMEDIAL ALTERNATIVES **14**

8.1 ALTERNATIVE 1: NO ACTION 14

8.2 ALTERNATIVE 2: PARTIAL SOIL TREATMENT USING IN-SITU STABILIZATION/SOLIDIFICATION, IN-SITU CHEMICAL REDUCTION (ISCR) AND PFAS TREATMENT, AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING. 14

8.3 ALTERNATIVE 3: PARTIAL SOIL EXCAVATION, ISCR AND PFAS TREATMENT, AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING 16

8.4 ALTERNATIVE 4: SITE-WIDE EXCAVATION 17

9.0 REMEDY SELECTION EVALUATION CRITERIA **18**

10.0 REMEDY SELECTION EVALUATION **20**

10.1 ALTERNATIVE NUMBER 1: NO FURTHER ACTION.....20
10.2 ALTERNATIVE NUMBER 2: PARTIAL SOIL TREATMENT USING ISS, ISCR AND PFAS TREATMENT AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING.....21
10.3 ALTERNATIVE NUMBER 3: PARTIAL SOIL EXCAVATION, ISCR AND PFAS TREATMENT, AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING.....25
10.4 ALTERNATIVE NUMBER 4: SITE-WIDE EXCAVATION.....30
10.0 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES.....33
11.0 RECOMMENDED REMEDIAL ALTERNATIVE.....38
12.0 REFERENCES.....40

TABLES

TABLE 2.1 SUMMARY OF SURROUNDING PROPERTIES
TABLE 10.1 ALTERNATIVES COST ANALYSIS 2
TABLE 10.2 ALTERNATIVES COST ANALYSIS 3
TABLE 10.3 ALTERNATIVES COST ANALYSIS 4

FIGURES

FIGURE 1.1 USGS SITE LOCATION TOPOGRAPHIC MAP
FIGURE 2.1 SITE PLAN
FIGURE 7.1 PDI SOIL SAMPLING LOCATION PLAN
FIGURE 7.2 PDI GROUNDWATER SAMPLING LOCATION PLAN
FIGURE 8.1A REMEDIAL ACTION MAP SOIL– ALTERNATIVE 2
FIGURE 8.1B REMEDIAL ACTION MAP GROUNDWATER– ALTERNATIVE 2
FIGURE 8.2A REMEDIAL ACTION MAP SOIL – ALTERNATIVE 3
FIGURE 8.2B REMEDIAL ACTION MAP GROUNDWATER– ALTERNATIVE 3
FIGURE 8.3A REMEDIAL ACTION MAP SOIL – ALTERNATIVE 4
FIGURE 8.3B REMEDIAL ACTION MAP GROUNDWATER– ALTERNATIVE 4

APPENDICES

APPENDIX A OFF-SITE MONITORING WELL CONSTRUCTION LOGS

LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	Below ground surface
CAMP	Community Air Monitoring Plan
CVOC	Chlorinated Volatile Organic Compounds
DER	Division of Environmental Remediation
DER-10	NYSDEC Technical Guidance for Site Investigation & Remediation
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Accreditation Program
ESA	Environmental Site Assessment
GPR	Ground-penetrating Radar
MS	Matrix Spike
MCL	Maximum Contaminant Level
MS	Matrix Spike
MSL	Mean Sea Level
MW	Monitoring Well
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene

Acronym	Definition
PE	Professional Engineer
PFAS	Per and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PGWSCO	Protection of Groundwater Soil Cleanup Objective
PHC	Petroleum Hydrocarbon
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppt	Parts Per Trillion
RAWP	Remedial Action Work Plan
RECs	Recognized Environmental Conditions
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RSCO	Residential Use Soil Cleanup Objectives
RRSCOs	Restricted Residential Soil Cleanup Objectives
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objectives
SESI	SESI Consulting Engineers, DPC
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TOGS	Technical and Operations Guidance Series
USEPA	United States Environmental Protection Agency
USCO	Unrestricted Use Soil Cleanup Objectives

Acronym	Definition
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

The Former Yonkers Firehouse Site (herein referred to as the "Site") was accepted into the New York Brownfield Cleanup Program (BCP) by New York State Department of Environmental Conservation (NYSDEC) on April 21, 2020, and is known as BCP Site No. C360191. The Site is approximately 0.4778 acres in size and is located at 32 John Street, Yonkers, New York. The Site is located in a commercial area and is bounded to the north by John Street Extension and commercial retail properties; to the east and south by commercial properties and the Saw Mill River, and to the west by New School Street and BCP Site C360083 - River Park Center (a.k.a. Chicken Island).

This Alternatives Analysis Report (AAR) presents an evaluation of remedial alternatives related to impacts to soil, soil vapor, and groundwater identified in the Remedial Investigation Report (RIR) prepared by SESI, last revised August 2022 and approved by NYSDEC on November 23, 2022.

Summary of the Remedial Investigation

Historic research indicates that the Site and adjacent property operations to the west have been occupied by industrial manufacturing, which included hat manufacturing, dye manufacturing, raw stock storage and warehousing, and leather/tanning between 1886 and 1917. Adjacent properties also included similar operations, as well as chemical dye production between 1971 and 2004. By 1940, Site structures west of the Saw Mill River were demolished, and the Yonkers Fire Department building was constructed. The City of Yonkers Fire Department operated on Lot 59 until the structure was demolished in 2018.

Results of the Remedial Investigation (RI) and prior investigations have identified petroleum hydrocarbons (PHCs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and metals Site-wide in soil at concentrations exceeding the Track 1 Unrestricted Use Soil Cleanup Objectives (USCOs), Protection of Groundwater Soil Cleanup Objectives (PGWSCOs), and Restricted Residential Soil Cleanup Objectives (RRSCOs) to depths of 20 feet below the ground surface (ft-bgs) across the Site. The emerging contaminants perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were detected at concentrations exceeding the proposed USCOs to depths up to 10 ft-bgs. Groundwater is similarly impacted with PHC VOCs, SVOCs, metals, and PFAS at concentrations exceeding the

Ambient Water Quality Standards (AWQS). In soil vapor, both PHC and chlorinated VOCs were detected across the Site.

Summary of the Selected Remedial Alternative (Alternative 3)

Below is a summary of the selected remedial alternatives analysis for the planned Track 4 cleanup remedy.

- To address the soil metals contamination at the Site, partial soil excavation will be conducted to remove approximately 735 cubic yards of hotspot contamination.
- An In-Situ Chemical Reduction (ISCR) treatment (ZVI) will be implemented to treat CVOC contaminants in groundwater in the western portion of the Site. The ISCR treatment's effectiveness will be monitored over time by monitoring on-Site monitoring wells.
- To control off-Site migration of PFAS contaminated groundwater, a PlumeStop® Colloidal Activated Carbon™ (PlumeStop®) permeable reactive barrier (PRB) will be installed. The PRB will remove PFAS from the aqueous phase by enhancing PFAS sorption onto the aquifer matrix, preventing further plume migration and eliminating the potential exposure risk. Additionally, to address the PFAS contamination on-Site and bring PFOA and PFOS concentrations below the MCLs, treatment of impacted areas will also be implemented using PlumeStop®.
- The soil and groundwater remedies will be monitored with groundwater sampling to evaluate natural attenuation of residual metals and CVOC contamination.
- A soil vapor intrusion evaluation will be performed after the completion of remedial measures.
- Control of exposure to impacted soil would be provided through a cover system. The cover system will act as another EC and prevent contact with the residual contaminated soil and limit contaminant mobility, thereby protecting ground water.
- ICs in the form of environmental easement (EE), which is subject to the provisions of ECL Article 71, Title 36, will be placed on the property to manage residual contamination. The EE contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with EC. The EE requirements will be detailed in an SMP. Additionally, the local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would permanently prevent exposure to residual contaminated groundwater. Vapor mitigation for future buildings would address potential exposures to building occupants via soil vapor intrusion.

1.0 INTRODUCTION

The volunteer, 32 John Street Yonkers AMS, LLC (Volunteer), entered into a Brownfield Cleanup Agreement (BCA) with the NYSDEC for the property located at 32 John Street (aka 5-7 New School Street), Yonkers, New York (BCP Site. # C360191) ("Site") on April 21, 2020. A Site Location Plan is presented as **Figure 1.1**. This document consists of an Alternatives Analysis Review (AAR), which presents an evaluation of remedial alternatives related to impacts to soil, soil vapor, and groundwater identified in the RIR prepared by SESI, last revised August 2022 and approved by NYSDEC on November 23, 2022. The purpose of the AAR is to identify and evaluate remedial alternatives that are:

- Appropriate for site-specific conditions,
- Protective of public health and the environment, and
- In conformance with NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) and Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 375-6 (6 NYCRR Part 375-6).

The overall objective of this AAR is to recommend a reliable and cost-effective remedy that achieves the site-specific remedial action objectives (RAOs) and the best balance of the NYSDEC evaluation criteria.

2.0 BACKGROUND

2.1 SITE DESCRIPTION AND HISTORY

The Site is 0.4778 acres in size and is located at 32 John Street (aka 5-7 New School Street) in the City of Yonkers, Westchester County, New York. The Site is identified on the Westchester County records as tax Block 475, Lot 51 and is zoned as D-MX (Downtown Mixed-Use District). The Site previously consisted of a 0.6593-acre area composed of four (4) contiguous parcels identified as Block 475; Lots 50, 51, 55, and 59. The former 0.1815 acre portion of the Site east of the Saw Mill River was removed from the BCA per the BCA Amendment of February 3, 2022, because this area is a permanent sloped area encumbered by an easement, which prevents future development due to the slope, and there were no environmentally sensitive historical uses in this permanently sloped undeveloped area no longer part of the BCP Site. The Site is currently vacant. A Site Plan is illustrated on **Figure 2.1**.

The Site and adjacent property operations to the west have been occupied by industrial manufacturing, which included hat manufacturing, dye manufacturing, raw stock storage and warehousing, and leather/tanning between 1886 and 1917. Adjacent properties also included similar operations, as well as chemical dye production between 1971 and 2004. By 1940, Site structures west of the Saw Mill River were demolished, and the Yonkers Fire Department building was constructed. The City of Yonkers Fire Department operated on Lot 59 until the structure was demolished in 2018.

2.2 DESCRIPTION OF SURROUNDING PROPERTIES

The Site is located in a commercial area of Yonkers, New York and is currently undeveloped land. A Site Plan is illustrated on **Figure 2.1**. Adjacent properties are presented on **Table 2.1** below:

Table 2.1: Summary of Surrounding Properties

Direction	Adjacent Property
North	Commercial Retail
South	Saw Mill River and Vacant Wooded Land beyond
East	Saw Mill River and Commercial Properties beyond
West	New School Street and River Park Center Redevelopment Site

3.0 REMEDIAL INVESTIGATION SUMMARY

The Remedial investigation (RI) consisted of collecting 58 soil samples from 20 soil borings, 18 groundwater samples from eight (8) on-site monitoring wells and two (2) off-site monitoring wells, and four (4) soil/sub-slab vapor samples from four (4) vapor sampling points. The recognized environmental conditions (RECs) identified during previous investigations included historical Site operations including manufacturing of hats and dyes, raw stock storage, and leather tanning, historical drum storage, historical underground storage tanks (USTs), and the historical firehouse operations (emerging contaminants). Soil and groundwater samples were analyzed for a combination of full target compound list (TCL) and target analyte list (TAL) analytes – which include volatile organic compounds (VOCs), metals, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and pesticides. In addition, samples were analyzed for per- and polyfluoroalkyl substances (PFAS), and 1,4-dioxane.

Based on the field investigation, the soil results indicate petroleum hydrocarbon (PHC) VOCs were detected at concentrations exceeding the Unrestricted Use Soil Cleanup Objectives (USCOs) and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs) in one (1) boring (RI-1) near the northwestern portion of the Site to depths of 20 feet below ground surface (ft-bgs). SVOCs were detected Site-wide in 19 soil samples collected from 11 borings exceeding the Restricted Residential Soil Cleanup Objectives (RRSCOs) and/or PGWSCOs Site-wide to depths of up to 20 ft-bgs. Metals (arsenic, barium, chromium, copper, lead, manganese, mercury, and zinc) were detected in 40 soil samples from 18 soil borings to depths up to 20 ft-bgs at concentrations exceeding the USCO, Residential Use Soil Cleanup Objective (RSCO) and/or RRSCO. Mercury was detected Site wide in 22 soil samples collected from 12 borings exceeding the RRSCOs and PGWSCOs Site-wide to depths of 0.5 to 20 ft-bgs. Finally, the emerging contaminants perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) were detected at concentrations exceeding the proposed USCOs in 15 soil samples collected from eight (8) soil borings to depths up to 10 ft-bgs.

In groundwater, VOCs, SVOCs, PCBs, and metals were detected in groundwater at a concentration in excess of the AWQS. However, filtered metals analysis resulted in exceedances of secondary metals iron, manganese, magnesium, sodium. Finally, the emerging contaminants PFOS and PFOA were detected in groundwater at concentrations exceeding the maximum contaminant levels (MCLs). PFOS and PFOA were also detected in downgradient off-site wells

at concentrations exceeding the MCLs, however at significantly lower concentrations than on-site detections.

In soil vapor, both PHC and chlorinated VOCs were detected in the vapor samples. The highest concentration of PHC VOCs was detected in vapor sample RSIV-4, with a toluene concentration of 448 ug/m^3 and a total xylene concentration of 89.5 ug/m^3. The highest concentration of chlorinated VOCs was detected in sample RSIV-4, with PCE detected at 21.9 ug/m^3, and TCE detected at 2.75 ug/m^3, and RSIV-1 with trichlorofluoromethane detected at 2,350 ug/m^3.

3.0 CONCEPTUAL SITE MODEL

The overall depth of impacted soils exceeding the USCOs and the PGWSCOs ranged from 0.5 foot to 20 ft-bgs. VOCs impacts to soil exceed the USCOs and PGWSCOs were identified in one (1) boring near the northeastern portion of the Site. SVOC impacts exceeding the USCOs, RSCOs and PGWSCOs extended to soils at 1 to 20 ft-bgs depth Site-wide. Metals contaminated soils exceeding the USCOs, RSCOs and PGWSCOs extend to depths of 20 ft-bgs. PFOA and PFAS contaminated soils exceeding the proposed USCOs were detected to depths of 10 ft-bgs.

The applicable standards criteria and guidance (SCGs) for the Site groundwater are the AWQS. The Site's groundwater has been impacted with VOCs, SVOCs, PCBs, and metals compounds above AWQS and PFOA/PFOS above the MCLs across of the Site as a result of the historical land uses. PFOA/PFOS have also been identified in off-site monitoring wells downgradient from the Site.

In soil vapor, both PHC and chlorinated VOCs were detected in the vapor samples. A vapor intrusion evaluation will be needed for this Site in future enclosed lowest elevation areas of the buildings since these PHC VOCs and CVOCs may result in soil vapor intrusion into the future on-Site buildings.

4.0 HUMAN HEALTH EXPOSURE ASSESSMENT

This exposure assessment discusses potential migration routes by which contaminants in the environment may be able to reach human receptors in accordance with NYSDEC DER-10 sections 3.14(c)17, 3.3(c)4 and Appendix 3B. This discussion is based on current and hypothetical future Site conditions at the investigation area.

An exposure assessment must evaluate five (5) elements that comprise an exposure pathway. A complete exposure pathway includes the following:

1. A description of the contaminant source. If the original source is unknown, then a description of the contaminated environmental medium at the point of exposure;
2. An explanation of the transport mechanism;
3. An identification of all potential exposure points;
4. A description of the exposure route at the contact point; and
5. A receptor population.

There are some exposure pathways related to the contamination if left unaddressed.

4.1 SOILS CONTAMINATION SUMMARY

During the RI, VOCs, SVOCs, PCBs, and metals exceedances of the USCOs were identified in the Site soil from grade to approximately 20 ft-bgs pose a potential risk to human health if left unaddressed. The exposure pathway to humans can be through direct dermal contact with the contaminated soils or incidental ingestion without the implementation of the remedial action. However, these potential exposures to workers will be mitigated through the implementation of the CAMP and HASP and use of PPE, and the remediation of impacted soils will be through the implementation of a future Remedial Action Work Plan (RAWP). Dust generation will be managed during excavation operations through the use of a water truck and truck wash at the point trucks exit the Site and monitored by air monitoring stations upgradient and downgradient of future excavation activities.

If left unaddressed, potential routes of exposure to subsurface and surface soils include dermal contact, ingestion and inhalation of soil particulates. At present, potential exposure points have been eliminated by restricting public access to the Site through fencing. During future construction activities, specifically disturbance of soils, the potential for exposures to soils would increase for on-Site workers, utility workers, visitors and trespassers.

4.2 GROUNDWATER CONTAMINATION SUMMARY

Site's groundwater has been impacted with VOCs, SVOCs, PCBs, and metals compounds above AWQS and PFOA/PFOS above the MCLs across of the Site as a result of the historical land uses. PFOA/PFOS have also been identified in off-site monitoring wells downgradient from the Site.

During the Site remediation, proper dewatering will be implemented during the excavation work where groundwater is encountered in order to prevent direct contact with the groundwater. The dewatering water will be treated and disposed of properly off-Site either in the City of Yonkers sewer or shipped to an off-Site facility.

Potential groundwater exposure points include ingestion, dermal contact and inhalation of vapors. Yonkers utilizes municipal water (not groundwater) for drinking purposes. Thus, ingestion as a potential exposure point may be eliminated from further evaluation.

If left unaddressed potential exposures through dermal contact and vapor inhalation could arise during future excavation, redevelopment, or utility repairs where workers, visitors, or trespassers may be exposed to groundwater.

4.3 SURFACE WATER AND SEDIMENT CONTAMINATION

SESI conducted a surface water and sediment assessment of the Saw Mill River as part of SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007. Based on results of the investigation, the surface water and sediment samples collected and analyzed contained similar concentrations of SVOCs in sediment and surface water samples collected upgradient and downgradient of the Site. Thus, surface water and sediment were not being significantly impacted by the Site and this exposure pathway may be eliminated from further evaluation.

4.4 SOIL VAPOR CONTAMINATION

In soil vapor, both PHC and CVOCs were detected in the vapor samples. The exposure route for soil vapor is through the inhalation of the contaminated soil vapor that may intrude into the enclosed spaces of any planned Site development. Nevertheless, the planned soil excavation of the most contaminated source areas on the Site and possible future vapor mitigation measures will address this potential exposure pathway.

When volatile organics are detected in soil gas, if left unaddressed it creates a potential exposure to building occupants through vapors accumulating beneath structures and impacting indoor air quality within a structure. Currently, all potential human receptors are restricted from entering by fencing. Thus, a potential exposure point does not exist. However, after the Site is remediated and redeveloped, a potential that vapors could accumulate in enclosed areas such as basements, crawl spaces, etc. of the proposed building could arise.

5.0 FISH AND WILDLIFE ANALYSIS

The Site does not contain any wildlife or fish ecologically sensitive resources and hence the Site contamination is not expected to have any impacts on any fish or wildlife ecological resources. The closest surface water body, the Saw Mill River, is located immediately adjacent east of the Site. As discussed above, based upon SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007, the contaminated groundwater from the Site is not impacting the surface water and sediment of the Saw Mill River. Per DER-10 Appendix 3C, no fish and wildlife impact analysis is needed.

6.0 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

6.1 GROUNDWATER

RAOs for Public Health Protection

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

Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-release conditions.

6.2 SOIL

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection

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

6.3 SOIL VAPOR RAOs

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from potential present and future soil vapor intrusion into buildings at the site.

7.0 PRE-DESIGN INVESTIGATION

7.1 PDI SOIL SAMPLING

In order to delineate the mercury contamination in soil impacts in the vicinity of SB-9, MW-4, and MW-19, three (3) additional soil borings will be advanced as shown on **Figure 7.1**. The borings will be advanced to a depth of 20 ft-bgs using direct-push or other drilling methods as needed. Soil samples will be at a minimum of one sample per 5-foot depth interval based on field screening that includes visual observations, photoionization detector (PID) readings and olfactory observations. Boring logs documenting soil classifications, PID readings, and visual observations will be provided in the final report.

Soil samples collected from the boring locations will be analyzed by a NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory for mercury by EPA Method 7471B. Category B deliverables will be requested on each sample chain of custody.

Quality Assurance/Quality Control (QA/QC) samples will be collected and analyzed as specified in the QAPP. The number of duplicate, spiked, and blank samples analyzed will be collected at a frequency of one (1) duplicate for every 20 samples. The inclusion and frequency of analysis of field blanks will be on the order of one per every 20 samples but not more than one (1) per day.

7.2 PDI GROUNDWATER SAMPLING

In order to delineate off-Site groundwater quality, off-site monitoring wells MW-101S and MW-105S that are part of the western adjoining River Park Center BCP (C360083) Site monitoring well network will be sampled for PFOA, PFOS, and mercury. The monitoring well locations are depicted on **Figure 7.2**. The monitoring well construction logs are included in **Appendix A**. The wells will be sampled using low flow techniques. A flow rate of 100 ml to 250 ml per minute is used to purge the wells. Drawdown should not exceed 0.3 feet. At the initiation of low-flow purging, water levels and field parameters are recorded. Field parameters are then monitored every five minutes during low-flow purging using a flow-through cell. When three consecutive measurements of pH differ by 0.1 units or less, with ORP within 10 mv or less, turbidity varies 10 percent or less, conductivity differs by 3 percent or less and dissolved oxygen by 10 percent or less, sampling may begin. Flow-through cells allow continuous real-time readings. When the parameters stabilize, the flow-through cell is disconnected and sample bottles are filled directly from the tubing. If the parameters of a well do not stabilize in a timely manner, the groundwater sample will be collected after emptying three (3) well volumes from the well to be sampled.

Groundwater samples will be collected and submitted for analysis of PFOA, PFOS, and mercury by EPA Methods 1633, and 7471A from an ELAP-certified laboratory.

QA/Q samples will be collected and analyzed as specified in the QAPP. The number of duplicate, spiked, and blank samples analyzed will be collected at a frequency of one (1) duplicate for every 20 samples. The inclusion and frequency of analysis of field blanks will be on the order of one per every 20 samples but not more than one (1) per day.

8.0 EVALUATION OF REMEDIAL ALTERNATIVES

The overall objective of the remedy is to evaluate remedial alternatives that present a cost-effective cleanup which is the protective of the human health and the environment, achieves the site-specific remedial action objectives (RAOs), and the best balance of the NYSDEC evaluation criteria. This preferred remedy is a Track 4 remedy (Alternative 3) can be accomplished by implementing the removal of soil "Hot-Spot" areas and treatment of groundwater through chemical injections that will achieve the desired restricted residential use. The remedial alternatives are discussed below.

8.1 ALTERNATIVE 1: NO ACTION

The No Action alternative relies on employing natural processes to degrade remaining contaminants to levels below the Cleanup Goals. This alternative is considered a baseline for comparison as required by the National Contingency Plan (NCP). This alternative would not include institutional controls (ICs) and would not involve quarterly monitoring to evaluate natural attenuation.

8.2 ALTERNATIVE 2: PARTIAL SOIL TREATMENT USING IN-SITU STABILIZATION/SOLIDIFICATION, IN-SITU CHEMICAL REDUCTION (ISCR) AND PFAS TREATMENT, AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING.

In-Situ Stabilization/Solidification (ISS) of contaminated soil would be conducted in the hotspot depicted in **Figure 8.1A** to achieve a Track 4 remedy. The hotspot is 40 ft wide by 40 ft long and 12 ft deep and encompasses the area with the highest metals contamination including mercury that exceeds the PGWSCOs. ISS treatments would be evaluated in a treatability study. Mixes with Portland Cement, sodium sulfide (Na_2S) or ferrous sulfate ($FeSO_4$) and/or trisodium phosphate (TSP) would be evaluated. Stabilization of mercury and other metals may be achieved by the addition of Na_2S, $FeSO_4$ and/or TSP. Portland cement has been used for stabilization/solidification of mercury-containing soils. These treatments can result in the complete mitigation in mercury leaching due to the low total mercury concentrations in the soil (< 300 mg/kg). Approximately 735 CY of soil would be stabilized/solidified.

The groundwater chlorinated VOC contamination depicted in **Figure 8.1B** at MW-16 and MW-35 (PCE, TCE and cis-1,2-DCE) would be treated with In-Situ Chemical Reduction. Zero-Valent Iron (ZVI) will be injected in the groundwater treatment area (**Figure 8.2B**) to destroy the CVOC

contaminants. This ISCR treatment method involves the transfer of electrons from a reductant such as ZVI to a contaminant such as PCE, whereby the molecule is converted to harmless compounds. The micron-size ZVI is blended in a liquid-suspension that is injected, via Direct Push Technology (DPT) or injection wells. The liquid suspension promotes broad dispersion in the subsurface at low injection pressures, which optimizes distribution and contact. Through the process of reductive dechlorination, the PCE is degraded upon contact with the ZVI, and the byproducts are broken down into ethene. Class GA AWQS for CVOCs would be achieved via this treatment. For other contaminants not exceeding AWQS, control of exposure to impacted soil would be provided through a cover system.

The ISS treatment is anticipated to stabilize the mercury soil contaminant source and attenuate groundwater contamination over time Sitewide. RRSCOs and PGWSCOs would be met Sitewide through natural attenuation. Class GA AWQS for metals would be achieved via natural attenuation following the ISS treatment.

To control off-Site migration of PFAS contaminated groundwater, a PlumeStop® Colloidal Activated Carbon™ (PlumeStop®) permeable reactive barrier (PRB) will be installed. The PRB will remove PFAS from the aqueous phase by enhancing PFAS sorption onto the aquifer matrix, preventing further plume migration and eliminating the potential exposure risk. Additionally, to address the PFAS contamination on-Site and bring PFOA and PFOS concentrations below the MCLs, treatment of impacted areas will also be implemented using PlumeStop®.

This alternative would include long-term operation, maintenance, and monitoring, including groundwater sampling to further evaluate contaminant migration and natural attenuation. The groundwater monitoring will continue until groundwater levels have reached AWQS or asymptotic levels acceptable by the NYSDEC and NYSDOH. The following frequency has been assumed for the groundwater monitoring purposes of this study:

- Quarterly for years 1 –5

Then if needed:

- Once every year for five (5) years for years 6 – 30

Long-term groundwater sampling (years 6 – 30) has been selected at a one event per year for five (5) years for budgetary purposes only. The actual frequency may be increased or decreased pending sampling analytical results from years one (1) through five (5).

A soil vapor intrusion evaluation will be performed after the completion of remedial measures.

8.3 ALTERNATIVE 3: PARTIAL SOIL EXCAVATION, ISCR AND PFAS TREATMENT, AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING

The soil treatment would consist of excavating the hotspot depicted in **Figure 8.2A** to achieve a Track 4 remedy. The hotspot is 40 ft wide by 40 ft long and 12 ft deep and encompasses the area with the highest metals contamination including mercury that exceeds the PGWSCOs. The estimated volume of vadose soils to be excavated is approximately 735 cubic yards (CY). Metals-impacted soils would be disposed at regulated landfills. For cost estimating purposes, it is assumed that 5% of the total excavated soils (37 CY or 56 tons) will be hazardous. The hazardous soil would be disposed of at a hazardous waste recycling facility. PAH-impacted soils would be disposed of at a treatment facility for recycling. Dewatering would be required prior to excavating the saturated soils. Groundwater from the dewatering operation would be stored in frac tanks prior to off-Site disposal. Certified clean material (e.g., quarry-derived stone or dense graded aggregate) would be used to fill the void space and return the excavation area to grade. This method would require Support of Excavation (SOE).

The removal of source area material is expected to reduce mercury concentrations in groundwater in the long term to levels that meet the AWQS. The groundwater chlorinated VOC contamination would be treated with ISCR as described in Alternative 2. To address the PFAS contamination on-Site and bring PFOA and PFOS concentrations below the MCLs, treatment of impacted areas will be implemented using PlumeStop®. For other contaminants not exceeding groundwater standards, control of exposure to impacted soil would be provided through a cover system. The groundwater monitoring will continue until groundwater levels have reached AWQS or asymptotic levels acceptable by the NYSDEC and NYSDOH.

The ISCR and PFAS treatments, long-term operation, maintenance, and monitoring, including groundwater sampling to further evaluate contaminant migration and natural attenuation, are described in Alternative 2.

A soil vapor intrusion evaluation will be performed after the completion of remedial measures.

8.4 ALTERNATIVE 4: SITE-WIDE EXCAVATION

The soil treatment would consist of the complete removal and/or remediation of all contaminated fill to native soils, which were encountered at up to 20 ft-bgs across the Site to achieve a Track 1 remedy. The estimated excavation volume is approximately 20,000 CY of contaminated material. Dewatering would be required prior to excavating the saturated soils. Metals-impacted soils would be disposed at regulated landfills. For cost estimating purposes, it is assumed that 5% of the total excavated soils (1,000 CY or 1,500 tons) will be hazardous. The hazardous soil would be disposed of at a hazardous waste recycling facility. PAH-impacted soils would be disposed of at a treatment facility for recycling. Groundwater from the dewatering operation would be stored in frac tanks prior to off-Site disposal. Certified clean material (e.g., quarry-derived stone or dense graded aggregate) would be used to fill the void space and return the excavation area to grade. This method would require Support of Excavation (SOE). RRSCOs, PGWSCOs and the AWQS would be met Sitewide. For other contaminants not exceeding groundwater standards, control of exposure to impacted soil would be provided through a cover system.

As described in Alternative 2, this alternative would include long-term operation, maintenance, and monitoring, groundwater sampling to further evaluate contaminant migration and natural attenuation. A soil vapor intrusion evaluation will be performed after the completion of remedial measures. The groundwater monitoring will continue until groundwater levels have reached AWQS or asymptotic levels acceptable by the NYSDEC and NYSDOH.

9.0 REMEDY SELECTION EVALUATION CRITERIA

The remedy in each alternative outlined in Section 8 is evaluated to ensure that the alternative can be employed to protect against a threat to public health and/or the environment and is technically suitable at the Site. Each alternative is described in detail and compared for its advantages and disadvantages based on the environmental benefits and costs and pursuant to the nine criteria established by 6 New York Code Rules and Regulations (NYCRR) Part 375, NYSDEC and Division of Environmental Remediation-10 (DER-10). The detailed analysis of each individual alternative is based on the following criteria below:

(1) Protection of human health and the environment: This criterion is an evaluation of the alternative's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced, or controlled through removal, treatment, engineering controls (ECs) or institutional controls (ICs). The alternative's ability to achieve each of the RAOs is evaluated.

(2) Compliance with Standards, Criteria and Guidance: This criterion evaluates the compliance of the alternative with all identified SCGs. All SCGs for the site will be listed along with a discussion of whether or not the remedy will achieve compliance.

(3) Long term effectiveness and permanence: Each alternative is evaluated for its long-term effectiveness after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

- The magnitude of the remaining risks (i.e., any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes); and
- The adequacy of the ECs and ICs intended to limit the risk.

(4) Reduction of toxicity, mobility, or volume of contamination through treatment: The alternative's ability to reduce the toxicity, mobility, or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.

(5) Short-term impacts and effectiveness: The potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified potential adverse impacts to the community or workers at the Site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of ECs that will be used to mitigate short term impacts (i.e., dust control measures). The length of time needed to achieve the remedial objectives is also estimated.

(6) Implementability: The technical and administrative feasibility of implementing each alternative is evaluated for this criterion. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

(7) Cost Effectiveness: This criterion is an evaluation of the overall cost effectiveness of an alternative or remedy. This criterion evaluates the estimated capital, operations, maintenance, and monitoring costs. Costs are estimated and presented on a present worth basis.

(8) Land Use: This criterion evaluates the current, intended and reasonably anticipated future use of the site and its surroundings, as it relates to an alternative or remedy, when unrestricted levels would not be achieved.

(9) Community Acceptance: This criterion evaluates the public opinion and response to the remedy proposed for this site via public comment sessions during which public community concerns will be raised and adequately addressed.

10.0 REMEDY SELECTION EVALUATION

10.1 ALTERNATIVE NUMBER 1: NO FURTHER ACTION

This alternative does not include further action to remedy existing contamination on the site. The NCP at 40 CFR §300.430(e) (6) states that a "No Action" alternative be evaluated during feasibility studies and used as a baseline for comparison with other remedial alternatives. This alternative relies on the natural processes occurring in the subsurface to provide all remedial action. It does not involve any remedial construction, installation, or long-term monitoring of existing monitoring wells at the Site.

- **Protection of human health and the environment:** This alternative provides no control of exposure to impacted soil, groundwater and soil vapor, and no reduction in risk to human health or the environment posed by these impacted media. The alternative would allow for continued off-site migration of impacted groundwater off-site.

- **Compliance with SCGs:** This alternative does not comply with any of the SCGs.

- **Long term effectiveness and permanence**: This alternative does not provide any long-term effectiveness or permanence. No long-term management or controls for exposure would be included in this alternative. Long term potential risks will remain unchanged under this alternative due to the high levels of toluene in groundwater and the lack of *in situ* biodegradation of the chlorinated compounds.

- **Reduction of toxicity, mobility, or volume of contamination through treatment:** This alternative does not provide reduction in toxicity, mobility, or volume of the impacted soil.

- **Short term impacts and effectiveness:** This alternative does not result in disruption of, or removal of the subsurface impacts; therefore, no additional risks are posed to the community, workers, or the environment from additional exposure to the soil impacts as a result of implementing this alternative. Remedial objectives are not achieved so no remedial time frame is associated with this alternative.

- **Implementability:** There are no implementability concerns posed by this remedy as no remedial actions are being implemented.

- **Cost Effectiveness:** Because this is a no further action alternative, the capital, operations and maintenance, and net present value costs are estimated to be $0. Therefore, no cost estimate is provided.

- **Land Use:** The no further action alternative would result in soil contaminants exceeding unrestricted SCOs remaining in place at the Site. Under the no action alternative there would be no restrictions placed on the future use of the site to prevent redevelopment to a residential or industrial use that would expose future occupants to soils impacted above SCOs identified for residential or commercial uses.

- **Community Acceptance:** Community acceptance will be evaluated after public review of the remedy selection process (public comment period) as part of the final DER selection/approval.

10.2 ALTERNATIVE NUMBER 2: PARTIAL SOIL TREATMENT USING ISS, ISCR AND PFAS TREATMENT AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING.

As described in Section 8.2, this alternative includes ISS of contaminated soil in the hotspot depicted in **Figure 8.1A**, ISCR treatment of the CVOC contaminated area and PlumeStop® treatment of the groundwater for PFAS.

A soil vapor intrusion evaluation will be performed after the completion of remedial measures and construction of the proposed building during the heating season. Implementation of this alternative will include long term groundwater sampling in twelve (12) existing monitoring wells (MW-4S, MW-4D, MW-18, MW-19, MW-2S, MW-2D, MW-3S, MW-3D, MW-16, MW-35, MW-1S and MW-1D) as shown in **Figure 8.1B** to further evaluate contaminant migration and natural attenuation. Sampling frequency is described in Section 8.2.

The ISS of source area material (hotspot) would reduce mercury concentrations in groundwater in the long term to levels that meet the AWQS. The RRSCOs and PGWSCOs would be met Sitewide through natural attenuation. The AWQS for CVOCs would be achieved via ISCR treatment. To address the PFAS contamination on-Site and bring PFOA and PFOS concentrations below the MCLs, treatment of impacted areas will be implemented using PlumeStop®. A PlumeStop® barrier on the western part of the Site would prevent off-Site migration. For other contaminants not exceeding the AWQS, control of exposure to impacted soil

would be provided through a cover system. The groundwater monitoring will continue until groundwater levels have reached AWQS or asymptotic levels acceptable by the NYSDEC and NYSDOH.

- **Protection of human health and the environment:** This alternative actively stabilizes/solidifies the hotspot, uses ISCR treatment of the CVOC contaminated area and uses PlumeStop® to treat PFAS contaminated areas and prevent off-Site migration. It provides control of exposure to impacted soil with a cover system. The local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would prevent exposure to contaminated groundwater. Soil Vapor Intrusion (SVI) evaluations and/or vapor mitigation for future buildings would address potential exposures to building occupants via soil vapor intrusion.

  The ISS treatment would be protective of the environment through stabilizing of contaminant mass from subsurface soils and the destruction of CVOC contamination in groundwater. This alternative would rely on natural attenuation of the remaining soil and groundwater contamination following the ISS, ISCR and PlumeStop® treatments of PFAS. For other contaminants not exceeding the AWQS, control of exposure to impacted soil would be provided through a cover system. Groundwater monitoring will be performed to verify the effectiveness of this remedial action.

  There are no anticipated ecological risks/receptors. The closest surface water body, the Saw Mill River, is located immediately adjacent east of the Site. Based upon SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007, the contaminated groundwater from the Site is not impacting the surface water and sediment of the Saw Mill River. Per DER-10 Appendix 3C, no fish and wildlife impact analysis was needed.

- **Compliance with SCGs:** This alternative can achieve compliance with the applicable SCGs for soil and groundwater (AWQS, PFOA/PFOS MCLs) in the long-term through natural attenuation following removal of hotspot soil contamination, ISCR and PlumeStop treatment for PFAS. ISS treatment will address soil related SCGs (PGWSCOs/RRSCOs) by removing hotspot soil contaminant mass. ISS, ISCR and PlumeStop® treatments of

PFAS will achieve SCGs for groundwater by removing hotspot contaminant mass, destroying CVOC contamination, adsorbing PFAS contamination, and natural attenuation.

- **Long term effectiveness and permanence**: This alternative provides hotspot contamination stabilization/solidification in soil, ISCR groundwater treatment for CVOCs and PlumeStop® treatment of PFAS. The ISS treatment would significantly reduce soil concentrations by stabilizing/solidifying soil contaminant mass in the soil hotspot. Groundwater metals contamination is expected to decrease through a natural attenuation process following ISS treatment of the hotspot. The long-term effectiveness of the remedy will be monitored with groundwater wells. If necessary, additional ISCR injections may be conducted to ensure long-term effectiveness with respect to CVOC groundwater contamination. Partial ISS treatment would potentially eliminate the source of PFAS in soil. PlumeStop® treatment of the groundwater on-Site and the PlumeStop® barrier would treat the remaining PFAS contamination and prevent off-Site migration of PFAS. Groundwater treatment of metals, CVOCs and PFAS contamination may be performed if further reductions are needed to ensure long-term effectiveness and permanence.

  The cover system will act as an EC to prevent contact with any contaminants remaining in soil. An environmental easement (EE), which is subject to the provisions of ECL Article 71, Title 36, will be placed on the property to manage residual contamination and maintain ICs and ECs. The EE contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with zoning and local groundwater use restrictions. The EE requirements will be detailed in a Site Management Plan (SMP). The SMP is intended to provide a detailed description of the procedures required to manage the remedial systems (if any), and any residual groundwater and soil contamination following completion of the Remedial Action. This includes: (1) development, implementation, and management of all ECs and ICs; (2) development and implementation of a Monitoring Plan; (3) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (4) defining criteria for termination of monitoring. Additionally, the local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would permanently prevent exposure to residual contaminated groundwater. Vapor mitigation for future buildings would permanently address potential exposures to building occupants via soil vapor intrusion.

- **Reduction of toxicity, mobility, or volume of contamination through treatment:** The ISS targets treatment of impacted soil. Therefore, the toxicity, mobility, and volume of soil contamination is anticipated to significantly decrease. Reduction in the source of contamination is expected to significantly reduce the toxicity, mobility, and volume of metals contamination in groundwater. ISCR groundwater treatment would actively remediate CVOCs in groundwater and significantly reduce the toxicity, mobility, and volume of CVOCs contamination in groundwater. ISS and PlumeStop® groundwater treatment for PFAS would significantly reduce the toxicity, mobility, and volume of PFAS contamination in soil and groundwater.

- **Short-term impacts and effectiveness:** Short-term impacts anticipated during implementation of this alternative include a potential dust and noise concern to the workers, employees at the buildings and residents along the adjacent properties during the ISS treatment. Additional impacts include the short-term impact to traffic with equipment occupying parking lot space and inhalation of soil vapor by workers during the ISS process, which would be addressed through the donning of personal protective equipment, as necessary. The neighborhood may experience increased truck traffic for the delivery/removal of the ISS batch treatment system, excavator and mixing equipment, and ISCR/PlumeStop® mixing and injection equipment. Work will be conducted to minimize potential dust generation and noise impacts.

  There are no anticipated ecological risks/receptors. The closest surface water body, the Saw Mill River, is located immediately adjacent east of the Site. Based upon SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007, the contaminated groundwater from the Site is not impacting the surface water and sediment of the Saw Mill River. Per DER-10 Appendix 3C, no fish and wildlife impact analysis was needed.

- **Implementability:** Implementation of this alternative could begin immediately following technical design of the ISS, ISCR and PlumeStop® treatment systems, completion of utility mark-out, establishing proper administrative controls (permits), and establishing means and methods for traffic controls. An ISS treatability study would be conducted to optimize the treatment prior to full-scale implementation.

- **Cost Effectiveness:** The present net worth cost to implement Alternative 2 is estimated to be $2,544,392 and includes partial ISS of contaminated soil, ISCR treatment of CVOC contaminated groundwater, groundwater PlumeStop® treatment for PFAS, a cap cover system, groundwater monitoring and cover inspections, and a vapor intrusion evaluation for future buildings. The capital cost to implement Alternative 2 is greater than Alternative 1 (no action), and less than Alternative 3 that would require partial soil excavation and fill, ISCR and PumeStop® groundwater treatment, and less than Alternative 4 that would require mass excavation of approximately 20,000 tons of soil to 20 ft-bgs. The estimated cost for Alternative 2 is summarized in **Table 10.1**.

- **Land Use:** The current, intended and reasonably anticipated future use of the Site and its surroundings is residential. This alternative will not impact the land use. Under this alternative, the Site would be restricted through an Environmental Easement (EE). Additionally, a Site Management Plan (SMP) will be necessary to manage the Cover System and residual contamination in soil, vapor and groundwater.

- **Community Acceptance:** Community acceptance will be evaluated after public review of the remedy selection process (public comment period) as part of the final DER selection/approval.

10.3 ALTERNATIVE NUMBER 3: PARTIAL SOIL EXCAVATION, ISCR AND PFAS TREATMENT, AND LONG-TERM OPERATION, MAINTENANCE, AND MONITORING

As described in Section 8.3, the soil treatment would consist of excavating the hotspot depicted in **Figure 8.1A**, ISCR groundwater treatment of the CVOC contaminated area, and PlumeStop® treatment of PFAS in groundwater. Certified clean material (e.g., quarry-derived stone or dense graded aggregate) would be used to fill the void space and return the excavation area to grade. This method would require Support of Excavation (SOE). A soil vapor intrusion evaluation will be performed after the completion of remedial measures and after the soil vapor intrusion evaluation that will be conducted during the heating season. Implementation of this alternative will include long term groundwater sampling in twelve (12) existing monitoring wells (MW-4S, MW-4D, MW-18, MW-19, MW-2S, MW-2D, MW-3S, MW-3D, MW-16, MW-35, MW-1S and MW-1D) as shown in **Figure 8.1B** to further evaluate contaminant migration and natural attenuation. Sampling frequency is described in Section 8.3.

The removal of source area material would reduce mercury concentrations in groundwater in the long term to levels that meet the AWQS. RRSCOs and PGWSCOs would be met Sitewide through natural attenuation. Class GA groundwater standards for CVOCs would be achieved via ISCR treatment. To address the PFAS contamination on-Site and bring PFOA and PFOS concentrations below the MCLs, treatment of impacted areas will be implemented using PlumeStop®. A PlumeStop® barrier on the western part of the Site would prevent off-Site migration of PFAS. For other contaminants not exceeding GW standards, control of exposure to impacted soil would be provided through a cover system. The groundwater monitoring will continue until groundwater levels have reached Class A GQS or asymptotic levels acceptable by the NYSDEC and NYSDOH.

- **Protection of human health and the environment:** This alternative actively removes soil contaminant mass and groundwater contamination. It also provides control of exposure to remaining impacted soil through a cover system. The local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would prevent exposure to contaminated groundwater. Soil Vapor Intrusion (SVI) evaluations and/or vapor mitigation for future buildings would address potential exposures to building occupants. The ISCR treatment would be protective of the environment through removal of CVOC contamination from groundwater. The PlumeStop® treatment would be protective of the environment through adsorption of the PFAS in groundwater on-Site and prevention of off-Site migration.

  Groundwater sampling would be performed to verify the effectiveness of the excavation, ISCR and PFAS (PlumeStop®) treatments. ISCR is anticipated to significantly reduce the on-Site CVOC impacts. PlumeStop® treatment is anticipated to significantly reduce the on-Site PFAS impacts and prevent off-Site migration. Control of exposure to impacted soil would be provided through a cover system. The cover system will prevent contact with the contaminated soil and limit contaminant mobility, thereby protecting ground water.

  There are no anticipated ecological risks/receptors. The closest surface water body, the Saw Mill River, is located immediately adjacent east of the Site. Based upon SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007, the contaminated groundwater from the Site is not impacting the surface

water and sediment of the Saw Mill River. Per DER-10 Appendix 3C, no fish and wildlife impact analysis was needed.

- **Compliance with SCGs:** This alternative can achieve compliance with the applicable SCGs for soil and groundwater (GWQS, PFOA/PFOS MCLs) in the long-term through natural attenuation following removal of hotspot soil contamination, CVOC and PFAS treatments in groundwater. Soil treatment will address soil related SCGs (PGWSCOs/RRSCOs) by removing hotspot soil contaminant mass. Soil excavation, ISCR and PFAS treatments will achieve SCGs for groundwater (Class GA standards) by removing hotspot contaminant mass, groundwater CVOC destruction, PFAS adsorption and natural attenuation. This alternative proposes long-term groundwater monitoring to evaluate mass removal and groundwater concentration trends.

- **Long term effectiveness and permanence**: This alternative provides hotspot contamination mass removal in soil, ISCR groundwater treatment for CVOCs and PFAS treatment of the groundwater with PlumeStop®. The soil excavation would significantly reduce soil contamination by removing metal and SVOC contaminant mass in the hotspot. Groundwater metal and SVOC contamination is expected to decrease through a natural attenuation process following soil excavation. The long-term effectiveness of the remedy will be monitored with groundwater wells. If necessary, additional ISCR injections may be conducted to ensure long-term effectiveness with respect to CVOC groundwater contamination. Partial ISS treatment would potentially eliminate the source of PFAS in soil. PFAS treatment of the groundwater on-Site and the PlumeStop® barrier would treat the remaining PFAS contamination and prevent off-Site migration of PFAS. The long-term effectiveness of any of these alternatives would be evaluated over time in the field. The cover system will act as an EC to prevent contact with any contaminants remaining in soil. Groundwater treatment may be performed if reductions in metals, CVOC and PFAS contamination are needed to ensure long-term effectiveness and permanence.

- An environmental easement (EE), which is subject to the provisions of ECL Article 71, Title 36, will be placed on the property to manage residual contamination and maintain ICs and ECs. The EE contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with zoning and local groundwater use restrictions. The EE requirements will be detailed in a Site Management Plan (SMP). The SMP is intended to

provide a detailed description of the procedures required to manage the remedial systems (if any), and any residual groundwater and soil contamination following completion of the Remedial Action. This includes: (1) development, implementation, and management of all ECs and ICs; (2) development and implementation of a Monitoring Plan; (3) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (4) defining criteria for termination of monitoring. Additionally, the local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would permanently prevent exposure to residual contaminated groundwater. Vapor mitigation for future buildings would permanently address potential exposures to building occupants via soil vapor intrusion.

- **Reduction of toxicity, mobility, or volume of contamination through treatment:** The soil excavation targets treatment of impacted soil. Therefore, the toxicity, mobility, and volume of soil contamination is anticipated to significantly decrease. ISCR groundwater treatment would actively remediate CVOCs in groundwater and significantly reduce the toxicity, mobility, and volume of CVOCs contamination in groundwater. Reduction in the soil source of contamination is expected to significantly reduce the toxicity, mobility, and volume of metals contamination in groundwater. Soil excavation and PlumeStop® groundwater treatment would significantly reduce the toxicity, mobility, and volume of PFAS contamination in soil and groundwater.

- **Short-term impacts and effectiveness:** Short-term impacts anticipated during implementation of this alternative include a potential dust and noise concern to the workers, employees at the buildings and residents along the adjacent properties during the soil excavation. Additional impacts include the short-term impact to traffic with equipment occupying parking lot space and inhalation of soil vapor by workers during the excavation process, which would be addressed through the donning of personal protective equipment, as necessary. The neighborhood may experience increased truck traffic for the delivery/removal of the excavator, soil disposal and ISCR/PlumeStop® mixing and injection equipment delivery/removal. Work will be conducted to minimize potential dust generation and noise impacts.

There are no anticipated ecological risks/receptors. The closest surface water body, the Saw Mill River, is located immediately adjacent east of the Site. Based upon SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007, the contaminated groundwater from the Site is not impacting the surface water and sediment of the Saw Mill River. Per DER-10 Appendix 3C, no fish and wildlife impact analysis was needed.

- **Implementability:** Implementation of this alternative could begin following technical design of the soil excavation and disposal, ISCR and PlumeStop® treatment systems, completion of utility mark-out, establishing proper administrative controls (permits) and other operational requirements, and establishing means and methods for traffic controls for soil disposal trucks. Soil excavation would require saturated soil dewatering and a support of excavation (SOE) system.

- **Cost Effectiveness:** The present worth cost to implement Alternative 3 is estimated to be $2,671,512 and includes hot-spot excavation of approximately 735 cubic yards of soil, importing clean fill, ISCR treatment of CVOC contaminated groundwater, a cap cover system, groundwater monitoring and cover inspections, and a vapor intrusion evaluation for future buildings. The capital cost to implement Alternative 3 is greater than Alternative 1 (no action), and also greater than Alternative 2 (ISS, ISCR and PlumeStop®), but less than Alternative 4 that would require mass excavation of approximately 20,000 tons of soil to 20 ft-bgs. The estimated cost for Alternative 3 is summarized in **Table 10.2**.

- **Land Use:** The current, intended and reasonably anticipated future use of the Site and its surroundings is residential. This alternative will not impact the land use. Under this alternative, the site would be restricted through an Environmental Easement (EE). Additionally, a Site Management Plan (SMP) will be necessary to manage the Cover System and residual contamination in soil, vapor and groundwater.

- **Community Acceptance:** Community acceptance will be evaluated after public review of the remedy selection process (public comment period) as part of the final DER selection/approval.

10.4 ALTERNATIVE NUMBER 4: SITE-WIDE EXCAVATION

As described in Section 8.4, the soil treatment would consist of the complete removal and/or remediation of all contaminated fill to native soils, which were encountered at up to 20 ft-bgs across the Site. Certified clean material (e.g., quarry-derived stone or dense graded aggregate) would be used to fill the void space and return the excavation area to grade. This method would require Support of Excavation (SOE). RRSCOs, PGWSCOs and Class GA groundwater standards would be met Sitewide.

The complete removal and/or remediation of all contaminated fill to native soils would reduce mercury, VOC and PFAS concentrations in groundwater in the long term to levels that meet the AWQS. For other contaminants not exceeding GW standards, control of exposure to impacted soil would be provided through a cover system. The groundwater monitoring will continue until groundwater levels have reached Class A GQS or asymptotic levels acceptable by the NYSDEC and NYSDOH.

- **Protection of human health and the environment:** This alternative provides control of exposure to impacted soil, groundwater and soil vapor, and reduction in risk to human health posed by these impacted media due to the soil excavation. This alternative actively removes soil and groundwater metal, SVOC and VOC mass, and potentially the PFAS source of contamination. The local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would prevent exposure to contaminated groundwater. Soil Vapor Intrusion (SVI) evaluations and/or vapor mitigation for future buildings would address potential exposures to building occupants. This alternative allows for complete mitigation of off-Site migration of impacted overburden groundwater through soil removal, and dewatering. Limited groundwater sampling would be performed to verify the effectiveness of the excavation measures. Vadose zone and saturated soil excavation is expected to eliminate the metal, VOC, SVOC and PFAS impacted areas.

  There are no anticipated ecological risks/receptors. The closest surface water body, the Saw Mill River, is located immediately adjacent east of the Site. Based upon SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007, the contaminated groundwater from the Site is not impacting the surface water and sediment of the Saw Mill River. Per DER-10 Appendix 3C, no fish and wildlife impact analysis was needed.

- **Compliance with SCGs:** This alternative can achieve compliance with the SCGs for soil (PGWSCOs and RRSCOs) and groundwater (GQS) by removing contaminated fill to native soils, which were encountered at up to 20 ft-bgs across the Site. This alternative proposes limited post-excavation groundwater monitoring to evaluate the effectiveness of the soil excavation.

- **Long term effectiveness and permanence**: This alternative provides mass removal of soil and impacted groundwater. This treatment is likely to fully mitigate the groundwater contaminant source mass and produce a permanent remedial solution for the Site through natural attenuation of residual contamination in native soils. It provides rapid treatment, which is desirable at the Site. This alternative would be an effective measure for mitigating off-Site migration of impacted groundwater. The local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would permanently prevent exposure to any residual contaminated groundwater. Vapor mitigation for future buildings would permanently address potential exposures to building occupants via soil vapor intrusion.

- **Reduction of toxicity, mobility, or volume of contamination through treatment:** The soil excavation targets removal of impacted soil. Therefore, the toxicity, mobility, and volume of soil contamination is anticipated to significantly decrease. Source-area metals, VOCs and SVOCs would be removed and this would mitigate the toxicity, mobility, and volume of groundwater contamination.

- **Short term impacts and effectiveness:** Short-term impacts anticipated during implementation of this alternative include a potential dust and noise concern to the workers, employees at the buildings and residents along the adjacent properties during the soil excavation. Additional impacts include the short-term impact to traffic with equipment occupying parking lot space and inhalation of soil vapor by workers during the excavation process, which would be addressed through the donning of personal protective equipment, as necessary. The neighborhood may experience increased truck traffic for the delivery/removal of the soil excavation equipment and soil disposal activities. Work will be conducted to minimize potential dust generation and noise impacts.

There are no anticipated ecological risks/receptors. The closest surface water body, the Saw Mill River, is located immediately adjacent east of the Site. Based upon SESI's Remedial Investigation Report of the River Park Center BCP Site (C360083), dated December 2007, the contaminated groundwater from the Site is not impacting the surface water and sediment of the Saw Mill River. Per DER-10 Appendix 3C, no fish and wildlife impact analysis was needed.

- **Implementability:** Implementation of this alternative could begin following technical design of the soil excavation and disposal, completion of utility mark-out, establishing proper administrative controls (permits) and other operational requirements, and establishing means and methods for traffic controls for soil disposal trucks. Soil excavation would require saturated soil dewatering and an extensive support of excavation (SOE) system. The SOE would be cost-prohibitive and disruptive.

- **Cost Effectiveness:** The present worth cost to implement Alternative 4 is estimated to be $7,165,321 and includes site-wide excavation of approximately 20,000 yards of soil to 20 ft-bgs, importing clean fill, and a vapor intrusion evaluation for future buildings. The capital cost to implement Alternative 4 is greater than Alternative 1 (no action), Alternative 2 (ISS, ISCR and PlumeStop®), and Alternative 3 (Partial soil excavation, ISCR and PlumeStop®). The estimated cost for Alternative 4 is summarized in **Table 10.3**.

- **Land Use:** The current, intended and reasonably anticipated future use of the Site and its surroundings is residential. This alternative will not impact the land use. Under this alternative, the site would be restricted through an temporary Environmental Easement (EE) for residual soil vapor and groundwater contamination. Additionally, a Site Management Plan (SMP) will be necessary to manage the residual contamination in vapor and groundwater.

- **Community Acceptance**: Community acceptance will be evaluated after public review of the remedy selection process (public comment period) as part of the final DER selection/approval.

10.0 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

A comparative analysis of all alternatives was performed pursuant to each of the nine criteria in 6 NYCRR Part 375-1.8(f) and DER-10 Section 4.4. The proposed remedies are based on the results of the RI and the evaluation of alternatives presented above. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. The first two evaluation criteria are termed "threshold criteria" and must be satisfied in for an alternative to be considered for selection.

- **Protection of human health and the environment:** This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

  Alternative 1 would leave remaining sources of contamination in soil and groundwater and potentially soil vapor, which would cause potential exposure to anyone present on the Site. Alternative 1 is unacceptable since it is not protective of public health and is, therefore, not considered further in this evaluation. Alternatives 2, 3, and 4 are all protective of public health and the environment to varying degrees and are considered further in this evaluation.

- **Compliance with Standards, Criteria and Guidance:** Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

  Alternatives 2, 3, and 4 all attempt to attain soil and groundwater SCGs and are considered further. The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

- **Long-term effectiveness and permanence**: This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the ECs and/or ICs intended to limit the risk, and 3) the reliability of these controls.

Alternatives 2, 3 and 4 can be considered effective remedies for soil, soil vapor treatment and for the treatment of impacted groundwater. The partial soil ISS, ISCR and PlumeStop® groundwater treatment in Alternative 2 would provide soil and groundwater contaminant mass removal. Using ISCR and PlumeStop® groundwater treatments in Alternative 2 is expected to reduce the dissolved groundwater impacts, thereby helping meet the RAOs. The partial soil excavation, ISCR and PlumeStop® groundwater treatment in Alternative 3 would provide soil and groundwater contaminant mass removal. Using ISCR and PlumeStop® groundwater treatments in Alternative 3 is expected to reduce the dissolved groundwater impacts, thereby helping meet the RAOs. Alternative 4 includes the removal of all remaining Site contaminated fill material which would fully mitigate the groundwater contaminant source mass and may produce a permanent remedial solution for the Site through natural attenuation of residual soil and groundwater contamination.

Although Alternative 4 is considered to have the best long-term effectiveness, Alternatives 2 and 3 are more aggressive and less disruptive treatments. If necessary, additional ISCR and PlumeStop® injections may be conducted to ensure long-term effectiveness of groundwater CVOC contamination. Alternative 3 is considered more effective than Alternative 2 because it uses soil excavation instead of ISS. The long-term effectiveness of any of these alternatives would be evaluated over time in the field.

- **Reduction of toxicity, mobility, or volume of contamination through treatment:** Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.

  Alternatives 2, 3 and 4 involve the mass removal and/or treatment of impacted soil and groundwater. Therefore, for these matrices, the toxicity, mobility, and volume of contamination would be significantly reduced.

  Alternative 4 involves the total removal of remaining contaminated fill material. Therefore, for groundwater and soil, the toxicity, mobility, and volume of contamination would be eliminated for the most part with Alternative 4.

Alternative 4 reduces the toxicity, mobility and volume of contamination to the greatest extent. Alternatives 2 and 3 may achieve this criterion through long-term natural attenuation.

- **Short term impacts and effectiveness:** The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

  Short-term impacts anticipated during the implementation of Alternative 2, 3, or 4 include a potential dust and noise concern to the workers, employees at the buildings and residents along the adjacent properties during soil excavation or ISS. Work will be conducted to minimize potential dust generation and noise impacts. The soil excavation under Alternative 4 would create more short-term impacts than the partial excavations in Alternatives 2 and 3 because of the volume of soil to be excavated, the need to install extensive SOEs and dewatering. Additional potential impacts include the short-term impact to traffic with equipment delivery and removal for Alternatives 2, 3, and 4. Inhalation of soil vapor by workers may also be a short-term impact for Alternatives 2, 3, and 4. ECs will be employed to mitigate impacts to workers during implementation.

  Alternative 4 is very disruptive and has the most short-term impact. Alternatives 2 and 3 have much lower short-term impacts.

- **Implementability:** The technical and administrative feasibility of implementing each alternative is evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, ICs, and so forth.
  Implementation of Alternative 2 could begin immediately following the final technical design of the ISS treatment based on the treatability study, and the final technical design of the ISCR and PlumeStop® treatments. Upon completion of a utility mark-out,

establishing proper administrative controls/permits etc. and establishing means and methods for traffic controls, the ISS treatment could begin.

Alternative 3 could begin immediately following the final technical design of the partial soil excavation, dewatering and SOE systems, ISCR and PlumeStop® treatments. Implementation of Alternative 3 would be more complex than Alternative 2 as it involves excavation, SOE, dewatering, ISCR and PlumeStop® activities.

Alternative 4 would be difficult to implement due to the extensive SOE system that would need to be installed and the dewatering operations. Given the restrictions and subsurface conditions, Alternative 4 is the least implementable of all Alternatives.

- **Cost Effectiveness:** Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

  The Present Worth Cost of alternative 4 is approximately 2.7 times the Present Worth Cost of alternatives 2 and 3. The Present Worth Cost of alternative 3 is approximately equal to alternative 2. Alternatives 2 and 3 are the most cost effective alternatives.

- **Land Use:** When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

  Alternatives 2, 3, or 4 address exposures from impacted groundwater and soil at the site. The site will continue to be allowed for restricted residential use since the soils exceeding the SCOs will be partially remediated. Restrictions on land use will be addressed through the SMP to manage residual contamination if SCOs are not met for Alternatives 2, 3, and 4.

- **Community Acceptance**: The final criterion, Community Acceptance, is considered a "modifying criterion" and is considered after evaluating all those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

  Concerns of the community regarding the evaluation of alternatives will be evaluated. A responsiveness summary will be prepared that describes public comments received and how the NYSDEC will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

11.0 RECOMMENDED REMEDIAL ALTERNATIVE

Based on a site wide evaluation of soil and groundwater impacts, and the above analysis of remedial alternatives, Alternative 3 is the recommended alternative. Alternative 3 has been determined to address chemical specific SCGs for the protection of human health and the environment, and satisfy all the above criteria. Alternative 3 is the preferred remedy since it adequately addresses the metals, CVOC and PFAS impacts on-Site in an approach that is effective, implementable and cost-effective. This alternative actively removes soil metals mass, destroys CVOC groundwater contamination, treats on-Site PFAS contamination, controls off-Site migration of PFAS and CVOCs, and provides control of exposure to impacted soil through a cover system. The local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would prevent exposure to contaminated groundwater. Soil Vapor Intrusion (SVI) evaluations and/or vapor mitigation for future buildings would address potential exposures to building occupants.

As described in Section 8.3, the primary components of Alternative 3 consist of the following:

- To address the soil metals contamination at the Site, partial soil excavation will be conducted to remove approximately 735 cubic yards of hotspot contamination.
- An ISCR treatment (ZVI) will be implemented to treat CVOC contaminants in groundwater in the western portion of the Site. The ISCR treatment's effectiveness will be monitored over time by monitoring on-Site monitoring wells. Additional ISCR events may be implemented to address potential rebounding CVOC concentrations and to further reduce groundwater CVOC contamination to ensure long-term effectiveness and permanence.
- To control off-Site migration of PFAS contaminated groundwater, a PlumeStop® PRB will be installed. The PRB will remove PFAS from the aqueous phase by enhancing PFAS sorption onto the aquifer matrix, preventing further plume migration and eliminating the potential exposure risk. Additionally, to address the PFAS contamination on-Site and bring PFOA and PFOS concentrations below the MCLs, treatment of groundwater impacted areas will also be implemented using PlumeStop®.
- The soil and groundwater remedies will be monitored with groundwater sampling to evaluate natural attenuation of residual metals and CVOC contamination.
- A soil vapor intrusion evaluation will be performed after the completion of remedial measures and construction of the proposed building during the heating season. The groundwater monitoring will continue until groundwater levels have reached Class A GQS

or asymptotic levels acceptable by the NYSDEC and NYSDOH. Potential exposures to building occupants on-Site and off-Site via soil vapor intrusion will be mitigated with an EC, as necessary.

- Control of exposure to impacted soil would be provided through a cover system. The cover system will act as another EC and prevent contact with the residual contaminated soil and limit contaminant mobility, thereby protecting ground water.
- ICs in the form of environmental easement (EE), which is subject to the provisions of ECL Article 71, Title 36, will be placed on the property to manage residual contamination. The EE contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with EC. The EE requirements will be detailed in an SMP. Additionally, the local groundwater use restriction (Chapter 873, Article VII of the Laws of Westchester County) would permanently prevent exposure to residual contaminated groundwater. Vapor mitigation for future buildings would address potential exposures to building occupants via soil vapor intrusion.

12.0 REFERENCES

A. Phase I Environmental Site Assessment for Trifont Realty, prepared by Advanced Cleanup Technologies, Inc., April 2006.

B. Remedial Investigation Report, prepared for Struever, Fidelco, Cappelli, LLC, prepared by SESI Consulting Engineers, December 2007.

C. Remedial Investigation Report of the River Park Center - Chicken Island Site (C360083), prepared for Struever, Fidelco, Cappelli, LLC, Prepared by SESI Consulting Engineers, dated December 14, 2007.

D. Phase I Environmental Site Assessment for 32 John St Yonkers AMS LLC, prepared by SESI, June 2019.

E. Remedial Investigation Report, prepared for 32 John Street Yonkers AMS, LLC, prepared by SESI, dated August 2022

Tables

Table 10.1
Alternatives Cost Analysis 2

	Years 2024-2053
Interest Rate	*5.00%*
Inflation Rate	*2.0%*
Discount Rate	*3.0%*

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Item Totals	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Waste Characterization Sampling		26,951	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ISS Treatment		82,241	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cover System		61,672	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PDI		10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater ISCR		59,540	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater PFAS Treatment		1,380,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells		24,610	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring		41,410	35,000	35,000	35,000	35,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Engineering		295,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Contingency 10% for first Year		198,142																			
Yearly Cost		2,179,566	43,000	43,000	43,000	43,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500
Yearly Cost Discounted		2,116,084	40,532	39,351	38,205	37,092	19,262	18,701	18,156	17,628	17,114	16,616	16,132	10,555	10,247	9,949	9,659	9,378	9,105	8,839	8,582
PWC	**$2,544,392**																				

Table 10.1
Alternatives Cost Analysis 2

	Years 2024-2053
Interest Rate	***5.00%***
Inflation Rate	***2.0%***
Discount Rate	***3.0%***

		21	22	23	24	25	26	27	28	29	30
	Item Totals	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Waste Characterization Sampling		0	0	0	0	0	0	0	0	0	0
ISS Treatment		0	0	0	0	0	0	0	0	0	0
Cover System		0	0	0	0	0	0	0	0	0	0
PDI		0	0	0	0	0	0	0	0	0	0
Groundwater ISCR		0	0	0	0	0	0	0	0	0	0
Groundwater PFAS Treatment		0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells		0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring		7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Engineering		8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Contingency 10% for first Year											
Yearly Cost		15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500
Yearly Cost Discounted		8,332	8,089	7,854	7,625	7,403	7,187	6,978	6,775	6,577	6,386
PWC	**$2,544,392**										

Table 10.2
Alternatives Cost Analysis 3

	Years 2024-2053
Interest Rate	***5.00%***
Inflation Rate	***2.0%***
Discount Rate	***3.0%***

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Item Totals	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Waste Characterization Sampling		37,903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hot-Spot Excavation		190,751	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cover System		61,672	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PDI		10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater ISCR		59,540	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater PFAS Treatment		1,380,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells		24,394	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring		41,194	35,000	35,000	35,000	35,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Engineering		295,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Contingency		210,045																			
Yearly Cost		2,310,499	43,000	43,000	43,000	43,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500
Yearly Cost Discounted		2,243,203	40,532	39,351	38,205	37,092	19,262	18,701	18,156	17,628	17,114	16,616	16,132	10,555	10,247	9,949	9,659	9,378	9,105	8,839	8,582
PWC	**$2,671,512**																				

Table 10.2
Alternatives Cost Analysis 3

	Years 2024-2053
Interest Rate	***5.00%***
Inflation Rate	***2.0%***
Discount Rate	***3.0%***

		21	22	23	24	25	26	27	28	29	30
	Item Totals	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Waste Characterization Sampling		0	0	0	0	0	0	0	0	0	0
Hot-Spot Excavation		0	0	0	0	0	0	0	0	0	0
Cover System		0	0	0	0	0	0	0	0	0	0
PDI		0	0	0	0	0	0	0	0	0	0
Groundwater ISCR		0	0	0	0	0	0	0	0	0	0
Groundwater PFAS Treatment		0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells		0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring		7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Engineering		8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Contingency											
Yearly Cost		15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500
Yearly Cost Discounted		8,332	8,089	7,854	7,625	7,403	7,187	6,978	6,775	6,577	6,386
PWC	**$2,671,512**										

Table 10.3
Alternatives Cost Analysis 4

	Years 2024-2053
Interest Rate	***5.00%***
Inflation Rate	***2.0%***
Discount Rate	***3.0%***

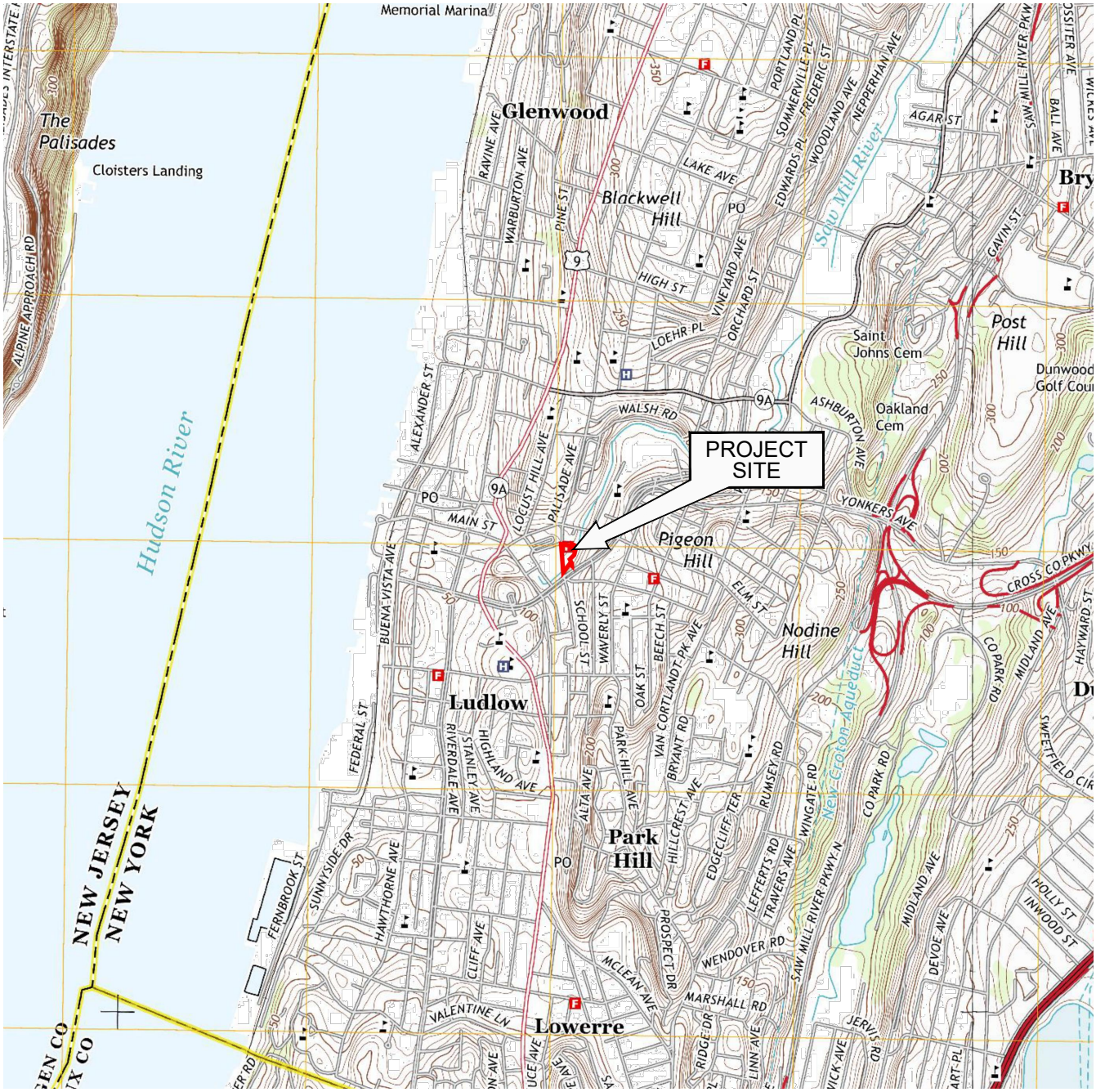
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Item Totals	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Waste Characterization Sampling		76,443	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sitewide Excavation		6,152,010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PDI		10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells		24,394	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring		41,194	35,000	35,000	35,000	35,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering		260,000	8,000	8,000	8,000	8,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Contingency		656,404																			
Yearly Cost		7,220,445	43,000	43,000	43,000	43,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yearly Cost Discounted		7,010,141	40,532	39,351	38,205	37,092	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PWC	**$7,165,321**																				

Table 10.3
Alternatives Cost Analysis 4

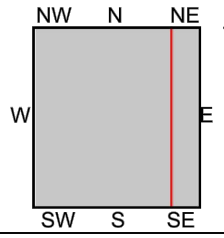
	Years 2024-2053
Interest Rate	***5.00%***
Inflation Rate	***2.0%***
Discount Rate	***3.0%***

		21	22	23	24	25	26	27	28	29	30
	Item Totals	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053
Waste Characterization Sampling		0	0	0	0	0	0	0	0	0	0
Sitewide Excavation		0	0	0	0	0	0	0	0	0	0
PDI		0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring Wells		0	0	0	0	0	0	0	0	0	0
Groundwater Monitoring		0	0	0	0	0	0	0	0	0	0
Engineering		0	0	0	0	0	0	0	0	0	0
Contingency											
Yearly Cost		0	0	0	0	0	0	0	0	0	0
Yearly Cost Discounted		0	0	0	0	0	0	0	0	0	0
PWC	**$7,165,321**										

Figures



This report includes information from the following map sheet(s).



TP, Yonkers, 2013, 7.5-minute
E, Mount Vernon, 2013, 7.5-minute

FIG-1.1

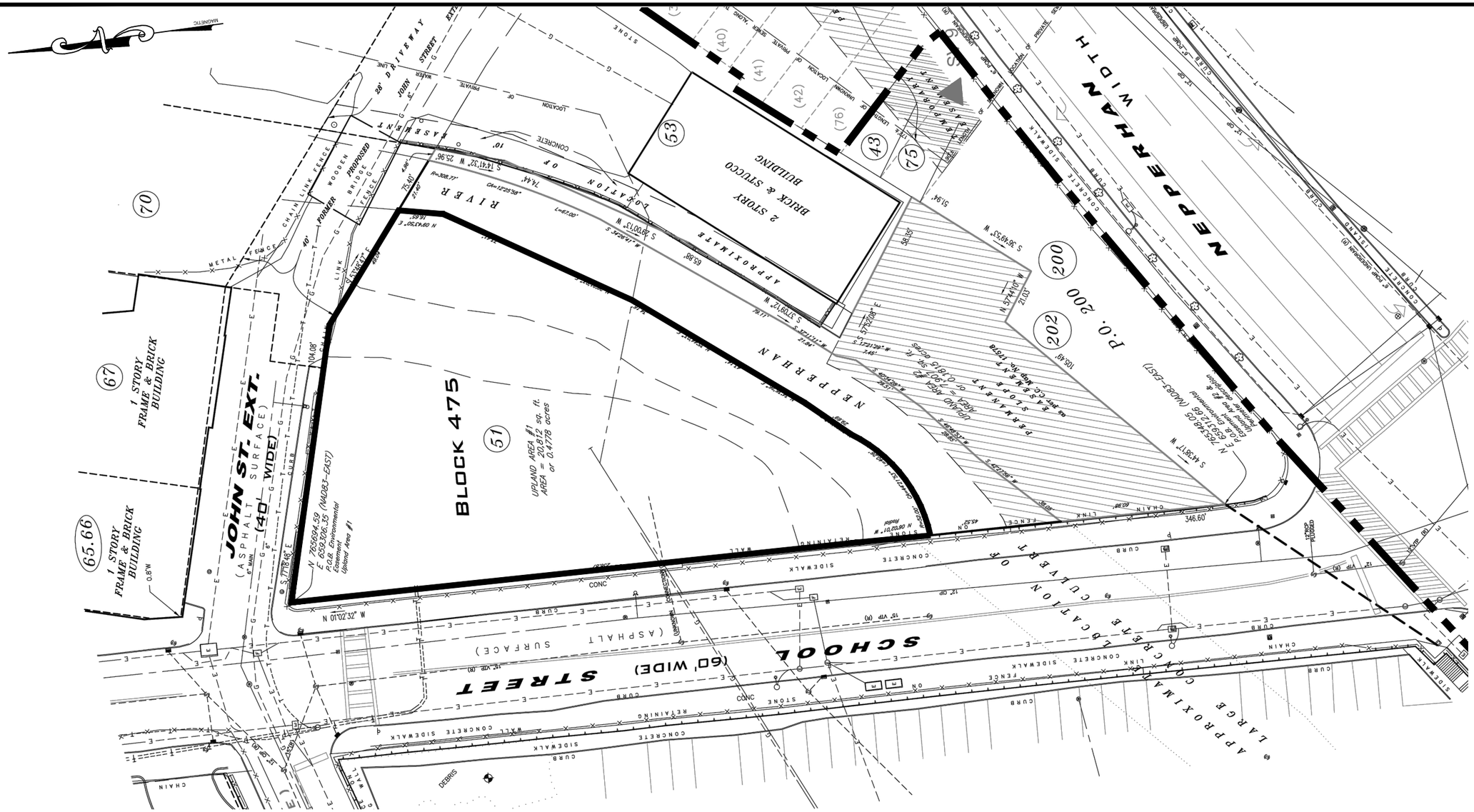
FORMER YONKERS
FIREHOUSE SITE (BCP#C360191)
32 JOHN STREET
YONKERS, NY 10701

SITE LOCATION MAP

SESI
CONSULTING
ENGINEERS D.P.C.
SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

DRAWN BY: yy
CHECKED BY: TD
SCALE: N.T.S.
DATE: 9/10/2020
JOB NO.: 10592

N:\ACAD\10592\RIWP\10592 FIG 1 – SITE LOCATION MAP.DWG 09/10/20 11:58:07AM, jenny, LAYOUT:FIG–1



LEGEND:

- BCP SITE BOUNDARY

REFERENCE:
1. SURVEY DATA OBTAINED FROM WARD CARPENTER ENGINEERS, INC, DATED MARCH 20, 2019.

NYS Education Law
Unauthorized alterations or additions to this plan are a violation of section 7209 (2) of the New York State Education Law. Copies of this map not having the seal of the engineer shall not be valid.

© SESI CONSULTING ENGINEERS D.P.C. 2021
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS D.P.C. and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS D.P.C.

SESI CONSULTING ENGINEERS D.P.C.
SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: yy
chk by: TK
scale: AS NOTED
date: 11/15/2021

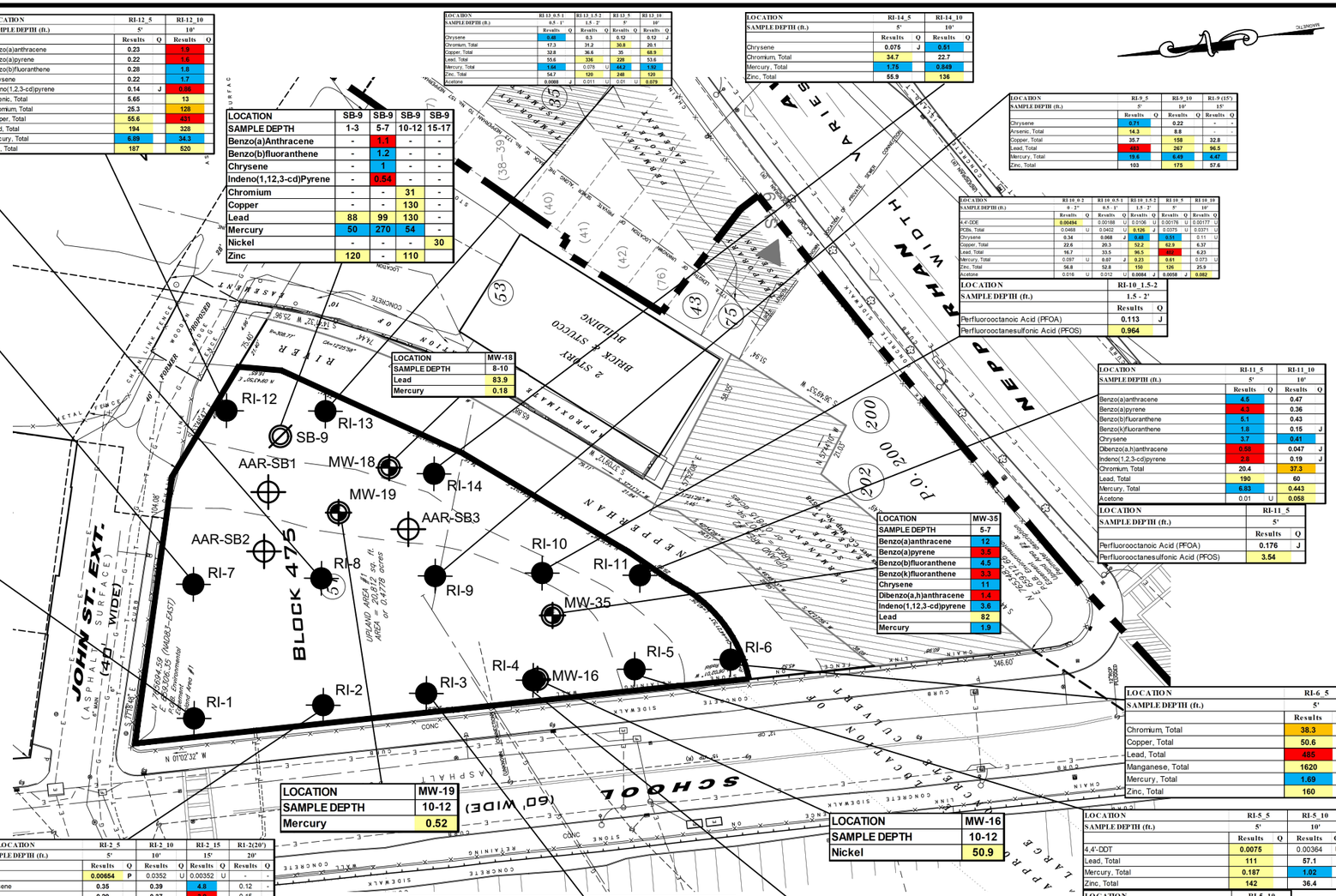
FORMER YONKERS FIREHOUSE SITE (BCP#C360191)
32 JOHN STREET
YONKERS, NY 10701

SITE PLAN

job no: 11740
drawing no:

FIG-2.1

N:\ACAD\11740\CAD\RIWP\11740 – FIG–2.1 SITE PLAN.DWG 11/15/21 10:16:05AM, yelena.zolotova, LAYOUT: FIG–2.1



LOCATION	RI-12_5	RI-12_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Benzo(a)anthracene	0.23	1.9
Benzo(a)pyrene	0.22	1.6
Benzo(b)fluoranthene	0.28	1.8
Chrysene	0.22	1.7
Indeno(1,2,3-cd)pyrene	0.14 J	0.86
Arsenic, Total	5.65	13
Chromium, Total	25.3	128
Copper, Total	55.6	451
Lead, Total	194	328
Mercury, Total	6.89	34.3
Zinc, Total	187	520

LOCATION	RI-13_0.5-1	RI-13_1.5-2	RI-13_5	RI-13_10
SAMPLE DEPTH (ft.)	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q
Chrysene	0.46	0.3	0.12	0.52 J
Chromium, Total	17.3	31.2	30.8	20.1
Copper, Total	32.8	36.6	35	68.9
Lead, Total	55.8	336	228	53.6
Mercury, Total	1.64	0.078 U	43.2	1.92
Zinc, Total	54.7	126	248	120
Acetone	0.0088 J	0.011 U	0.01 U	0.079

LOCATION	RI-14_5	RI-14_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Chrysene	0.075 J	0.51
Chromium, Total	34.7	22.7
Mercury, Total	1.75	0.849
Zinc, Total	55.9	136

LOCATION	RI-9_5	RI-9_10	RI-9 (15')
SAMPLE DEPTH (ft.)	5'	10'	15'
	Results Q	Results Q	Results Q
Chrysene	0.71	0.22	-
Arsenic, Total	14.3	8.8	-
Copper, Total	35.7	158	32.8
Lead, Total	483	267	96.5
Mercury, Total	15.6	6.45	4.47
Zinc, Total	103	175	57.6

LOCATION	RI-8_0-2	RI-8-0.5-1	RI-8-1.5-2	RI-8-5	RI-8-10
SAMPLE DEPTH (ft.)	0 -2"	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q	Results Q
Dieldrin	0.0762	0.0156	0.0101	0.00107 U	0.0012 U
4,4'-DDT	0.0026 J	0.008	0.00551	0.00223	0.00359 U
Benzo(a)anthracene	0.079 J	0.46	0.68	3.5	5.3
Benzo(a)pyrene	0.092 J	0.45	0.68	1	4.7
Benzo(b)fluoranthene	0.12 J	0.56	0.83	1.3	6.3
Benzo(k)fluoranthene	0.038 J	0.2	0.2	0.48	1.4
Chrysene	0.074 J	0.38	0.62	0.94	4.7
Dibenzo(a,h)anthracene	0.14 U	0.066 J	0.092 J	0.13	0.58
Indeno(1,2,3-cd)pyrene	0.078 J	0.32	0.39	0.61	2.5
Barium, Total	46.8	72.5	174	118	379
Chromium, Total	8.48	16.1	7.62	6.38	33.7
Copper, Total	14.7	25.9	13.6	8.5	180
Lead, Total	50.9	38.5	85	47.3	273
Mercury, Total	0.097 U	0.12	0.199	0.065 J	25.8
Zinc, Total	44.3	66.8	130	75.4	199
Acetone	0.36	0.012 U	0.012 U	0.016 U	0.0075 J

LOCATION	SB-9	SB-9	SB-9	SB-9
SAMPLE DEPTH	1-3	5-7	10-12	15-17
Benzo(a)Anthracene	-	1.1	-	-
Benzo(b)fluoranthene	-	1.2	-	-
Chrysene	-	1	-	-
Indeno(1,12,3-cd)Pyrene	-	0.54	-	-
Chromium	-	-	31	-
Copper	-	-	130	-
Lead	88	99	130	-
Mercury	50	270	54	-
Nickel	-	-	-	30
Zinc	120	-	110	

LOCATION	MW-18
SAMPLE DEPTH	8-10
Lead	83.9
Mercury	0.18

LOCATION	MW-35
SAMPLE DEPTH	5-7
Benzo(a)anthracene	12
Benzo(a)pyrene	3.5
Benzo(b)fluoranthene	4.5
Benzo(k)fluoranthene	3.3
Chrysene	11
Dibenzo(a,h)anthracene	1.4
Indeno(1,12,3-cd)pyrene	3.6
Lead	82
Mercury	1.9

LOCATION	MW-19
SAMPLE DEPTH	10-12
Mercury	0.52

LOCATION	MW-16
SAMPLE DEPTH	10-12
Nickel	50.9

LOCATION	RI-10_0-2	RI-10_0.5-1	RI-10_1.5-2	RI-10_5	RI-10_10
SAMPLE DEPTH (ft.)	0 -2"	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q	Results Q
4,4'-DDE	0.00494	0.00188 U	0.0106 U	0.00176 U	0.00177 U
PCBs, Total	0.0468 U	0.0402 U	0.126 J	0.0375 U	0.0371 U
Chrysene	0.34	0.068 J	0.46 J	0.51	0.11 U
Copper, Total	22.6	20.3	52.2	62.9	6.37
Lead, Total	16.7	33.5	96.5	400	6.23
Mercury, Total	0.097 U	0.07 J	0.23	0.61	0.073 U
Zinc, Total	56.8	52.8	150	126	25.9
Acetone	0.016 U	0.012 U	0.0084 J	0.0058 J	0.082

LOCATION	RI-10_1.5-2
SAMPLE DEPTH (ft.)	1.5 - 2'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.113 J
Perfluorooctanesulfonic Acid (PFOS)	0.964

LOCATION	RI-7-5	RI-7-10	RI-7 (16')
SAMPLE DEPTH (ft.)	5'	10'	16'
	Results Q	Results Q	Results Q
Benzo(b)fluoranthene	0.3	0.36	-
Chrysene	0.75	0.31	-
Lead, Total	81.2	51.6	-
Mercury, Total	0.079	1.2	3.28
Zinc, Total	134	35.6	-

LOCATION	RI-7-5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.13 J
Perfluorooctanesulfonic Acid (PFOS)	1.89

LOCATION	RI-11_5	RI-11_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Benzo(a)anthracene	4.5	0.47
Benzo(a)pyrene	4.3	0.36
Benzo(b)fluoranthene	5.1	0.43
Benzo(k)fluoranthene	1.8	0.15 J
Chrysene	3.7	0.41
Dibenzo(a,h)anthracene	0.58	0.047 J
Indeno(1,2,3-cd)pyrene	2.2	0.19 J
Chromium, Total	20.4	37.3
Lead, Total	190	60
Mercury, Total	6.83	0.443
Acetone	0.01 U	0.058

LOCATION	RI-11_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.176 J
Perfluorooctanesulfonic Acid (PFOS)	3.54

LOCATION	RI-1-0.2	RI-1-0.5-1	RI-1-1.5-2	RI-1-5	RI-1-10	RI-1-15	RI-1A(20')
SAMPLE DEPTH (ft.)	0 -2"	0.5 - 1'	1.5 - 2'	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
Dieldrin	0.00253	0.0102	0.0012 U	0.00123 U	0.00122 U	0.00106 U	0.00146 U
4,4'-DDE	0.00412	0.00336	0.00191 U	0.00188 J	0.00196 U	0.0017 U	0.00234 U
4,4'-DDT	0.0022 JP	0.0087	0.00358 U	0.00368 U	0.00367 U	0.00318 U	0.00438 U
PCBs, Total	0.118 U	0.0415 U	0.0566 J	0.0574 J	0.121 J	0.0351 U	0.0488 U
Naphthalene	0.22 U	0.038 J	0.045 J	1 U	0.11 J	0.033 J	1 U
Benzo(a)anthracene	0.27	0.74	0.57	2.8	0.23	0.23	0.15 U
Benzo(a)pyrene	0.28	0.71	0.4	1.9	0.25	0.22	0.2 U
Benzo(b)fluoranthene	0.42	0.97	0.58	2.8	0.34	0.28	0.15 U
Benzo(k)fluoranthene	0.1 J	0.28	0.22	0.92	0.12	0.092 J	0.15 U
Chrysene	0.26	0.7	0.54	2.4	0.22	0.21	0.047 J
Indeno(1,2,3-cd)pyrene	0.2	0.46	0.22	1	0.18	0.14	0.2 U
2-Methylphenol	0.22 U	0.21 U	0.2 U	1 U	0.2 U	0.18 U	0.2 J
Lead, Total	60.4	66.8	196	17.9	180	86	51.4
Mercury, Total	0.165	0.543	0.136	0.088	0.115	1.66	0.096 U
Zinc, Total	94.3	80.7	121	47.7	304	36.3	388
Benzene	0.00363 U	0.00353 U	0.001 U	0.00364 U	0.00393 U	0.00359 U	0.19
Ethylbenzene	0.0012 U	0.001 U	0.002 U	0.0017 U	0.0018 U	0.0012 U	2.7
Xylenes, Total	0.0012 U	0.001 U	0.002 U	0.0017 U	0.0018 U	0.0012 U	7.8
Acetone	0.012 U	0.01 U	0.0099 J	0.017 U	0.018 U	0.012 U	0.75 J
Naphthalene	0.005 U	0.0042 U	0.008 U	0.0067 U	0.0074 U	0.0011 J	36
1,2,4-Trimethylbenzene	0.0025 U	0.0021 U	0.004 U	0.0033 U	0.0037 U	0.0006 J	17

LOCATION	RI-1-1.5-2	RI-1-5	RI-1-10
SAMPLE DEPTH (ft.)	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.078 J	0.383	0.396
Perfluorooctanesulfonic Acid (PFOS)	1.19	2.68	2.76

LOCATION	RI-2_5	RI-2_10	RI-2_15	RI-2(20')
SAMPLE DEPTH (ft.)	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q
4,4'-DDT	0.00654 P	0.0352 U	0.00352 U	- -
Benzo(a)anthracene	0.35	0.39	4.8	0.12 -
Benzo(a)pyrene	0.29	0.37	3.9	0.15 -
Benzo(b)fluoranthene	0.4	0.5	5.1	0.12 U
Benzo(k)fluoranthene	0.12	0.19	1.1	0.12 U
Chrysene	0.3	0.41	3.9	0.12 U
Dibenzo(a,h)anthracene	0.039 J	0.05 J	0.56	0.12 U
Indeno(1,2,3-cd)pyrene	0.17	0.19	2.4	0.15 U
Phenol	0.2 U	0.2 U	0.044 J	- -
Copper, Total	15.9	22.7	63	- -
Lead, Total	137	93.7	262	20.7 -
Mercury, Total	0.142	0.108	0.875	11.2
Zinc, Total	122	222	86.7	- -

LOCATION	RI-2_5	RI-2_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.18 J	0.45
Perfluorooctanesulfonic Acid (PFOS)	1.9	2.28

LOCATION	RI-3_0.2	RI-3_0.5-1	RI-3_1.5-2	RI-3_5	RI-3_10	RI-3_15	RI-3A(20')
SAMPLE DEPTH (ft.)	0.2"	0.5 - 1'	1.5 - 2'	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
4,4'-DDE	0.00436	0.000985 J	0.00144 J	0.00126 J	0.0021 U	0.00182 U	0.00163 U
4,4'-DDT	0.00459 U	0.00078 P	0.00511 P	0.00387 P	0.00394 U	0.00341 U	0.00306 U
PCBs, Total	0.0499 U	0.0964	0.0759 J	0.12	0.0432 U	0.039 U	0.0355 U
Arsenic, Total	2.65	4.12	3.56	3.92	4.8	14.3	1.43
Chromium, Total	6.78	11.7	9.22	7.64	18.3	14.7	33.6
Copper, Total	11.3	17.3	25.9	19.8	22.1	19.5	50.8
Lead, Total	9.99	126	120	165	97.7	8.68	12.7
Mercury, Total	0.1 U	0.317	0.449	0.494	0.58	0.197	0.26
Zinc, Total	37.5	175	614	204	68.6	26.5	106

LOCATION	RI-3_1.5-2	RI-3_5	RI-3_10
SAMPLE DEPTH (ft.)	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.066 J	0.078 J	0.691
Perfluorooctanesulfonic Acid (PFOS)	1.46	5.14	1.87

LOCATION	RI-4_5	RI-4_10	RI-4_15
SAMPLE DEPTH (ft.)	5'	10'	15'
	Results Q	Results Q	Results Q
PCBs, Total	0.117	0.0383 U	0.0375 U
Benzo(a)anthracene	0.29	0.4	0.11 U
Benzo(a)pyrene	0.24	0.2	0.15 U
Benzo(b)fluoranthene	0.34	0.8	0.11 U
Chrysene	0.3	0.1	0.11 U
Indeno(1,2,3-cd)pyrene	0.17	0.4	0.15 U
Copper, Total	24	149	23.6
Lead, Total	116	115	84
Mercury, Total	0.65	5.66	1.15
Zinc, Total	207	140	39
Acetone	0.015 U	0.019	0.28

LOCATION	RI-4_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.2 J
Perfluorooctanesulfonic Acid (PFOS)	3.12

LOCATION	RI-5_5	RI-5_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
4,4'-DDT	0.0075	0.00364 U
Lead, Total	111	57.1
Mercury, Total	0.187	1.02
Zinc, Total	142	36.4

LOCATION	RI-5_10
SAMPLE DEPTH (ft.)	10
	Results Q
Perfluorooctanoic Acid (PFOA)	1.08
Perfluorooctanesulfonic Acid (PFOS)	0.216 J

LOCATION	RI-6_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Chromium, Total	38.3
Copper, Total	50.6
Lead, Total	485
Manganese, Total	1620
Mercury, Total	1.69
Zinc, Total	160

	USCO	RSCO	RRSCO	PGWSCO	Units
Dieldrin	0.005	0.039	0.2	0.1	mg/kg
4,4'-DDE	0.0033	1.8	8.9	4.4	mg/kg
4,4'-DDT	0.0033	1.7	7.9	2.5	mg/kg
PCBs, Total	0.1	1	1		mg/kg
Naphthalene	12	100	100	13	mg/kg
Benzo(a)anthracene	1	1	1	3	mg/kg
Benzo(a)pyrene	1	1	1	11	mg/kg
Benzo(b)fluoranthene	1	1	1	1.1	mg/kg
Benzo(k)fluoranthene	0.8	1	3.9	1.1	mg/kg
Chrysene	1	1	3.9	0.4	mg/kg
Dibenzo(a,h)anthracene	0.33	0.33	0.33	165000	mg/kg
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	3.2	mg/kg
Phenol	0.33	100	100	0.03	mg/kg
2-Methylphenol	0.33	100	100	0.1	mg/kg
Arsenic, Total	13	16	16	16	mg/kg
Barium, Total	350	350	400	820	mg/kg
Chromium, Total	30	36	180		mg/kg
Copper, Total	50	270	270	1720	mg/kg
Lead, Total	63	400	400	450	mg/kg
Manganese, Total	1600	2000	2000	2000	mg/kg
Mercury, Total	0.18	0.81	0.81	0.73	mg/kg
Zinc, Total	109	2200	10000	2480	mg/kg
Benzene	0.06	2.9	4.8	0.06	mg/kg
Ethylbenzene	1	30	41	5.5	mg/kg
Xylenes, Total	0.26	100	100	1.2	mg/kg
Acetone	0.05	100	100	0.11	mg/kg
Naphthalene	12	100	100	13	mg/kg
1,2,4-Trimethylbenzene	3.6	47	52	13	mg/kg

1 USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
2 RSCO: New York NYCRR Part 375 Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
3 RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
4 PGWSCO: New York TAGM Soil Cleanup Objective Protection of Groundwater, effective January 2007

LEGEND:

- BCP SITE BOUNDARY
- RI-1 - SOIL BORING COMPLETED MARCH 2021
- SB-9 - SOIL BORING COMPLETED NOVEMBER 2007
- MW-35 GWE 53.71 - SOIL BORING COMPLETED AUGUST 2007
- AAR-SB1 - PROPOSED PDI SOIL SAMPLE LOCATION

SCALE: 1"=50'
0 50 100

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS.

REFERENCE:
1. SURVEY DATA OBTAINED FROM WARD CARPENTER ENGINEERS, INC, DATED MARCH 20, 2019.

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050
Cert of Auth #24GA27934700

dwg by: APG
chk by: TK
scale: AS NOTED
date: 03/08/2024

project: FORMER YONKERS FIREHOUSE SITE (BCP#C360191)
32 JOHN STREET
YONKERS, NY 10701

title: PDI SOIL SAMPLE LOCATION PLAN

job no: 11740
drawing no:

FIG-7.1

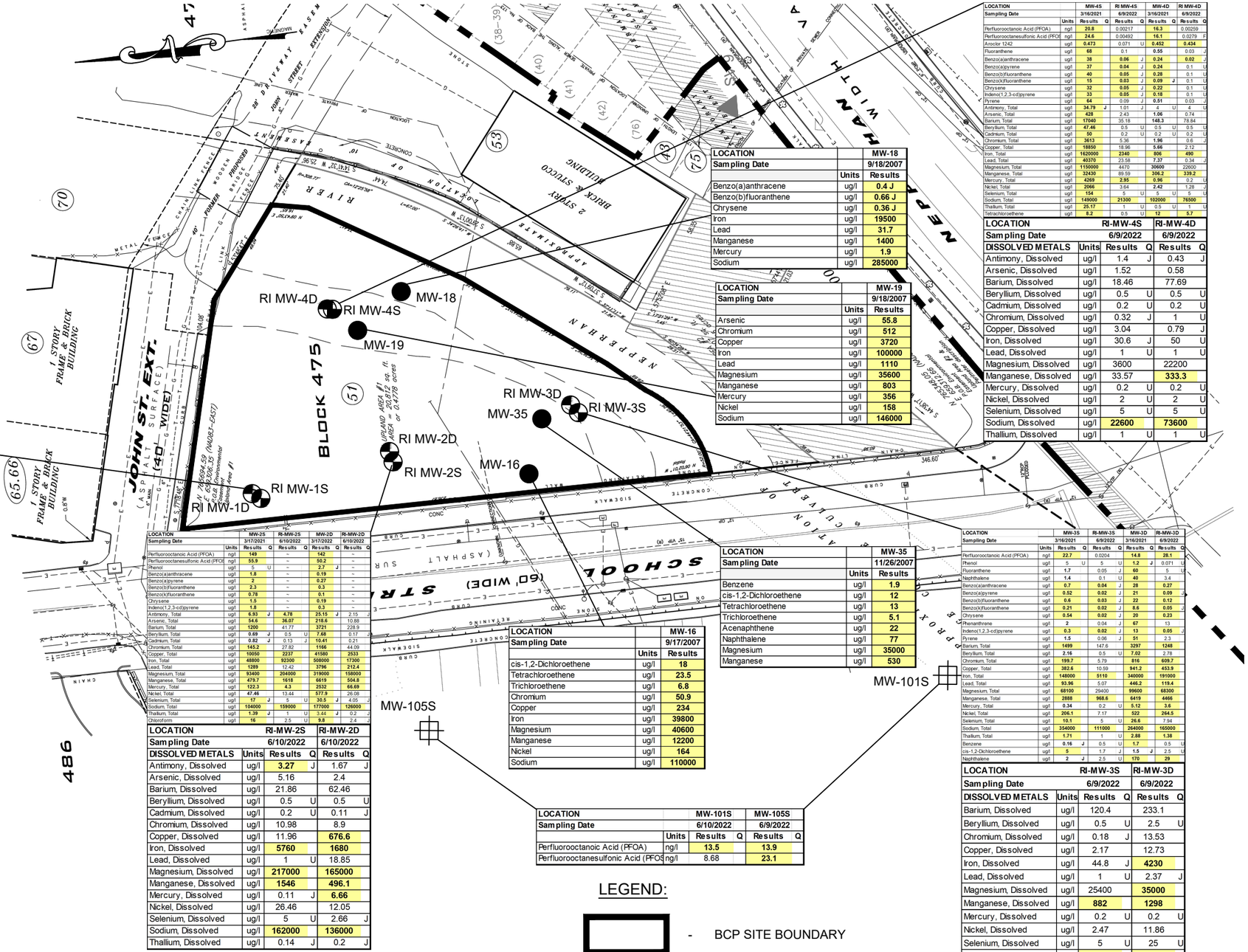
N:\ACAD\11740\CAD\RIWP\11740.DWG_PDI SOIL SAMPLE LOCATION.DWG 08/13/24 11:31:53AM, alan.ward, LAYOUT:FIG-7.1

LOCATION		MW-1S		RI-MW-1S		MW-1D		RI-MW-1D	
Sampling Date		3/17/2021		6/10/2022		3/17/2021		6/10/2022	
	Units	Results	Q	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	ng/l	50.9		~		50.6		37.3	
Perfluorooctanesulfonic Acid (PFOS)	ng/l	133		~		87.6		43.7	
Benzo(a)anthracene	ug/l	2.5		~		0.64		0.03	J
Benzo(a)pyrene	ug/l	1.8		~		0.34		0.1	U
Benzo(b)fluoranthene	ug/l	2		~		0.32		0.1	U
Benzo(k)fluoranthene	ug/l	0.6		~		0.12		0.1	U
Chrysene	ug/l	2.7		~		0.66		0.03	J
Indeno(1,2,3-cd)pyrene	ug/l	1.2		~		0.21		0.1	U
Antimony, Total	ug/l	4.68		81.06	J	1.66	J	4	U
Arsenic, Total	ug/l	27.98		260.9		3.26		0.47	J
Barium, Total	ug/l	2076		25740		147.5		59.49	
Beryllium, Total	ug/l	6.32		77.86		0.26	J	0.5	U
Cadmium, Total	ug/l	2.2		24.76		0.16	J	0.2	U
Chromium, Total	ug/l	289.6		5209		20.59		2.5	
Copper, Total	ug/l	453.8		6773		23.2		4.09	
Iron, Total	ug/l	107000		2600000		8110		1060	
Lead, Total	ug/l	1205		13870		22.14		1.82	
Magnesium, Total	ug/l	42000		833000		8250		5440	
Manganese, Total	ug/l	2257		36470		233.1		85.71	
Mercury, Total	ug/l	34.86		185.3		0.45		0.2	U
Nickel, Total	ug/l	137.7		3213		13.55		1.89	J
Selenium, Total	ug/l	34.2		231	J	2.01	J	5	U
Sodium, Total	ug/l	22100		190000		39200		37800	
Thallium, Total	ug/l	1.23		23.93	J	0.28	J	0.14	J
Chloroform	ug/l	27		10		1.9	J	2.5	U
n-Butylbenzene	ug/l	5.4		2.5	U	3.4		0.7	J
sec-Butylbenzene	ug/l	6.7		2.5	U	4.2		1.5	J
1,2,4,5-Tetramethylbenzene	ug/l	33		2.6		19		8.7	

LOCATION		RI-MW-1S		RI-MW-1D	
Sampling Date		6/10/2022		6/10/2022	
DISSOLVED METALS	Units	Results	Q	Results	Q
Antimony, Dissolved	ug/l	1.77	J	4	U
Arsenic, Dissolved	ug/l	1.16		0.46	J
Barium, Dissolved	ug/l	106.4		48.84	
Beryllium, Dissolved	ug/l	0.5	U	0.5	U
Cadmium, Dissolved	ug/l	0.2	U	0.2	U
Chromium, Dissolved	ug/l	0.98	J	1	U
Copper, Dissolved	ug/l	2.06		1	U
Iron, Dissolved	ug/l	246		21.8	J
Lead, Dissolved	ug/l	1.12		1	U
Magnesium, Dissolved	ug/l	24600		5090	
Manganese, Dissolved	ug/l	272.4		68.88	
Mercury, Dissolved	ug/l	0.2	U	0.2	U
Nickel, Dissolved	ug/l	1.84	J	2	U
Selenium, Dissolved	ug/l	5	U	5	U
Sodium, Dissolved	ug/l	167000		37900	
Thallium, Dissolved	ug/l	1	U	1	U

	NY-AWQS	Units
Perfluorooctanoic Acid (PFOA)	10	ng/l
Perfluorooctanesulfonic Acid (PFOS)	10	ng/l
Aroclor 1242	0.09	ug/l
Phenol	1	ug/l
Fluoranthene	50	ug/l
Naphthalene	10	ug/l
Benzo(a)anthracene	0.002	ug/l
Benzo(a)pyrene	0	ug/l
Benzo(b)fluoranthene	0.002	ug/l
Benzo(k)fluoranthene	0.002	ug/l
Chrysene	0.002	ug/l
Phenanthrene	50	ug/l
Indeno(1,2,3-cd)pyrene	0.002	ug/l
Pyrene	50	ug/l
Antimony, Total	3	ug/l
Arsenic, Total	25	ug/l
Barium, Total	1000	ug/l
Beryllium, Total	3	ug/l
Cadmium, Total	5	ug/l
Chromium, Total	50	ug/l
Copper, Total	200	ug/l
Iron, Total	300	ug/l
Lead, Total	25	ug/l
Magnesium, Total	35000	ug/l
Manganese, Total	300	ug/l
Mercury, Total	0.7	ug/l
Nickel, Total	100	ug/l
Selenium, Total	10	ug/l
Sodium, Total	20000	ug/l
Thallium, Total	0.5	ug/l
Chloroform	7	ug/l
Tetrachloroethene	5	ug/l
Benzene	1	ug/l
cis-1,2-Dichloroethene	5	ug/l
n-Butylbenzene	5	ug/l
sec-Butylbenzene	5	ug/l
Naphthalene	10	ug/l
1,2,4,5-Tetramethylbenzene	5	ug/l

Exceeds NY-AWQS: New York TOGS 111 Ambient Water Quality Standards criteria reflects all addendum to criteria through June 2004.



LOCATION		MW-18
Sampling Date		9/18/2007
	Units	Results
Benzo(a)anthracene	ug/l	0.4 J
Benzo(b)fluoranthene	ug/l	0.66 J
Chrysene	ug/l	0.36 J
Iron	ug/l	19500
Lead	ug/l	31.7
Manganese	ug/l	1400
Mercury	ug/l	1.9
Sodium	ug/l	285000

LOCATION		MW-19
Sampling Date		9/18/2007
	Units	Results
Arsenic	ug/l	55.8
Chromium	ug/l	512
Copper	ug/l	3720
Iron	ug/l	100000
Lead	ug/l	1110
Magnesium	ug/l	35600
Manganese	ug/l	803
Mercury	ug/l	356
Nickel	ug/l	158
Sodium	ug/l	146000

LOCATION		MW-4S		RI MW-4S		MW-4D		RI MW-4D	
Sampling Date		3/16/2021		6/9/2022		3/16/2021		6/9/2022	
	Units	Results	Q	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	ng/l	20.8		0.00217		16.3		0.00259	
Perfluorooctanesulfonic Acid (PFOS)	ng/l	24.6		0.00492		16.1		0.0279	
Aroclor 1242	ug/l	0.473		0.071	U	0.452		0.434	
Fluoranthene	ug/l	68		0.1		0.55		0.03	J
Benzo(a)anthracene	ug/l	38		0.06	J	0.24		0.02	J
Benzo(a)pyrene	ug/l	37		0.04	J	0.24		0.1	U
Benzo(b)fluoranthene	ug/l	40		0.05	J	0.28		0.1	U
Benzo(k)fluoranthene	ug/l	15		0.03	J	0.09	J	0.1	U
Chrysene	ug/l	32		0.05	J	0.22		0.03	J
Indeno(1,2,3-cd)pyrene	ug/l	33		0.05	J	0.18		0.1	U
Pyrene	ug/l	64		0.09	J	0.51		0.03	J
Antimony, Total	ug/l	34.79	J	1.01	J	4	U	4	U
Arsenic, Total	ug/l	428		2.43		1.06		0.74	
Barium, Total	ug/l	17040		35.18		140.3		78.64	
Beryllium, Total	ug/l	47.46		0.5	U	0.5	U	0.5	U
Cadmium, Total	ug/l	50		0.2	U	0.2	U	0.2	U
Chromium, Total	ug/l	3613		5.36		1.96		0.6	J
Copper, Total	ug/l	18850		18.96		5.66		2.12	
Iron, Total	ug/l	1620000		2340		806		490	
Lead, Total	ug/l	40370		23.58		7.37		0.34	J
Magnesium, Total	ug/l	1150000		4470		30600		22600	
Manganese, Total	ug/l	32430		89.59		306.2		339.2	
Mercury, Total	ug/l	4269		2.95		0.96		0.2	U
Nickel, Total	ug/l	2066		3.64		2.42		1.28	J
Selenium, Total	ug/l	154		5	U	5	U	5	U
Sodium, Total	ug/l	149000		21300		102000		76500	
Thallium, Total	ug/l	25.17		1	U	0.5	U	1	U
Tetrachloroethene	ug/l	8.2		0.5	U	12		5.7	

LOCATION		RI-MW-4S		RI-MW-4D	
Sampling Date		6/9/2022		6/9/2022	
DISSOLVED METALS	Units	Results	Q	Results	Q
Antimony, Dissolved	ug/l	1.4	J	0.43	J
Arsenic, Dissolved	ug/l	1.52		0.58	
Barium, Dissolved	ug/l	18.46		77.69	
Beryllium, Dissolved	ug/l	0.5	U	0.5	U
Cadmium, Dissolved	ug/l	0.2	U	0.2	U
Chromium, Dissolved	ug/l	0.32	J	1	U
Copper, Dissolved	ug/l	3.04		0.79	J
Iron, Dissolved	ug/l	30.6	J	50	U
Lead, Dissolved	ug/l	1	U	1	U
Magnesium, Dissolved	ug/l	3600		22200	
Manganese, Dissolved	ug/l	33.57		333.3	
Mercury, Dissolved	ug/l	0.2	U	0.2	U
Nickel, Dissolved	ug/l	2	U	2	U
Selenium, Dissolved	ug/l	5	U	5	U
Sodium, Dissolved	ug/l	22600		73600	
Thallium, Dissolved	ug/l	1	U	1	U

LOCATION		MW-25		RI-MW-2S		MW-2D		RI-MW-2D	
Sampling Date		3/17/2021		6/10/2022		3/17/2022		6/10/2022	
	Units	Results	Q	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	ng/l	149		~		142		~	
Perfluorooctanesulfonic Acid (PFOS)	ng/l	55.9		~		50.2		~	
Phenol	ug/l	5	U	~		2.7	J	~	
Benzo(a)anthracene	ug/l	1.8		~		0.19		~	
Benzo(a)pyrene	ug/l	2		~		0.27		~	
Benzo(b)fluoranthene	ug/l	2.3		~		0.3		~	
Benzo(k)fluoranthene	ug/l	0.78		~		0.1		~	
Chrysene	ug/l	1.5		~		0.19		~	
Indeno(1,2,3-cd)pyrene	ug/l	1.8		~		0.3		~	
Antimony, Total	ug/l	6.93	J	4.78		25.15	J	2.15	
Arsenic, Total	ug/l	54.6		36.07		218.6		10.88	
Barium, Total	ug/l	1200		41.77		3721		228.9	
Beryllium, Total	ug/l	0.69	J	0.5	U	7.68		0.17	
Cadmium, Total	ug/l	0.82	J	0.13	J	10.41		0.21	
Chromium, Total	ug/l	145.2		27.82		1166		44.09	
Copper, Total	ug/l	10050		2237		41560		2533	
Iron, Total	ug/l	48800		92300		508000		17300	
Lead, Total	ug/l	1289		12.42		3796		212.4	
Magnesium, Total	ug/l	83400		204000		319000		158000	
Manganese, Total	ug/l	479.7		1618		6619		504.8	
Mercury, Total	ug/l	122.3		4.3		2532		66.69	
Nickel, Total	ug/l	47.46		13.44		577.8		26.66	
Selenium, Total	ug/l	17	J	5	U	30.5	J	4.05	J
Sodium, Total	ug/l	104000		159000		177000		126000	
Thallium, Total	ug/l	1.39	J	1	U	3.44	J	0.2	J
Chloroform	ug/l	16		2.5	U	9.8		2.4	

LOCATION		RI-MW-2S		RI-MW-2D	
Sampling Date		6/10/2022		6/10/2022	
DISSOLVED METALS	Units	Results	Q	Results	Q
Antimony, Dissolved	ug/l	3.27	J	1.67	J
Arsenic, Dissolved	ug/l	5.16		2.4	
Barium, Dissolved	ug/l	21.86		62.46	
Beryllium, Dissolved	ug/l	0.5	U	0.5	U
Cadmium, Dissolved	ug/l	0.2	U	0.11	J
Chromium, Dissolved	ug/l	10.98		8.9	
Copper, Dissolved	ug/l	11.96		676.6	
Iron, Dissolved	ug/l	5760		1680	
Lead, Dissolved	ug/l	1	U	18.85	
Magnesium, Dissolved	ug/l	217000		165000	
Manganese, Dissolved	ug/l	1546		496.1	
Mercury, Dissolved	ug/l	0.11	J	6.66	
Nickel, Dissolved	ug/l	26.46		12.05	
Selenium, Dissolved	ug/l	5	U	2.66	J
Sodium, Dissolved	ug/l	162000		136000	
Thallium, Dissolved	ug/l	0.14	J	0.2	J

LOCATION		MW-16
Sampling Date		9/17/2007
	Units	Results
cis-1,2-Dichloroethene	ug/l	18
Tetrachloroethene	ug/l	23.5
Trichloroethene	ug/l	6.8
Chromium	ug/l	50.9
Copper	ug/l	234
Iron	ug/l	39800
Magnesium	ug/l	40600
Manganese	ug/l	12200
Nickel	ug/l	164
Sodium	ug/l	110000

LOCATION		MW-35
Sampling Date		11/26/2007
	Units	Results
Benzene	ug/l	1.9
cis-1,2-Dichloroethene	ug/l	12
Tetrachloroethene	ug/l	13
Trichloroethene	ug/l	5.1
Acenaphthene	ug/l	22
Naphthalene	ug/l	77
Magnesium	ug/l	35000
Manganese	ug/l	530

LOCATION		MW-3S		RI-MW-3S		MW-3D		RI-MW-3D	
Sampling Date		3/16/2021		6/9/2022		3/16/2021		6/9/2022	
	Units	Results	Q	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	ng/l	22.7		0.0204		14.8		28.1	
Phenol	ug/l	5	U	5	U	1.2	J	0.071	U
Fluoranthene	ug/l	1.4		0.1	U	40		3.4	
Benzo(a)anthracene	ug/l	0.7		0.04	J	28		0.27	
Benzo(a)pyrene	ug/l	0.52		0.02	J	21		0.09	J
Benzo(b)fluoranthene	ug/l	0.6		0.03	J	22		0.12	
Benzo(k)fluoranthene	ug/l	0.21		0.02	J	8.6		0.05	J
Chrysene	ug/l	0.54		0.02	J	20		0.23	
Phenanthrene	ug/l	2		0.04	J	67		13	
Indeno(1,2,3-cd)pyrene	ug/l	0.3		0.02	J	13		0.05	J
Pyrene	ug/l	1.5		0.06	J	51		2.3	
Barium, Total	ug/l	1499		147.6		3297		1248	
Beryllium, Total	ug/l	2.16		0.5	U	7.02		2.78	
Chromium, Total	ug/l	199.7		5.79		816		609.7	
Copper, Total	ug/l	382.6		10.59		941.2		453.9	
Iron, Total	ug/l	148000		5110		340000		191000	
Lead, Total	ug/l	93.96		5.07		446.2		119.4	
Magnesium, Total	ug/l	68100		29400		99600		68300	
Manganese, Total	ug/l	2888		968.6		6419		4466	
Mercury, Total	ug/l	0.34		0.2	U	5.12		3.6	
Nickel, Total	ug/l	206.1		7.17		522		264.5	
Selenium, Total	ug/l	10.1		5	U	26.6		7.94	
Sodium, Total	ug/l	354000		111000		264000		165000	
Thallium, Total	ug/l	1.71		1	U	2.88		1.38	
Benzene	ug/l	0.16	J	0.5	U	1.7		0.5	U
cis-1,2-Dichloroethene	ug/l	5		1.7	J	1.5	J	2.5	U
Naphthalene	ug/l	2	J	2.5	U	170		29	

LOCATION		RI-MW-3S		RI-MW-3D	
Sampling Date		6/9/2022		6/9/2022	
DISSOLVED METALS	Units	Results	Q	Results	Q
Barium, Dissolved	ug/l	120.4		233.1	
Beryllium, Dissolved	ug/l	0.5	U	2.5	U
Chromium, Dissolved	ug/l	0.18	J	13.53	
Copper, Dissolved	ug/l	2.17		12.73	
Iron, Dissolved	ug/l	44.8	J	4230	
Lead, Dissolved	ug/l	1	U	2.37	J
Magnesium, Dissolved	ug/l	25400		35000	
Manganese, Dissolved	ug/l	882		1298	
Mercury, Dissolved	ug/l	0.2	U	0.2	U
Nickel, Dissolved	ug/l	2.47		11.86	
Selenium, Dissolved	ug/l	5	U	25	U
Sodium, Dissolved	ug/l	101000		182000	
Thallium, Dissolved	ug/l	0.34	J	5	U

LOCATION		MW-101S		MW-105S	
Sampling Date		6/10/2022		6/9/2022	
	Units	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	ng/l	13.5		13.9	
Perfluorooctanesulfonic Acid (PFOS	ng/l	8.68		23.1	

LEGEND:

- BCP SITE BOUNDARY
- RI MW-1S/MW-1D — PROPOSED PDI GROUNDWATER SAMPLE LOCATIONS
- MW-16 — HISTORICAL MONITORING WELL CLUSTER LOCATIONS (SAMPLED SEPTEMBER 2007)
- MW-105S — PROPOSED PDI GROUNDWATER SAMPLE LOCATION

SCALE: 1"=50'
0 50 100

NOTE:
CLUSTER LOCATIONS WILL CONSIST OF ONE SHALLOW AND ONE DEEP MONITORING WELL.

REFERENCE:
1. SURVEY DATA OBTAINED FROM WARD CARPENTER ENGINEERS, INC, DATED MARCH 20, 2019.

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS.

N:\ACAD\11740\CAD\RIWP\11740.DWG_PROPOSED PDI GW SAMPLE LOCATION.DWG 08/13/24 11:39:25AM, alan.ward, LAYOUT:FIG-7.1B

Cert of Auth #24GA27934700
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

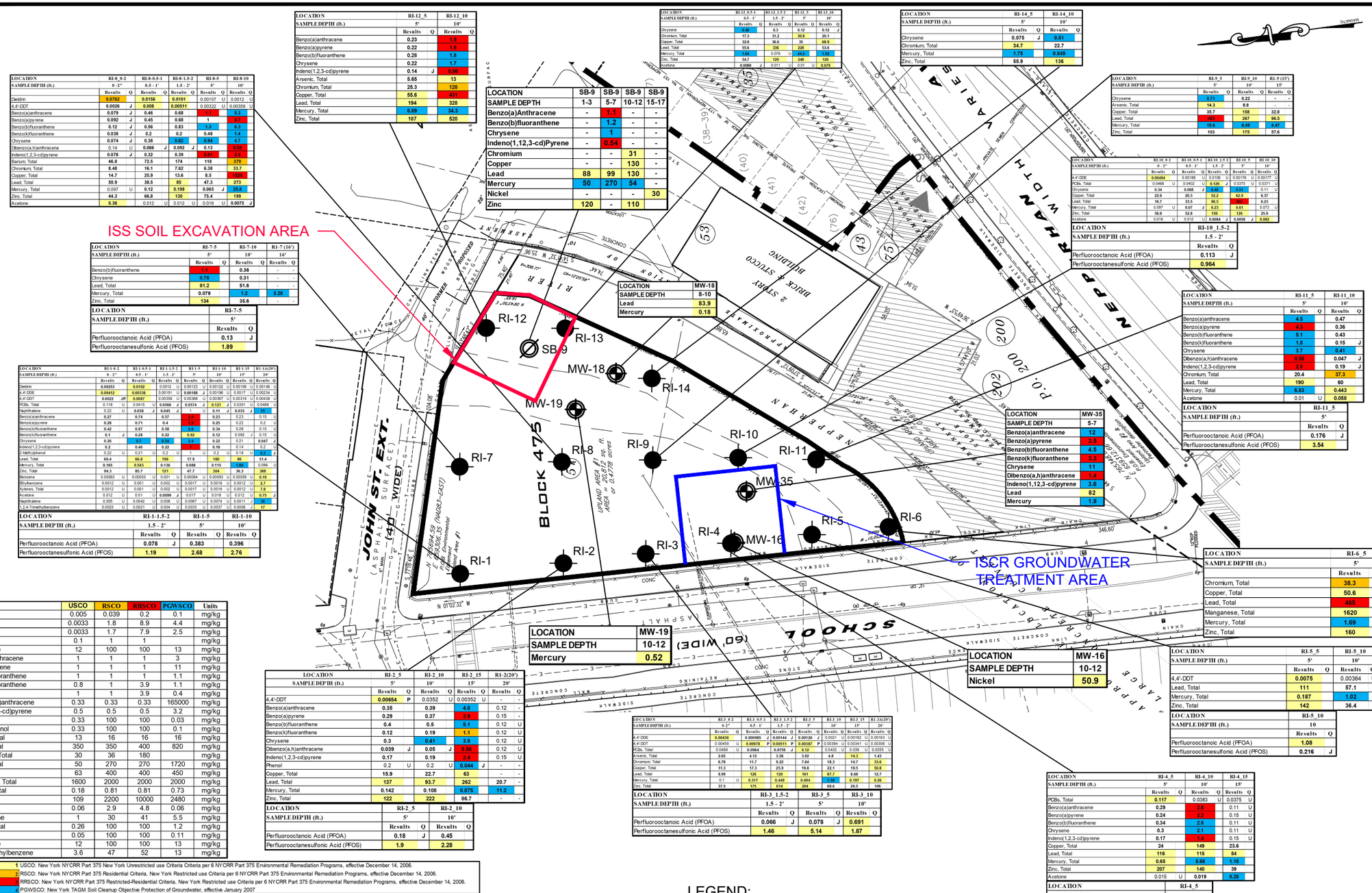
dwg by: APG
chk by: TK
scale: AS NOTED
date: 03/08/2024

project: FORMER YONKERS FIREHOUSE SITE (BCP#C360191)
32 JOHN STREET
YONKERS, NY 10701

title: PDI GROUNDWATER SAMPLE LOCATION PLAN

job no: 11740
drawing no:

FIG-7.2



LOCATION	RI-12_5		RI-12_10	
SAMPLE DEPTH (ft.)	5'		10'	
	Results	Q	Results	Q
Benzo(a)anthracene	0.23		1.9	
Benzo(a)pyrene	0.22		1.6	
Benzo(b)fluoranthene	0.28		1.8	
Chrysene	0.22		1.7	
Indeno(1,2,3-cd)pyrene	0.14	J	0.86	
Arsenic, Total	5.65		13	
Chromium, Total	25.3		128	
Copper, Total	55.6		451	
Lead, Total	194		328	
Mercury, Total	6.89		34.3	
Zinc, Total	187		520	

LOCATION	RI-13_0.5-1		RI-13_1.5-2		RI-13_5		RI-13_10	
SAMPLE DEPTH (ft.)	0.5 - 1'		1.5 - 2'		5'		10'	
	Results	Q	Results	Q	Results	Q	Results	Q
Chrysene	0.46		0.3		0.12		0.52	J
Chromium, Total	17.3		31.2		30.8		20.1	
Copper, Total	32.8		36.6		35		68.9	
Lead, Total	55.8		336		228		53.6	
Mercury, Total	1.64		0.078	U	43.2		1.92	
Zinc, Total	54.7		126		248		120	
Acetone	0.0088	J	0.011	U	0.01	U	0.079	

LOCATION	RI-14_5		RI-14_10	
SAMPLE DEPTH (ft.)	5'		10'	
	Results	Q	Results	Q
Chrysene	0.075	J	0.51	
Chromium, Total	34.7		22.7	
Mercury, Total	1.75		0.849	
Zinc, Total	55.9		136	

LOCATION	RI-9_5		RI-9_10		RI-9 (15')	
SAMPLE DEPTH (ft.)	5'		10'		15'	
	Results	Q	Results	Q	Results	Q
Chrysene	0.71		0.22		-	-
Arsenic, Total	14.3		8.8		-	-
Copper, Total	35.7		158		32.8	
Lead, Total	483		267		96.5	
Mercury, Total	19.6		6.49		4.47	
Zinc, Total	103		175		57.6	

LOCATION	SB-9	SB-9	SB-9	SB-9
SAMPLE DEPTH	1-3	5-7	10-12	15-17
Benzo(a)Anthracene	-	1.1	-	-
Benzo(b)fluoranthene	-	1.2	-	-
Chrysene	-	1	-	-
Indeno(1,12,3-cd)Pyrene	-	0.54	-	-
Chromium	-	-	31	-
Copper	-	-	130	-
Lead	88	99	130	-
Mercury	50	270	54	-
Nickel	-	-	-	30
Zinc	120	-	110	

LOCATION	MW-18
SAMPLE DEPTH	8-10
Lead	83.9
Mercury	0.18

LOCATION	MW-35
SAMPLE DEPTH	5-7
Benzo(a)anthracene	12
Benzo(a)pyrene	3.5
Benzo(b)fluoranthene	4.5
Benzo(k)fluoranthene	3.3
Chrysene	11
Dibenzo(a,h)anthracene	1.4
Indeno(1,12,3-cd)pyrene	3.6
Lead	82
Mercury	1.9

LOCATION	MW-19
SAMPLE DEPTH	10-12
Mercury	0.52

LOCATION	MW-16
SAMPLE DEPTH	10-12
Nickel	50.9

LOCATION	RI-8_0-2		RI-8-0.5-1		RI-8-1.5-2		RI-8-5		RI-8-10	
SAMPLE DEPTH (ft.)	0 -2"		0.5 - 1'		1.5 - 2'		5'		10'	
	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Dieldrin	0.0762		0.0156		0.0101		0.00107	U	0.0012	U
4,4'-DDT	0.0026	J	0.008		0.00551		0.00223	U	0.00359	U
Benzo(a)anthracene	0.079	J	0.46		0.68		3.5		5.3	
Benzo(a)pyrene	0.092	J	0.45		0.68		1		4.7	
Benzo(b)fluoranthene	0.12	J	0.56		0.83		1.3		6.3	
Benzo(k)fluoranthene	0.038	J	0.2		0.2		0.48		1.4	
Chrysene	0.074	J	0.38		0.62		0.94		4.7	
Dibenzo(a,h)anthracene	0.14	U	0.066	J	0.092	J	0.13		0.58	
Indeno(1,2,3-cd)pyrene	0.078	J	0.32		0.39		0.61		3.5	
Barium, Total	46.8		72.5		174		118		379	
Chromium, Total	8.48		16.1		7.62		6.38		33.7	
Copper, Total	14.7		25.9		13.6		8.5		180	
Lead, Total	50.9		38.5		85		47.3		273	
Mercury, Total	0.097	U	0.12		0.199		0.065	J	25.8	
Zinc, Total	44.3		66.8		130		75.4		199	
Acetone	0.36		0.012	U	0.012	U	0.016	U	0.0075	J

LOCATION	RI-7-5		RI-7-10		RI-7 (16')	
SAMPLE DEPTH (ft.)	5'		10'		16'	
	Results	Q	Results	Q	Results	Q
Benzo(b)fluoranthene	0.3		0.36		-	-
Chrysene	0.75		0.31		-	-
Lead, Total	81.2		51.6		-	-
Mercury, Total	0.079		1.2		3.28	
Zinc, Total	134		35.6		-	-

LOCATION	RI-7-5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.13 J
Perfluorooctanesulfonic Acid (PFOS)	1.89

LOCATION	RI-10_0-2		RI-10_0.5-1		RI-10_1.5-2		RI-10_5		RI-10_10	
SAMPLE DEPTH (ft.)	0 -2"		0.5 - 1'		1.5 - 2'		5'		10'	
	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
4,4'-DDE	0.00494		0.00188	U	0.0106	U	0.00176	U	0.00177	U
PCBs, Total	0.0468	U	0.0402	U	0.126	J	0.0375	U	0.0371	U
Chrysene	0.34		0.068	J	0.46		0.51		0.11	U
Copper, Total	22.6		20.3		52.2		62.9		6.37	
Lead, Total	16.7		33.5		96.5		400		6.23	
Mercury, Total	0.097	U	0.07	J	0.23		0.61		0.073	U
Zinc, Total	56.8		52.8		150		126		25.9	
Acetone	0.016	U	0.012	U	0.0084	J	0.0058	J	0.062	

LOCATION	RI-10_1.5-2
SAMPLE DEPTH (ft.)	1.5 - 2'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.113 J
Perfluorooctanesulfonic Acid (PFOS)	0.964

LOCATION	RI-11_5		RI-11_10	
SAMPLE DEPTH (ft.)	5'		10'	
	Results	Q	Results	Q
Benzo(a)anthracene	4.5		0.47	
Benzo(a)pyrene	4.3		0.36	
Benzo(b)fluoranthene	5.1		0.43	
Benzo(k)fluoranthene	1.8		0.15	J
Chrysene	3.7		0.41	
Dibenzo(a,h)anthracene	0.58		0.047	J
Indeno(1,2,3-cd)pyrene	2.2		0.19	J
Chromium, Total	20.4		37.3	
Lead, Total	190		60	
Mercury, Total	6.83		0.443	
Acetone	0.01	U	0.058	

LOCATION	RI-11_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.176 J
Perfluorooctanesulfonic Acid (PFOS)	3.54

LOCATION	RI-1-0.2		RI-1-0.5-1		RI-1-1.5-2		RI-1-5		RI-1-10		RI-1-15		RI-1-15(20')	
SAMPLE DEPTH (ft.)	0 -2"		0.5 - 1'		1.5 - 2'		5'		10'		15'		20'	
	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Dieldrin	0.00253		0.0102		0.0012	U	0.00123	U	0.00122	U	0.00108	U	0.00146	U
4,4'-DDE	0.00412		0.00336		0.00191	U	0.00188	J	0.00196	U	0.0017	U	0.00234	U
4,4'-DDT	0.0022	JP	0.0087		0.00358	U	0.00368	U	0.00367	U	0.00318	U	0.00438	U
PCBs, Total	0.118	U	0.0415	U	0.0566	J	0.0574	J	0.121	J	0.0351	U	0.0488	U
Naphthalene	0.22	U	0.038	J	0.045	J	1	U	0.11	J	0.033	J	10	
Benzo(a)anthracene	0.27		0.74		0.57		2.6		0.23		0.23		0.15	U
Benzo(a)pyrene	0.28		0.71		0.4		1.9		0.25		0.22		0.2	U
Benzo(b)fluoranthene	0.42		0.97		0.58		2.6		0.34		0.28		0.15	U
Benzo(k)fluoranthene	0.1	J	0.28		0.22		0.92		0.12		0.092	J	0.15	U
Chrysene	0.26		0.7		0.54		2.4		0.22		0.21		0.047	J
Indeno(1,2,3-cd)pyrene	0.2		0.46		0.22		1		0.18		0.14		0.2	U
2-Methylphenol	0.22	U	0.21	U	0.2	U	1	U	0.2	U	0.18	U	0.2	U
Lead, Total	60.4		66.8		196		17.9		180		86		51.4	
Mercury, Total	0.165		0.543		0.136		0.088		0.115		1.66		0.096	U
Zinc, Total	94.3		80.7		121		47.7		304		36.3		388	
Benzene	0.00363	U	0.00553	U	0.001	U	0.00094	U	0.00093	U	0.00089	U	6.19	
Ethylbenzene	0.0012	U	0.001	U	0.002	U	0.0017	U	0.0018	U	0.0012	U	2.7	
Xylenes, Total	0.0012	U	0.001	U	0.002	U	0.0017	U	0.0018	U	0.0012	U	7.8	
Acetone	0.012	U	0.01	U	0.0099	J	0.017	U	0.018	U	0.012	U	0.75	J
Naphthalene	0.005	U	0.0042	U	0.008	U	0.0067	U	0.0074	U	0.0011	J	36	
1,2,4-Trimethylbenzene	0.0025	U	0.0021	U	0.004	U	0.0033	U	0.0037	U	0.0006	J	17	

LOCATION	RI-1-1.5-2		RI-1-5		RI-1-10	
SAMPLE DEPTH (ft.)	1.5 - 2'		5'		10'	
	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	0.078	J	0.383		0.396	
Perfluorooctanesulfonic Acid (PFOS)	1.19		2.68		2.76	

LOCATION	RI-2_5		RI-2_10		RI-2_15		RI-2(20')	
SAMPLE DEPTH (ft.)	5'		10'		15'		20'	
	Results	Q	Results	Q	Results	Q	Results	Q
4,4'-DDT	0.00654	P	0.0352	U	0.00352	U	-	-
Benzo(a)anthracene	0.35		0.39		4.8		0.12	-
Benzo(a)pyrene	0.29		0.37		3.9		0.15	-
Benzo(b)fluoranthene	0.4		0.5		5.1		0.12	U
Benzo(k)fluoranthene	0.12		0.19		1.1		0.12	U
Chrysene	0.3		0.41		3.9		0.12	U
Dibenzo(a,h)anthracene	0.039	J	0.05	J	0.56		0.12	U
Indeno(1,2,3-cd)pyrene	0.17		0.19		2.4		0.15	U
Phenol	0.2	U	0.2	U	0.044	J	-	-
Copper, Total	15.9		22.7		63		-	-
Lead, Total	137		93.7		262		20.7	-
Mercury, Total	0.142		0.108		0.875		11.2	
Zinc, Total	122		222		86.7		-	-

LOCATION	RI-2_5		RI-2_10	
SAMPLE DEPTH (ft.)	5'		10'	
	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	0.18	J	0.45	
Perfluorooctanesulfonic Acid (PFOS)	1.9		2.28	

LOCATION	RI-3_0.2		RI-3_0.5-1		RI-3_1.5-2		RI-3_5		RI-3_10		RI-3_15		RI-3A(20')	
SAMPLE DEPTH (ft.)	0.2"		0.5 - 1'		1.5 - 2'		5'		10'		15'		20'	
	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
4,4'-DDE	0.00436		0.000985	J	0.00144	J	0.00126	J	0.0021	U	0.00182	U	0.00163	U
4,4'-DDT	0.00459	U	0.00978	P	0.00511	P	0.00387	P	0.00394	U	0.00341	U	0.00306	U
PCBs, Total	0.0499	U	0.0964		0.0759	J	0.12		0.0432	U	0.039	U	0.0355	U
Arsenic, Total	2.65		4.12		3.56		3.92		4.8		14.3		1.43	
Chromium, Total	6.78		11.7		9.22		7.64		18.3		14.7		33.6	
Copper, Total	11.3		17.3		25.9		19.8		22.1		19.5		50.8	
Lead, Total	9.99		126		120		165		97.7		8.68		12.7	
Mercury, Total	0.1	U	0.317		0.449		0.494		0.58		0.197		0.26	
Zinc, Total	37.5		175		614		204		68.6		26.5		106	

LOCATION	RI-3_1.5-2		RI-3_5		RI-3_10	
SAMPLE DEPTH (ft.)	1.5 - 2'		5'		10'	
	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	0.066	J	0.078	J	0.691	
Perfluorooctanesulfonic Acid (PFOS)	1.46		5.14		1.87	

LOCATION	RI-4_5		RI-4_10		RI-4_15	
SAMPLE DEPTH (ft.)	5'		10'		15'	
	Results	Q	Results	Q	Results	Q
PCBs, Total	0.117		0.0383	U	0.0375	U
Benzo(a)anthracene	0.29		2.6		0.11	U
Benzo(a)pyrene	0.24		2.2		0.15	U
Benzo(b)fluoranthene	0.34		2.8		0.11	U
Chrysene	0.3		2.1		0.11	U
Indeno(1,2,3-cd)pyrene	0.17		1.4		0.15	U
Copper, Total	24		149		23.6	
Lead, Total	116		115		84	
Mercury, Total	0.65		5.66		1.15	
Zinc, Total	207		140		39	
Acetone	0.015	U	0.019		0.28	

LOCATION	RI-4_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.2 J
Perfluorooctanesulfonic Acid (PFOS)	3.12

LOCATION	RI-5_5		RI-5_10	
SAMPLE DEPTH (ft.)	5'		10'	
	Results	Q	Results	Q
4,4'-DDT	0.0075		0.00364	U
Lead, Total	111		57.1	
Mercury, Total	0.187		1.02	
Zinc, Total	142		36.4	

LOCATION	RI-5_10
SAMPLE DEPTH (ft.)	10
	Results Q
Perfluorooctanoic Acid (PFOA)	1.08
Perfluorooctanesulfonic Acid (PFOS)	0.216 J

LOCATION	RI-6_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Chromium, Total	38.3
Copper, Total	50.6
Lead, Total	485
Manganese, Total	1620
Mercury, Total	1.69
Zinc, Total	160

	USCO	RSCO	RRSCO	PGWSCO	Units
Dieldrin	0.005	0.039	0.2	0.1	mg/kg
4,4'-DDE	0.0033	1.8	8.9	4.4	mg/kg
4,4'-DDT	0.0033	1.7	7.9	2.5	mg/kg
PCBs, Total	0.1	1	1		mg/kg
Naphthalene	12	100	100	13	mg/kg
Benzo(a)anthracene	1	1	1	3	mg/kg
Benzo(a)pyrene	1	1	1	11	mg/kg
Benzo(b)fluoranthene	1	1	1	1.1	mg/kg
Benzo(k)fluoranthene	0.8	1	3.9	1.1	mg/kg
Chrysene	1	1	3.9	0.4	mg/kg
Dibenzo(a,h)anthracene	0.33	0.33	0.33	165000	mg/kg
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	3.2	mg/kg
Phenol	0.33	100	100	0.03	mg/kg
2-Methylphenol	0.33	100	100	0.1	mg/kg
Arsenic, Total	13	16	16	16	mg/kg
Barium, Total	350	350	400	820	mg/kg
Chromium, Total	30	36	180		mg/kg
Copper, Total	50	270	270	1720	mg/kg
Lead, Total	63	400	400	450	mg/kg
Manganese, Total	1600	2000	2000	2000	mg/kg
Mercury, Total	0.18	0.81	0.81	0.73	mg/kg
Zinc, Total	109	2200	10000	2480	mg/kg
Benzene	0.06	2.9	4.8	0.06	mg/kg
Ethylbenzene	1	30	41	5.5	mg/kg
Xylenes, Total	0.26	100	100	1.2	mg/kg
Acetone	0.05	100	100	0.11	mg/kg
Naphthalene	12	100	100	13	mg/kg
1,2,4-Trimethylbenzene	3.6	47	52	13	mg/kg

1 USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
2 RSCO: New York NYCRR Part 375 Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
3 RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
4 PGWSCO: New York TAGM Soil Cleanup Objective Protection of Groundwater, effective January 2007

LEGEND:

- BCP SITE BOUNDARY
- RI-1 - SOIL BORING COMPLETED MARCH 2021
- SB-9 - SOIL BORING COMPLETED NOVEMBER 2007
- MW-35 GWE 53.71 - SOIL BORING COMPLETED AUGUST 2007

SCALE: 1"=50'
0 50 100

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS.

REFERENCE:
1. SURVEY DATA OBTAINED FROM WARD CARPENTER ENGINEERS, INC, DATED MARCH 20, 2019.

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050
Cert of Auth #24GA27934700

dwg by: APG
chk by: TK
scale: AS NOTED
date: 03/08/2024

project: FORMER YONKERS FIREHOUSE SITE (BCP#C360191)
32 JOHN STREET
YONKERS, NY 10701

title: SOIL ANALYSIS MAP - ALTERNATIVE 2

job no: 11740
drawing no:

FIG-8.1A

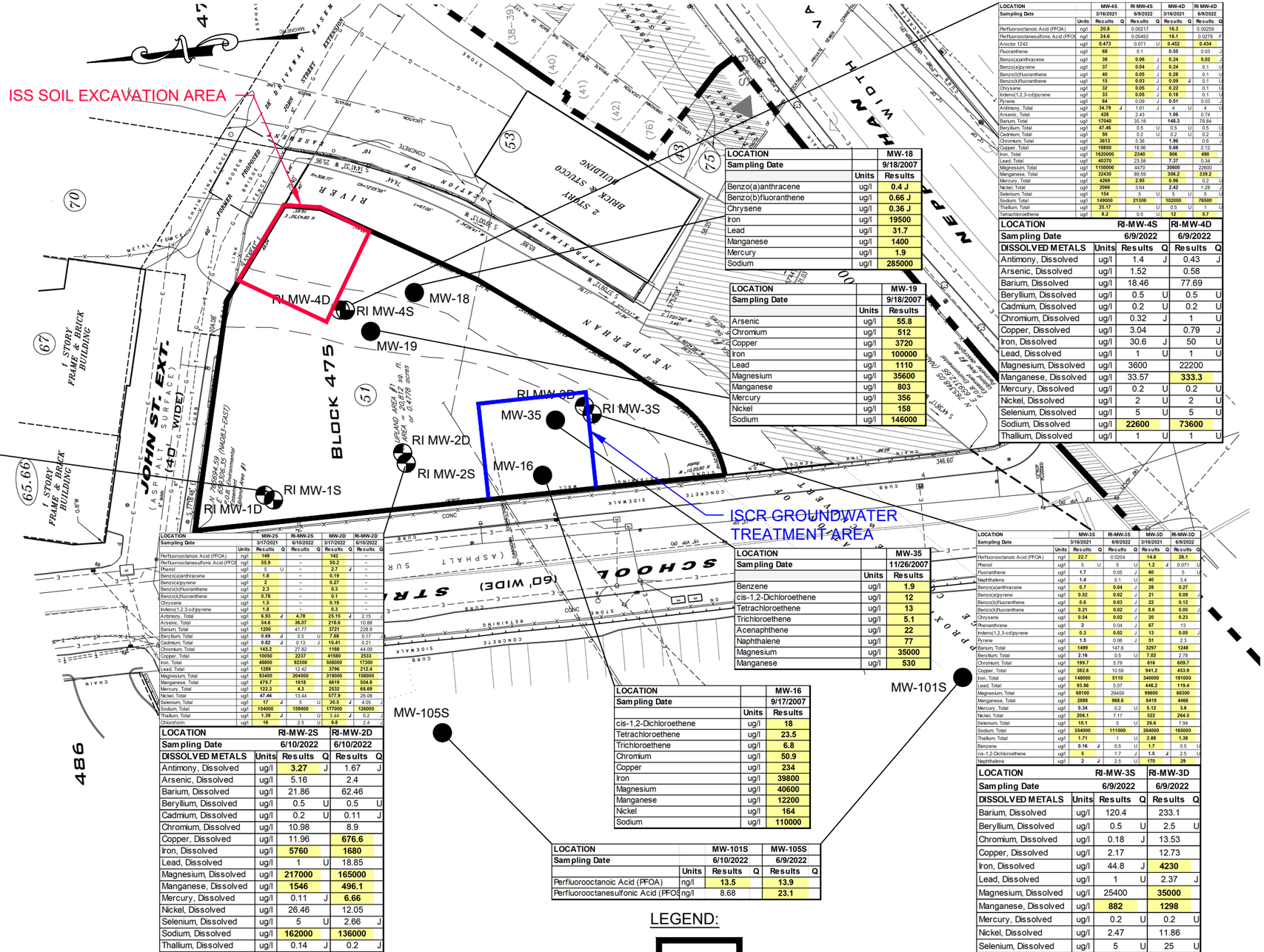
N:\ACAD\11740\CAD\RIWP\11740 – SOIL_ALTERNATIVES.DWG 08/13/24 10:38:05AM, alan.ward, LAYOUT:FIG–8.1A

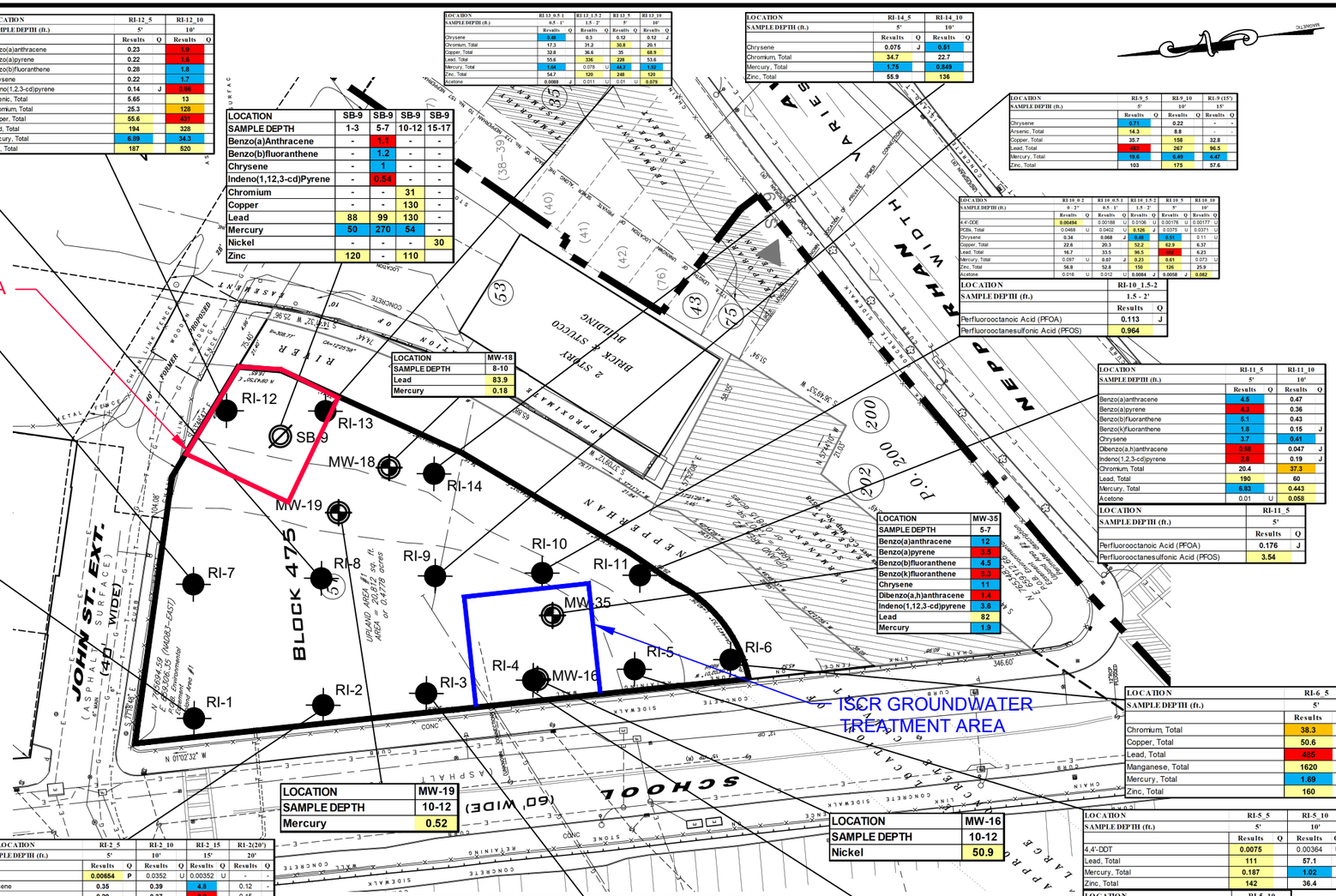
LOCATION		MW-1S		RI-MW-1S		MW-1D		RI-MW-1D	
Sampling Date		3/17/2021		6/10/2022		3/17/2021		6/10/2022	
	Units	Results	Q	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	ng/l	50.9		~		50.6		37.3	
Perfluorooctanesulfonic Acid (PFOS	ng/l	133		~		87.6		43.7	
Benzo(a)anthracene	ug/l	2.5		~		0.34		0.03	J
Benzo(a)pyrene	ug/l	1.8		~		0.34		0.1	U
Benzo(b)fluoranthene	ug/l	2		~		0.32		0.1	U
Benzo(k)fluoranthene	ug/l	0.6		~		0.12		0.1	U
Chrysene	ug/l	2.7		~		0.66		0.03	J
Indeno(1,2,3-cd)pyrene	ug/l	1.2		~		0.21		0.1	U
Antimony, Total	ug/l	4.08		81.06	J	1.66	J	4	U
Arsenic, Total	ug/l	27.98		260.9		3.26		0.47	J
Barium, Total	ug/l	2076		25740		147.5		59.49	
Beryllium, Total	ug/l	6.32		77.86		0.26	J	0.5	U
Cadmium, Total	ug/l	2.2		24.76		0.16	J	0.2	U
Chromium, Total	ug/l	289.6		5209		20.59		2.5	
Copper, Total	ug/l	453.8		6773		23.2		4.09	
Iron, Total	ug/l	107000		2600000		8110		1060	
Lead, Total	ug/l	1205		13870		22.14		1.82	
Magnesium, Total	ug/l	42000		833000		8250		5440	
Manganese, Total	ug/l	2257		36470		233.1		85.71	
Mercury, Total	ug/l	34.86		185.3		0.45		0.2	U
Nickel, Total	ug/l	137.7		3213		13.55		1.89	J
Selenium, Total	ug/l	34.2		231	J	2.01	J	5	U
Sodium, Total	ug/l	22100		190000		39200		37800	
Thallium, Total	ug/l	1.23		23.93	J	0.28	J	0.14	J
Chloroform	ug/l	27		10		1.9	J	2.5	U
n-Butylbenzene	ug/l	5.4		2.5	U	3.4		0.7	J
sec-Butylbenzene	ug/l	6.7		2.5	U	4.2		1.5	J
1,2,4,5-Tetramethylbenzene	ug/l	33		2.6		19		8.7	

LOCATION		RI-MW-1S		RI-MW-1D	
Sampling Date		6/10/2022		6/10/2022	
DISSOLVED METALS	Units	Results	Q	Results	Q
Antimony, Dissolved	ug/l	1.77	J	4	U
Arsenic, Dissolved	ug/l	1.16		0.46	J
Barium, Dissolved	ug/l	106.4		48.84	
Beryllium, Dissolved	ug/l	0.5	U	0.5	U
Cadmium, Dissolved	ug/l	0.2	U	0.2	U
Chromium, Dissolved	ug/l	0.98	J	1	U
Copper, Dissolved	ug/l	2.06		1	U
Iron, Dissolved	ug/l	246		21.8	J
Lead, Dissolved	ug/l	1.12		1	U
Magnesium, Dissolved	ug/l	24600		5090	
Manganese, Dissolved	ug/l	272.4		68.88	
Mercury, Dissolved	ug/l	0.2	U	0.2	U
Nickel, Dissolved	ug/l	1.84	J	2	U
Selenium, Dissolved	ug/l	5	U	5	U
Sodium, Dissolved	ug/l	167000		37900	
Thallium, Dissolved	ug/l	1	U	1	U

	NY-AWQS	Units
Perfluorooctanoic Acid (PFOA)	10	ng/l
Perfluorooctanesulfonic Acid (PFOS)	10	ng/l
Aroclor 1242	0.09	ug/l
Phenol	1	ug/l
Fluoranthene	50	ug/l
Naphthalene	10	ug/l
Benzo(a)anthracene	0.002	ug/l
Benzo(a)pyrene	0	ug/l
Benzo(b)fluoranthene	0.002	ug/l
Benzo(k)fluoranthene	0.002	ug/l
Chrysene	0.002	ug/l
Phenanthrene	50	ug/l
Indeno(1,2,3-cd)pyrene	0.002	ug/l
Pyrene	50	ug/l
Antimony, Total	3	ug/l
Arsenic, Total	25	ug/l
Barium, Total	1000	ug/l
Beryllium, Total	3	ug/l
Cadmium, Total	5	ug/l
Chromium, Total	50	ug/l
Copper, Total	200	ug/l
Iron, Total	300	ug/l
Lead, Total	25	ug/l
Magnesium, Total	35000	ug/l
Manganese, Total	300	ug/l
Mercury, Total	0.7	ug/l
Nickel, Total	100	ug/l
Selenium, Total	10	ug/l
Sodium, Total	20000	ug/l
Thallium, Total	0.5	ug/l
Chloroform	7	ug/l
Tetrachloroethene	5	ug/l
Benzene	1	ug/l
cis-1,2-Dichloroethene	5	ug/l
n-Butylbenzene	5	ug/l
sec-Butylbenzene	5	ug/l
Naphthalene	10	ug/l
1,2,4,5-Tetramethylbenzene	5	ug/l

Exceeds NY-AWQS: New York TOGS 111 Ambient Water Quality Standards criteria reflects all addendum to criteria through June 2004.


ISS SOIL EXCAVATION AREA
ISCR GROUNDWATER TREATMENT AREA
RI MW-4D
RI MW-4S
MW-18
MW-19
RI MW-3D
RI MW-3S
MW-35
RI MW-2D
RI MW-2S
MW-16
RI MW-1S
RI MW-1D
MW-105S
MW-101S
MW-102D
MW-102S
MW-103D
MW-103S
MW-104D
MW-104S
MW-105D
MW-105S
MW-101D
MW-101S
BLOCK 475
JOHN ST. EXT.
(ASPHALT SURFACE)
(40' WIDE)
SCHOOL STREET
(60' WIDE)
NEPPERHAN AVENUE
RIVER TERRACE
1 STORY FRAME & BRICK BUILDING
2 STORY BRICK & STUCCO BUILDING
UPLAND AREA #1 = 0.4178 acres or 18,200 sq. ft.
N 765604.59 (NAD83-EAST)
E 838206.35
Environmental Easement Area #1
N 765528.26
E 838227.92
S 14°01'32" W 25.98'
S 76°01'37" E 65.68'
S 13°58'23" W 26.71'
N 76°01'37" W 65.68'
N 13°58'23" E 26.71



LOCATION	RI-12_5	RI-12_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Benzo(a)anthracene	0.23	1.9
Benzo(a)pyrene	0.22	1.6
Benzo(b)fluoranthene	0.28	1.8
Chrysene	0.22	1.7
Indeno(1,2,3-cd)pyrene	0.14 J	0.86
Arsenic, Total	5.65	13
Chromium, Total	25.3	128
Copper, Total	55.6	421
Lead, Total	194	328
Mercury, Total	6.89	34.3
Zinc, Total	187	520

LOCATION	RI-13_0.5-1	RI-13_1.5-2	RI-13_5	RI-13_10
SAMPLE DEPTH (ft.)	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q
Chrysene	0.46	0.3	0.12	0.52 J
Chromium, Total	17.3	31.2	30.8	20.1
Copper, Total	32.8	36.6	35	68.9
Lead, Total	55.8	336	228	53.6
Mercury, Total	1.64	0.078 U	43.2	1.92
Zinc, Total	54.7	126	248	120
Acetone	0.0088 J	0.011 U	0.01 U	0.079

LOCATION	RI-14_5	RI-14_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Chrysene	0.075 J	0.51
Chromium, Total	34.7	22.7
Mercury, Total	1.75	0.849
Zinc, Total	55.9	136

LOCATION	RI-9_5	RI-9_10	RI-9 (15')
SAMPLE DEPTH (ft.)	5'	10'	15'
	Results Q	Results Q	Results Q
Chrysene	0.71	0.22	- -
Arsenic, Total	14.3	8.8	- -
Copper, Total	35.7	158	32.8
Lead, Total	483	267	96.5
Mercury, Total	10.6	6.45	4.47
Zinc, Total	103	175	57.6

LOCATION	RI-10_0-2	RI-10_0.5-1	RI-10_1.5-2	RI-10_5	RI-10_10
SAMPLE DEPTH (ft.)	0 - 2"	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q	Results Q
4,4'-DDE	0.00494	0.00188 U	0.0106 U	0.00176 U	0.00177 U
PCBs, Total	0.0468 U	0.0402 U	0.126 J	0.0375 U	0.0371 U
Chrysene	0.34	0.068 J	0.46 J	0.51	0.11 U
Copper, Total	22.6	20.3	52.2	62.9	6.37
Lead, Total	16.7	33.5	96.5	400	6.23
Mercury, Total	0.097 U	0.07 J	0.23	0.61	0.073 U
Zinc, Total	56.8	52.8	150	126	25.9
Acetone	0.016 U	0.012 U	0.0084 J	0.0058 J	0.062

LOCATION	RI-10_1.5-2
SAMPLE DEPTH (ft.)	1.5 - 2'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.113 J
Perfluorooctanesulfonic Acid (PFOS)	0.964

LOCATION	RI-11_5	RI-11_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Benzo(a)anthracene	4.5	0.47
Benzo(a)pyrene	4.3	0.36
Benzo(b)fluoranthene	5.1	0.43
Benzo(k)fluoranthene	1.8	0.15 J
Chrysene	3.7	0.41
Dibenzo(a,h)anthracene	0.58	0.047 J
Indeno(1,2,3-cd)pyrene	2.2	0.19 J
Chromium, Total	20.4	37.3
Lead, Total	190	60
Mercury, Total	6.83	0.443
Acetone	0.01 U	0.058

LOCATION	RI-11_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.176 J
Perfluorooctanesulfonic Acid (PFOS)	3.54

LOCATION	MW-35
SAMPLE DEPTH	5-7
Benzo(a)anthracene	12
Benzo(a)pyrene	3.5
Benzo(b)fluoranthene	4.5
Benzo(k)fluoranthene	3.3
Chrysene	11
Dibenzo(a,h)anthracene	1.4
Indeno(1,12,3-cd)pyrene	3.6
Lead	82
Mercury	1.9

LOCATION	MW-19
SAMPLE DEPTH	10-12
Mercury	0.52

LOCATION	MW-16
SAMPLE DEPTH	10-12
Nickel	50.9

LOCATION	RI-6_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Chromium, Total	38.3
Copper, Total	50.6
Lead, Total	485
Manganese, Total	1620
Mercury, Total	1.69
Zinc, Total	160

LOCATION	RI-5_5	RI-5_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
4,4'-DDT	0.0075	0.00364 U
Lead, Total	111	57.1
Mercury, Total	0.187	1.02
Zinc, Total	142	36.4

LOCATION	RI-5_10
SAMPLE DEPTH (ft.)	10
	Results Q
Perfluorooctanoic Acid (PFOA)	1.08
Perfluorooctanesulfonic Acid (PFOS)	0.216 J

LOCATION	RI-4_5	RI-4_10	RI-4_15
SAMPLE DEPTH (ft.)	5'	10'	15'
	Results Q	Results Q	Results Q
PCBs, Total	0.117	0.0383 U	0.0375 U
Benzo(a)anthracene	0.29	2.6	0.11 U
Benzo(a)pyrene	0.24	2.2	0.15 U
Benzo(b)fluoranthene	0.34	2.8	0.11 U
Chrysene	0.3	2.1	0.11 U
Indeno(1,2,3-cd)pyrene	0.17	1.4	0.15 U
Copper, Total	24	149	23.6
Lead, Total	116	115	84
Mercury, Total	0.65	5.66	1.15
Zinc, Total	207	140	39
Acetone	0.015 U	0.019	0.28

LOCATION	RI-4_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.2 J
Perfluorooctanesulfonic Acid (PFOS)	3.12

LOCATION	RI-7-5	RI-7-10	RI-7 (16')
SAMPLE DEPTH (ft.)	5'	10'	16'
	Results Q	Results Q	Results Q
Benzo(b)fluoranthene	0.7	0.36	- -
Chrysene	0.75	0.31	- -
Lead, Total	81.2	51.6	- -
Mercury, Total	0.079	1.2	3.28
Zinc, Total	134	35.6	-

LOCATION	RI-7-5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.13 J
Perfluorooctanesulfonic Acid (PFOS)	1.89

LOCATION	MW-18
SAMPLE DEPTH	8-10
Lead	83.9
Mercury	0.18

LOCATION	SB-9	SB-9	SB-9	SB-9
SAMPLE DEPTH	1-3	5-7	10-12	15-17
Benzo(a)Anthracene	-	1.1	-	-
Benzo(b)fluoranthene	-	1.2	-	-
Chrysene	-	1	-	-
Indeno(1,12,3-cd)Pyrene	-	0.54	-	-
Chromium	-	-	31	-
Copper	-	-	130	-
Lead	88	99	130	-
Mercury	50	270	54	-
Nickel	-	-	-	30
Zinc	120	-	110	

LOCATION	RI-1-0.2	RI-1-0.5-1	RI-1-1.5-2	RI-1-5	RI-1-10	RI-1-15	RI-1A(20')
SAMPLE DEPTH (ft.)	0 - 2"	0.5 - 1'	1.5 - 2'	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
Dieldrin	0.00253	0.0102	0.0012 U	0.00123 U	0.00122 U	0.00106 U	0.00146 U
4,4'-DDE	0.00412	0.00336	0.00191 U	0.00188 J	0.00196 U	0.0017 U	0.00234 U
4,4'-DDT	0.0022 JP	0.0087	0.00358 U	0.00368 U	0.00367 U	0.00318 U	0.00438 U
PCBs, Total	0.118 U	0.0415 U	0.0566 J	0.0574 J	0.121 J	0.0351 U	0.0488 U
Naphthalene	0.22 U	0.038 J	0.045 J	1 U	0.11 J	0.033 J	10
Benzo(a)anthracene	0.27	0.74	0.57	2.6	0.23	0.23	0.15 U
Benzo(a)pyrene	0.28	0.71	0.4	1.9	0.25	0.22	0.2 U
Benzo(b)fluoranthene	0.42	0.97	0.58	2.6	0.34	0.28	0.15 U
Benzo(k)fluoranthene	0.1 J	0.28	0.22	0.92	0.12	0.092 J	0.15 U
Chrysene	0.26	1.2	0.54	2.4	0.22	0.21	0.047 J
Indeno(1,2,3-cd)pyrene	0.2	0.46	0.22	1	0.18	0.14	0.2 U
2-Methylphenol	0.22 U	0.21 U	0.2 U	1 U	0.2 U	0.18 U	0.2 J
Lead, Total	60.4	66.8	196	17.9	180	86	51.4
Mercury, Total	0.165	0.543	0.136	0.088	0.115	1.66	0.096 U
Zinc, Total	94.3	80.7	121	47.7	304	36.3	388
Benzene	0.00363 U	0.00353 U	0.001 U	0.00364 U	0.00393 U	0.00359 U	6.19
Ethylbenzene	0.0012 U	0.001 U	0.002 U	0.0017 U	0.0018 U	0.0012 U	2.7
Xylenes, Total	0.0012 U	0.001 U	0.002 U	0.0017 U	0.0018 U	0.0012 U	7.8
Acetone	0.012 U	0.01 U	0.0099 J	0.017 U	0.018 U	0.012 U	0.75 J
Naphthalene	0.005 U	0.0042 U	0.008 U	0.0067 U	0.0074 U	0.0011 J	36
1,2,4-Trimethylbenzene	0.0025 U	0.0021 U	0.004 U	0.0033 U	0.0037 U	0.0006 J	17

LOCATION	RI-1-1.5-2	RI-1-5	RI-1-10
SAMPLE DEPTH (ft.)	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.078 J	0.383	0.396
Perfluorooctanesulfonic Acid (PFOS)	1.19	2.68	2.76

LOCATION	RI-2_5	RI-2_10	RI-2_15	RI-2(20')
SAMPLE DEPTH (ft.)	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q
4,4'-DDT	0.00654 P	0.0352 U	0.00352 U	- -
Benzo(a)anthracene	0.35	0.39	4.8	0.12 -
Benzo(a)pyrene	0.29	0.37	3.9	0.15 -
Benzo(b)fluoranthene	0.4	0.5	5.1	0.12 U
Benzo(k)fluoranthene	0.12	0.19	1.1	0.12 U
Chrysene	0.3	0.41	3.9	0.12 U
Dibenzo(a,h)anthracene	0.039 J	0.05 J	0.56	0.12 U
Indeno(1,2,3-cd)pyrene	0.17	0.19	2.4	0.15 U
Phenol	0.2 U	0.2 U	0.044 J	- -
Copper, Total	15.9	22.7	63	- -
Lead, Total	137	93.7	262	20.7 -
Mercury, Total	0.142	0.108	0.875	11.2
Zinc, Total	122	222	86.7	- -

LOCATION	RI-2_5	RI-2_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.18 J	0.45
Perfluorooctanesulfonic Acid (PFOS)	1.9	2.28

LOCATION	RI-3_0.2	RI-3_0.5-1	RI-3_1.5-2	RI-3_5	RI-3_10	RI-3_15	RI-3A(20')
SAMPLE DEPTH (ft.)	0-2"	0.5 - 1'	1.5 - 2'	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
4,4'-DDE	0.00436	0.000985 J	0.00144 J	0.00126 J	0.0021 U	0.00182 U	0.00163 U
4,4'-DDT	0.00459 U	0.00978 P	0.00511 P	0.00387 P	0.00394 U	0.00341 U	0.00306 U
PCBs, Total	0.0499 U	0.0964	0.0759 J	0.12	0.0432 U	0.039 U	0.0355 U
Arsenic, Total	2.65	4.12	3.56	3.92	4.8	14.3	1.43
Chromium, Total	6.78	11.7	9.22	7.64	18.3	14.7	33.6
Copper, Total	11.3	17.3	25.9	19.8	22.1	19.5	50.8
Lead, Total	9.99	126	120	165	97.7	8.68	12.7
Mercury, Total	0.1 U	0.317	0.449	0.494	0.58	0.197	0.26
Zinc, Total	37.5	175	614	204	68.6	26.5	106

LOCATION	RI-3_1.5-2	RI-3_5	RI-3_10
SAMPLE DEPTH (ft.)	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.066 J	0.078 J	0.691
Perfluorooctanesulfonic Acid (PFOS)	1.46	5.14	1.87

	USCO	RSCO	RRSCO	PGWSCO	Units
Dieldrin	0.005	0.039	0.2	0.1	mg/kg
4,4'-DDE	0.0033	1.8	8.9	4.4	mg/kg
4,4'-DDT	0.0033	1.7	7.9	2.5	mg/kg
PCBs, Total	0.1	1	1		mg/kg
Naphthalene	12	100	100	13	mg/kg
Benzo(a)anthracene	1	1	1	3	mg/kg
Benzo(a)pyrene	1	1	1	11	mg/kg
Benzo(b)fluoranthene	1	1	1	1.1	mg/kg
Benzo(k)fluoranthene	0.8	1	3.9	1.1	mg/kg
Chrysene	1	1	3.9	0.4	mg/kg
Dibenzo(a,h)anthracene	0.33	0.33	0.33	165000	mg/kg
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	3.2	mg/kg
Phenol	0.33	100	100	0.03	mg/kg
2-Methylphenol	0.33	100	100	0.1	mg/kg
Arsenic, Total	13	16	16	16	mg/kg
Barium, Total	350	350	400	820	mg/kg
Chromium, Total	30	36	180		mg/kg
Copper, Total	50	270	270	1720	mg/kg
Lead, Total	63	400	400	450	mg/kg
Manganese, Total	1600	2000	2000	2000	mg/kg
Mercury, Total	0.18	0.81	0.81	0.73	mg/kg
Zinc, Total	109	2200	10000	2480	mg/kg
Benzene	0.06	2.9	4.8	0.06	mg/kg
Ethylbenzene	1	30	41	5.5	mg/kg
Xylenes, Total	0.26	100	100	1.2	mg/kg
Acetone	0.05	100	100	0.11	mg/kg
Naphthalene	12	100	100	13	mg/kg
1,2,4-Trimethylbenzene	3.6	47	52	13	mg/kg

1 USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
2 RSCO: New York NYCRR Part 375 Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
3 RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
4 PGWSCO: New York TAGM Soil Cleanup Objective Protection of Groundwater, effective January 2007

LEGEND:

- BCP SITE BOUNDARY
- RI-1 - SOIL BORING COMPLETED MARCH 2021
- SB-9 - SOIL BORING COMPLETED NOVEMBER 2007
- MW-35 GWE 53.71 - SOIL BORING COMPLETED AUGUST 2007

SCALE: 1"=50'
0 50 100

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS.

REFERENCE:
1. SURVEY DATA OBTAINED FROM WARD CARPENTER ENGINEERS, INC, DATED MARCH 20, 2019.

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050
Cert of Auth #24GA27934700

dwg by: APG
chk by: TK
scale: AS NOTED
date: 03/08/2024

project: FORMER YONKERS FIREHOUSE SITE (BCP#C360191)
32 JOHN STREET
YONKERS, NY 10701

title: SOIL ANALYSIS MAP - ALTERNATIVE 3

job no: 11740
drawing no:

FIG-8.2A

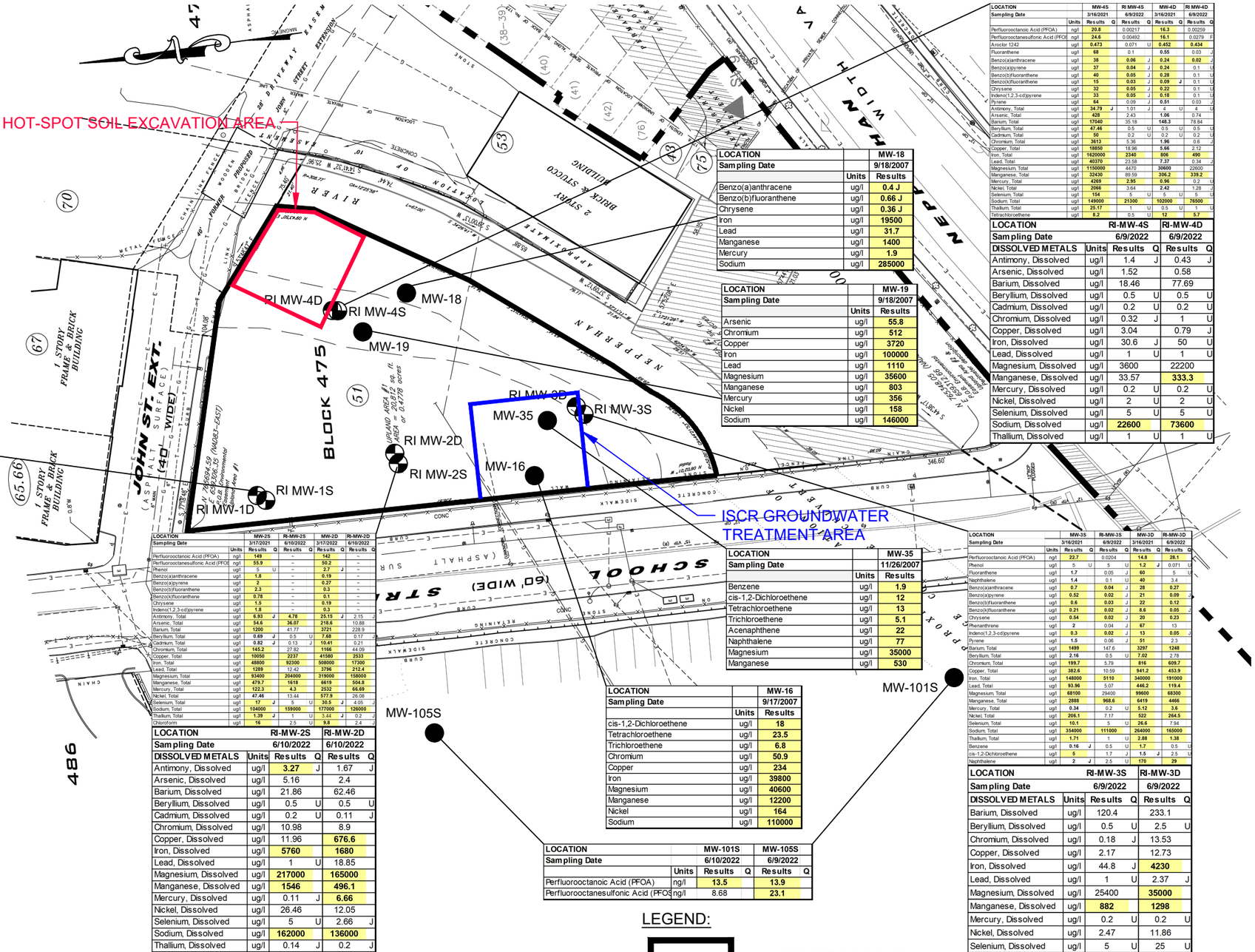
N:\ACAD\11740\CAD\RIWP\11740 – SOIL_ALTERNATIVES.DWG 08/13/24 10:37:41AM, alan.ward, LAYOUT:FIG-8.2A

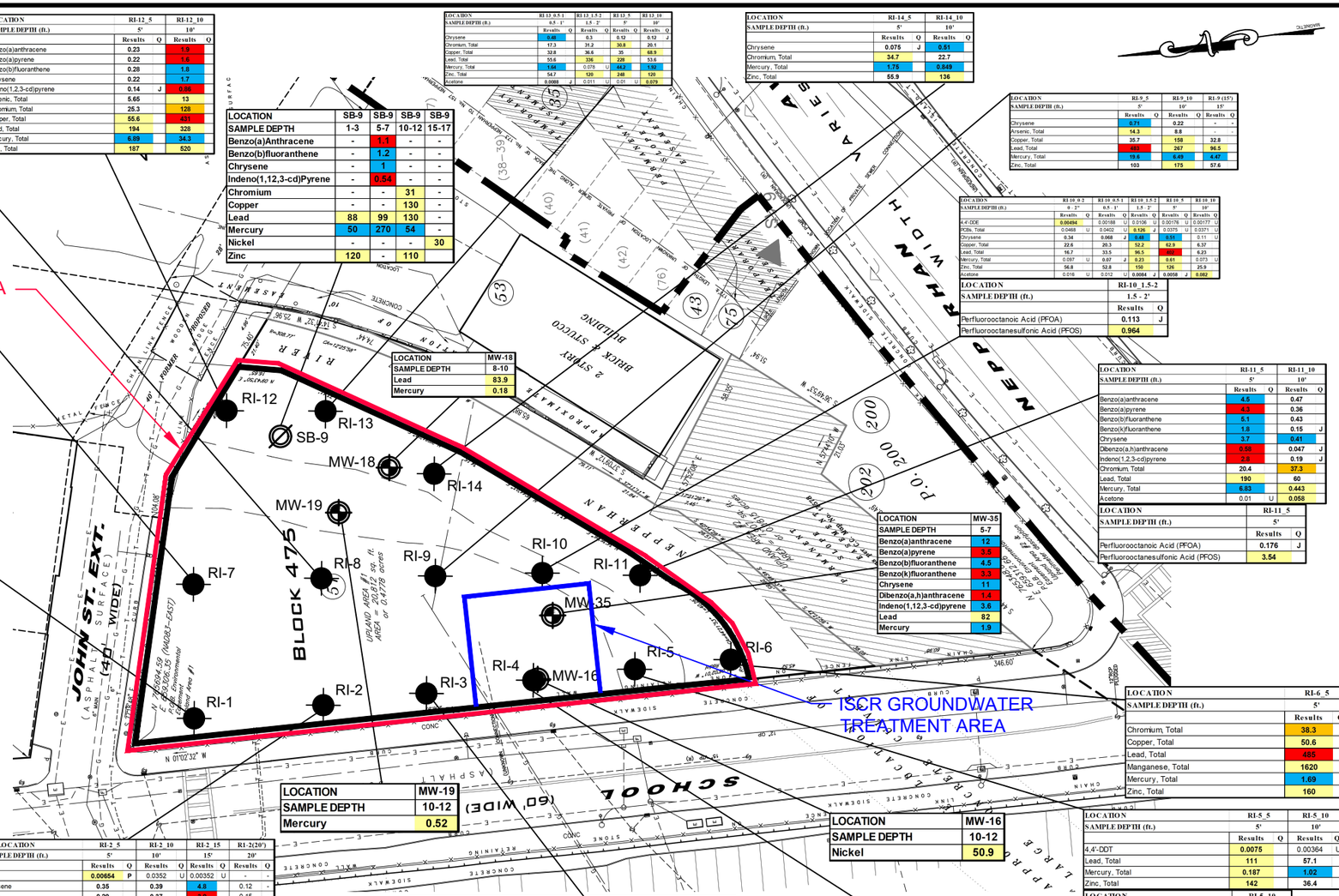
LOCATION		MW-1S		RI-MW-1S		MW-1D		RI-MW-1D	
Sampling Date		3/17/2021		6/10/2022		3/17/2021		6/10/2022	
	Units	Results	Q	Results	Q	Results	Q	Results	Q
Perfluorooctanoic Acid (PFOA)	ng/l	50.9		~		50.6		37.3	
Perfluorooctanesulfonic Acid (PFOS)	ng/l	133		~		87.6		43.7	
Benzo(a)anthracene	ug/l	2.5		~		0.64		0.03	J
Benzo(a)pyrene	ug/l	1.8		~		0.34		0.1	U
Benzo(b)fluoranthene	ug/l	2		~		0.32		0.1	U
Benzo(k)fluoranthene	ug/l	0.6		~		0.12		0.1	U
Chrysene	ug/l	2.7		~		0.66		0.03	J
Indeno(1,2,3-cd)pyrene	ug/l	1.2		~		0.21		0.1	U
Antimony, Total	ug/l	4.08		81.06	J	1.66	J	4	U
Arsenic, Total	ug/l	27.98		260.9		3.26		0.47	J
Barium, Total	ug/l	2076		25740		147.5		59.49	
Beryllium, Total	ug/l	6.32		77.86		0.26	J	0.5	U
Cadmium, Total	ug/l	2.2		24.76		0.16	J	0.2	U
Chromium, Total	ug/l	289.6		5209		20.59		2.5	
Copper, Total	ug/l	453.8		6773		23.2		4.09	
Iron, Total	ug/l	107000		2600000		8110		1060	
Lead, Total	ug/l	1205		13870		22.14		1.82	
Magnesium, Total	ug/l	42000		833000		8250		5440	
Manganese, Total	ug/l	2257		36470		233.1		85.71	
Mercury, Total	ug/l	34.86		185.3		0.45		0.2	U
Nickel, Total	ug/l	137.7		3213		13.55		1.89	J
Selenium, Total	ug/l	34.2		231	J	2.01	J	5	U
Sodium, Total	ug/l	22100		190000		39200		37800	
Thallium, Total	ug/l	1.23		23.93	J	0.28	J	0.14	J
Chloroform	ug/l	27		10		1.9	J	2.5	U
n-Butylbenzene	ug/l	5.4		2.5	U	3.4		0.7	J
sec-Butylbenzene	ug/l	6.7		2.5	U	4.2		1.5	J
1,2,4,5-Tetramethylbenzene	ug/l	33		2.6		19		8.7	

LOCATION		RI-MW-1S		RI-MW-1D	
Sampling Date		6/10/2022		6/10/2022	
DISSOLVED METALS	Units	Results	Q	Results	Q
Antimony, Dissolved	ug/l	1.77	J	4	U
Arsenic, Dissolved	ug/l	1.16		0.46	J
Barium, Dissolved	ug/l	106.4		48.84	
Beryllium, Dissolved	ug/l	0.5	U	0.5	U
Cadmium, Dissolved	ug/l	0.2	U	0.2	U
Chromium, Dissolved	ug/l	0.98	J	1	U
Copper, Dissolved	ug/l	2.06		1	U
Iron, Dissolved	ug/l	246		21.8	J
Lead, Dissolved	ug/l	1.12		1	U
Magnesium, Dissolved	ug/l	24600		5090	
Manganese, Dissolved	ug/l	272.4		68.88	
Mercury, Dissolved	ug/l	0.2	U	0.2	U
Nickel, Dissolved	ug/l	1.84	J	2	U
Selenium, Dissolved	ug/l	5	U	5	U
Sodium, Dissolved	ug/l	167000		37900	
Thallium, Dissolved	ug/l	1	U	1	U

	NY-AWQS	Units
Perfluorooctanoic Acid (PFOA)	10	ng/l
Perfluorooctanesulfonic Acid (PFOS)	10	ng/l
Aroclor 1242	0.09	ug/l
Phenol	1	ug/l
Fluoranthene	50	ug/l
Naphthalene	10	ug/l
Benzo(a)anthracene	0.002	ug/l
Benzo(a)pyrene	0	ug/l
Benzo(b)fluoranthene	0.002	ug/l
Benzo(k)fluoranthene	0.002	ug/l
Chrysene	0.002	ug/l
Phenanthrene	50	ug/l
Indeno(1,2,3-cd)pyrene	0.002	ug/l
Pyrene	50	ug/l
Antimony, Total	3	ug/l
Arsenic, Total	25	ug/l
Barium, Total	1000	ug/l
Beryllium, Total	3	ug/l
Cadmium, Total	5	ug/l
Chromium, Total	50	ug/l
Copper, Total	200	ug/l
Iron, Total	300	ug/l
Lead, Total	25	ug/l
Magnesium, Total	35000	ug/l
Manganese, Total	300	ug/l
Mercury, Total	0.7	ug/l
Nickel, Total	100	ug/l
Selenium, Total	10	ug/l
Sodium, Total	20000	ug/l
Thallium, Total	0.5	ug/l
Chloroform	7	ug/l
Tetrachloroethene	5	ug/l
Benzene	1	ug/l
cis-1,2-Dichloroethene	5	ug/l
n-Butylbenzene	5	ug/l
sec-Butylbenzene	5	ug/l
Naphthalene	10	ug/l
1,2,4,5-Tetramethylbenzene	5	ug/l

Exceeds NY-AWQS: New York TOGS 111 Ambient Water Quality Standards criteria reflects all addendum to criteria through June 2004.


HOT-SPOT SOIL EXCAVATION AREA
RI MW-4D
RI MW-4S
MW-18
MW-19
RI MW-3D
RI MW-3S
MW-35
RI MW-2D
RI MW-2S
MW-16
RI MW-1S
RI MW-1D
ISCR GROUNDWATER TREATMENT AREA
MW-105S
MW-101S
BLOCK 475
JOHN ST. EXT.
(40' WIDE)
SCHOOL STREET
(60' WIDE)
NEPPERHAN AVENUE
RIVER TERRACE
ASPHALT SURFACE
1 STORY FRAME & BRICK BUILDING
2 STORY BRICK & STUCCO BUILDING
UPLAND AREA #1 = 0.4178 acres or 18,204 sq. ft.
N 756504.59 (NAD83-EAST)
E 834206.35
Source: Environmental Easement Area #1
S 14°01'32" W 25.98'
S 75°58'28" E 65.68'
N 14°01'32" E 25.98'
N 75°58'28" W 65.68'



LOCATION	RI-12_5	RI-12_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Benzo(a)anthracene	0.23	1.9
Benzo(a)pyrene	0.22	1.6
Benzo(b)fluoranthene	0.28	1.8
Chrysene	0.22	1.7
Indeno(1,2,3-cd)pyrene	0.14 J	0.86
Arsenic, Total	5.65	13
Chromium, Total	25.3	128
Copper, Total	55.6	421
Lead, Total	194	328
Mercury, Total	6.89	34.3
Zinc, Total	187	520

LOCATION	RI-13_0.5-1	RI-13_1.5-2	RI-13_5	RI-13_10
SAMPLE DEPTH (ft.)	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q
Chrysene	0.46	0.3	0.12	0.52 J
Chromium, Total	17.3	31.2	30.8	20.1
Copper, Total	32.8	36.6	35	68.9
Lead, Total	55.8	336	228	53.6
Mercury, Total	1.64	0.078 U	43.2	1.92
Zinc, Total	54.7	126	248	120
Acetone	0.0088 J	0.011 U	0.01 U	0.079

LOCATION	RI-14_5	RI-14_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Chrysene	0.075 J	0.51
Chromium, Total	34.7	22.7
Mercury, Total	1.75	0.849
Zinc, Total	55.9	136

LOCATION	RI-9_5	RI-9_10	RI-9 (15')
SAMPLE DEPTH (ft.)	5'	10'	15'
	Results Q	Results Q	Results Q
Chrysene	0.71	0.22	- -
Arsenic, Total	14.3	8.8	- -
Copper, Total	35.7	158	32.8
Lead, Total	483	267	96.5
Mercury, Total	15.6	6.49	4.47
Zinc, Total	103	175	57.6

LOCATION	SB-9	SB-9	SB-9	SB-9
SAMPLE DEPTH	1-3	5-7	10-12	15-17
Benzo(a)Anthracene	-	1.1	-	-
Benzo(b)fluoranthene	-	1.2	-	-
Chrysene	-	1	-	-
Indeno(1,12,3-cd)Pyrene	-	0.54	-	-
Chromium	-	-	31	-
Copper	-	-	130	-
Lead	88	99	130	-
Mercury	50	270	54	-
Nickel	-	-	-	30
Zinc	120	-	110	

LOCATION	MW-18
SAMPLE DEPTH	8-10
Lead	83.9
Mercury	0.18

LOCATION	MW-35
SAMPLE DEPTH	5-7
Benzo(a)anthracene	12
Benzo(a)pyrene	3.5
Benzo(b)fluoranthene	4.5
Benzo(k)fluoranthene	3.3
Chrysene	11
Dibenzo(a,h)anthracene	1.4
Indeno(1,12,3-cd)pyrene	3.6
Lead	82
Mercury	1.9

LOCATION	MW-19
SAMPLE DEPTH	10-12
Mercury	0.52

LOCATION	MW-16
SAMPLE DEPTH	10-12
Nickel	50.9

LOCATION	RI-8_0-2	RI-8-0.5-1	RI-8-1.5-2	RI-8-5	RI-8-10
SAMPLE DEPTH (ft.)	0 -2"	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q	Results Q
Dieldrin	0.0762	0.0156	0.0101	0.00107 U	0.0012 U
4,4'-DDT	0.0026 J	0.008	0.00551	0.00223	0.00359 U
Benzo(a)anthracene	0.079 J	0.46	0.68	3.5	5.3
Benzo(a)pyrene	0.092 J	0.45	0.68	1	4.7
Benzo(b)fluoranthene	0.12 J	0.56	0.83	1.3	6.3
Benzo(k)fluoranthene	0.038 J	0.2	0.2	0.48	1.4
Chrysene	0.074 J	0.38	0.62	0.94	4.7
Dibenzo(a,h)anthracene	0.14 U	0.066 J	0.092 J	0.13	0.58
Indeno(1,2,3-cd)pyrene	0.078 J	0.32	0.39	0.61	3.5
Barium, Total	46.8	72.5	174	118	379
Chromium, Total	8.48	16.1	7.62	6.38	33.7
Copper, Total	14.7	25.9	13.6	8.5	180
Lead, Total	50.9	38.5	85	47.3	273
Mercury, Total	0.097 U	0.12	0.199	0.065 J	25.8
Zinc, Total	44.3	66.8	130	75.4	199
Acetone	0.36	0.012 U	0.012 U	0.016 U	0.0075 J

LOCATION	RI-7-5	RI-7-10	RI-7 (16')
SAMPLE DEPTH (ft.)	5'	10'	16'
	Results Q	Results Q	Results Q
Benzo(b)fluoranthene	0.7	0.36	- -
Chrysene	0.75	0.31	- -
Lead, Total	81.2	51.6	- -
Mercury, Total	0.079	1.2	3.28
Zinc, Total	134	35.6	-

LOCATION	RI-7-5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.13 J
Perfluorooctanesulfonic Acid (PFOS)	1.89

LOCATION	RI-10_0-2	RI-10_0.5-1	RI-10_1.5-2	RI-10_5	RI-10_10
SAMPLE DEPTH (ft.)	0 -2"	0.5 - 1'	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q	Results Q	Results Q
4,4'-DDE	0.00494	0.00188 U	0.0106 U	0.00176 U	0.00177 U
PCBs, Total	0.0468 U	0.0402 U	0.126 J	0.0375 U	0.0371 U
Chrysene	0.34	0.068 J	0.45	0.51	0.11 U
Copper, Total	22.6	20.3	52.2	62.9	6.37
Lead, Total	16.7	33.5	96.5	400	6.23
Mercury, Total	0.097 U	0.07 J	0.23	0.61	0.073 U
Zinc, Total	56.8	52.8	150	126	25.9
Acetone	0.016 U	0.012 U	0.0084 J	0.0058 J	0.062

LOCATION	RI-10_1.5-2
SAMPLE DEPTH (ft.)	1.5 - 2'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.113 J
Perfluorooctanesulfonic Acid (PFOS)	0.964

LOCATION	RI-11_5	RI-11_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Benzo(a)anthracene	4.5	0.47
Benzo(a)pyrene	4.3	0.36
Benzo(b)fluoranthene	5.1	0.43
Benzo(k)fluoranthene	1.8	0.15 J
Chrysene	3.7	0.41
Dibenzo(a,h)anthracene	0.58	0.047 J
Indeno(1,2,3-cd)pyrene	2.2	0.19 J
Chromium, Total	20.4	37.3
Lead, Total	190	60
Mercury, Total	6.83	0.443
Acetone	0.01 U	0.058

LOCATION	RI-11_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.176 J
Perfluorooctanesulfonic Acid (PFOS)	3.54

LOCATION	RI-1-0.2	RI-1-0.5-1	RI-1-1.5-2	RI-1-5	RI-1-10	RI-1-15	RI-1A(20')
SAMPLE DEPTH (ft.)	0 -2"	0.5 - 1'	1.5 - 2'	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
Dieldrin	0.00253	0.0102	0.0012 U	0.00123 U	0.00122 U	0.00106 U	0.00146 U
4,4'-DDE	0.00412	0.00336	0.00191 U	0.00188 J	0.00196 U	0.0017 U	0.00234 U
4,4'-DDT	0.0022 JP	0.0087	0.00358 U	0.00368 U	0.00367 U	0.00318 U	0.00438 U
PCBs, Total	0.118 U	0.0415 U	0.0566 J	0.0574 J	0.121 J	0.0351 U	0.0488 U
Naphthalene	0.22 U	0.038 J	0.045 J	1 U	0.11 J	0.033 J	1 U
Benzo(a)anthracene	0.27	0.74	0.57	2.8	0.23	0.23	0.15 U
Benzo(a)pyrene	0.28	0.71	0.4	1.9	0.25	0.22	0.2 U
Benzo(b)fluoranthene	0.42	0.97	0.58	2.8	0.34	0.28	0.15 U
Benzo(k)fluoranthene	0.1 J	0.28	0.22	0.92	0.12	0.092 J	0.15 U
Chrysene	0.26	0.7	0.54	2.4	0.22	0.21	0.047 J
Indeno(1,2,3-cd)pyrene	0.2	0.46	0.22	1	0.18	0.14	0.2 U
2-Methylphenol	0.22 U	0.21 U	0.2 U	1 U	0.2 U	0.18 U	0.2 U
Lead, Total	60.4	66.8	196	17.9	180	86	51.4
Mercury, Total	0.165	0.543	0.136	0.088	0.115	1.66	0.096 U
Zinc, Total	94.3	80.7	121	47.7	304	36.3	388
Benzene	0.00363 U	0.00353 U	0.001 U	0.00364 U	0.00393 U	0.00359 U	6.19
Ethylbenzene	0.0012 U	0.001 U	0.002 U	0.0017 U	0.0018 U	0.0012 U	2.7
Xylenes, Total	0.0012 U	0.001 U	0.002 U	0.0017 U	0.0018 U	0.0012 U	7.8
Acetone	0.012 U	0.01 U	0.0099 J	0.017 U	0.018 U	0.012 U	0.75 J
Naphthalene	0.005 U	0.0042 U	0.008 U	0.0067 U	0.0074 U	0.0011 J	36
1,2,4-Trimethylbenzene	0.0025 U	0.0021 U	0.004 U	0.0033 U	0.0037 U	0.0006 J	17

LOCATION	RI-1-1.5-2	RI-1-5	RI-1-10
SAMPLE DEPTH (ft.)	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.078 J	0.383	0.396
Perfluorooctanesulfonic Acid (PFOS)	1.19	2.68	2.76

LOCATION	RI-2_5	RI-2_10	RI-2_15	RI-2(20')
SAMPLE DEPTH (ft.)	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q
4,4'-DDT	0.00654 P	0.0352 U	0.00352 U	- -
Benzo(a)anthracene	0.35	0.39	4.8	0.12 -
Benzo(a)pyrene	0.29	0.37	3.9	0.15 -
Benzo(b)fluoranthene	0.4	0.5	5.1	0.12 U
Benzo(k)fluoranthene	0.12	0.19	1.1	0.12 U
Chrysene	0.3	0.41	3.9	0.12 U
Dibenzo(a,h)anthracene	0.039 J	0.05 J	0.56	0.12 U
Indeno(1,2,3-cd)pyrene	0.17	0.19	2.4	0.15 U
Phenol	0.2 U	0.2 U	0.044 J	- -
Copper, Total	15.9	22.7	63	- -
Lead, Total	137	93.7	262	20.7 -
Mercury, Total	0.142	0.108	0.875	11.2
Zinc, Total	122	222	86.7	- -

LOCATION	RI-2_5	RI-2_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.18 J	0.45
Perfluorooctanesulfonic Acid (PFOS)	1.9	2.28

LOCATION	RI-3_0.2	RI-3_0.5-1	RI-3_1.5-2	RI-3_5	RI-3_10	RI-3_15	RI-3A(20')
SAMPLE DEPTH (ft.)	0-2"	0.5 - 1'	1.5 - 2'	5'	10'	15'	20'
	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
4,4'-DDE	0.00436	0.000985 J	0.00144 J	0.00126 J	0.0021 U	0.00182 U	0.00163 U
4,4'-DDT	0.00459 U	0.00978 P	0.00511 P	0.00387 P	0.00394 U	0.00341 U	0.00306 U
PCBs, Total	0.0499 U	0.0964	0.0759 J	0.12	0.0432 U	0.039 U	0.0355 U
Arsenic, Total	2.65	4.12	3.56	3.92	4.8	14.3	1.43
Chromium, Total	6.78	11.7	9.22	7.64	18.3	14.7	33.6
Copper, Total	11.3	17.3	25.9	19.8	22.1	19.5	50.8
Lead, Total	9.99	126	120	165	97.7	9.68	12.7
Mercury, Total	0.1 U	0.317	0.449	0.494	0.58	0.197	0.26
Zinc, Total	37.5	175	614	204	68.6	26.5	106

LOCATION	RI-3_1.5-2	RI-3_5	RI-3_10
SAMPLE DEPTH (ft.)	1.5 - 2'	5'	10'
	Results Q	Results Q	Results Q
Perfluorooctanoic Acid (PFOA)	0.066 J	0.078 J	0.691
Perfluorooctanesulfonic Acid (PFOS)	1.46	5.14	1.87

LOCATION	RI-4_5	RI-4_10	RI-4_15
SAMPLE DEPTH (ft.)	5'	10'	15'
	Results Q	Results Q	Results Q
PCBs, Total	0.117	0.0383 U	0.0375 U
Benzo(a)anthracene	0.29	2.6	0.11 U
Benzo(a)pyrene	0.24	2.2	0.15 U
Benzo(b)fluoranthene	0.34	2.8	0.11 U
Chrysene	0.3	2.1	0.11 U
Indeno(1,2,3-cd)pyrene	0.17	1.4	0.15 U
Copper, Total	24	149	23.6
Lead, Total	116	115	84
Mercury, Total	0.65	5.66	1.15
Zinc, Total	207	140	39
Acetone	0.015 U	0.019	0.28

LOCATION	RI-4_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Perfluorooctanoic Acid (PFOA)	0.2 J
Perfluorooctanesulfonic Acid (PFOS)	3.12

LOCATION	RI-5_5	RI-5_10
SAMPLE DEPTH (ft.)	5'	10'
	Results Q	Results Q
4,4'-DDT	0.0075	0.00364 U
Lead, Total	111	57.1
Mercury, Total	0.187	1.02
Zinc, Total	142	36.4

LOCATION	RI-5_10
SAMPLE DEPTH (ft.)	10
	Results Q
Perfluorooctanoic Acid (PFOA)	1.08
Perfluorooctanesulfonic Acid (PFOS)	0.216 J

LOCATION	RI-6_5
SAMPLE DEPTH (ft.)	5'
	Results Q
Chromium, Total	38.3
Copper, Total	50.6
Lead, Total	485
Manganese, Total	1620
Mercury, Total	1.69
Zinc, Total	160

	USCO	RSCO	RRSCO	PGWSCO	Units
Dieldrin	0.005	0.039	0.2	0.1	mg/kg
4,4'-DDE	0.0033	1.8	8.9	4.4	mg/kg
4,4'-DDT	0.0033	1.7	7.9	2.5	mg/kg
PCBs, Total	0.1	1	1		mg/kg
Naphthalene	12	100	100	13	mg/kg
Benzo(a)anthracene	1	1	1	3	mg/kg
Benzo(a)pyrene	1	1	1	11	mg/kg
Benzo(b)fluoranthene	1	1	1	1.1	mg/kg
Benzo(k)fluoranthene	0.8	1	3.9	1.1	mg/kg
Chrysene	1	1	3.9	0.4	mg/kg
Dibenzo(a,h)anthracene	0.33	0.33	0.33	165000	mg/kg
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	3.2	mg/kg
Phenol	0.33	100	100	0.03	mg/kg
2-Methylphenol	0.33	100	100	0.1	mg/kg
Arsenic, Total	13	16	16	16	mg/kg
Barium, Total	350	350	400	820	mg/kg
Chromium, Total	30	36	180		mg/kg
Copper, Total	50	270	270	1720	mg/kg
Lead, Total	63	400	400	450	mg/kg
Manganese, Total	1600	2000	2000	2000	mg/kg
Mercury, Total	0.18	0.81	0.81	0.73	mg/kg
Zinc, Total	109	2200	10000	2480	mg/kg
Benzene	0.06	2.9	4.8	0.06	mg/kg
Ethylbenzene	1	30	41	5.5	mg/kg
Xylenes, Total	0.26	100	100	1.2	mg/kg
Acetone	0.05	100	100	0.11	mg/kg
Naphthalene	12	100	100	13	mg/kg
1,2,4-Trimethylbenzene	3.6	47	52	13	mg/kg

1 USCO: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
2 RSCO: New York NYCRR Part 375 Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
3 RRSCO: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
4 PGWSCO: New York TAGM Soil Cleanup Objective Protection of Groundwater, effective January 2007

LEGEND:

- BCP SITE BOUNDARY
- RI-1 - SOIL BORING COMPLETED MARCH 2021
- SB-9 - SOIL BORING COMPLETED NOVEMBER 2007
- MW-35 GWE 53.71 - SOIL BORING COMPLETED AUGUST 2007

SCALE: 1"=50'
0 50 100

© SESI CONSULTING ENGINEERS 2024
This drawing and all information contained here on is proprietary information of SESI CONSULTING ENGINEERS and may not be copied or reproduced, either in whole or in part, by any method, without written permission of SESI CONSULTING ENGINEERS.

REFERENCE:
1. SURVEY DATA OBTAINED FROM WARD CARPENTER ENGINEERS, INC, DATED MARCH 20, 2019.

N:\ACAD\11740\CAD\RIWP\11740 – SOIL_ALTERNATIVES.DWG 08/13/24 10:37:18AM, alan.ward, LAYOUT:FIG-8.3A

Cert of Auth #24GA27934700
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

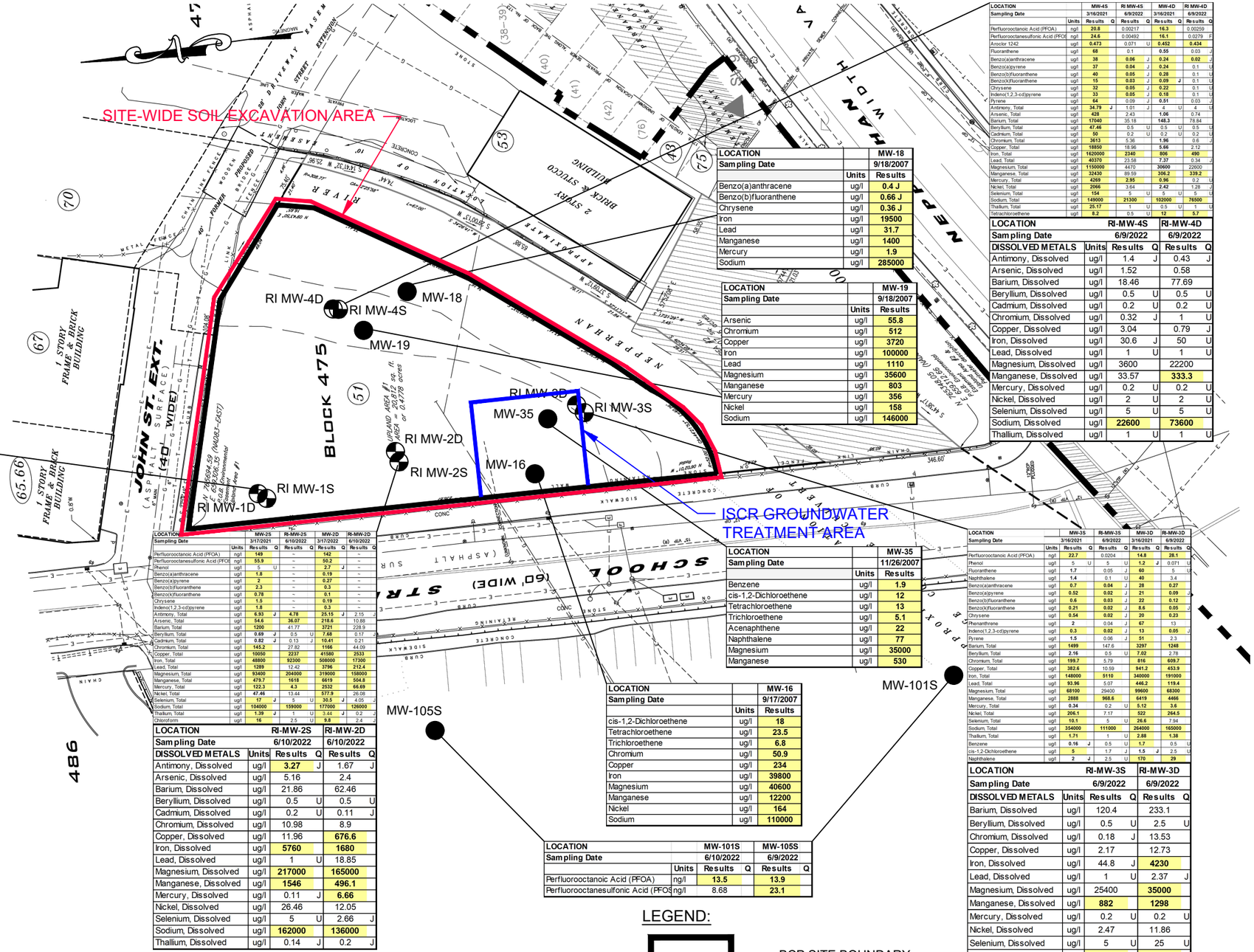
dwg by: APG
chk by: TK
scale: AS NOTED
date: 03/08/2024

project: FORMER YONKERS FIREHOUSE SITE (BCP#C360191)
32 JOHN STREET
YONKERS, NY 10701

title: SOIL ANALYSIS MAP - ALTERNATIVE 4

job no: 11740
drawing no:

FIG-8.3A

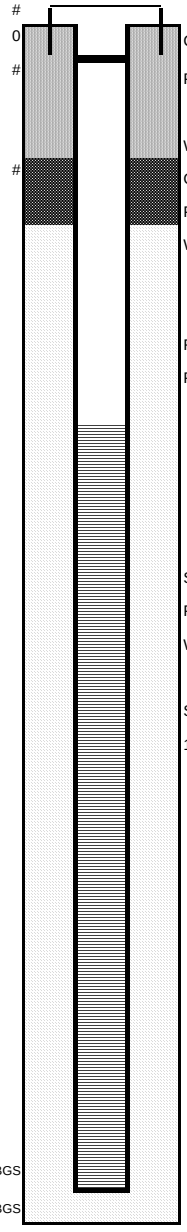

SITE-WIDE SOIL EXCAVATION AREA
ISCR GROUNDWATER TREATMENT AREA
RI MW-4D
RI MW-4S
MW-18
MW-19
RI MW-3D
RI MW-3S
MW-35
RI MW-2D
RI MW-2S
MW-16
RI MW-1S
RI MW-1D
MW-105S
MW-101S
BLOCK 475
JOHN ST. EXT.
(40' WIDE)
SCHOOL STREET
(60' WIDE)
NEPPERHAN AVENUE
RIVER TERRACE
ASPHALT DRIVEWAY
ASPHALT PARKING
BRICK & STUCCO BUILDING
2 STORY FRAME & BRICK BUILDING
1 STORY FRAME & BRICK BUILDING
WOODEN PROPPED BUILDING
CHAIN LINK FENCE
METAL FENCE
UPLAND AREA #1 = 0.4178 acres or 18,200 sq. ft.
N 765604.59 (NAD83-EAST)
E 834206.35
Ecosite Environmental
Surveyed June 2019
Bollard Area #1
N 765524.26
E 834206.77
S 14°50'37" W 25.56'
S 75°09'23" E 65.68'
N 75°09'23" W 65.68'
S 14°50'37" W 25.56'
N 14°50'37" E

Appendix A:

Off-Site Monitoring Well Construction Logs

SESI CONSULTING ENGINEERS	PROJECT NAME:	Chicken Island	MONITORING WELL NO.	**MW-101S**
	PROJECT LOCATION:	Yonkers, NY	JOB NO.	7190A
			GROUND ELEVATION:	

BORING BY: **EPI**	DATE STARTED	7/14/17	DEVELOPMENT PERIOD	1hr	INSIDE CASING DIAMETER (in)	2"
INSPECTOR: **NL**	DATE COMPLETED	7/14/17	DEVELOPMENT METHOD	purge	BOREHOLE DIAMETER (in)	6"
NJ DEP PERMIT NO.:	DATE DEVELOPED	7/14/17	DEVELOPMENT RATE	# gpm	INITIAL WATER LEVEL (ft):	



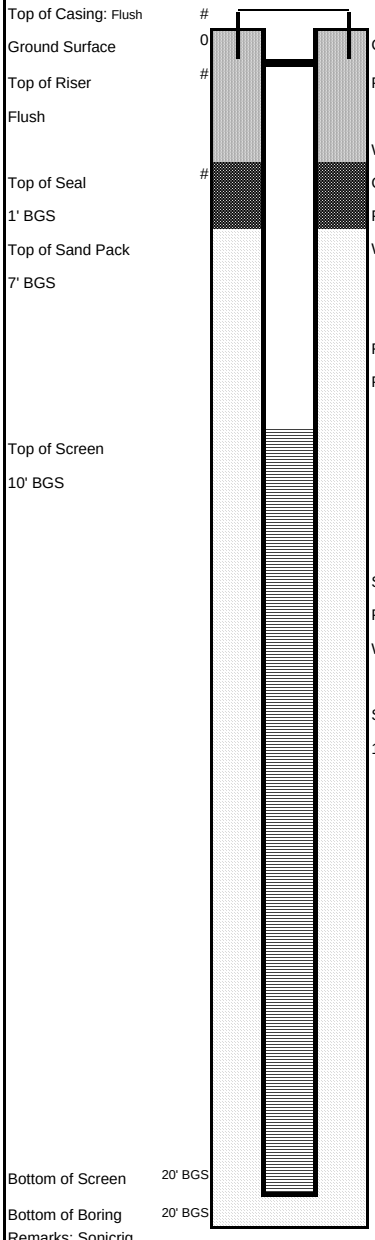
DEPTH (ft)	Sample	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	P.I.D.
0							8" asphalt (6" subbase, 2" top)	
							16" fill: Dark to light, Gray coarse to fine GRAVEL,	
							some Sand, trace silt with brick.	
							asphalt cobbles, moist	
5						27		
							3" cobbles, river rock	
							misc. cobbles, river rock	
10						8		
							mixed river rock and Light to dark gray rock	
15								
20						18		
							EOB ± 20' BGS	
25								
30								
35								
40								

Approximate Change in Strata: _____ Inferred Change in Strata: _ _ _ _ _ _ _ _ _ _ _ _

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted. Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.

SESI CONSULTING ENGINEERS	PROJECT NAME:	Chicken Island	MONITORING WELL NO.	**MW-105S**	
	PROJECT LOCATION:	Yonkers, NY	JOB NO.	7190A	
			GROUND ELEVATION:		

BORING BY: **EPI**	DATE STARTED	7/14/17	DEVELOPMENT PERIOD	1hr	INSIDE CASING DIAMETER (in)	2"
INSPECTOR: **NL**	DATE COMPLETED	7/14/17	DEVELOPMENT METHOD	purge	BOREHOLE DIAMETER (in)	6"
NJ DEP PERMIT NO.:	DATE DEVELOPED	7/14/17	DEVELOPMENT RATE	# gpm	INITIAL WATER LEVEL (ft):	



WELL CONSTRUCTION	DEPTH (ft)	Sample	Blows on Spoon 0/6	6/12	12/18	18/24	REC (in)	SOIL DESCRIPTION AND STRATIFICATION	P.I.D.
	0								
								8" asphalt (2" top coarse, 6" subbase)	
								4" Dark to light gray, coarse to fine GRAVEL, some Sand	
								trace Silt with brick, asphalt, cobbles; moist	
	5						12		
								Light to dark gray rock	
	10						8		
	15								
								Misc. cobbles; small, rounded river rock	
	20						18		
								EOB ± 20' BGS	
	25								
	30								
	35								
	40								

Approximate Change in Strata: _____ Inferred Change in Strata: _ _ _ _ _ _ _ _ _ _ _ _

The subsurface information shown hereon was obtained for the design and estimating purposes for our client. It is made available to authorized users only that they may have access to the same information available to our client. It is presented in good faith, but it is not intended as a substitute for investigations, interpretations or judgment of such authorized users. Information on the logs should not be relied upon without the geotechnical engineers recommendations contained in the report from which these logs were extracted. Soil descriptions represent a field identification after D. M. Burmister unless otherwise noted.