REMEDIAL INVESTIGATION/ INTERIM REMEDIAL MEASURES WORK PLAN

FOR

PIERCE ARROW SITE
1695, 1721, AND 1723 ELMWOOD AVENUE
CITY OF BUFFALO, ERIE COUNTY, NEW YORK
SITE NO. C915308

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ACRONYM LIST

AAR	Alternatives Analysis Report
ACM	Asbestos-containing Material
ASP	Analytical Services Protocol
BGS	Below Ground Surface
BSA	Buffalo Sewer Authority
CAMP	Community Air Monitoring Plan
CPP	Citizen Participation Plan
DER	Department of Environmental Remediation
DUSR	Data Usability and Summary Report
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
IRM	Interim Remedial Measures
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbons
PID	Photo-ionization Detector
RI	Remedial Investigation
RI/AAR/RWP	Remedial Investigation / Alternative Analysis Report/ Remedial Work Plan
SCO	Soil Cleanup Objectives
Site	2.86-Acre portion of Former Pierce Arrow Facility, Buffalo, New York
SVOC	Semi-volatile Organic Compounds
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

1 INTRODUCTION

This Remedial Investigation/Interim Remedial Measures (RI/IRM) Work Plan provides a description of the procedures that will be implemented to characterize the nature and extent of contamination of soil at the Pierce Arrow Site (the "Site") and the proposed methods to address that contamination. The Site has been assigned New York State Department of Environmental Conservation (NYSDEC) Site No. C915308 under the State's Brownfield Cleanup Program (BCP). This RI/IRM Work Plan has been prepared in accordance with Division of Environmental Remediation "Technical Guidance for Site Investigation and Remediation" (DER-10). To effectively characterize the environmental conditions, this RI/IRM Work Plan discusses the following:

- Current and historic site conditions
- Contaminants of concern and the extent of the contamination
- Extent of RI activities
- Quality controls and protocols for analytical sampling
- Health and safety procedures to protect site workers and the local community
- Community participation activities
- Proposed remedial measures

On October 14, 2016, Pierce Arrow LLC (the "Applicant"), acting as a BCP Volunteer, submitted a BCP Application to remediate and develop a portion of the larger Pierce Arrow Site. This particular portion consists of the buildings and land located at 1695, 1721, and 1723 Elmwood Avenue in Buffalo, New York (the "Site"). Investigative and remedial actions covered under this IRM will include the three parcels totaling 2.86 acres.

The Site is the location of the planned construction of a mixed use residential and commercial structure. The significant historic building will be repurposed into a quality residential facility with traditional apartments, residential and work studios, and loft style apartments. The project would include a complete historic renovation of the Pierce Arrow Administration Building (1695 Elmwood Avenue) and the original Pierce Arrow Garage (1721 and 1723 Elmwood Avenue). An RI will be implemented to further evaluate the extent of the contaminated fill material and to aid in the preparation of an Alternatives Analysis Report (AAR). **Section 4 Remedial Investigation** describes the scope of the investigation during remediation. This document also described proposed IRM actions intended to address known contamination present at the Site.

Closure sampling will be conducted during the performance of the RI. The results of the closure sampling will determine if remedial SCOs are achieved during the subsequent IRM.

1.1 Site Description

The Pierce Arrow Site is located in the City of Buffalo on Elmwood Avenue, at the intersection of Elmwood Avenue and Great Arrow Avenue, extending north to Conrail Railroad. The Site consists of three buildings from the former Pierce Arrow facility. The former Pierce Arrow Administrative Building located near the intersection of Elmwood Avenue and Great Arrow Avenue consists of a three- to four-story commercial building. A small parking lot is located along Elmwood Avenue and a private driveway, accessed from Great Arrow Avenue, runs along the east side of the building. The Site also consists of two conjoined buildings north of the

Administrative Building. These buildings were constructed as one-story brick and concrete slab-on-grade structures. A private driveway runs east to west in front of the buildings. Rail lines are located off-site to the immediate north of these buildings.

Figure 1 shows the location of the Site and **Figure 2** shows the Project Area and Site Boundaries.

The initial phase of the redevelopment will consist with historic renovation of over 150,000 square feet in the original Pierce Arrow Administration Building and an additional 40,000$^{+/-}$ square feet in the adjacent historical Pierce Arrow Garage. The grand auditorium space on the second floor of the building will be converted into a combined residential space and work center with a full service office and conference center, internet and Wi-Fi lounge, and still preserve, in part, the physical character of the original vaulted auditorium space. The building will be repurposed into a quality residential facility to accommodate both residential and Live/Work style spaces.

1.2 Site History

The land comprising the Site was historically divided into small, mostly residential lots that were consolidated in the early 1900s to facilitate the development of the Pierce-Arrow Motor Car Company.

The Pierce-Arrow Motor Car Company once built the world's most luxurious automobiles at the Site in Buffalo, New York. Pierce Arrow cars were manufactured on this facility from 1906 to 1938. The Site includes the former Administrative Building which was used primarily as office space and the two buildings along the rail line which were used to test engines. Ancillary uses within these buildings include aboveground and underground tanks for heating oil and gasoline storage, and coal storage. Since the closing of the Pierce Arrow facility, the Site has been used for commercial and industrial purposes. Past uses of the Site include the following:

- Tool and die manufacturing
- Cleaning compound manufacturing
- Garage, brazing and heat treatment
- Machine shop operations
- Dry cleaning
- Office space

Some remedial events were completed prior to Brownfield Cleanup Program sampling. On June 13, 2016, the NYSDEC was notified of an underground storage tank that was removed in November 2011 from the east side of the Administrative Building. The tank was removed and cut into pieces onsite. The tank size, contents, and removal of contaminated soil is unknown at this time, but is located in the NYSDEC as open spill number 1602559.

Based on recent investigation results, contaminated urban fill appears to have been deposited at the Site at some point in its history.

1.3 Site Geography, Geology, and Hydrogeology

The Site is generally flat, although certain minor variations in elevation are present. The Site contains a mix of buildings, asphalt parking/driveway areas and landscaped areas containing trees.

The Site contains urban fill with observed thickness ranging up to approximately one to three feet. Native clay is located below the fill.

Urban fill is defined as material coming from anthropogenic sources of the material re-worked to build a site to a defined grade. The urban fill material at the Site contains:

- Crushed Rock
- Sand
- Silt
- Clay
- Plastics
- Construction Debris
- Lumber
- Ash/Cinders
- Ceramics
- Bricks
- Metal

Native soil encountered beneath the fill consisted of soft to moderately stiff orange brown clay with some very stiff to extremely stiff reddish clay at deeper levels.

Groundwater was not observed during the Phase II investigation. Based on a review of NYSDEC data, the Site is not underlain by any mapped principal or unconfined aquifers. Groundwater at and in the vicinity of the Site is not used for public drinking water supply.

2 SUMMARY OF ENVIRONMENTAL CONDITIONS

2.1 Environmental Reports

Environmental information currently exists for the Site from a Phase I Environmental Site Assessment (ESA) completed at the Site by KTR Newmark in 2006, a Phase I/II ESA completed by AEI Consultants in 2011, surface soil sampling conducted by C&S in 2016, a geophysical survey conducted in 2016, and a Pre-Renovation Asbestos Inspection Report completed by AMD Environmental Consultants, Inc. in 2016. The associated documents are included in **Appendix A.**

2.1.1 KTR Newmark Phase I ESA Report (2006)

The Phase I ESA for the Site identified the following Recognized Environmental Conditions (RECs):

- According to available records from the Buffalo Fire Department, there are four 550-gallon heating oil underground storage tanks (USTs) at the Subject Property that have been unaccounted for since 1952. There are no records of these USTs ever having been removed or closed in place.
- One 200-gallon single-walled steel AST with unknown contents was noted during the site reconnaissance in the rooftop elevator mechanical room. The AST vent and fill pipes were not observed at the Subject Property. The AST has reportedly not been utilized in many years, and may have been a steam expansion tank for the former oil-fired heating system.
- The review of fire insurance maps indicated that several manufacturing buildings were present on the adjacent north and east properties relative to the Subject Property. Such buildings included a chemical laboratory located at 1711 Elmwood Avenue on the adjacent north and upgradient parcel and a garage, brazing facility, and heat-treating facility along a set of railroad tracks located to the north relative to the subject property. Buildings to the east included the main manufacturing plant for the former Pierce Arrow
- The review of historical street directories indicated past activities of environmental concern. Several current and former tenants of the subject property include photodevelopers, a graphics printing company, a chemical laboratory, and a metal fabricating business.
- Several railroad tracks were historically observed to the north and down gradient relative to the Subject Property since circa 1916. Historically, railroad tracks were treated with defoliants that potentially contained polychlorinated biphenyls (PCBs).

2.1.2 AEI Consultants Phase I ESA Report (2011)

The Phase I ESA for the Site identified the following RECs:

- Areas of the Subject Property have been occupied by a series of tenants that likely utilized the spaces for industrial purposes since at least 1938. These tenants include a tool and die manufacturer, cleaning compound manufacturers, chemical laboratories, a machine shop, dry cleaning facilities, and numerous other light industrial tenants. No other information was available regarding the historical operations of these facilities. These tenants likely stored and/or utilized petroleum products and other hazardous materials including hydraulic fluids and cleaning solvents. Due to the duration of industrial use, the unknown operations performed onsite, and the likely use of petroleum products and hazardous

substances, all under circumstances outside of regulatory agency oversight (prior to modern oversight standards), it is likely that the historical use has resulted in a release of hazardous substances or petroleum products to the subsurface of the Subject Property and represents a REC.

- One pad mounted transformer is located in the sub-grade basement of the Subject Property building. The transformer was reportedly the original transformer for the building and is still used in combination with a newer transformer for the building. Based on the presumed date of installation, the transformer is expected to contain polychlorinated biphenyls (PCBs). The presence of the historic transformer that is likely to contain hazardous materials represents a REC.
- Significant staining and pooling of unidentified liquids was observed in the vicinity of the drain located within the elevator pit adjacent to the former furniture woodworking shop. Due to the age of the building and the unknown integrity of the drain lines, the floor drain has the potential to act as a conduit to the subsurface of the Subject Property for any materials that are spilled around or discharged into the drain lines. Based on the quantity of staining and pooling liquids observed in combination with the presence of a floor drain, the potential that a release to the subsurface of the Subject Property has occurred could not be ruled out.

2.1.3 AEI Consultants Phase II ESA Report (2011)

A Phase II was completed in 2011 to provide additional information on the RECs discovered during the Phase I ESA. The Phase II consisted of the advancement of nine soil borings to approximately 12 feet below grade on 1695 Niagara Street. Nine soil samples were collected and analyzed for US Environmental Protection Agency (EPA) Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), and Target Analyte List (TAL) metals including mercury. Soil samples were also analyzed for PCBs.

The results indicated the presence of chromium, lead, mercury and various SVOCs at concentrations above the NYSDEC's Soil Cleanup Objectives Unrestricted Use (SCOs). A portion of the analyte concentrations also exceeded the Residential, Restricted Residential, Commercial, and/or Industrial Use SCOs.

2.1.4 C&S Surface Soil Sampling (2016)

Ten surface soil samples were collected from the Site. Eight surface soil samples were collected around the 1721 and 1723 Elmwood Avenue properties and two surface soil samples were collected on the 1695 Elmwood Avenue property. Surface soil samples were collected from the top two inches of soil, although in some cases the surface was covered by asphalt or bricks. In these instances, samples were collected directly underneath the asphalt or brick. All ten samples were collected and analyzed for SVOCs and TAL metals.

The results indicated the presence of arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc and SVOCs at concentrations above the Unrestricted Use SCOs. A portion of the analyte concentrations also exceeded the Residential, Restricted Residential, Commercial, and/or Industrial Use SCOs.

2.1.5 C&S Geophysical Survey

New York Leak Detection (NYLD) conducted a geophysical survey of the proposed BCP Site. NYLD used ground penetrating radar technology to scan the Site for underground storage tanks (UST). One possible UST was identified in the private driveway along the Administrative Building. Two concrete vaults were also identified along Elmwood Avenue.

2.1.6 AMD Environmental Consultants Asbestos Inspection

AMD Environmental Consultants, Inc. conducted a pre-renovation asbestos inspection of the BCP Site from September 26th – 29th, 2016 for the administrative building and the north garage structure. Asbestos containing materials (ACM) were identified above 1% in materials that were sampled. Asbestos containing materials included:

- Wall panel mastic
- 9" x 9" and 12" x 12" Floor tiles and floor tile mastic
- Floor leveler
- Thermal system insulations
- Hot water tank
- Boiler insulation and breeching
- Fire door
- Sink insulation
- Transite pipe and exhaust stack
- Repair tar
- Door and window caulk
- Roofing

Since asbestos containing materials were identified and will be disturbed by proposed renovation work, proper asbestos abatement procedures should be implemented prior to the commencement of said work.

Site characterization efforts conducted to assess contaminant concentrations at the Site are summarized on **Figure 3**. Analytical results from the investigations are summarized in **Section 2.2** below.

2.2 Nature and Extent of Contamination

The Site soils generally consist of one to three feet of urban fill material. Consistent with urban fill found throughout the City of Buffalo, this urban fill contains SVOC and metal contamination, as shown in recent sampling. No discrete contamination layer was observed within the fill, and therefore, the extent of contamination within the fill material is difficult to identify due to its heterogeneous nature.

The Phase II completed in 2011 by AEI Consultants resulted in evidence of contamination. Two of the nine soil samples analyzed for TCL SVOCs contained analyte concentrations exceeding Restricted Residential Use SCOs. One of the two samples contained polycyclic aromatic hydrocarbons (PAHs), benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene, at concentrations exceeding Commercial Use SCOs. In the same sample, benzo(a)pyrene was detected at concentrations exceeding Industrial Use SCOs.

Three samples contained concentrations of metals (chromium, lead or mercury) that were above Unrestricted Use SCOs. All soil samples exceeded for total chromium. NYSDEC standards separate chromium into trivalent and hexavalent. Soil samples were collected for total chromium and the results need to be compared to the more restrictive hexavalent chromium SCO.

The surface soil sampling completed in 2016 by C&S resulted in additional evidence of contamination. Ten surface soil samples were collected from the Site with eight surface soil samples collected around the 1721 and 1723 Elmwood Avenue properties and two surface soil samples collected on the 1695 Elmwood Avenue property.

All ten samples were collected and analyzed for SVOCs and TAL metals and contained at least one metal concentration that exceeded Unrestricted Use SCOs. Arsenic concentrations exceeded Industrial Use SCOs in two of the ten samples. Concentrations of copper exceeded Commercial Use SCOs in two of the ten samples. Cadmium concentrations exceeded Residential and Restricted Residential SCOs in three samples.

Eight of the ten surface soil samples contained SVOC concentrations at least above Restricted Residential Use SCOs. From the eight samples with elevated SVOC concentrations, seven samples contained levels of benzo(a)pyrene above Industrial Use SCOs.

Based on investigations conducted to date, the known contaminants of concern include SVOCs and metals including arsenic, copper, and cadmium in surface soils and in the fill.

The variation in analyte concentrations across the Site indicates that the source of contamination is the variable urban fill material and no discrete source is located onsite or offsite. Contaminated urban fill is expected to exist onsite from surface to an average approximate depth of three feet below grade.

3 OBJECTIVES, SCOPE AND RATIONALE

The objectives of the scope of work described in this Work Plan are to evaluate contaminant impacts to soil and identify and evaluate appropriate remedial actions necessary to redevelop the Site. The investigation work will include evaluating the magnitude and extent of contaminant impacts, conducting a qualitative exposure assessment for actual or potential exposures to contaminants at the Site and/or emanating from the Site, and producing data that will support the development of an acceptable RI Report and subsequent Alternatives Analysis Report (AAR). The IRM portion of this document details the remedial methods proposed to address the contamination present at the Site.

The RI is based on information previously gathered regarding historical operations conducted at the Site, the results of the limited site characterization, and the project objectives. The RI will include the following:

- Drainage Evaluation – This task will consist of flushing out and video logging the floor drains in the garage building.

- Soil Evaluation – This task will consist of four primary elements: surface soil, urban fill, soils under the buildings, and underlying native soil characterization.

    - The surface soils will be characterized to assess the extent and magnitude of contamination in all areas not covered by pavement.

    - The urban fill will be characterized to identify the extent and magnitude of contamination within the fill. This material will also be the subject of waste characterization sampling because subsequent remedial activities would possibly include the excavation and off-site disposal of the urban fill.

    - The soils under the two buildings will be characterized to determine if contaminant impacts are present under the building.

    - The underlying native soils will be characterized to determine the depth of impacts from the overlying urban fill.

- Groundwater Evaluation – Subsequent to completing the above tasks, groundwater monitoring wells will be installed. Although groundwater impacts at the Site are not anticipated, groundwater monitoring wells have been proposed to characterize site-wide groundwater conditions.

- Air Sampling – Sub-slab and indoor air sampling in the administrative building will be performed contingent on finding petroleum contamination at the site.

Additionally, because impacted fill is known to exist across portions of the Site, the proposed IRM is intended to address this contamination within the urban fill. The IRM tasks include removing the AST that is located along the side of the garage building, excavating the urban fill above the native soil and backfilling the excavation.

The RI and IRM activities will be completed in accordance with NYSDEC Division of Environmental Remediation: Technical Guidance for Site Investigation and Remediation dated May 2010 (DER-10).

4 REMEDIAL INVESTIGATION

A previous soil investigation encountered fill material at the Site that is impacted by SVOCs and metals at concentrations above NYSDEC Soil Cleanup Objectives (SCOs). This part of the RI Work Plan describes the scope of investigative work necessary to collect sufficient data to determine the extent of contaminated fill material which will support a subsequent AAR and RWP in achieving **Unrestricted Use SCOs**. This section of the RI Work Plan includes:

- Field Investigation
- Sampling Program
- Laboratory Analysis

4.1 Field Investigation

The RI intends to supplement the previous site characterization information by the advancement of soil borings, installing monitoring wells, and collecting and analyzing soil and groundwater samples. In addition, floor drains in the garage building will be flushed out and video logged. Contingent sub-slab and indoor air sampling of the administrative building will be necessary in the event that petroleum contamination is found somewhere onsite.

4.1.1 Video Inspection

The Garage Building had been used to test and run automobile engines and contains a number of floor drains. The condition, location, and contents of the floor drains are not known and concern exists for the presence of petroleum within the floor drains due to previous uses of the building as well as releases from the floor drains. However, if the floor drain system is viable, the system may be used following redevelopment of the building.

To initiate the cleaning and closure of the floor drain and associated piping system, a video inspection will be performed and the potential for removal of the water and sediment, if any, from and closure of the system will be evaluated. The video inspection will include the use of a video camera mounted on flexible hose or a camera tractor to assess the condition and length of the floor drain system.

The video equipment will be lowered into available access points and will remotely travel as far as possible in both directions. If the termination of the piping system is not reached in one or both directions, the equipment will be extracted and placed in other locations to attempt to reach the termination points. The equipment will be decontaminated following completion of the survey.

The results of the video inspection will be used to help determine:

- If the system does or once contained petroleum products
- If the piping is intact or if breaks exist at which contaminants may have been released
- The final discharge point(s)
- If the system can be reused during future reuse of the building

4.1.2 Surface Soil Sampling

Surface soil samples will be collected across the Site. The eight surface soil samples will be spatially distributed across the Site in areas not “capped” by asphalt or buildings. The samples

will be collected from 0 to 2 inches below grade using a decontaminated, stainless steel spoon or spatula. Surface soil samples will be collected at the locations shown on **Figure 4**.

The surface soil samples will be analyzed for the following analyte list:

- Target Compound List (TCL) volatile organic compounds (VOCs)
- TCL semivolatile organic compounds (SVOCs)
- TCL List pesticides/herbicides
- Polychlorinated biphenyls (PCBs)
- Target Analyte List (TAL) metals, including total mercury
- Total cyanide
- Hexavalent chromium (from 4 of 8 samples only)

4.1.3 Soil Boring Program

The advancement of soil borings across the Site will facilitate sampling of native material, fill material, and construction of groundwater monitoring wells. To ensure complete coverage of the Site, borings will be located around the building perimeter and in the buildings, as shown on **Figure 4**, resulting in 47 locations. All sub-slab areas within the building showing signs of staining and product will be investigated. If petroleum odors and/or elevated PID readings over 10 ppm will be sampled for indoor air and soil vapor beneath the sub-slab as discussed in **Section 4.1.1 Soil Vapor Sampling.**

From the borings, fill and native soil samples will be collected to document Site conditions. Up to 8 locations will also be used for the construction of groundwater monitoring wells, as discussed in **Section 4.1.3 Groundwater Monitoring**.

For the borings in which wells will not be installed, a direct-push drilling rig will be used to advance the borings. Each boring location will be continuously sampled in four-foot intervals using a one-inch by four-foot steel sampling tube fitted with a disposable acetate liner. All non-disposable sampling equipment will be decontaminated between runs and between drill locations to avoid potential cross contamination of samples.

In locations where direct-push techniques are not feasible and/or groundwater wells will be constructed, a rotary drill will be used to advance 4-1/4-inch hollow stem augers. Split-spoon samples will be advanced at two-foot intervals using a 140-pound hammer ahead of the augers. The augers and drilling rods will be decontaminated prior to use via high pressure sprayer. The split-spoons will be decontaminated prior to use via an Alconox wash followed by a potable water rinse. Between each soil sample and soil boring, decontamination procedures will be repeated.

Soils from the split-spoons and acetate liners will be screened in the field for visible impairment (e.g. staining), olfactory indications of impairment, evidence of NAPLs, and/or indication of detectable VOCs with a 10.6 eV PID over 10 ppm, collectively referred to as “evidence of impairment” and the results will be recorded on boring logs. The boring logs will be included in the RI Report.

Soil boring logs will be completed and include soil description, PID readings, etc. The boring logs will be included in the RI Report.

Fill Sampling

Fill samples will be collected from the borings based on evidence of impairment and to provide characterization across the Site. Up to 16 fill samples will be collected based on evidence of impairment, spatial distribution, and fill type. At least one sample will be collected from each fill type encountered and at least two samples will be collected from borings within each of the buildings. The fill samples will be collected and analyzed for the following:

- TCL volatile organic compounds (VOCs)
- TCL semivolatile organic compounds (SVOCs)
- TCL pesticides
- Polychlorinated biphenyls (PCBs)
- TAL List metals
- Total cyanide (from 8 of 16 samples only)
- Hexavalent chromium (from 8 of 16 samples only)

Additionally, two samples will be collected from the fill for waste disposal characteristics. The waste characterization analysis will include:

- Toxicity Characteristic Leaching Procedure (TCLP) VOCs
- TCLP SVOCs
- TCLP pesticides/herbicides
- PCBs
- TCLP metals
- Reactivity
- Corrosivity
- Ignitability

Native Soil Sampling

In the exterior borings, native soil will be visually assessed and sampled in each of the locations. In order to assess the impact of fill on the underlying native soil, a soil sample will be collected from the top of native material in each location. Four additional native soil samples will be collected at six-inch intervals below that and held. The 26 native soil samples will be collected and analyzed for:

- TCL VOCs
- TCL SVOCs
- TCL pesticides
- PCBs
- TAL metals
- Total cyanide (from 13 of 26 samples only)
- Hexavalent chromium (from 13 of 26 samples only)

The samples held by the laboratory immediately underneath those samples with contraventions of SCOs will be analyzed for those analytes exceeding the SCOs. This process will be repeated until the concentrations meet the SCOs. Based on the results, the native soil samples will also serve as the final confirmatory samples during the subsequent remedial activities.

4.1.1 Soil Vapor Sampling

If significant VOC contamination of subsurface soils adjacent to the Administration Building or encountered underneath the sub-slab during the Remedial Investigation or the Interim Remedial Measures, a soil gas survey may be necessary. The scope of this contingent soil vapor assessment will be discussed with and approved by the NYSDEC and the New York State Department of Health (NYSDOH) prior to implementation.

4.1.2 Groundwater Monitoring

To characterize groundwater conditions at the Site, up to eight monitoring wells will be installed. The wells will be installed from soil borings discussed in **Section 4.1.1 Soil Borings** and sampled. At least three wells will be distributed across the Site for groundwater flow determination. Additional wells will be installed around anomalies and in borings with evidence of impairment. The proposed well locations will be based on field observations and will be submitted to the NYSDEC for review prior to installation.

The overburden wells will be constructed to intersect the top of the water table. Each well will be completed with 5 to 10 feet of 2-inch Schedule 40 0.010-slot well screen connected to an appropriate length of schedule 40 PVC well riser to complete the well. The annulus will be sand packed with quartz sand to approximately one to two feet above the screened section, and one to two feet of bentonite chips or pellets above the sand. The remaining annulus will be grouted to ground surface. Each well will be completed without a stick-up protective casing.

Following installation, the monitoring wells will be developed through the removal of up to ten well volumes using dedicated bailers or a peristaltic or submersible pump.

Groundwater sampling will follow well development and be conducted using low-flow purging and sampling techniques. Before purging the well, water levels will be measured using an electric water level sounder capable of measuring to the 0.01-foot accuracy. Peristaltic or bladder pumps using manufacturer-specified tubing will be used for purging and sampling groundwater. Calibration, purging and sampling procedures will be performed as specified by the USEPA[1] for low-flow sampling. Decontamination will be conducted after each well is sampled to reduce the likelihood of cross contamination. Calibration times, purging volumes, water levels and field measurements will be recorded in a field log and will be provided in the Final Engineering Report.

The groundwater samples will be analyzed for the following analyte list:

- TCL VOCs
- TCL SVOCs
- TCL pesticides
- PCBs
- TAL metals
- Total cyanide (from 4 of 8 samples only)
- Hexavalent chromium (from 4 of 8 samples only)

[1] U.S. EPA Region 1 Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, January 19, 2010.

Drilling decontamination, development, and purge fluids will be allowed to infiltrate the ground surface of the Site in the vicinity of each soil sampling location, unless these fluids contain petroleum / chemical odors and/or showing signs of contamination must be collected and treated or disposed. Excess soil will be placed in a drum for subsequent removal.

A second round of groundwater sampling will be performed one to three months after the first round. The second round of groundwater samples will be analyzed for the same analytes as in the first round.

4.2 Sampling Plan and Laboratory Analysis

Table 1 summarizes the sampling program described in the sections above. Additionally, Quality Assurance/Quality Control (QA/QC) samples will be collected, and the following describes the minimum number of samples per media type.

- Soil samples (excluding waste characteristic samples)
    - Matrix Spike/Matrix Spike Duplicate (MS/MSD) – 5%
- Groundwater samples
    - Trip blank – 1 per shipment
    - Blind Duplicate – 5%
    - Matrix Spike/Matrix Spike Duplicate (MS/MSD) – 5%

C&S will utilize the services of an NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory for analytical testing. The laboratory results for the samples will be reported in a Category B deliverables package to facilitate validation of the data, and a third party validator will review the laboratory data and prepare a Data Usability Summary Report (DUSR). The validator will evaluate the analytical results for the field samples and quality assurance/quality control samples and compare the findings to USEPA guidance to determine the accuracy and validity of the results.

5 QUALITY ASSURANCE AND QUALITY CONTROL PROTOCOLS

To ensure that suitable and verifiable data results are obtained from the information collected at the Site, quality assurance procedures are detailed in this section.

During the RI or IRM the NYSDEC may spilt any waste, soil or groundwater sample.

5.1 Sampling Methods, Analytical Procedures and Documentation

5.1.1 Sampling Methods

Sampling procedures will be conducted in accordance with the NYSDEC *Sampling Guidelines and Protocols Manual*. Collection of representative samples will include the following procedures:

- Ensuring that the sample taken is representative of the material being sampled;
- Using proper sampling, handling and preservation techniques;
- Properly identifying the collected samples and documenting their collection in field records;
- Maintaining chain-of-custody; and
- Properly preserving samples after collection.

Soil Sampling

Soil sampling will be performed using two methods: (1) field screening using a PID; and (2) grab samples. Whether soil samples are collected from the excavator bucket, direct-push rig sleeves, or split-spoons, they will be collected as grab samples that are split and placed into jars supplied by the laboratory as well as into individual zip-lock bags for screening. Screening soil samples will be allowed to sit in sealed zip-lock bag for a short period of time (minimum of five minutes). Head space measurements will then be taken from each zip-lock bag. To prevent cross contamination, zip-lock bags will not be reused and will be properly disposed. Calibration of all electronic field screening equipment will be completed daily and will be done to manufacturer's specifications.

As detailed in the *Sampling Guidelines and Protocols Manual*, grab samples will be placed in 4-ounce and 8-ounce, wide-mouth, glass jars. Sample jars will immediately be placed on ice in a cooler.

Water Sampling

Groundwater sampling will be conducted in accordance with USEPA guidance for low-flow purging and sampling, as described in **Section 4**.

Water samples will be collected via pouring directly into pre-cleaned bottles provided by the laboratory and immediately placing the bottles on ice. The bottles and associated preservatives used, if any, will be based on the requirements of the analytical methods. The water will be analyzed for VOC, SVOC, PCBs, pesticides and metals on a standard turnaround time.

QA/QC Sampling

Matrix Spike /Matrix Spike Duplicates (MS/MSD) and duplicate samples will be collected from a minimum of 5% of the locations, and will be selected randomly. Quality Assurance/Quality Control samples will not be collected and analyzed for the waste characterization sampling.

Table 6-1: Summary of Estimated Sampling

Sample Type	***Matrix***	***Est. #***	***Purpose***
Urban Fill	Soil	16	Characterization
Native Soil	Soil	26	Confirmatory
Groundwater	Water	16	Characterization
Duplicate Groundwater	Water	2	QA/QC
MS/MSD –So.	Soil	3	QA/QC
MS/MSD –Aq.	Water	2	QA/QC
	Total	**65**	

5.1.2 Analytical Procedures

Laboratory Analysis

Laboratory analysis will be conducted by a third-party laboratory that is accredited by the NYSDOH Environmental Laboratory Accreditation Program (ELAP). Laboratory analytical methods will include the most current NYSDEC Analytical Services Protocol (ASP).

Soil and groundwater samples sent to a certified laboratory will be analyzed in accordance with EPA SW-846 methodology for the following contaminants:

- TCL Volatile Organic Compounds (EPA Method 8260);
- TCL Semi-Volatile Compounds (EPA Method 8270);
- TCL Pesticides (USEPA 8081);
- PCBs (USEPA 8082); and
- TAL Metals (EPA Method 6010).

Category B deliverable will be requested to be used in a third-party data validation.

Data Usability

Data Usability Summary Report (DUSR) will be performed by a third-party data consultant using the most recent methods and criteria from the U.S. EPA. The DUSR will assess all sample analytical data, blanks, duplicates and laboratory control samples and evaluate the completeness of the data package. The waste characterization samples will not be validated.

5.1.3 Documentation

Custody Procedures

As outlined in NYSDEC *Sampling Guidelines and Protocols*, a sample is in custody under the following conditions:

- It is in your actual possession;
- It is in your view after being in your physical possession;
- It was in your possession and then you locked or sealed it up to prevent tampering; or
- It is in a secure area.

The environmental professional will maintain all chain-of-custody documents that will be completed for all samples that will leave the Site to be tested in the laboratory.

Air Monitoring

Air monitoring will be conducted for on-site health and safety. Air monitoring will be conducted during active invasive activities periods. The monitoring will include VOC screening. The specifics of the air monitoring procedures and criteria are detailed in the Health and Safety Plan (HASP) in **Appendix D** and Community Air Monitoring Plan (CAMP) in **Appendix C.**

6 HEALTH AND SAFETY

To verify the safety of the workers and the local community during the performance of the work, monitoring practices of the work environment will be in place during all phases of RI activities. A Health and Safety Plan (HASP) was prepared that details procedures for maintaining safe working conditions and minimizing the potential for exposure to hazardous material. The HASP is provided in **Appendix D**.

Air monitoring during RI activities will be conducted using PID and an aerosol particle meter. Details on air monitoring are provided in the Community Air Monitoring Plan (CAMP). The CAMP is provided in **Appendix C**.

7 INTERIM REMEDIAL MEASURES

The Site is known to contain fill with concentrations of contaminants above the SCOs, Interim Remedial Measures are being planned to:

- Remove and properly dispose of all impacted fill material to meet Unrestricted Use SCOs.
- Removal of any petroleum storage tanks and impacted soil around the tanks.
- Backfill the excavation with material that meets Unrestricted Use SCOs.

The following sections identify the steps to be taken to implement the IRMs.

7.1 Site Control

Site control is an important aspect of this remedial program. In order to safeguard the health and safety of site workers and the general public, access to all remedial work areas will be restricted. Perimeter fencing will be installed to facilitate site control. Additionally, temporary construction fencing will be erected around accessible excavations and staging areas to prevent unauthorized personnel from entering these areas as appropriate.

7.2 Site Preparation

Site preparation activities will include the following:

7.2.1 Water Collection and Treatment System

Contingent plans will be created to address stormwater, if any, in the excavation. These plans include the potential for pumping the excavation water using temporary sumps or a vacuum truck into steel holding tanks. Stored water will either be shipped for off-site treatment at a licensed treatment facility or will be characterized and treated, if necessary, on-site and discharged to the sanitary sewer under a Buffalo Sewer Authority permit, as appropriate.

7.3 Excavation

Excavation is planned to occur across the Site and will include the removal and off-site disposal of all fill material to achieve Unrestricted Use SCOs. Fill excavated from the Site will not be re-used at other sites.

The depth of the excavation will be based on the sampling completed. The RI sampling will include one native soil sample from various locations around the buildings.

Although petroleum or other similar impacts are not anticipated, a C&S scientist or engineer will screen the removed fill for visual and olfactory observations and for total volatile compounds using a photoionization detector (PID). If grossly contaminated fill is observed, the impacted material will be evaluated and may be handled separately from the remaining fill at the Site.

As outlined in CP-51 Section G, soils that meet DEC-approved soil cleanup levels may exhibit a distinct odor or other type of nuisance. When the DEC determines that soil remaining after the remedial action will result in the continuation of the nuisance, the DEC will require that additional

remedial measures be evaluated, and may require additional remedial actions to be taken to address the nuisance condition.

Excavated fill may be direct-loaded onto trucks for off-site disposal or stockpiled and loaded onto trucks for off-site disposal. Excavated fill to be stockpiled on-site will be placed on and covered by a minimum of double 6-mil polyethylene sheeting which is sufficiently anchored to prevent any wind and water erosion. The cover will be inspected at least once per day with corrective action taken as needed. The inspections and any corrective actions will be documented in logs and will occur until the fill materials have been properly removed and disposed off-site.

Good housekeeping practices will be followed during excavation activities to prevent leaving contaminated material on the ground surface (e.g., precautions will be taken to prevent impacts to the ground surface due to material spilled from the excavator bucket).

Transportation of all wastes will be completed by properly permitted vehicles. To the extent practicable, trucks will travel along routes that avoid residential areas.

7.4 Backfilling

The excavation at the Site will be backfilled with material such as clean soil, crushed stone, and/or concrete.

For each source of backfill that is imported to the Site, one of the following will be completed prior to importing the backfill.

a. Documentation will be provided to NYSDEC as to the source of the material and the consistency of the material in accordance with the exemption for no chemical testing listed in DER-10 Section 5.4(e)(5); **OR**

b. Chemical testing will be completed in accordance with the following table:

<table>
<tr><td colspan="4">Recommended Number of Soil Samples for Soil Imported To or Exported From a Site</td></tr>
<tr><td>Contaminant</td><td>VOCs</td><td colspan="2">SVOCs, Inorganics & PCBs/Pesticides</td></tr>
<tr><td>Soil Quantity (cubic yards)</td><td>Discrete Samples</td><td>Composite</td><td>Discrete Samples/Composite</td></tr>
<tr><td>0-50</td><td>1</td><td>1</td><td rowspan="8">3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis</td></tr>
<tr><td>50-100</td><td>2</td><td>1</td></tr>
<tr><td>100-200</td><td>3</td><td>1</td></tr>
<tr><td>200-300</td><td>4</td><td>1</td></tr>
<tr><td>300-400</td><td>4</td><td>2</td></tr>
<tr><td>400-500</td><td>5</td><td>2</td></tr>
<tr><td>500-800</td><td>6</td><td>2</td></tr>
<tr><td>800-1000</td><td>7</td><td>2</td></tr>
<tr><td>1000</td><td colspan="3">Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER</td></tr>
</table>

Taken from DER-10 - Table 5.4(e)10

In the event that laboratory analytical testing is conducted, the results for each new source of fill must meet the values provided in Appendix 5 of DER-10 (provided as Appendix C in this Work Plan) for Restricted Residential use and must receive approval by the NYSDEC.

7.5 Air Monitoring

Continuous air monitoring will be conducted at upwind and downwind locations during all ground intrusive activities as per the NYSDOH Generic Community Air Monitoring Plan (CAMP) included in **Appendix C**. A particulate monitor will be used at a downwind location on the perimeter of the Site. Another handheld detector will be used in the excavation to ensure that the worker area is safe.

The action threshold for VOCs established in the CAMP is 5 ppm above background. If this value is exceeded for the 15-minute average, work will be halted and work may resume once instantaneous readings fall below 5 ppm work. The action level for dust is 100 micrograms per cubic meter over background during a 15-minute average. If this limit is exceeded, dust suppression techniques will be employed, including using water to wet the area.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

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

If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

7.6 Erosion and Dust Controls

As part of the remedial actions to be performed at the Site, measures will be needed to limit erosion and dust generation. Erosion control and dust suppression techniques will be employed as necessary to limit erosion and fugitive dust generated in disturbed areas during remediation and redevelopment activities. Such techniques may be employed even if the community air monitoring results indicate that particulate levels are below action levels. Techniques may include but are not limited to:

- Using silt fencing, hay bales, and/or mulching;
- Applying water on haul roads;
- Wetting equipment and excavation surfaces;
- Hauling materials in properly tarped or watertight containers;
- Limiting vehicle speed on the Site;
- Limiting the size of excavations; and
- Covering excavated areas and materials following excavation.

Effectiveness of the dust suppression measures will be evaluated based on the results of the air monitoring that will be conducted under the Site-Specific Community Air Monitoring Plan provided in **Appendix C**.

7.7 Confirmatory Sampling

The RI will determine the depth of impacts from the overlying urban soil. Excavation depths will be determined from the RI results; additional confirmatory sampling will not be necessary.

7.8 Summary of Interim Remedial Measures

The IRM as described above will be effective in remediating the Site.

All confirmatory soil samples collected during the RI will meet Unrestricted Use SCOs at the bottom depth of the excavation for that grid location following the excavation. The urban fill materials will be properly excavated and disposed off-site. Backfill materials will meet NYSDEC requirements for backfill at BCP sites.

8 REPORTING

Based on the results of the work described above, one report will be prepared to describe the methodologies and results of the RI and IRM. The report will also include an Alternatives Analysis for any contamination remaining at the Site following implementation of the IRMs. The RI and IRM portions of the Report will describe:

- Investigative methods;
- Observations and findings;
- Comparison of soil sample results to Unrestricted Use SCOs;
- Inspection/Monitoring observations of the remedial measures;
- Results of the community air monitoring program; and
- Analytical results.

The AAR portion of the Report will include the following elements:

- An Alternatives Analysis
  - Description of remaining contamination, if any
  - Identification of potential, additional remedial measures
  - Evaluation of potential, additional remedial measures, including no action following the remediation
  - Identification of recommended additional remedy

The documents will be submitted to the NYSDEC for review and approval.

9 SCHEDULE

It is assumed that NYSDEC will promptly review this RI/IRM Work Plan followed by a 30-day comment period. Below is an anticipated schedule of milestones for the remediation of the Site.

Anticipated Date Milestone

January 2017: Preparation/execution of Brownfield Cleanup Agreement

January 2017: Submission of Draft RI/AA Work Plan

March 2017: NYSDEC Approval of RI/AA Work Plan

March 2017: Performance of RI sampling/data collection

April 2017: Submission of RI results to NYSDEC

April-May 2017: Performance of IRMs

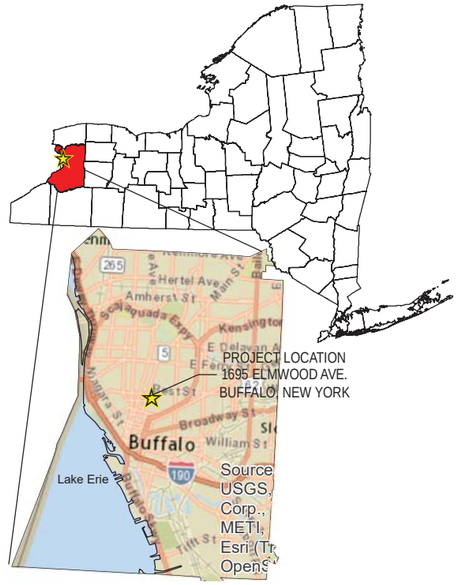
June 2017: Submission of RI/IRM/AA Report

August 2017: NYSDEC Approval of RI/IRM/AA Report

September 2017: Completion and approval of Final Engineering Report and other Brownfield Cleanup Program requirements as needed

December 2017: Receipt of Certificate of Completion

FIGURES



LEGEND

BCP BOUNDARY

0 500 1,000 2,000 Feet

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PIERCE ARROW BCP
WORK PLAN

BUFFALO, NEW YORK

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	069.001.001
DATE:	12/30/2016
DRAWN BY:	S.HERBERGER
DESIGNED BY:	S.HERBERGER
CHECKED BY:	DAN RIKER

SITE LOCATION MAP

FIGURE 1

LEGEND

BCP BOUNDARY

0 45 90 180 Feet

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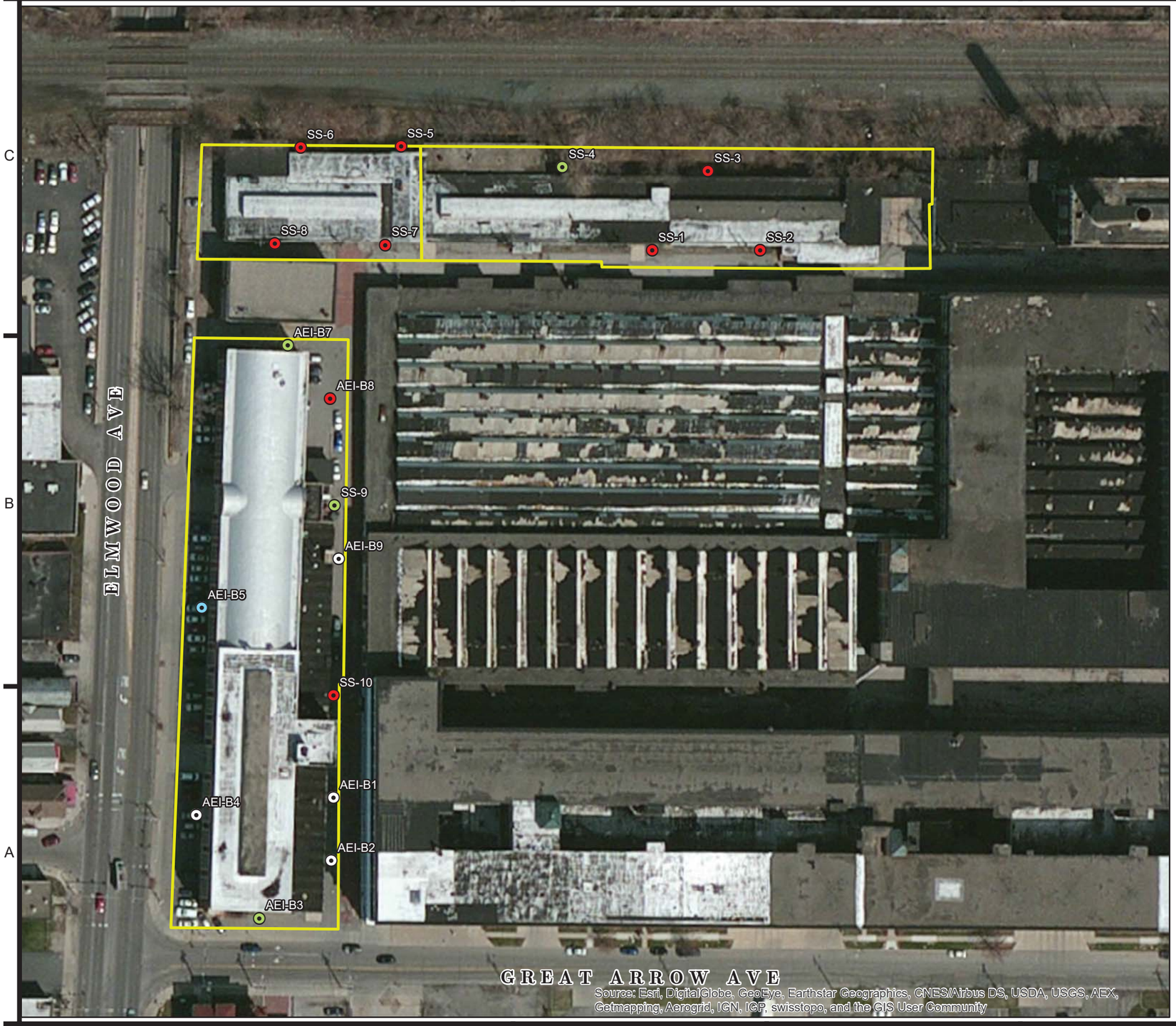
SITE MAP

FIGURE 2



EXCEEDANCE OF NYSDEC SOIL CLEANUP OBJECTIVES

NAME

- BELOW UNRESTRICTED USE CRITERIA
- SAMPLE EXCEED UNRESTRICTED USE CRITERIA FOR AT LEAST ONE COMPOUND
- SAMPLE EXCEED RESTRICTED RESIDENTIAL USE CRITERIA FOR AT LEAST ONE COMPOUND
- SAMPLE EXCEED INDUSTRIAL USE CRITERIA FOR AT LEAST ONE COMPOUND
- *PROPOSED BROWNFIELD CLEANUP PROGRAM (BCP) BOUNDARY*

0 45 90 180 Feet

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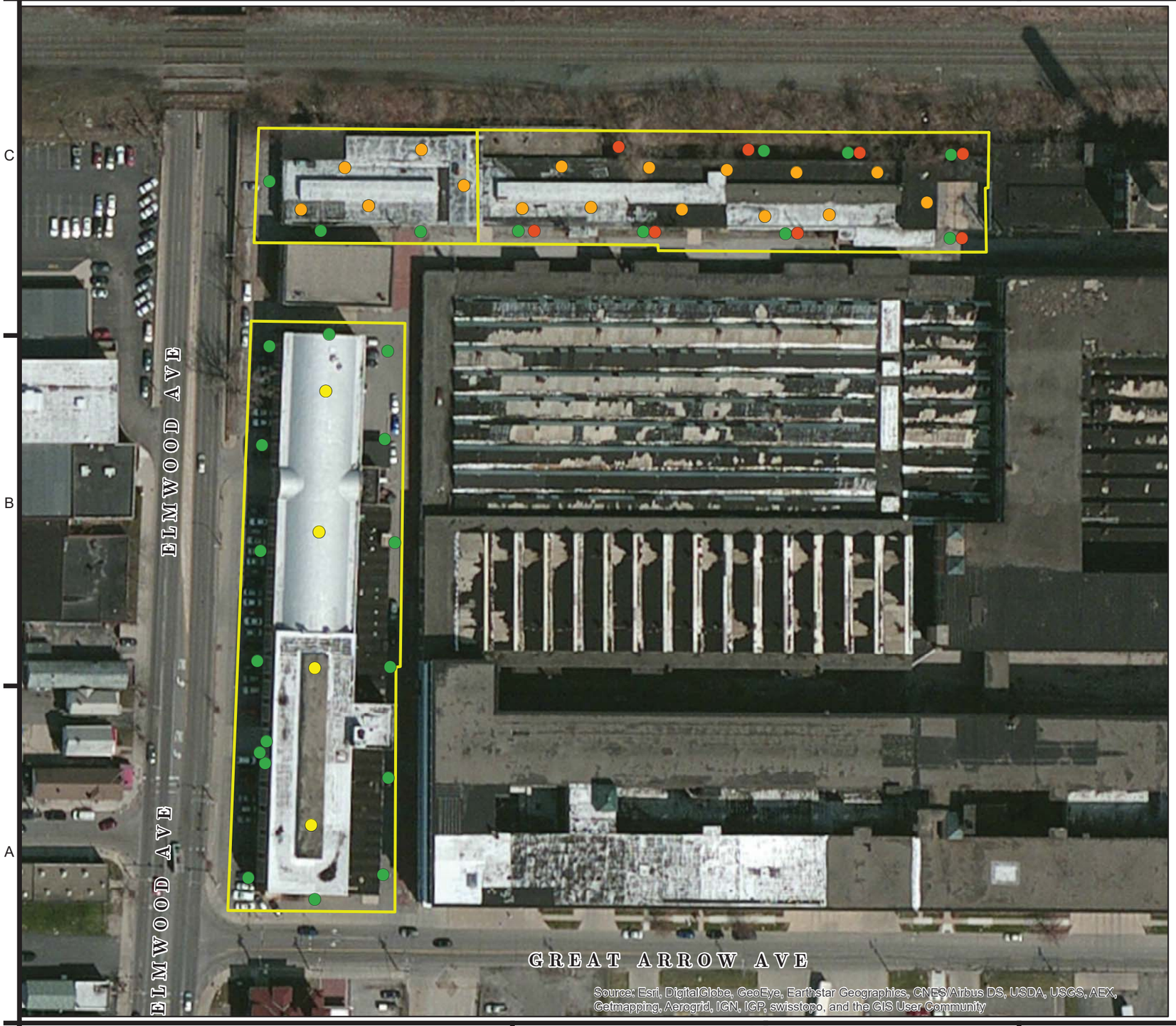
EXISTING SITE CHARACTERIZATION RESULTS

FIGURE 3



Legend

PROPOSED SOIL SAMPLING

- Interior Soil Boring Locations - Garage Building
- Interior Soil Boring Locations - Administrative Building
- Surface Soil Sample Locations
- Exterior Soil Boring Locations
- *PROPOSED BROWNFIELD CLEANUP PROGRAM (BCP) BOUNDARY*

0 45 90 180 Feet

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PIERCE ARROW BCP
WORK PLAN

BUFFALO, NEW YORK

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	Q69.001.001
DATE:	1/5/2017
DRAWN BY:	A. SVIRGUN
DESIGNED BY:	A. SVIRGUN
CHECKED BY:	DAN RIKER

PROPOSED SOIL SAMPLE LOCATION MAP

FIGURE 4

TABLES

Table 1 – Proposed Remedial Investigation Sampling Program			
Task	**Location**	**Number of Samples**	**Lab Analysis**
Urban Fill Samples	Site-wide		TCL VOCs, SVOCs, and pesticides, PCBs, TAL Metals, Cyanide, Hex Chromium
	Site-wide		TCLP VOCs, SVOCs, pesticides, herbicides, and metals, PCBs, reactivity, corrosivity, ignitability
Native Soil Samples	Site-wide		TCL VOCs, SVOCs, and pesticides, PCBs, TAL Metals, Cyanide, Hex Chromium
Indoor Soil Samples (Cores)	Administration and Garage Buildings		TCL VOCs, SVOCs, and pesticides, PCBs, TAL Metals, Cyanide, Hex Chromium
Surface Soil Samples	Site-wide on areas without asphalt		TCL VOCs, SVOCs, and pesticides, PCBs, TAL Metals, Cyanide, Hex Chromium
Groundwater Samples	Site-wide	Up to 8	TCL VOCs, SVOCs, and pesticides, PCBs, TAL Metals, Cyanide, Hex Chromium
Indoor Air (Soil Vapor) Samples	Administration and Garage Buildings	Samples as a Contingency	TO-15 VOCs