Remedial Investigation/Alternatives Analysis Report

3 Gates Circle Site
BCP Site No. C915272
Buffalo, New York

February 2015

Prepared For:
Gates Circle Holdings, LLC

Prepared By:
Benchmark Environmental Engineering & Science, PLLC
BROWNFIELD CLEANUP PROGRAM

REMEDIAL INVESTIGATION/
ALTERNATIVES ANALYSIS REPORT

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Certification

I, Thomas H. Forbes, certify that I am currently a NYS registered professional engineer and that this February 2015 Remedial Investigation/Alternatives Analysis (RI/AA) Report for the 3 Gates Circle Site (C915272) 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.
1.0 INTRODUCTION

Benchmark Environmental Engineering & Science, PLLC (Benchmark) has prepared this Remedial Investigation and Alternatives Analysis (RI-AA) Report on behalf of Gates Circle Holdings, LLC (GCH). GCH owns the subject property (Site) located at 3 Gates Circle in the City of Buffalo, New York (see Figures 1 and 2).

The RI work was completed under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and executed Brownfield Cleanup Agreement (BCA, Index # C915272-02-13) dated March 19, 2013. The BCA was amended in October 2014, prior to the start of the RI, to identify GCH as the BCA entity. The BCA was initially established between the NYSDEC and Chapin Place MAR, LLC. In June 2014, Chapin Place MAR, LLC was purchased by TMMontante and required to change the name of the entity as part of the sale agreement. In July 2014, the company formerly known as Chapin Place MAR, LLC was changed to Lancaster Avenue Development, LLC. Because Lancaster Avenue Development, LLC does not own the property and the ownership of 3 Gates Circle Site (former Millard Fillmore Gates Hospital) was transferred from Kalieda Health to GCH (Chapin Place MAR, LLC never took ownership), GCH was identified as the sole party to the BCA with NYSDEC.

The RI activities discussed in this report were completed under approved NYSDEC work plans and Benchmark provided engineering oversight. The RI Work Plan (Ref. 1) was approved in October 2013 and the RI Work Plan Addendum (Ref. 2) was approved on October 8, 2014. The RI activities were completed between October 2014 and November 2014.

Interpretations presented within this report are based on historic investigations (see Section 1.2) completed by others prior to the Site entering into the BCP and subsequent to RI activities. The analytical data generated as part of the other investigations are included within this report and compared to the current applicable cleanup regulations.

1.1 Background

The Site consists of a single parcel (SBL# 89.79-4-1) 6.9 acres, located at 3 Gates Circle in the City of Buffalo, Erie County, New York. The property is now unoccupied but formerly operated as a commercial/medical facility with 13 interconnecting buildings
covering most of the Site (see Figure 2). These buildings were primarily used for patient care and hospital administration operations, but included other supporting facilities (i.e., laboratories, research facilities, staff housing, auditorium, and a kitchen). The Power Plant located on the southeast corner of the property contains boilers, cooling towers, backup generators, and a maintenance area for buildings and grounds equipment. The Power Plant is connected to the main campus via an underground tunnel. Current and historic backup generator and boiler fuel storage tanks are located proximate to the Power Plant.

A collection and treatment system is present and adjacent to a sump in the basement of the Power Plant. The system was designed to collect and pretreat perched groundwater impacted by No. 6 fuel oil from a historic underground storage tank (UST) failure (NYSDEC Spill No. 0751494) on the western side of the Power Plant. The USTs and accessible impacted soils were removed in August 2008. The presence of residual impacts beneath the Power Plant foundation necessitated installation of the collection and treatment system. Section 1.2 contains a summary of the previous investigations completed at the Site.

Site redevelopment will consist of a residential assisted-living facility, amenities to support the assisted-living facility, and other miscellaneous uses (residential and commercial). Physical modifications to the existing Site will include demolition, existing building renovation, and new building construction.

1.2 Historic Investigations

A summary of the investigations that have been completed at the Site are presented below. Appendix A includes the laboratory data from these investigations and Figure 3 shows the approximate locations of the historic investigations. We note that NYSDEC Spill No. 0751494, discussed below, was closed on May 20, 2013 when the Site was accepted into the BCP. Residual impacts from this spill will be addressed under the BCP by the NYSDEC Division of Environmental Remediation.

1.2.1 March 2008 No. 6 Fuel Oil Spill

As described in the July 2012 Hazardous Materials Assessment report and November 2012 Phase I/II Environmental Assessment (see Sections 1.2.2 and 1.2.3), a No. 6 fuel oil spill associated with two (2) former 12,000-gallon USTs adjacent to the Power Plant was reported to the NYSDEC in March 2008 (NYSDEC Spill No. 0751494). The spill was
reportedly discovered when suspect oil was noted migrating through a basement wall within the boiler room area of the Power Plant. The Environmental Service Group (NY), Inc. (ESG) was contacted and attempted to tightness test the two (2) former 12,000 gallon No. 6 fuel oil USTs; both tanks failed the test. Subsequently, the following studies/remedial efforts were completed:

- Soil borings completed around the former tanks confirmed the presence of No. 6 fuel oil in the backfill. Impacts did not appear to extend significantly into the surrounding clay (native) soils. Approximately 18 inches of oil was noted in a well installed in the tank backfill.
- In May 2008 six (6) test borings were completed through the approximate 2-foot thick concrete floor of the Power Plant boiler room in several locations. The data suggested that the oil migrated through the stone fill beneath the floor, resulting in an approximate 2-foot layer of contaminated sub-slab fill that extended over much of the boiler room basement.
- The two USTs were excavated in August 2008 and found to be significantly deteriorated, suggesting that there was a release of the No. 6 fuel oil from the tanks.
- Following removal of the USTs, approximately 962 tons of contaminated soil was removed from the excavation and shipped off-site for disposal.
- To address the remaining residual oil, including that which had flowed beneath the building, an approximate 8-inch diameter perforated pipe was placed in the bottom of the excavation and surrounded by gravel. The perforated pipe was plumbed into a manhole that pumped collected material to a sump southern portion in the boiler room. A pump at the bottom of the sump then pumps the oil/water mixture into an oil/water separator adjacent to the sump within the Power Plant. The oil is containerized and shipped off-site for disposal. The water is filtered and eventually discharged to the municipal sewer system.
- Changes to the system have been required due to the viscosity of the No. 6 fuel oil, specifically related to heating the oil/water separator to allow the oil to flow.

**1.2.2 July 2012 Hazardous Materials Assessment**

Stohl Environmental (Stohl) completed a “Hazardous Materials Assessment” in July 2012 (Ref. 3). In general, Stohl’s report was structured, in terms of both content and organization, in a manner similar to a Phase I Environmental Site Assessment (ESA). Accordingly, it contains historical research, site reconnaissance observations, and related
Several hazardous materials were observed in the vacated hospital buildings including: cleaning supplies; medical wastes; paints; thinners; epoxy; and large quantities of laboratory chemicals (e.g., chlorinated solvents, acids, aromatic, glycols, and x-ray developer fluid).

Stohl reports that documentation related to open Spill No. 0751494 indicates that impacts to the upper two feet of material beneath the boiler room concrete floor pad are likely extensive.

Stohl observed an apparent historic fill port near the northeast corner of the Power Plant and evidence of a historic contractor’s yard on the west side of the Site.

Several records of historic UST installations were identified but did not correlate with UST removal records.

A Phase II investigation completed by Stohl involved advancement of test borings at 21 locations across the Site and one test pit near the apparent fill port at the northeast corner of the Power Plant. One temporary monitoring well was installed north of the former 12,000-gallon USTs but did not produce sufficient water for sampling. Nineteen soil samples were submitted for analysis of various parameters, primarily NYSDEC Spills Technology and Remediation Series (STARS) List volatile organic compounds (VOCs); STARS List semi-volatile organic compounds (SVOCs); and polychlorinated biphenyls (PCBs). Some sample locations were expanded to include Resource Conservation and Recovery Act (RCRA) metals analysis and Target Compound List (TCL) VOCs and SVOCs. Key observations and results recorded by Stohl include:

- Elevated PID readings at Stohl soil borings SB-2 and SB-15.
- Evidence of petroleum globules in the soil and petroleum sheen on the groundwater interface at soil boring SB-7.
- Evidence of several SVOC compounds above 6NYCRR Part 375 Soil Cleanup Objectives (SCOs) and/or NYSDEC CP-51 spill cleanup criteria. In particular, soil boring SB-17 and SB-18 exhibited concentrations of SVOCs above restricted-residential SCOs.

1.2.3 November 2012 Phase I/II Environmental Site Assessment

Benchmark performed a Phase I ESA in October 2012 (Ref. 4). Based on Benchmark’s findings, which were similar to those documented by Stohl in its July 2012
Hazardous Materials Assessment, a limited Phase II Site investigation was performed on October 11-15, 2012. The limited Phase II investigation involved a direct push soil boring program with collection of one shallow groundwater sample from a temporary on-site monitoring well (TMW-1). Ten soil borings, identified as SB-1 through SB-10, were advanced at locations outside the known petroleum spill cleanup to check for evidence of impact in other areas of the Site. Key findings of Benchmark’s limited Phase II investigation are listed below:

- All soil borings analyzed for SVOCs exhibited detectable concentrations; soil boring SB-6 exhibited concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene above Commercial SCOs; benzo(a)anthracene, benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene above Restricted Residential SCOs; and chrysene and benzo(k)fluoranthene above Unrestricted Use SCOs.
- RCRA metals were detected above analytical detection limits at all sampling locations. Lead concentrations were detected above Unrestricted SCOs at SB-5 and SB-8. Total mercury concentrations were detected above Commercial SCOs at SB-5 and Unrestricted Use SCOs at SB-8 and SB-9.

Temporary monitoring well TMW-1 was installed at direct-push (Geoprobe®) borehole SB-4 since overburden groundwater was encountered. VOCs were not detected in the sample from TMW-1.

1.3 Report Organization

This report contains the following ten (10) sections:

- Section 1.0 provides an introduction to the project, Site background and previous investigation information.
- Section 2.0 presents the investigation approach.
- Section 3.0 describes the Site physical characteristics as they pertain to the investigation findings.
- Section 4.0 presents the investigation results by media.
- Section 5.0 describes the planned interim remedial measure.
- Section 6.0 describes the fate and transport of the COCs.
- Section 7.0 describes the proposed Interim Remedial Measure to be completed.
• Section 8.0 presents the qualitative risk assessment.
• Section 9.0 evaluates remedial alternatives for the Site.
• Section 10.0 presents the project summary and conclusions.
• Section 11.0 provides a list of references for this report.
2.0 INVESTIGATION APPROACH

The Remedial Investigation (RI) scope of work focused on further defining the nature and extent of contamination, identifying the source of contamination, defining chemical constituent migration pathways, qualitatively assessing human health and ecological risks (if necessary), and obtaining data of sufficient quantity and quality to perform the remedial alternatives evaluation in accordance with NYSDEC DER-10 (Ref. 5).

The RI was performed to supplement previous investigation data and to better characterize surface and subsurface soil materials, groundwater, and overburden stratigraphy within the Site boundaries. The RI tasks were performed in accordance with the RI/AA Work Plan and RI Work Plan Addendum. The RI tasks consisted of the following:

- Completion of 13 interior soil probes within the footprint of the existing Site buildings to facilitate subsurface soil/fill sampling and to assess site stratigraphy. The soil probes were completed in access areas of the basements of the buildings.
- Completion of five (5) soil borings to facilitate subsurface soil/fill sampling, to assess site stratigraphy and delineate/assess previously identified contamination.
- Complete one (1) hand core to assess subsurface soil/fill in a court yard area that was not accessible with conventional drilling equipment (i.e. drill rig).
- Completion of four (4) soil borings to facilitate the collection of soil samples and installation of four (4) permanent overburden groundwater monitoring wells.
- Submittal of 46 subsurface soil/fill samples (excluding QA/QC) for analytical testing to better characterize the Site overburden chemistry.
- Submittal of four (4) groundwater samples (excluding QA/QC) for analytical testing to better characterize the Site overburden groundwater chemistry.
- Completion of a radiological survey at the Site. The survey consisted of a site walkover/gamma scan of the accessible exterior portions of the Site and an alpha/beta and gamma field screening of representative soil samples retained from the soil probes, soil borings and hand core.
- Groundwater level gauging and hydraulic conductivity testing were completed to further assess flow directions Site hydrogeologic conditions.
- Site-specific Quality Assurance/Quality Control (QA/QC) samples were collected to assist in evaluating the usability of the data in accordance with the RI/AA Work Plan.
Field team personnel collected environmental samples (i.e., sub-surface soil, water and groundwater) in accordance with the rationale and protocols described in the Sampling and Analysis Plan (SAP) of the Quality Assurance Project Plan (QAPP, Section 4.0 of the RI/AA Work Plan). Representative environmental samples were collected during the RI using dedicated sampling devices and were placed in pre-cleaned laboratory provided sample containers, cooled to 4°C in the field (if necessary), and transported under chain-of-custody command to Alpha Analytical, Inc. (Alpha), located in Westborough, Massachusetts, a New York State Department of Health (NYSDOH) ELAP-certified analytical laboratory.

Samples for chemical analysis were analyzed in accordance with USEPA SW-846 methodologies to meet the definitive-level data requirements. A Category B deliverable package was provided for each sample delivery group to allow independent third-party data validation and provide defensible data. Analytical results were evaluated by a third-party data validation expert in accordance with provisions described in the QAPP. The scope of work completed for is RI was performed between October and November 2014, as described below.

2.1 Remedial Investigation Field Activities

2.1.1 Subsurface Soil/Fill Investigation (October 2014)

2.1.1.1 Soil Probe Investigation

A subsurface soil/fill investigation was completed to supplement the previous environmental data collected, collect soil samples and assess the conditions beneath the existing Site buildings.

Thirteen (13) soil probes were advance into the subsurface beneath the existing Site buildings through holes cored in the concrete basement slab. These soil probes were designated TP(SB)-1 through TP(SB)-13, as shown on Figure 4. The soil probe logs are provided in Appendix B. We note that these locations were initially proposed to be completed as test pits after the buildings were demolished. However, to expedite the completion of the RI/AA Report, soil probes were used in lieu of test pits, prior to building demolition. The TP-(SB) designation will also differentiate the RI soil probes/borings from those completed by Benchmark as part of the 2013 Phase II investigation.
The RI soil probes were completed in accessible portions of the building basements, as follows.

- TP(SB)-1, through -4 and -5 were completed in the Medical Services Building.
- TP(SB)-2 and -6 were completed in the Admissions Building.
- TP(SB)-3 was completed in the East Building.
- TP(SB)-7 was completed in the Auditorium Building.
- TP(SB)-8 was completed in the South Nurses Home Building.
- TP(SB)-9 and -10 were completed in the eastern portion of the Power Plant.
- TP(SB)-11 was completed in the East Wing Building.
- TP(SB)-12 was completed in the North Nurses Home Building.
- TP(SB)-13 was completed in the Center Building.

Soil probes were advanced using direct push methodology via hydraulic hammer on a track-mounted probe rig. Soil samples were collected with a macrocore sampler which contained a 2-inch outer diameter by 48-inch long acetate liner. A new acetate liner was used for each 4-foot sample run. Probes were pushed through fill materials and native overburden soils to depths which ranged from approximately 11 feet below the basement floor slab (TP(SB)-11) to 20 feet below the basement floor slab (TP(SB)-8). We note that the elevations of the building basement floor slabs are lower on the southeastern portion of the Site (Power Plant) relative to the northern (East Building and East Wing). The basement floor in the Power Plant is approximately 12 to 13 feet below the exterior surface grade, the basement floor in the Medical Services Building, Auditorium and South Nurses Home are approximately 8 feet below the existing surface grade, and the basement floor in the East Building and/or East Wing (northern portion of the Site) are 4 feet below the exterior surface grade.

The soil/fill samples retrieved from the probes allowed for visual, olfactory, photo ionization detector (PID) and radiological assessment of subsurface conditions. Soil/fill samples were collected from the probes for laboratory analysis (see Table 1). Elevated PID readings above background levels (less than 1 part per million (ppm)) were not measured at the 13 interior soil probes locations.
Representative soil/fill samples were placed in pre-cleaned laboratory provided sample jars, cooled to 4°C in the field, and transported under chain-of-custody command to TestAmerica for analysis. The subsurface surface soil/fill sample analysis from the probe included TCL VOCs, TCL SVOCs, SVOCs Base-Neutral list (BNs), TAL Metals, RCRA 8 Metals, PCBs, pesticides and herbicides. The radiological screening of the soil/fill retrieved from the soil borings are further discussed in Section 2.1.3.

The subsurface conditions encountered are presented on the Soil Boring Logs in Appendix B.

2.1.1.2 Soil Boring Investigation

Five (5) soil borings (SB-105 through SB-109) were completed to further assess the extent of contamination identified during historic investigation activities. SB-105 through SB-108 were completed to assess/delineate the horizontal extent of SVOCs identified at previous boring SB-6 (Benchmark Phase II ESA). SB-109 was completed to assess/delineate the vertical extents of the SVOCs identified at previous borings 17 and 18 (Stohl).

Soil borings were advanced through the overburden soil/fill using a truck-mounted rotary drill rig and 6-5/8 inch inside diameter (I.D.) hollow stem augers (HSA). Overburden soil samples were continuously collected ahead of the HSA by driving a 1-3/8 inch I.D. by 2-foot long split spoon sampler ahead of the lead HSA. Soil borings were advanced to depths of 13 feet below ground surface (fbgs; SB-109) to 20 fbgs (SB-107). Auger cuttings from each borehole were containerized for reuse at the Site pending analytical sample results and/or disposal.

The soil/fill samples retrieved from the borings allowed for visual, olfactory, photo ionization detector (PID) and radiological assessment of subsurface conditions. Soil/fill samples were collected from the probes for laboratory analysis (see Table 1). Elevated PID readings above background levels (less than 1 part per million (ppm)) were not measured at these five (5) exterior soil boring locations, nor were any odors or staining indicative of impact encountered.

Representative soil/fill samples were placed in pre-cleaned laboratory provided sample jars, cooled to 4°C in the field, and transported under chain-of-custody command to TestAmerica for analysis. The subsurface surface soil/fill sample analysis from the probe
included SVOCs Base-Neutral list (BNs) and RCRA 8 Metals. The radiological screening of the soil/fill retrieved from the soil borings are further discussed in Section 2.1.3.

The subsurface conditions encountered are presented on the Soil Boring Logs in Appendix B.

2.1.1.3 Hand Cores Soil/Fill Investigation

One (1) hand core (SB-110) was completed to assess subsurface soil/fill in the open court yard in the vicinity of in the northeastern portion of the Site (see Figure 4). The soil/fill samples from the hand core was collected from a pre-cleaned stainless steel barrel auger. The soil/fill sample was collected from the 2-foot interval of soil/fill beneath the topsoil present in the court yard.

The soil/fill samples retrieved from the hand core allowed for visual, olfactory, photo ionization detector (PID) and radiological assessment of subsurface conditions. Soil/fill sample was collected for laboratory analysis (see Table 1). Elevated PID readings above background levels (less than 1 part per million (ppm)) were not measured at the court yard hand core location, nor were any odors or staining indicative of impact encountered.

The representative soil/fill sample was placed in pre-cleaned laboratory provided sample jars, cooled to 4ºC in the field, and transported under chain-of-custody command to Alpha for analysis. The subsurface surface soil/fill sample analysis from the hand core included SVOCs BNs and RCRA Metals. The radiological screening of the soil/fill retrieved from the soil borings are further discussed in Section 2.1.3.

The subsurface conditions encountered are presented on the Soil Boring Logs in Appendix B.

2.1.2 Groundwater Investigation

2.1.2.1 Soil Borings for Monitoring Well Installation (October 2014)

Four (4) soil borings (SB-101 through SB-104) were completed to facilitate the installation of four (4) 2-inch diameter groundwater monitoring wells (MW-1 through MW-4) to investigate groundwater flow direction and quality (see Figure 4), as well as collect soil samples and assess subsurface conditions. Monitoring well installation, well development, and groundwater sample collection are discussed in Sections 2.1.2.2 through 2.1.2.4.
Soil borings were advanced through the overburden soil/fill using a truck-mounted rotary drill rig and 6-5/8 inch inside diameter (I.D.) hollow stem augers (HSA). Overburden soil samples were continuously collected ahead of the HSA by driving a 1-3/8 inch I.D. by 2-foot long split spoon sampler continuously to the bottom of the soil borings ranging from at approximately 22 to 24 fbgs. The soil borings were advanced to approximately 5 to 7 feet below the first sign of a water bearing zone based on field observations. Auger cuttings from each borehole were containerized for reuse at the Site or proper disposal pending the analytical sample results.

The soil/fill samples retrieved from the soil borings allowed for visual, olfactory, photo ionization detector (PID) and radiological assessment of subsurface conditions. Soil/fill sample was collected for laboratory analysis (see Table 1). Elevated PID readings above background levels (less than 1 part per million (ppm)) were not measured at these four (4) exterior soil boring locations, nor were any odors or staining indicative of impact encountered.

The representative soil/fill sample was placed in pre-cleaned laboratory provided sample jars, cooled to 4°C in the field, and transported under chain-of-custody command to Alpha for analysis. The subsurface surface soil/fill sample analysis from the monitoring well soil borings included TCL VOCs, TAL SVOCs, SVOCs Base-Neutral list (BNs), TAL Metals, RCRA 8 Metals, PCBs, pesticides and herbicides. The radiological screening of the soil/fill retrieved from the soil borings are further discussed in Section 2.1.3.

The subsurface conditions encountered are presented on the Soil Boring Logs in Appendix B.

**2.1.2.2 Monitoring Well Installation (October 2014)**

After completion of the four (4) soil borings, 2-inch inner diameter (ID) flush-joint Schedule 40 PVC monitoring wells were installed at the boring locations. Each well was constructed with a flush-joint Schedule 40 PVC, 0.010-inch machine slotted well screen. The screen lengths used for the well installation were 10 feet. Each well screen and attached riser was placed at the bottom of each borehole and a silica sand filter pack (size #00N) was installed from the base of the well to approximately 2 feet above the top of the screen. A bentonite chip seal was installed and hydrated to mitigate the potential for downhole contamination. The monitoring wells were completed with lockable J-plug, and a steel flush
mounted road box. The monitoring well construction details are presented on the Soil Boring Logs in Appendix B.

2.1.2.3 Monitoring Well Development

The newly installed monitoring wells were developed prior to sampling to remove residual sediments and ensure hydraulic connection within the water-bearing zone. The newly installed monitoring wells were developed after installation, in accordance with Benchmark and NYSDEC protocols. Development of the monitoring wells was completed with dedicated disposable polyethylene bailers via surge and purge methodology. Field parameters including pH, temperature, turbidity, dissolved oxygen and specific conductance were measured every well volume during development until they became relatively stable. The well development logs are included in Appendix C.

Stability was defined as variation between measurements of approximately 10 percent or less with no overall upward or downward trend in the measurements; or a minimum of three well volumes. Development water from the monitoring wells was containerized and staged on-site. Pending the results of the groundwater sample analysis, the water will be discharged to ground surface at the Site or properly disposed.

2.1.2.4 Monitoring Well Groundwater Sample Collection

Benchmark personnel sampled the four (4) monitoring wells using a down-hole pump and dedicated tubing following low-flow/minimal drawdown purge and sample collection procedures. Field measurements for pH, specific conductance, temperature, turbidity, and water level as well as visual and olfactory field observations were periodically recorded and monitored for stabilization. Purging was considered complete when pH, specific conductivity, and temperature stabilized, and when turbidity measurements fell below 50 Nephelometric Turbidity Units (NTU) or became stable above 50 NTU. Upon stabilization of field parameters, groundwater samples were collected. The groundwater sampling forms are included in Appendix C.

The collected groundwater samples were placed in pre-cleaned, pre-preserved (if required) laboratory provided sample bottles, cooled to 4°C in the field, and transported under chain-of-custody command to Test America for analysis. The groundwater sample analysis from permanent wells included TCL VOCs, SVOCs BNs, TAL Metals (total and dissolved), RCRA 8 Metals (total and dissolved), PCBs, pesticides and herbicides.
Water generated from the monitoring well sampling was containerized and staged on-site. Pending the results of the groundwater sample analysis, the water will be discharged to ground surface at the Site or properly disposed.

2.1.3 Radiological Survey Investigation (November 2014)

A radiological survey was completed at the Site to assess if radioactive materials formerly used at the Site were released to the environment and/or improperly disposed of. Benchmark subcontracted with Greater Radiological Dimensions, Inc. (GRD) to perform a radiological survey to screen the soil/fill from the RI locations and the screen the accessible portions of the Site for alpha, beta and gamma radiation. The survey was completed in two (2) phases. The first phase was to screen soil/fill samples retained from the 23 RI locations (soil probes, soil borings and hand core) completed as part of the RI. The second phase consisted of a Site walkover of the accessible portions of the Site.

The first phase consisted of field screening representative soil/fill retained from each investigation location. The gamma screening survey was completed with a 2-inch by 2-inch sodium iodide detector coupled with a Ludlum 2221 digital rate meter. The alpha and beta screening survey were completed with a Ludlum Model 43-93 Alpha-Beta Phoswich. Representative soil/fill from the each investigation location was placed in a one-gallon plastic bag and screened with both detectors. The results are discussed in Section 4.3.1 and the reports provided by GRD are included in Appendix D.

The second phase of the radiological survey consisted of the gamma Site walkover which was performed with the 2-inch by 2-inch sodium iodide detector coupled with a Ludlum 2221 digital rate meter. The survey was completed by walking the accessible portions of the Site in a serpentine pattern at a speed no faster than 1 meter per second. The results are discussed in Section 4.3.2 and the reports provided by GRD are included in Appendix D.

2.1.4 Field Specific Quality Assurance/Quality Control Sampling

In addition to the soil/fill and groundwater samples described above, field-specific quality assurance/quality control (QA/QC) samples were collected and analyzed to ensure the reliability of the generated data as described in the QAPP and to support the required
third-party data usability assessment effort. Site-specific QA/QC samples included matrix spikes, matrix spike duplicates, blind duplicates, and trip blanks.

2.2 Site Mapping

A Site map was developed during the RI field investigation. The exterior investigation locations and relevant Site features were located on the map. Benchmark used existing Site features to identify the exterior investigation locations, as the majority of the Site is covered with building footprints.

Monitoring well monitoring point elevations were measured by Benchmark and used as the basis for the groundwater isopotential map showing the general direction of groundwater flow based on water level measurements (see Figure 5).

Benchmark was provided a basement floor plan that identified the various interior features such as hallways, rooms, elevators and doorways. This basement floor plan was used to locate the interior soil probe locations based on the interior features and was overlain onto the various investigation location figures via AutoCad.

2.3 Decontamination & Investigation-Derived Waste Management

Every attempt was made to utilize dedicated sampling equipment during the RI, however, non-dedicated equipment was required and/or used (hand cores, split spoons) and was decontaminated with a non-phosphate detergent (i.e., Alconox®) and potable water mixture, rinsed with distilled water, and air-dried before each use in accordance with Benchmark’s field operating procedures (FOPs).

RI generated drilling spoils and groundwater development water were containerized and staged on-site. Pending the results of the analytical samples, the soil/fill and water may be reused or discharged to the ground surface at the Site or properly disposed.

IDW will be reused, recycled, and/or disposed off-Site, in accordance with the approved remedial activities.
3.0 SITE PHYSICAL CHARACTERISTICS

The physical characteristics of the Site observed during the RI are described in the following sections.

3.1 General Site Features

The Site consists of a single parcel (SBL# 89.79-4-1) 6.9 acres, located at 3 Gates Circle in the City of Buffalo, Erie County, New York. The Site is located on the southeast end of Gates Circle and is bound by Lafayette Avenue to the north, Delaware Avenue to the west, Linwood Avenue to the east, and a municipal-owned parking ramp and office building to the south. The Site is largely comprised of large multi-story buildings, asphalt parking areas and concrete walkways with a small portion of the Site covered with vegetation (see Figure 2).

The property is now unoccupied but formerly operated as a commercial/medical facility with 13 interconnecting buildings covering most of the Site (see Figure 2). These buildings were primarily used for patient care and hospital administration operations, but included other supporting facilities (i.e., laboratories, research facilities, staff housing, auditorium, and a kitchen). The Power Plant located on the southeast corner of the property contains boilers, cooling towers, backup generators, and a maintenance area for buildings and grounds equipment. The Power Plant is connected to the main campus via an underground tunnel.

The Site is generally flat lying with limited topographic features. The surface elevation is about 630 feet above mean sea level. The area surrounding the Site generally dips from south to north towards Scajaquada Creek.

3.2 Geology

3.2.1 Overburden

The U.S. Department of Agriculture Soil Conservation Service soil survey map of Erie County (Ref. 6) describes the general soil type at the Site as Urban Land (Ud). This is indicative of level to gently sloping land with at least 40 percent of the soil surface covered
by asphalt, concrete, buildings, or other impervious structures typical of an urban environment.

RI activities investigated subsurface soil/fill at both exterior and interior locations of the Site. In both instances the subsurface generally consisted of non-native soil/fills overlying native soil.

At the exterior investigation locations, the fill materials were generally granular and non-cohesive consisting of varying amounts of sands, gravels and silts overlying lean clay with fill characteristics (cinders, brick fragments, slag) and the non-native soil/fill materials were generally present in the upper 4 feet. We note that at SB-104 and SB-109 located in the northern central portion of the Site, the fill materials extended to depths of 14 fbgs and 9 fbgs, respectively.

Underlying the fill materials, native soils generally consisted of cohesive soil, variations of brown lean clays with varying amounts of sands, silts and gravels with inter-bedded layers of sands, silts and gravels. Appendix B includes the Soil Boring Logs.

At the interior investigation locations, the fill materials encountered beneath the buildings were generally granular and non-cohesive consisting of varying amounts of gravels, sands, and silts overlying lean clay with fill characteristics (cinders, brick fragments, slag). The depth of the fill materials beneath the building generally range from about 1 to 6 feet beneath the basement slabs. However, at TP(SB)-3 and TP(SB)-13 located in the northern central portion of the Site, the fill materials extended to depth of 8 feet below the building basement. The depth of the fill materials are consistent with those identified on the exterior portion of the Site at SB-9 and SB-104. Underlying the fill materials, native soils generally consisted of cohesive soil, variations of brown lean clays with varying amounts of sands, silts and gravels with inter-bedded layers of sands, silts and gravels. Appendix B includes the Soil Boring Logs. A cross-section of the general subsurface soil/fill conditions has been included as Figure 12.

3.2.2 Bedrock

Based on the bedrock geologic map of Erie County (Ref. 3), the Site is situated over the Onondaga Formation of the Middle Devonian Series. The Onondaga Formation is comprised of a varying texture from coarse to very finely crystalline with a dark gray to tan color and chert and fossils within. The unit has an approximate thickness of 110 to 160 feet.
Depth to and type of bedrock below the Site was not been determined by drilling as part of the RI. However, a geotechnical investigation (Ref. 8) was conducted by others, prior to the RI and bedrock was encountered and cored at two (2) locations. It was encountered at a depth of about 26 to 30 fbgs in the northwestern portion of the Site. It was described as a gray cherty limestone, consistent with the bedrock geology map of Eire County.

### 3.3 Hydrogeology

Groundwater elevation data was collected during the RI, which included water levels measurements on November 3, 2014 from the four (4) permanent monitoring wells, and used to evaluate Site hydrogeology. Monitoring well construction logs are provided in Appendix B.

Depth to groundwater ranged from approximately 11 fbgs (MW-1) to 19 fbgs (MW-4). In general, groundwater flow direction was estimated to be northerly as shown on Figure 5, which presents an overburden groundwater isopotential map.

#### 3.3.1 Hydraulic Gradients

Hydraulic properties of the saturated overburden at the Site were determined from data collected during the RI groundwater sampling gauging performed in November 2014.

The gradients were determined from the highest elevation at MW-1 to the north at MW-2 through MW-4. The horizontal gradient for overburden groundwater was calculated to range from 0.007 ft/ft (MW-1 to MW-2) to 0.018 ft/ft (MW-1 to MW04). The hydraulic gradient calculations are included in Appendix E.
4.0 INVESTIGATION RESULTS BY MEDIA

The nature and extent of contamination at the Site was further characterized using soil and groundwater samples collected and analyzed as part of the RI. As described in Section 2, soil and groundwater samples collected during previous investigations were used to supplement this RI. Sampling protocols and methodologies for samples collected during the RI investigation were performed in accordance with the NYSDEC-approved RI Work Plan which included Benchmark’s FOPs and were previously described in Section 2.0 of this report.

The soil and groundwater samples collected during the RI sampling events were submitted for analyses under chain-of-custody to Alpha Analytical, Inc. (Alpha) located in Westborough, Massachusetts. Analytical services were performed in accordance with the most current SW-846 analytical methods and protocols. Appendix F contains raw analytical data (Form 1 packages) for samples analyzed from the RI investigation. Tabulated analytical data discussed in this section includes results from prior investigations as well as the RI data collected by Benchmark personnel. Tabulated analytical results are shown only for those parameters for which a value greater than the laboratory method detection limit was detected at a minimum of one (1) sample location.

Figure 3 shows the sampling locations for soil and groundwater samples collected during historic investigations and Figure 4 shows both the historic and RI investigations. Table 1A summarizes the sampling and analysis program of the RI.

The objective of the sampling program summarized on Table 1A was to utilize previously collected data and that collected as part of the RI to characterize both the fill materials and native soils present at the Site. Table 1B expands upon Table 1A and provides sample information regarding the ‘Soil Type’ (fill material or native soil) which was analyzed at the various locations as well as provides the analysis completed. This table also includes the previous Stohl investigation, ESG UST removal, and the Benchmark Phase II samples.

The table below is a breakdown of the number of samples collected as part of the previous investigations and the RI, by Soil Type and analysis completed.
### Analysis Table

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Total Number of Samples</th>
<th>Number of Fill Samples</th>
<th>Number of Fill Samples Exceeding RRSCOs</th>
<th>Number of Native Samples</th>
<th>Number of Native Samples Exceeding RRSCOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>40</td>
<td>18</td>
<td>0</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>SVOC</td>
<td>70</td>
<td>32</td>
<td>6 (19%)</td>
<td>38</td>
<td>0</td>
</tr>
<tr>
<td>Metals</td>
<td>56</td>
<td>27</td>
<td>2 (7%)</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>PCBs</td>
<td>16</td>
<td>11</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Pesticides</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Herbicides</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1B is also color coded to identify the fill material samples that were analyzed. Fill material samples that did not exceed their respective RRSCOs for the parameters tested are highlighted in green. The locations of fill material that were analyzed and had compounds or analytes concentrations exceed their respective RRSCO are highlighted in orange. This is graphically depicted in Figures 10 and 11.

Both historic and RI investigation analytical results were used for site contaminant characterization purposes. Summaries of the historic subsurface soil samples are summarized in Tables 2A and 2B. Table 2A is a summary of the Stohl investigation (July 2012) analytical results and Table 2B is a summary of the Benchmark investigation (October 2012) analytical results. As only one (1) groundwater sample was collected by Benchmark as part of the previous historic investigation and having non-detect results for VOCs, no summary table was developed.

For discussion purposes, analytical results for the investigation were compared with the following Standards, Criteria, and Guidance values (SCGs).

**Subsurface Soil:**

Soil Cleanup Objectives (SCOs) per 6 New York Code Rules and Regulation (6 NYCRR) Part 375 Environmental Remediation Programs, Subparts 375-12 to 375-4 & 375-6, effective December 14, 2006.

Specifically, the Restricted Residential Soil Cleanup Objectives (RRSCOs) are the Soil Cleanup Objectives that are most applicable to the planned redevelopment of the Site.
(mixed-use residential (apartment) and commercial capacity) and are considered to be the most applicable health risk-based comparative criteria.

**Groundwater**


Sample results compared to the above criteria are described below according to media and contaminant class.

### 4.1 Soil/Fill

Forty-six (46) subsurface soil/fill samples were collected and analyzed as part of the RI and 29 subsurface soil samples were collected as part of historic investigations, of which four (4) are confirmatory samples associated with the removal of the two (2) 12,000 gallon No. 6 fuel oil USTs completed in 2008. The results from the four (4) UST confirmatory samples which were analyzed for STARS\(^1\) list VOCs and SVOCs were reported as non-detect for these parameters. No data table was developed to summarize these non-detect results.

Tables 2A (Stohl Investigation), 2B (Benchmark Phase II), and 3 (RI) compare the soil/fill data to a range of health risk-based SCOs as published in 6NYCRR Part 375, including Unrestricted SCOs (USCOs) and Restricted Residential SCOs (RRSCOs).

The RRSCOs are the most applicable to the planned redevelopment of the Site and deemed protective of human health under a scenario whereby site use and associated exposure pathways are assumed to be similar to those under a single family home setting, excluding those that might occur from consumption of foods grown in a home vegetable garden. Based upon the reasonably anticipated future use of the Site in a mixed-use residential (apartment) and commercial capacity, the RRSCOs are conservatively considered to be the most applicable health risk-based comparative criteria. Nevertheless, the following

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sections discuss the surface and subsurface soil results relative to the range of health-based SCO criteria to provide a comprehensive summary of the data.

4.1.1 Surface Soil/Fill

No surface soil/fill samples were collected as part of the RI, as the majority of the Site is covered by buildings, asphalt parking or concrete walkways. The small amount of existing surface soil that is present is covered with topsoil and vegetation and will likely be disturbed during redevelopment.

4.1.2 Subsurface Soil/Fill

Forty-six (46) subsurface soil samples (excluding QA/QC samples) were collected from the 13 interior soil probes (designated TP(SB)-1 through TP(SB)-13), nine (9) exterior soil borings (designated SB-101 through SB-110) and one (1) hand cores (designated SB-110) as part of the RI.

Of the 46 subsurface soil samples collected as part of the RI:

- Eight (8) were analyzed for TCL VOCs via SW-846 8260C;
- Six (6) were analyzed for TCL plus CP-51 VOCs via SW-846 8260C;
- Four (4) were analyzed for TCL SVOCs (Base Neutral & Acid Extractable Compounds) via SW-846 8270D;
- Thirty-eight (38) were analyzed for SVOCs Base Neutral via SW-846 8270D;
- Thirty-eight (38) were analyzed for RCRA 8 Metals via SW-846 6010C/7471B;
- Four (4) were analyzed for TAL Metals via SW-846 6010C/7471B;
- Four (4) were analyzed for Total Cyanide via SW-846 9010C/9012B;
- Six (6) were analyzed for PCBs via SW-846 8280A;
- Six (6) were analyzed for pesticides via SW-846 8081B; and
- Six (6) were analyzed for herbicides via SW-846 8151A.

As part of the historic investigation activities and/or UST removal/remedial activities, the following subsurface soil samples were also collected for analysis:
• Fourteen (14) were analyzed for TCL VOCs plus STARS VOCs via SW-846 8260;
• Fourteen (14) were analyzed for STARS VOCs via SW-846 8260;
• Fourteen (10) were analyzed for STARS SVOCs via SW-846 8270;
• Fourteen (14) were analyzed for TCL SVOCs (Base Neutral & Acid Extractable Compounds) via SW-846 8270;
• Fourteen (14) were analyzed for RCRA 8 Metals via SW-846 6010/7471; and
• Ten (10) were analyzed for PCBs via SW-846 8082.

Tables 2 summarize the previous investigation activities results and Table 3 summarizes the results of the RI subsurface soil samples. The results are discussed below as they compare to the respective Part 375 SCOs.

4.1.2.1 VOCs
VOCs were detected above MDLs in 16 of 41 samples analyzed as part of the historic investigations and RI. Of the VOCs detected above method detection limits (MDLs) only one (1) compound, naphthalene (generally considered to be a SVOC) was detected above its Unrestricted SCO (USCO). This detection was in soil boring 18, completed by Stohl during their July 2012 investigation at a depth of 4 to 9 fbgs. No other VOCs were detected above method detection limits in the two (2) samples collected at this location.

None of the remaining VOCs detected above MDLs were detected at concentrations above their respective USCOs. VOCs are not considered to be a concern at the Site.

4.1.2.2 SVOCs
SVOCs were detected above MDLs in the 33 of the 66 samples analyzed for SVOCs as part of the historic investigations and RI. Compounds detected above their respective RRSCOs were limited to benzo(b)fluoranthene, benzo(a)pyrene, benzo(a)anthracene, benzo(k)fluoranthene, chrysene, dibenzo(ah)anthracene, and indeno((1,2,3-cd)pyrene). The exceedances were identified at the following six (6) locations:
• Stohl Investigation: 12, 0 to 4 fbgs; 17, 4 to 8 fbgs, and 18, 4 to 9 fbgs.
• Benchmark Phase II: SB-6, 0.5 to 4 fbgs.
• RI: TP(SB)-13, 2 to 4 fbgs and SB-109, 0.5 to 4 fbgs.
The SVOCs detected in Stohl samples from 17, 18 and the RI sample from SB-109 are related to the same area in the central portion of the Site (see Figure 4). Subsurface conditions documented by Stohl and Benchmark during the RI indicate there is approximately 9 feet of fill present in this area. Two (2) SVOCs were detected in the Stohl sample from location 17, 4 to 8.5 ft, benzo(a)anthracene (1.05 mg/kg) and benzo(b)fluoranthene (1.01 mg/kg), which slightly exceeded their respective RRSCO of 1 mg/kg. Seven (7) SVOCs were detected in the Stohl sample from location 18, 4 to 9 ft, benzo(b)fluoranthene (5.69 mg/kg), benzo(a)pyrene (4.43 mg/kg), benzo(a)anthracene (5.83 mg/kg), benzo(k)fluoranthene (2.25 mg/kg), chrysene (4.93 mg/kg), dibenzo(ah)anthracene (0.918 mg/kg), and indeno((1,2,3-cd)pyrene (2.56 mg/kg) above their respective RRSCOs. The total SVOCs detected in this sample is about 58 mg/kg.

As part of the RI, the extent of the elevated SVOC detections, discussed above, was assessed. Two (2) samples were collected at SB-109, from 0.5 to 4 fbgs and from 4 to 8 fbgs. The sample results from 0.5 to 4 fbgs indicated that three (3) SVOCs were detected slightly above their respective RRSCOs of 1 mg/kg (benzo(b)fluoranthene (1.8 mg/kg), benzo(a)pyrene (1.3 mg/kg), benzo(a)anthracene (1.7 mg/kg)). However, the samples from 4 to 8 fbgs did not have detections of SVOCs above their respective USCOs and native soil was encountered at below 9 fbgs. The native soil samples analyzed as part of the RI did contain SVOCs, other compounds and/or metal analytes above their respective USCOs. Accordingly the SVOCs detected in this area are likely associated with some of the fill material in this area. The SVOC impacts in this area are not considered significant.

Five (5) SVOCs were detected above their respective RRSCOs in the sample collected from SB-6, 0 to 4 fbgs (Benchmark Phase II) [benzo(a)pyrene (2.8 mg/kg), benzo(a)anthracene (1.7 mg/kg), benzo(b)fluoranthene (2.8 mg/kg), dibenzo(ah)anthracene (0.65 mg/kg), and indeno((1,2,3-cd)pyrene (2 mg/kg)]. These detected concentrations slightly exceed their respective RRSCOs as shown on Table 2B. As part of the RI, four (4) soil borings (SB-105 through SB-108) were completed 25 feet from and in the four cardinal directions around the area of elevated SVOCs identified in soil boring SB-6 in the southern portion of the Site (see Figure 4). No SVOCs were detected above their respective USCOs in the fill or native soil samples analyzed from each of the four (4) soil borings. The
detections of SVOCs above their RRSCOs in SB-6 appear to be limited to a small area around SB-6.

Benzo(b)fluoranthene was the only SVOC detected above its RRSCO in sample SB-12, 0 to 4 fbgs completed by Stohl. The detected concentration was 1.01 microgram per kilogram (mg/kg) and its RRSCO is 1.00 mg/kg. This exceedance is not considered to be significant as other fill sample analyzed as part of the Stohl Investigation and RI from this area did not indicate SVOCs are present above their respective USCOs and/or RRSCOs.

Five (5) SVOCs were detected at RI location TP(SB)-13, 2 to 4 feet below the basement floor of the East Building located in the northern central portion of the Site above their respective RRSCOs [benzo(b)fluoranthene (20 mg/kg), benzo(a)pyrene (15 mg/kg), benzo(a)anthracene (20 mg/kg), benzo(k)fluoranthene (8.1 mg/kg), and chrysene (18 mg/kg). The total SVOCs detected in this sample was about 339 mg/kg. Based on a basement floor depth of approximately 4 fbgs, the sample depth is actually about 6 to 8 fbgs. The sample was collected from fill material present in this area. A second sample was also collected and analyzed from the fill material present from 4 to 6 feet below the basement floor (8 to 10 fbgs). The fill material extends to depth of around 9 below the basement floor (13 fbgs). The SVOC sample results for TP(SB)-13 4 to 6 feet were below their respective USCOs. The exceedances in this area appear to be limited to shallow fill material. We note that sample description for the 2 to 4 foot sample indicated that coal pieces were present and may likely be the cause of the elevated SVOCs.

As shown on Table 1B, of the 32 fill materials samples analyzed for SVOCs as part of the previous investigations and RI, six (6) samples (19% of the fill material samples) exceeded their respective RRSCOs. This does not indicate that the SVOCs impacts are wide spread at the Site and appear to be limited to the fill material present in a few select locations, central (SB-109), northern-central TP(SB)-13 and small area in the southern portion of the Site (SB-6). In all instances total SVOC concentrations were present at levels well below 500 mg/kg. It is not uncommon to detect SVOCs in the urban fill materials within the City of Buffalo. The locations of the acceptable fill soil (below RRSCOs) and fill samples that had exceedances of the RRSCOs is provided on Figure 10. Figure 11 identifies the location of fill material exceedances with RRSCO exceedance data.

As discussed in Section 1.2.1, six (6) test borings were completed through the approximate 2-foot thick concrete floor in May 2008 by ESG at several locations on the
north and western portions of the Power House (see Figure 3). It appears that the No. 6 fuel oil from the former-leaking USTs has migrated through the stone fill beneath the floor, resulting in an approximate two-foot layer of contaminated sub-base fill beneath the concrete floor in the basement of the Power Plant. The two (2) soil probes completed as part of the RI in the eastern portion of the Power Plant did not encounter oil in the sub-base material (see Figure 5). However, the remaining No. 6 fuel oil will require remedial action.

### 4.1.2.3 Metals

Metal analytes were detected above MDLs in the 56 samples analyzed for metals as part of the historic investigations and RI. Of the metal analytes detected above MDLs, only one (1) analyte, mercury, was detected above its respective RRSCOs at two locations: SB-5, 2 to 4 fbgs (Benchmark Phase II) at a concentration of 4.2 mg/kg, and TP(SB)-3, 0.6 to 4 feet below the basement floor (5 to 8 fbgs) at a concentration of 2.2 mg/kg, collected during the RI from the East Building located in the northern central portion of the Site. Both samples were collected from fill material present in their respective areas.

As shown on Table 1B, of those 27 fill materials samples analyzed for metal analytes as part of the previous investigations and RI, two (2) samples (7% of the fill material samples analyzed) had an exceedance of the RRSCOs. In both samples the analyte which exceeded the RRSCO was mercury only. No other analytes were detected in the 27 fill material samples above their respective RRSCOs. The twenty-nine (29) native soil samples collected and analyzed as part of previous investigation and the RI, and did not contain contaminants above their respective USCOs. The locations of the acceptable fill soil (below RRSCOs) and fill samples that had exceedances of the RRSCOs is provided on Figure 10. Figure 11 identifies the location of fill material exceedances with RRSCO exceedance data.

The metal analyte impacts are not significant at the Site and appear limited to the two (2) isolated locations, one in the northern-central (TP(SB)-3) and a small area in the southern portion of the Site (SB-5). Sample analysis from around these location to not indicate other metals impacts. It is not uncommon to detect metals in the urban fill materials within the City of Buffalo.
4.1.2.4 PCBs

No PCBs were detected above MDLs in the 16 samples analyzed for PCBs as part of the historic investigations or RI. PCBs are not considered to be a concern at the Site.

4.1.2.5 Pesticides

Pesticides were detected above MDLs in the three (3) of the six (6) samples analyzed for pesticides as part of the RI. One compound, 4,4’-DDT was detected above its USCO at one location (SB-102, 0 to 4 fbgs) but well below its RRSCO. Pesticides are not considered to be a concern at the Site.

4.1.2.6 Herbicides

No herbicides were detected above MDLs in the six (6) samples analyzed for herbicides as part of the RI. Herbicides are not considered to be a concern at the Site.

4.1.2.7 Total Cyanide

Cyanide was not detected above MDLs in the four (4) samples analyzed for total cyanide as part of the RI and is not considered to be a concern at the Site.

4.2 Groundwater

Four (4) groundwater samples (excluding QA/QC samples) were collected from the four (4) monitoring wells installed as part of the RI activities (see Figure 4). The permanent monitoring wells are designated MW-1 through MW-4.

Of the four (4) groundwater samples collected as part of the RI:

- Three (3) were analyzed for TCL VOCs via SW-846 8260C;
- One (1) was analyzed for TCL VOCs plus CP-51 via SW-846 8260C
- Three (3) were analyzed for SVOC Base Neutrals via SW-846 8270D;
- One (1) was analyzed for TCL SVOCs (Base Neutral & Acid Extractable Compounds) via SW-846 8270D;
- Three (3) were analyzed for both total and dissolved RCRA 8 Metals via SW-846 6010C/7471B;
- One (1) was analyzed for both total and dissolved TAL Metals via SW-846 6010C/7471B;
- One (1) was analyzed for Total Cyanide via SW-846 9012B;
One (1) groundwater sample was also collected as part of the Benchmark Phase II from TMW-1 installed at SB-4 (see Figures 3 and 4). It was sampled for VOCs only. Because the analytical results sample were non-detect, no table was generated.

Table 4 summarizes the results of the groundwater samples collected as part of the RI. The groundwater and water sample results from the RI and previous investigations were compared to the NYS Class “GA” Groundwater Quality Standards and Guidance Values (GWQS/GVs) and discussed below.

### 4.2.1 VOCs

VOCs were detected above MDLs in two (2) of the five (5) groundwater samples analyzed as part of the previous investigations and RI, in which two (2) different VOCs were detected. Of the two (2) VOCs (benzene and tetrachloroethene (PCE)) detected above MDLs, benzene (2.5 microgram per liter (ug/l)) was detected slightly above its respective GWQS/GV (1 ug/l). The detected concentration of PCE was below its respective GWQS/GV.

The location of the benzene detection, MW-2, is on the western portion of the Site, approximately 25 feet from Delaware Avenue. The detected concentration, although above its GWQS/GV is not considered significant and VOCs are not considered to a concern in the Site groundwater. Benzene was detected above MDL, but below its USCO, in one (1) of the 40 samples analyzed for VOC as part of the previous investigation and RI work.

### 4.2.2 SVOCs

SVOCs were not detected above MDLs in the groundwater samples analyzed as part of the RI. SVOCs in groundwater are not a concern at the Site.
4.2.3 Metals

Groundwater samples collected during the RI were analyzed for both total metals and dissolved metals. The dissolved metals analysis was completed on samples that were collected and filtered at the laboratory due to the elevated turbidity in the groundwater samples collected.

Total metals detected above their respective GWQS/GVs were limited to cobalt (1 location), iron (4 locations), lead (1 location), magnesium (4 locations), manganese (2 locations), sodium (4 locations), and vanadium (1 location) see Table 4.

The detected concentrations of cobalt (10.7 ug/l), lead (40.9 ug/l), magnesium (368.5 ug/l and 441.7 ug/l) and vanadium (20.6 ug/l) slightly exceeded their respective GWQS/GVs and were not widespread with limited detections. The elevated concentrations of iron are likely associated with the turbidity levels in the groundwater samples. The turbidity of monitoring wells MW-1, -2 and -3 were greater than 1,000 NTUs with iron concentrations ranging from 4,500 ug/l to 15,000 ug/l. The turbidity at MW-4 was approximately 500 NTUs and the concentration of iron detected was 355 ug/l, slightly above its GWQS/GV of 300 ug/l. The detection of magnesium and sodium in the four (4) monitoring well locations is likely associated with road salt use at the former hospital and city streets surrounding the Site.

Due to the high turbidity discussed above, additional sample volume was collected and filtered at the laboratory and also analyzed for metals. In the dissolved metal samples analyzed, only two (2) analytes, magnesium (60,020 ug/l) and sodium (794,000 ug/l) were detected at one (1) location, MW-2, at concentrations above their respective GWQS/GVs.

The difference in the number of analyte detections that exceed their respective GWQS/GV (seven analytes at multiple locations) in the total metal versus the number of analyte detections that exceed their respective GWQS/GV (two analytes at one location) in the dissolved metal analysis is due to the turbidity of the total metal analysis samples. The two (2) analytes detected in the dissolved metal sample from MW-2 are likely associated with road salt used along Delaware Avenue in the winter months, which is about 25 feet from the well location.

Based on RI groundwater data, there are minor metal analyte impacts to the groundwater. The analytes detected above their respective GWQS/GV, with the exception magnesium and sodium in the dissolved sample from MW-4, were for total metals in
unfiltered samples with high turbidity, and the results are likely biased high due to sediment present within those groundwater samples. Because the Site and surrounding area are on public water supply and the dissolved phase samples indicated only two (2) analytes, magnesium and sodium, common to road salt, exceeded their respective GWQS/GV, the metal analytes detected are not considered to be of concern at the Site.

4.2.4 PCBs
No PCBs were detected above MDLs in the groundwater sample analyzed for PCBs as part of the RI.

4.2.5 Pesticides
No pesticides were detected above MDLs in the groundwater sample analyzed for PCBs as part of the RI.

4.2.6 Herbicides
No herbicides were detected above MDLs in the groundwater sample analyzed for herbicides as part of the RI.

4.2.7 Total Cyanide
Cyanide was not detected above MDLs in the groundwater sample analyzed for total cyanide as part of the RI.

4.3 Radiological Survey Results
As discussed in Section 2.1.3, the radiological survey was completed in two (2) phases. The first phase was to screen soil/fill samples retained from the 23 RI locations (soil probes, soil borings and hand core) completed as part of the RI. The second phase consisted of a Site walkover of the accessible portions of the Site. The radiological survey reports are included in Appendix D.
4.3.1 RI Location Soil/Fill Screening

The results of alpha beta survey did not identify alpha or beta radiation at elevated levels within the individual soil/fill samples retained from the RI location that would indicate release of radioactive contaminants to the Site soil/fill.

Similarly the results of the gamma survey did not identify gamma radiation at elevated levels within the individual soil/fill samples retained from the RI location that would indicate release of radioactive contaminants to the Site soil/fill.

4.3.2 Site Walkover Survey

The results of the gamma Site walkover survey did not identified gamma radiation on the exterior accessible portions of the Site.

Three (3) locations were identified where naturally occurring radioactive materials were recorded within building construction materials:

- The yellow bricks used on the outside of the Site buildings.
- The granite used for landscaping on the southern side of the Medical Services building.
- The base of the Power Plant Smoke Stack, also constructed of yellow brick.

It is not uncommon to find radiological activity in granite and/or construction brick.

4.4 Summary of Historic Investigation and RI Findings

The following is a summary of the Historic Investigations and RI findings.

Surface Soils:
No samples were collected from surface soils as the majority of the Site is covered by buildings, asphalt parking or concrete walkways. The small amount of existing surface soil that is present is covered with topsoil and current vegetation will likely be disturbed during redevelopment.
Subsurface Soils:

VOCs are not considered to be a concern at the Site. One (1) VOC, naphthalene (generally considered to be a SVOC) was detected above its USCO in one (1) sample analyzed from the previous investigations and RI.

SVOCs detected above their respective RRSCOs were limited to benzo(b) fluoranthene, benzo(a)pyrene, benzo(a)anthracene, benzo(k)fluoranthene, chrysene, dibenzo(ah)anthracene, and indeno((1,2,3-cd)pyrene). The exceedances were identified at the following six (6) locations:

• Stohl Investigation: 12, 0 to 4 fbgs; 17, 4 to 8 fbgs, and 18, 4 to 9 fbgs.
• Benchmark Phase II: SB-6, 0.5 to 4 fbgs.
• RI: TP(SB)-13, 2 to 4 fbgs and SB-109, 0.5 to 4 fbgs.

The SVOCs detected at the Site at the locations identified above, are from fill material at these respective locations. In these instances the compound concentrations detected, slightly exceeded their respective RRSCOs and the total SVOC concentrations were well below 500 mg/kg. As shown on Table 1B, of the 32 fill materials samples analyzed for SVOCs as part of the previous investigations and RI, six (6) samples (19% of the fill material samples) exceeded their respective RRSCOs. This does not indicate that the SVOCs impacts are wide spread at the Site and appear to be limited to the fill material present in a few select locations, central (SB-109), northern-central TP(SB)-13 and small area in the southern portion of the Site (SB-6). It is not uncommon to detect SVOCs in the urban fill materials within the City of Buffalo. Native soil samples collected and analyzed as part of the RI did not contain contaminants above their respective USCOs.

One (1) metal analyte, mercury, was detected above its respective RRSCOs at two (2) locations: SB-5, 2 to 4 fbgs (Benchmark Phase II) and TP(SB)-3, 0.6 to 4 feet below the basement floor collected during the RI. Both sample locations were collected from fill material present in their respective area. As shown on Table 1B, of those 27 fill material samples analyzed for metal analytes as part of the previous investigations and RI, two (2) samples (7% of the fill material samples analyzed) had an exceedance
of the RRSCOs for mercury only. No other analytes were detected in the 27 fill material samples above their respective RRSCO. It is not uncommon to detect metals in the urban fill materials within the City of Buffalo. Twenty-nine (29) native soil samples were collected and analyzed as part of previous investigation and the RI, and did not contain contaminants above their respective USCOs.

PCBs were not detected above MDLs as part of the historic investigations or RI. PCBs are not considered to be a concern at the Site.

One (1) pesticide compound, 4,4’-DDT, was detected above its USCOs at one (1) location (SB-102, 0 to 4 fbgs) but well below its RRSCO. Pesticides are not considered to be a concern at the Site.

Herbicides were not detected above MDLs as part of the RI. Herbicides are not considered to be a concern at the Site.

Cyanide was not detected above MDLs as part of the RI and is not considered to be a concern at the Site.

**Groundwater:**

Two (2) VOCs (benzene and tetrachloroethene) were detected above MDLs in the groundwater samples collected as part of the RI. Benzene (2.5 ug/l) was the only compound detected above its respective GWQS/GV at MW-2, which is located on the western portion of the Site, approximately 25 feet from Delaware Avenue. The detected concentration, although above its GWQS/GV is not considered significant and VOCs are not considered to a concern in the Site groundwater.

SVOCs were not detected above MDLs in the groundwater samples analyzed as part of the RI. SVOCs in groundwater are not a concern at the Site.

The groundwater samples collected during the RI were analyzed for both total metals and dissolved metals due to the high turbidity in the groundwater samples collected.
Seven (7) analytes (cobalt, iron, lead, magnesium, manganese, sodium, and vanadium) were detected above their respective GWQS/GVs in the total metals (unfiltered) groundwater monitoring wells at the Site. However, only two (2) analytes (magnesium and sodium) were detected at one (1) location, MW-2, at concentrations above their respective GWQS/GVs in the dissolved metal samples.

The analytes detected in the dissolved metal sample from MW-2 are likely associated with road salt used along Delaware Avenue, which is about 25 feet from the well location. Because the Site and surrounding area are on public water supply and the dissolved phase samples indicated only two (2) analytes, magnesium and sodium, common to road salt had exceedances of their respective GWQS/GV, metal analytes in groundwater are not considered a concern at the Site.

No PCBs were detected above MDLs in the groundwater sample analyzed for PCBs as part of the RI. PCBs in groundwater are not a concern at the Site.

No pesticides were detected above MDLs in the groundwater sample analyzed for pesticides as part of the RI. Pesticides in groundwater are not a concern at the Site.

No herbicides were detected above MDLs in the groundwater sample analyzed for herbicides as part of the RI. Herbicides in groundwater are not a concern at the Site.

Cyanide was not detected above MDLs in the groundwater samples analyzed for total cyanide as part of the RI and is not a concern at the Site.

It appears that No. 6 fuel oil from the former-leaking USTs has migrated through the stone fill beneath the floor, resulting in an approximate two-foot layer of contaminated sub-base fill beneath the concrete floor in the basement of the Power Plant based on historic investigation activities. The two (2) soil probes completed as part of the RI in the eastern portion of the Power Plant did not encounter oil in the sub-base material (see Figure 5). However, the No. 6 fuel oil remaining beneath and proximate to the western portion of the building will require remedial action.
Radiological Survey:
The survey did not identify alpha, beta or gamma radiation at elevated levels within the individual soil/fill samples retained from the RI locations.

The results of the gamma walkover survey did not identify gamma radiation at elevated levels on the exterior accessible portions of the Site.

4.5 Data Usability Summary
In accordance with the RI Work Plan, the laboratory analytical data was independently assessed and, as required, submitted for independent review. Ms. Judy Harry of Data Validation Services located in North Creek, New York performed the data usability summary assessment for the soil vapor, soil/fill and groundwater samples, which involved a review of the summary form information and sample raw data, and a limited review of associated QC raw data. Specifically, the following items were reviewed:

- Laboratory Narrative Discussion
- Custody Documentation
- Holding Times
- Surrogate and Internal Standard Recoveries
- Matrix Spike Recoveries/Duplicate Recoveries
- Field Duplicate Correlation
- Preparation/Calibration Blanks
- Control Spike/Laboratory Control Samples
- Instrumental IDLs
- Calibration/CRI/CRA Standards
- ICP Interference Check Standards
- ICP Serial Dilution Correlations
- Sample Results Verification

The Data Usability Summary Reports (DUSRs) were conducted using guidance from the USEPA Region 2 validation Standard Operating Procedures, the USEPA National Functional Guidelines for Data Review, as well as professional judgment. Appendix G includes the DUSRs for the September 2010 and May 2011 analytical data, which were
prepared in accordance with Appendix 2B of NYSDEC’s DER-10 guidance. Those items listed above that demonstrated deficiencies are discussed in detail in the DUSR narrative sections. Analytical results were edited or qualified per the DUSR with changes reflected on the summary tables. In general, most sample results are usable either as reported or with minor qualification or edit. The following issues were noted in the DUSR:

- Phenolic results were rejected in one (1) soil field duplicated (Blind Dup#2);
- Results for the four (4) filtered groundwater samples for metals analysis are qualified as estimated; and
- Several sample detections are considered external contamination are were edited to non-detect.

The findings of the DUSR do not significantly impact the analytical data for the Site. The rejected data were in one (1) duplicate sample, for acid compounds (phenolics), which were not detected above method detection limits in other soil/fill samples at the Site. The sample detections which were considered “external contamination” and were edited to non-detect were acetone (6 soil samples), 1,2,4-trimethylbenzene (1 soil sample), selenium (13 soil samples), 4,4’-DDD (1 soil sample) and benzene (1 groundwater sample). The initial results for these compounds or analytes which were edited to non-detect, were below their respective USCOs or GWQS/GVs and do not affect the findings of the RI.

### 4.6 Constituents of Concern (COCs)

Based on historical investigation and the RI findings to date, the Constituents of Concern (COCs) for a restricted residential development are presented by media below:

- Subsurface Soil/Fill: SVOCs, metals (specifically mercury) at select locations in the fill material present on the Site (see Figure 6).
- No. 6 fuel oil present beneath the Power Plant basement slab (See Figure 6).
5.0 FATE AND TRANSPORT OF COCs

The soil/fill and groundwater sample analytical results associated with historic investigation and the RI were incorporated with the physical characterization of the Site to evaluate the fate and transport of COCs in Site media. The mechanisms by which the COCs can migrate to other areas or media are briefly outlined below.

5.1 Fugitive Dust Generation

Volatile and non-volatile chemicals present in soil/fill can be released to ambient air as a result of fugitive dust generation. Fugitive dust generation during excavations related to construction and Site redevelopment is considered a relevant potential short-term migration pathway.

Particulate monitoring in accordance with an approved Community Air Monitoring Plan (CAMP) would be implemented during intrusive activities and, if required, dust mitigation measures will be employed during future remediation and redevelopment (if not addressed during remedial actions) minimize the potential exposure.

5.2 Volatilization

Volatile chemicals present in soil/fill and groundwater may be released to ambient air through volatilization. At this time, VOCs were not identified in soil/fill or groundwater at concentrations that would be of concern. Therefore, volatilization is not considered a relevant migration pathway.

5.3 Surface Water Runoff

Erosion and transport of surface soils and associated sorbed chemicals in surface water runoff is a potential migration pathway. The potential for soil particle transport with surface water runoff is low as the Site is predominantly covered by a structure, concrete walks and asphalt parking lot. As such, surface water runoff is not considered a relevant migration pathway.

Surface water generated during remedial excavation activities would be managed under a management plan, which would minimize or eliminate the potential of contaminated sediment particles from migrating from the Site.
5.4 Leaching

Chemicals present in soil have the ability to migrate downward to groundwater or deeper soils as a result of infiltration of precipitation. The Site is predominantly covered by structures, concrete walks and asphalt parking lot that mitigates infiltration of precipitation.

The analytical results collected from the Site, indicates some SVOC impact and mercury at select locations. The samples collected from native soils and groundwater does not indicate that leaching has occurred. Therefore, leaching is not considered a relevant migration pathway.

5.5 Groundwater Transport

Overburden groundwater underlying the Site flows in a northerly direction. As described in Section 4.2, groundwater data indicates that one (1) compound, benzene, was detected slightly above its GWQS/GVs at one (1) location, MW-2. Analytical results from soil/fill samples did not detect benzene above MDLs at the Site. The close proximity of this well location (approximately 25 feet) to Delaware Avenue, a major thoroughfare in the City of Buffalo, may explain this low-level detection.

In addition, the Site and surrounding area are serviced by municipal (supplied) water. Therefore, it does not appear that groundwater is a relevant migration pathway.

5.6 Exposure Pathways

Based on the analysis of chemical fate and transport provided above, the pathways through which Site COCs could reach receptors at significant exposure point concentrations are: incidental contact with impacted Site soil/fill; fugitive dust generated from impacted fill; and surface water runoff.

Remedial activities completed in accordance with a soil/fill management plan will significantly minimize or eliminate the potential exposure associated with:

- direct contact with impacted soil/fill,
- impacted soil/fill particles migration from the Site in the form of fugitive dust and/or surface runoff.
During remedial action or redevelopment, the use of proper personal protective equipment (PPE) will significantly minimize or eliminate the potential exposure associated with direct contact with impacted soil/fill.

A Community Air Monitoring Program (CAMP), along with erosion and sediment control strategies will be implemented to mitigate the potential for off-site exposure.
6.0 **QUALITATIVE EXPOSURE ASSESSMENT**

6.1 **Human Health Exposure Assessment**

A qualitative exposure assessment consists of characterizing the exposure setting (including the physical environment and potentially exposed human populations), identifying exposure pathways, and evaluating contaminant fate and transport.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements:

- A receptor population
- A contaminant source
- Contaminant release and transport mechanism
- A point of exposure
- A route of exposure

The receptor population is the person or group of people who are or may be exposed to contaminants at a point of exposure. The source of contamination is defined as either the source of contaminant release to the environment (e.g., a waste disposal area or point of discharge), or the impacted environmental medium (i.e., soil, air, biota, water) at the point of exposure. Contaminant release and transport mechanisms carry contaminants from the source to points where people may be exposed. The point of exposure is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (i.e., ingestion, inhalation, dermal absorption).

An exposure pathway is complete when all five elements of an exposure pathway are documented; a potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway is not documented but could reasonably occur. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway does not exist in the present and will not exist in the future.
6.1.1 Potential Receptors

The identification of potential human receptors is based on the characteristics of the Site, the surrounding land uses, and the probable future land uses. The Site is a former commercial/medical facility primarily used for patient care and hospital administration operations, but included other supporting facilities (i.e., laboratories, research facilities, staff housing, auditorium, and a kitchen).

The Site is not currently and/or consistently occupied, but some construction/building activities are underway. The Site is located in a mixed commercial and residential area of the City of Buffalo.

Under current Site conditions, human contact with Site-related soil COCs can occur via exposure to subsurface soil by construction workers who may encounter impacted subsurface soil or airborne particulate during construction and/or servicing of utilities, if working in COC-impacted areas and not utilizing the appropriate personal protective equipment. The use of proper protective equipment will significantly reduce exposure.

6.1.2 Contaminant Source

The COCs present in Site media at elevated concentrations are generally limited to:
- SVOCs and mercury identified in subsurface fill/soil present in the northern-central and southern portions of the Site. No specific sources of these contaminants were identified.

6.1.3 Contaminant Release and Transport Mechanisms

Contaminant release and transport mechanisms are specific to the type of impacted media. For the current use and future (unremediated) commercial/residential use scenario, contaminant release and transport mechanisms are listed below by receptor:
- Construction/Maintenance Worker: Direct contact with Site soil/fill

6.1.4 Point of Exposure

SVOCs and mercury were detected above their respective RRSCOs in soil/fill at the Site. The SVOCs and mercury were detected in subsurface soil/fill could be a point of
exposure by construction workers in certain areas of the property if the Site remains unremediated.

6.1.5 Route of Exposure

Based on the types of receptors and points of exposure identified above, potential routes of exposure are listed below:

**Current Use Scenario**
- Construction Worker (short-term) – Skin contact and incidental ingestion of SVOC, No. 6 fuel oil and/or mercury impacted subsurface soils.

**Future Use Scenario (Unremediated)**
- Construction Worker or Maintenance Worker (short-term) – Skin contact and incidental ingestion of SVOC, No. 6 fuel oil and/or mercury impacted subsurface soils.

6.1.6 Exposure Assessment Summary

Based on the above assessment of potential exposure receptors, sources, transport mechanisms, exposure points, and routes of exposure, potential exposure pathways exist if the Site is left unremediated.

Construction worker or maintenance worker contact with SVOCs, No. 6 fuel oil and/or mercury-impacted subsurface soil/fill in the northern-central and southern portions of the Site could occur. Contact could occur through direct contact with impacted soil/fill or from airborne particulate during construction and/or servicing of utilities and workers do not employ appropriate PPE.

6.2 Potential Ecological Risks

The Site is currently vacant, and was formerly used as a former commercial/medical facility with the building footprints, asphalt parking lots and concrete sidewalks covering a majority of the Site. Accordingly, the Site provides little or no wildlife habitat or food value. No natural waterways are present on or adjacent to the Site. The reasonably anticipated future use is residential/commercial within a substantial redevelopment via demolition and
construction of new Site buildings. As such, no unacceptable ecological risks are anticipated under the current or reasonably anticipated future use scenario.
7.0 **Planned Interim Remedial Measures**

GCH intends to address the No. 6 fuel oil impacts and residual contamination in the vicinity of the Power Plant as an Interim Remedial Measure (IRM) based upon the presumptive nature of the cleanup (excavation and off-site disposal). As discussed in Section 1.2.1, six (6) test borings were completed through the approximate 2-foot thick concrete floor in May 2008 at several locations on the north and western portions of the Power House (see Figure 3). It appears that the No. 6 fuel oil from the former-leaking USTs has migrated through the stone fill beneath the floor, resulting in an approximate two-foot layer of contaminated sub-base fill beneath the concrete floor in the basement level of the Power Plant. The two (2) soil probes completed as part of the RI in the eastern portion of the Power Plant basement did not encounter oil in the sub-base material (see Figure 5).

The No. 6 fuel oil and petroleum-impacted soil/fill around and beneath the Power Plant on the southeastern portion of the Site are proposed to be addressed as an IRM to coincide with demolition of that structure.

A revised IRM work plan was prepared and submitted to NYSDEC for review and comment on January 29, 2015. The assumed area of the No. 6 fuel oil to be address as part of the IRM is included on Figure 6. Post excavation confirmatory samples will be collected from the excavation, with bias toward material exhibiting evidence of visual, olfactory, and/or elevated PID readings, if remaining. Sample locations from excavated areas will include samples from excavation sidewalls and bottom. One sample per 30 linear feet of sidewall and one sample for each 900 square feet of excavation bottom will be collected in accordance with DER-10.

Samples from the excavation will be analyzed for TCL VOCs plus CP-51 List VOCs via EPA Method 8260 and Part 375 and CP-51 list SVOCs via EPA Method 8270. Three (3) samples from the bottom of the excavation will also be analyzed for Part 375 list Metals via EPA Method 6010/7471 and polychlorinated biphenyls (PCBs) via EPA Method 8082. Post excavation sample results will be compared to the RRSCOs.

Although not considered environmental contaminants in their current form, GCH also intends to remove certain solid and other potential regulated waste materials that are present within the Power Plant from prior owners/occupants (e.g., oils, coolants, miscellaneous chemicals, fluorescent lamps, etc.) before the building is demolished.
NYSDEC approval will be obtained prior to implementing the IRM. The IRM work plan presents the scope of the planned IRM, including preparation tasks, post-demolition soil/fill handling, groundwater management, community air monitoring, post-excavation confirmatory sampling, backfill criteria, and reporting. It was prepared in general accordance with NYSDEC DER-10.

In addition to the No. 6 fuel oil area, GCH is proposing to excavate the four (4) exterior areas shown on Figures 6 and 7, and further discussed in Section 8.3.2 in order to expedite the remedial efforts. These four (4) exterior areas contain SVOCs (3 areas) and mercury (1 area) in shallow fill material present in these areas.

Fill materials removed from the four (4) areas will be taken to a permitted landfill facility for disposal. Prior to backfill with material compliant with the DER-10 requirements, a demarcation layer will be placed at the bottom of the excavation and the excavation will be backfilled to surface grade. It is estimated that approximately 545 cubic yards (cy) of soil/fill will be removed to a depth of 2 ftgrs from these four (4) areas. The excavation work will be monitored by a qualified environmental professional under Benchmark’s employ. The lateral extent of the excavations will be based on the post-excavation sample analytical results.

Post-excavation samples will be collected from the sidewalls and bottom of the excavation for analytical testing. One sample per 30 linear feet of sidewall and one sample for each 900 square feet of excavation bottom will be collected in accordance with DER-10. Confirmatory samples from the three (3) SVOC-impacted excavation areas will be analyzed for Part 375 list SVOCs via EPA Method 8270. Confirmatory samples from the one (1) mercury excavation area will be analyzed for mercury via EPA Method 7471. The Part 375 SVOC and mercury RRSCOs will be the remedial goals.
8.0 **Remedial Alternatives Evaluation**

8.1 Remedial Action Objectives

The final remedial measures for the Site must satisfy Remedial Action Objectives (RAOs). Remedial Action Objectives are site-specific statements that convey the goals for minimizing or eliminating substantial risks to public health and the environment. Per DER-10, generic RAOs associated with the Site include:

1. **Groundwater**:
   - Public Health Protection
     - i. Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
     - ii. Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
   - Environmental Protection
     - i. Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

2. **Soil**:
   - Public Health Protection
     - i. Prevent ingestion/direct contact with contaminated soil.
     - ii. Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.
   - Environmental Protection
     - i. Prevent migration of contaminants that would result in groundwater contamination.
     - ii. Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

3. **Soil Vapor**:
   - Public Health Protection
     - i. Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

In addition to achieving RAOs, NYSDEC’s Brownfield Cleanup Program calls for remedy evaluation in accordance with DER-10 Technical Guidance for Site Investigation and Remediation. Specifically, the guidance states “When proposing an appropriate remedy,
the person responsible for conducting the investigation and/or remediation should identify and develop a remedial action that is based on the following criteria:"

- **Overall Protectiveness of Public Health and the Environment.** This criterion is an evaluation of the remedy'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, or institutional controls.

- **Standards, Criteria, and Guidance (SCGs).** Compliance with SCGs addresses whether a remedy will meet applicable environmental laws, regulations, standards, and guidance.

- **Long-Term Effectiveness and Permanence.** This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: (i) the magnitude of the remaining risks (i.e., will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residuals), (ii) the adequacy of the engineering and institutional controls intended to limit the risk, (iii) the reliability of these controls, and (iv) the ability of the remedy to continue to meet RAOs in the future.

- **Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment.** This criterion evaluates the remedy's ability to reduce the toxicity, mobility, or volume of Site contamination. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the Site.

- **Short-Term Impact and Effectiveness.** Short-term effectiveness is an evaluation of the potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during construction and/or implementation. This includes a discussion of how the identified adverse impacts and health risks to the community or workers at the Site will be controlled, and the effectiveness of the controls. This criterion also includes a discussion of engineering controls that will be used to mitigate short term impacts (i.e., dust control measures), and an estimate of the length of time needed to achieve the remedial objectives.

- **Implementability.** The implementability criterion evaluates the technical and administrative feasibility of implementing the remedy. 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.

- **Cost Effectiveness.** Capital, operation, maintenance, and monitoring costs are estimated for the remedy and presented on a present worth basis.

- **Community Acceptance.** This criterion evaluates the public’s comments, concerns, and overall perception of the remedy.

### 8.2 Future Land Use Evaluation

In developing and screening remedial alternatives, NYSDEC’s Part 375 regulations require that the reasonableness of the anticipated future land be factored into the evaluation. The regulations identify 16 criteria that must be considered. These criteria and the resultant outcome for the Site are presented in Appendix H. As indicated, this evaluation supports a mixed residential and commercial use as the reasonably anticipated future use of the Site. The proposed redevelopment of the Site for a mixed residential and commercial use is consistent with the City of Buffalo’s Buffalo Green Code (Ref. 10). Accordingly, remedial alternatives to clean up the Site to restricted residential end use are identified and evaluated herein.

Although the Site is intended to be used for mixed residential and commercial purposes, evaluating a more restricted-use scenario is a requirement of the BCP. Therefore, Tables 2A, 2B and 3 also shows historic data and RI characterization soil/fill analytical data compared to Part 375 USCOs. Per NYSDEC DER-10, evaluation of a “no-action” alternative is also required to provide a baseline for comparison against other alternatives. The remedial alternatives discussed in greater detail in Section 8.3 below include:

- No Further Action
- Track 4 Restricted Residential Soil Cleanup
- Track 2 Restricted Residential Soil Cleanup
- Unrestricted Use Cleanup

### 8.3 Alternatives Evaluation

The following sections include a series of remedial action alternatives that could potentially be implemented at the Site, which are compared to the criteria listed in Section
8.1. The remedial alternatives are evaluated in order of least comprehensive to most comprehensive. Table 5 provides a cost summary of for each alternative evaluated below.

For purposes of developing the remedial alternatives, it has been assumed that the No. 6 fuel oil contamination associated with the Power Plant will addressed as an IRM as discussed in Section 7.0. Therefore, this remedial action and the associated costs to address the No. 6 fuel oil have not been included in the remedial alternative evaluations discussed below.

### 8.3.1 Alternative #1- No Further Action

Under this alternative, the Site would remain in its current state, with no controls in-place.

*Overall Protection of Public Health and the Environment* – This alternative does not reduce the risk of exposure for human health and the environment. The Site as it exists is not fully protective of human health and the environment due to the presence of SVOCs and mercury in the subsurface fill, and the absence of institutional controls to prevent more restrictive forms of future Site use (e.g., unrestricted, residential). Uncontrolled access to the Site could lead to potential exposure to impacted fill soil if intrusive work were performed at the Site and workers are unaware or untrained regarding the contaminants.

*Compliance with SCGs* – Under the current and reasonably anticipated future restricted residential use scenario, elevated concentrations of SVOCs and mercury are present in subsurface fill soil which should be addressed considering the residential redevelopment planned.

*Long-Term Effectiveness and Permanence* – The no further action alternative involves no additional remediation, engineering or institutional controls, and provides no long-term effectiveness toward achieving the RAOs.

*Reduction of Toxicity, Mobility, or Volume* – The no further action alternative does not reduce the toxicity, mobility, or volume of fill soil contaminants present; therefore, no further action does not fully satisfy the RAOs for a restricted residential redevelopment.
**Short-Term Impact and Effectiveness** – No potential short-term adverse environmental impacts and human exposures are anticipated during the implementation of this alternative since there are no remedial activities involved.

**Implementability** – No technical or administrative implementability issues are associated with the no further action alternative.

**Cost** – There would be no capital or long-term operation, maintenance, or monitoring costs associated with the no further action alternative (see Table 6).

**Community Acceptance** – Community acceptance will be evaluated based on comments to be received from the public in response to Fact Sheets and other planned Citizen Participation activities.

### 8.3.2 Alternative #2- Track 4 Restricted Residential Soil Cleanup: Fill Soil Excavation and Cover System

The alternative includes the following components:

- **Soil Excavation Activities** to address impacted fill material areas containing SVOCs above their respective RRSCOs in the upper 2 feet on the exterior portions of the Site (see Figure 7). Detections of SVOCs and mercury detected beneath the existing buildings are at depths greater than 2 fbgs, given the basement floor grades of the Site building vary from about 4 fbgs (northern portion of the Site) to 12 fbgs (southern portion) and would not require excavation action under a Track 4 cleanup scenario. A cover system, as discussed below, would be used to cover the materials above the RRSCO remaining on-Site.

- **Cover System** consisting of building footprint/foundations, asphalt parking lots, concrete walkways, NYSDEC acceptable backfill, and vegetative cover would be utilized at the Site. Based on the analytical data from the previous investigations and the RI, soil/fill for the cover system would only need to be installed in the areas proposed to be excavated under this scenario. Shallow surface soils (upper 2 feet) or existing cover (building foundations, concrete sidewalks, and asphalt cover) are suitable to be used as part of the cover system. As shown on Table 1B and the table provided in Section 4, only 19%
of the fill samples submitted for SVOC analysis and 7% of the fill samples submitted for metals analysis had exceedances of their respective RRSCOs.

The locations of the acceptable fill soil (below RRSCOs) and fill samples that had exceedances of the RRSCOs is provided on Figure 10. Figure 11 identifies the location of fill material exceedances with RRSCO exceedance data. The cover system is depicted on Figure 13.

- **Implementation of a Site Management Plan (SMP).** The fill/soil that has exceedances of the RRSCOs and is deeper than 2 ftgs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place as well, as the cover system, will be managed in accordance with the SMP. The SMP will include:
  
  - **Institutional Controls and Engineering Controls (IC/EC) Plan.** Engineering controls include any physical barrier or method employed to actively or passively contain, stabilize, or monitor contaminants; restrict the movement of contaminants; or eliminate potential exposure pathways to contaminants. Institutional controls at the site will include groundwater use restrictions and use restrictions of the Site to restricted residential use;
  
  - **Operation and Maintenance Plan** that describes the measures necessary to operate, monitor, and maintain the soil cover;
  
  - **Excavation Work Plan** to assure that future intrusive activities and soil/fill handling at the Site are completed in a safe and environmentally responsible manner;
  
  - **Site Monitoring Plan** that includes: provisions for Site-wide inspection program to assure that the IC/ECs have not been altered and remain effective; and,
  
  - **Environmental Easement** filed with Erie County.

As discussed in Section 7.0, the No. 6 fuel oil impacts and residual contamination in the vicinity of the Power Plant will be addressed as an IRM based upon the presumptive nature of the cleanup (excavation and off-site disposal). Post excavation soil samples will be compared to the Part 375 RRSCOs for VOCs, SVOCs and metals as discussed in the IRM work plan. Therefore the No. 6 fuel oil impacted soil/fill are not included in the evaluations below.

**Overall Protection of Public Health and the Environment** – The Site as it exists is not fully protective of human health and the environment for a residential redevelopment due to the presence of elevated SVOCs and mercury in subsurface fill material present in the
upper 2 fbgs, and the absence of institutional controls to prevent more restrictive forms of future site use (e.g., unrestricted). This alternative would be protective of public health and the environment as it would reduce the potential exposure to subsurface fill material contamination. The fill/soil that has exceedances of the RRSCOs and is deeper than 2 fbgs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP. The SMP will include appropriate plans, controls and measures and an environmental easement to ensure the restricted use remedy is protective of human health and the environment. Therefore, this alternative meets the RAOs.

**Compliance with SCGs** – Compliance with the SCGs would be achieved by excavation of the SVOCs and mercury-impacted areas in the fill material present in the upper 2 feet at the Site and replacement with soils meeting RRSCOs, and/or construction of other acceptable forms of cover to assure that the site is covered by at least 2 feet of clean soil or 6 inches of hardscape (building, asphalt, concrete). The clean cover will mitigate contact with underlying soils where RRSCO exceedances remain.

The fill/soil that has exceedances of the RRSCOs and is deeper than 2 fbgs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP. The SMP will include appropriate plans, controls, and measures and an environmental easement to ensure that the cover is maintained and that the restricted use remedy remains protective of human health and the environment. This would achieve compliance with a restricted residential Track 4 cleanup.

**Long-Term Effectiveness and Permanence** – This alternative is expected to provide long-term effectiveness by addressing SVOC and mercury-impacted areas in the fill material in the upper 2 feet present at the Site and by maintenance of the cover system to prevent exposure to any remaining subsurface soils below that depth.

The fill/soil that has exceedances of the RRSCOs and is deeper than 2 fbgs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP. The SMP will include appropriate plans, controls, and measures and an environmental easement to ensure the restricted use remedy is protective of human health and the environment. The SMP will be followed by the current Site owner as well as future Site
owners. As such, this alternative is expected to provide long-term effectiveness and permanence.

**Reduction of Toxicity, Mobility, or Volume** – Reduction of toxicity, mobility or volume would be achieved by excavation and offsite disposal of the SVOC and mercury-impacted areas in the fill material present in the upper 2 feet present at the Site. The fill/soil that has exceedances of the RRSCOs and is deeper than 2 ftbs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP. The SMP will include appropriate plans, controls, and measures and an environmental easement to ensure the restricted use remedy is protective of human health and the environment. Accordingly, this alternative satisfies this criterion.

**Short-Term Impact and Effectiveness** – There are potential short-term impacts associated with this alternative.

- There is potential for impacts to human health (workers and construction personnel) due to direct contact with impacted soil and particulate releases. This alternative would require the preparation of a health and safety plan (HASP) to identify proper personal protective equipment required as well as the proper site and community air monitoring, as outlined in the NYSDOH Generic Community Air Monitoring Plan (CAMP), in order to mitigate potential adverse conditions.

- Contamination of equipment used for excavation purposes could carry contamination off-site. Therefore, equipment will be decontaminated prior to leaving the Site, as necessary, in order to avoid the transport of contaminants.

- Field personnel would wear appropriate personal protective equipment during excavation in order to limit health risks due to exposure to contaminants and physical hazards.
- Human health and the environment would be protected under this alternative if the HASP and CAMP are properly implemented. This alternative is expected to meet the soil remedial action objectives at completion of the excavations, because the impacted soil will be removed from the Site. Confirmatory soil sampling would be performed to verify the alternatives effectiveness.

- This alternative would have short term effectiveness. The removal of impacted fill material would remove the contaminants above their respective RRSCOs.

**Implementability** – Implementation of the fill material excavations and cover system alternative would not be subject to special technical implementability issues. No action-specific administrative implementability issues are associated with this alternative.

**Cost** – The capital costs for this alternative are estimated at approximately $129,000 and the annual certification reporting is estimated at approximately $2,500 per year. Table 6 provides a summary of costs for this alternative.

**Community Acceptance** – Community acceptance will be evaluated based on comments to be received from the public in response to Fact Sheets and other planned Citizen Participation activities.

### 8.3.3 Alternative #3 - Track 2 Restricted Residential Soil Cleanup: Fill Material Excavation

The alternative includes the following components:

- **Soil Excavation Activities** to address impacted fill material impacted with SVOCs and mercury that exceed their respective RRSCOs in the upper 15 ftbs at the Site (see Figure 8).
- **Environmental Easement** filed with Erie County.
**Overall Protection of Public Health and the Environment** – The Site as it exists is not fully protective of human health and the environment for a residential redevelopment due to the presence of elevated SVOCs and mercury in subsurface fill materials, and the absence of institutional controls to prevent more restrictive forms of future site use (e.g., unrestricted). This alternative would be protective of public health and the environment as it would be expected to reduce the potential exposure to subsurface fill contamination. The environmental easement will ensure the restricted use remedy is protective of human health and the environment. Therefore, this alternative meets the RAOs.

**Compliance with SCGs** – Compliance with the SCGs would be achieved by excavation of the SVOCs and metals-impacted fill material exceeding the RRSCOs present in the upper 15 fbgs at the Site.

The environmental easement to ensure the restricted use remedy is protective of human health and the environment. This would achieve compliance with a restricted residential Track 2 cleanup.

**Long-Term Effectiveness and Permanence** – This alternative is expected to provide long-term effectiveness by addressing SVOC and mercury-impacted areas present in fill material in the upper 15 feet present at the Site. The environmental easement will ensure the restricted use remedy is protective of human health and the environment. As such, this alternative is expected to provide long-term effectiveness and permanence.

**Reduction of Toxicity, Mobility, or Volume** – Reduction of toxicity, mobility or volume would be achieved by excavation of the SVOCs and mercury-impacted fill material above the RRSCOs present in the upper 15 fbgs of the Site. The environmental easement will ensure the restricted use remedy is protective of human health and the environment. Accordingly, this alternative satisfies this criterion.

**Short-Term Impact and Effectiveness** – There are potential short-term impacts associated with this alternative.
• There is potential for impacts to human health (workers and construction personnel) due to direct contact with impacted soil and particulate releases. This alternative would require the preparation of a health and safety plan (HASP) to identify proper personal protective equipment required as well as the proper site and community air monitoring, as outlined in the NYSDOH Generic Community Air Monitoring Plan (CAMP), in order to mitigate potential adverse conditions.

• Contamination of equipment used for excavation purposes could carry contamination off-site. Therefore, equipment will be decontaminated prior to leaving the Site, as necessary, in order to avoid the transport of contaminants.

• Field personnel would wear appropriate personal protective equipment during excavation in order to limit health risks due to exposure to contaminants and physical hazards.

• Human health and the environment would be protected under this alternative if the HASP and CAMP are properly implemented. This alternative is expected to meet the soil remedial action objectives at completion of the excavations, because the impacted soil will be removed from the Site. Confirmatory soil sampling would be performed to verify the alternatives effectiveness.

• This alternative would have short term effectiveness. The removal of impacted soil/fill would remove the potential exposure.

**Implementability** – Implementation of the fill material excavations would not be subject to special technical implementability issues. No action-specific administrative implementability issues are associated with this alternative.
**Cost** – The capital costs for this alternative are estimated at approximately $472,000 and the annual certification reporting is estimated at approximately $2,500 per year. Table 8 provides a summary of costs for this alternative.

**Community Acceptance** – Community acceptance will be evaluated based on comments to be received from the public in response to Fact Sheets and other planned Citizen Participation activities.

### 8.3.4 Alternative #4 - Unrestricted Use Alternative

An Unrestricted Use alternative would necessitate remediation of all soil/fill where concentrations exceed the 6NYCRR Part 375 Unrestricted Use SCOs. For Unrestricted Use scenarios, excavation and off-site disposal of impacted soil/fill is generally regarded as the most applicable remedial measure, because institutional controls cannot be used to supplement the remedy. As such, the Unrestricted Use alternative assumes that those areas with constituents above Unrestricted Use SCOs would be excavated and disposed at an off-Site commercial solid waste landfill. Following removal and confirmatory sampling of the excavation, the areas would be backfilled with clean soil/fill that meet the requirements of NYSDEC DER-10 to match the surrounding grade.

Subsurface soil/fill samples indicate concentrations of VOCs, SVOCs, metals, and pesticides are present in unsaturated soil above Unrestricted Use SCOs. It is likely that a significant portion of the fill material present in the eastern and northern-central portion of the Site would require excavation and off-site disposal. These areas of the Site and the estimated excavation depths are shown on Figure 9.

**Overall Protection of Public Health and the Environment** – The Unrestricted Use alternative would achieve the corresponding Part 375 USCOs, which are designed to be protective of human health under any reuse scenario.

**Compliance with SCGs** – The Unrestricted Use alternative would be performed in accordance with applicable, relevant, and appropriate standards, guidance, and criteria.
**Long-Term Effectiveness and Permanence** – The Unrestricted Use alternative would involve removal of all impacted soil/fill; therefore, no soil/fill exceeding the Unrestricted Use SCOs would remain on the Site.

**Reduction of Toxicity, Mobility, or Volume with Treatment** – Through removal of impacted soil/fill, the Unrestricted Use alternative would permanently and significantly reduce the toxicity, mobility, and volume of Site contamination.

**Short-Term Impact and Effectiveness** – There are several potential short-term impacts associated with this alternative.

- There is potential for impacts to human health (workers and construction personnel) due to direct contact with impacted soil and particulate releases. This alternative would require the preparation of a health and safety plan (HASP) to identify proper personal protective equipment required as well as the proper site and community air monitoring, as outlined in the NYSDOH Generic Community Air Monitoring Plan (CAMP), in order to mitigate potential adverse conditions.

- Contamination of equipment used for excavation purposes could carry contamination off-site. Therefore, equipment will be decontaminated prior to leaving the Site, as necessary, in order to avoid the transport of contaminants.

- Field personnel would wear appropriate personal protective equipment during excavation in order to limit health risks due to exposure to contaminants and physical hazards.

- Human health and the environment would be protected under this alternative if the HASP and CAMP are properly implemented. This
The alternative is expected to meet the soil remedial action objectives at completion of the excavations, because the impacted soil will be removed from the Site. Confirmatory soil sampling would be performed to verify the alternatives effectiveness.

- This alternative would have short term effectiveness. The removal of impacted soil/fill would remove the potential exposure.

**Implementability** – Implementation of the soil/fill excavations at the Site would not be subject to special technical implementability issues. However, excavation activities would have to occur after building demolition.

No action-specific administrative implementability issues are associated with this alternative.

**Cost** – The capital costs for Unrestricted Use Cleanup is approximately $1,786,000, which includes costs of soil/fill removal and disposal. Table 8 provides a summary of costs for this alternative.

**Community Acceptance** – Community acceptance will be evaluated based on comments to be received from the public in response to Fact Sheets and other planned Citizen Participation activities.

### 8.4 Recommended Remedial Measure

Based on the Remedial Alternatives Analysis evaluation, Alternative #2, Track 4 Restricted Residential Soil Cleanup consisting of fill/soil excavations and cover system fully satisfies the remedial action objectives. This alternative includes the following components:

- **Soil Excavation Activities** to address the fill/soil material impacted with SVOCs and metals that exceed their respective RRSCOs in the upper 2 fbgs at the Site (see Figure 7).
- **Cover System** consisting of building footprints, asphalt parking lots, concrete walkways and NYSDEC acceptable backfill and vegetative cover would be utilized at the Site.
- **Site Management Plan** implementation. The fill/soil that has exceedances of the RRSCOs and is deeper than 2 ftbs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP.
- **Environmental Easement** filed with Erie County.

This alternative was selected based on following:

- **Overall Protection of Public Health and the Environment** – This alternative would be protective of public health and the environment as it would reduce the potential exposure to subsurface fill material contamination. The SMP will include appropriate plans, controls and measures and an environmental easement to ensure the restricted use remedy is protective of human health and the environment. Therefore, this alternative meets the RAOs.

- **Compliance with SCGs** – Compliance with the SCGs would be achieved by excavation of the SVOCs and mercury-impacted areas in the fill material present in the upper 2 feet at the Site exceeding the RRSCOs and replacement with soils meeting RRSCOs, and/or construction of other acceptable forms of cover to assure that the site is covered by at least 2 feet of clean soil or 6 inches of hardscape (building, asphalt, concrete). The clean cover will mitigate contact with underlying soils where RRSCO exceedances remain.

  The fill/soil that has exceedances of the RRSCOs and is deeper than 2 ftbs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP. A SMP will be implemented that will include appropriate plans, controls, and measures and an environmental easement to ensure that the cover is maintained and that the restricted use remedy remains protective of human health and the environment. This would achieve compliance with a restricted residential Track 4 cleanup.

- **Long-Term Effectiveness and Permanence** – This alternative is expected to provide long-term effectiveness by addressing SVOC and mercury-impacted areas in the fill material present in the upper 2 feet at the Site exceeding the RRSCOs and by
maintaining the cover system to prevent exposure to any remaining subsurface soils below that depth.

The fill/soil that has exceedances of the RRSCOs and is deeper than 2 fbgs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP. A SMP will be implemented that will include appropriate plans, controls, and measures and an environmental easement to ensure the restricted use remedy is protective of human health and the environment. The SMP will be followed by the current Site owner as well as future Site owners. As such, this alternative is expected to provide long-term effectiveness and permanence.

- **Reduction of Toxicity, Mobility, or Volume** – Reduction of toxicity, mobility or volume would be achieved by excavation and offsite disposal of the SVOC and metals-impacted areas in the fill material present in the upper 2 feet present at the Site. The fill/soil that has exceedances of the RRSCOs and is deeper than 2 fbgs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place will be managed in accordance with the SMP. A SMP will be implemented that will include appropriate plans, controls, and measures and an environmental easement to ensure the restricted use remedy is protective of human health and the environment. Accordingly, this alternative satisfies this criterion.

- **Short-Term Impact and Effectiveness** – There are several potential short-term impacts associated with this alternative that can be addressed through proper health and safety and community monitoring. This alternative would have short term effectiveness as the removal of impacted soil/fill would remove the potential exposure.

- **Implementability** – Implementation of this alternative would not be subject to special technical or action specific implementability issues.
• **Cost** – The capital costs for this alternative are estimated at approximately $129,000 and the annual certification reporting is estimated at approximately $2,500 per year. Table 6 provides a summary of costs for this alternative.

Based on the above analysis, Alternative #2- Track 4 Restricted Residential Soil Cleanup: Fill Material Excavation, Cover System, SMP and Environmental Easement is the recommended final remedial approach for the Site.
9.0 FINDINGS AND CONCLUSIONS

9.1 Remedial Investigation

Based on the data collected during historic investigations and the NYSDEC-approved RI presented in the preceding sections, we offer the following summary and conclusions.

Surface Soils:

No samples were collected from surface soils as the majority of the Site is covered by buildings, asphalt parking or concrete walkways. The small amount of existing surface soil that is present is covered with topsoil and current vegetation will likely be disturbed during redevelopment.

Subsurface Soils:

VOCs are not considered to be a concern at the Site. One (1) VOC, naphthalene (generally considered to be a SVOC) was detected above its USCO in one (1) sample analyzed from the previous investigations and RI.

SVOCs detected above their respective RRSCOs were limited to benzo(b)fluoranthene, benzo(a)pyrene, benzo(a)anthracene, benzo(k)fluoranthene, chrysene, dibenzo(ah)anthracene, and indeno((1,2,3-cd)pyrene). The exceedances were identified at the following six (6) locations:

- Stohl Investigation: 12, 0 to 4 fbgs; 17, 4 to 8 fbgs, and 18, 4 to 9 fbgs.
- Benchmark Phase II: SB-6, 0.5 to 4 fbgs.
- RI: TP(SB)-13, 2 to 4 fbgs and SB-109, 0.5 to 4 fbgs.

The SVOCs detected at the Site, as identified above, are from fill material at a few select locations. As shown on Table 1B and Figure 10, of the 32 fill materials samples analyzed for SVOCs as part of the previous investigations and RI, six (6) samples (19% of the fill material samples) exceeded their respective RRSCOs. This
does indicates that the SVOCs impacts are not wide spread at the Site and appear to be limited to the fill material present in a few select locations, northern-central (SB-109), northern-central TP(SB)-13 and small area in the southern portion of the Site (SB-6). In all instances total SVOC concentrations were present at levels well below 500 mg/kg. It is not uncommon to detect SVOCs in the urban fill materials within the City of Buffalo. Native soil samples collected and analyzed as part of the RI did not contain contaminants above their respective USCOs.

One (1) metal analyte, mercury, was detected above its respective RRSCOs at two (2) locations: SB-5, 2 to 4 fbgs (Benchmark Phase II) and TP(SB)-3, 0.6 to 4 feet below the basement floor collected during the RI. Both sample locations were collected from fill material present in their respective area.

As shown on Table 1B, of the 27 fill materials samples analyzed for metal analytes as part of the previous investigations and RI, two (2) samples (7% of the fill material samples analyzed) had an exceedance of the RRSCOs and in both samples the analyte was mercury only. No other analytes were detected in the 27 fill material samples above their respective RRSCO. The twenty-nine (29) native soil samples collected and analyzed as part of previous investigation and the RI, and did not contain contaminants above their respective USCOs.

The metal analyte impacts are not significant at the Site and appear to be limited to the two (2) isolated locations, one in the northern-central (TP(SB)-3) and a small area in the southern portion of the Site (SB-5). It is not uncommon to detect metals in the urban fill materials within the City of Buffalo. Native soil samples collected and analyzed as part of the RI did not contain contaminants above their respective USCOs.

PCBs were not detected above MDLs as part of the historic investigations or RI. PCBs are not considered to be a concern at the Site.
One (1) pesticide compound, 4,4'-DDT, was detected above its USCOs at one (1) location (SB-102, 0 to 4 fbgs) but well below its RRSCO. Pesticides are not considered to be a concern at the Site.

Herbicides were not detected above MDLs as part of the RI. Herbicides are not considered to be a concern at the Site.

Cyanide was not detected above MDLs as part of the RI and is not considered to be a concern at the Site.

**Groundwater:**
Two (2) VOCs (benzene and tetrachloroethene) were detected above MDLs in the groundwater samples collected as part of the RI. Benzene (2.5 ug/l) was the only compound detected above its respective GWQS/GV at MW-2, which is located on the western portion of the Site, approximately 25 feet from Delaware Avenue. The detected concentration, although above its GWQS/GV is not considered significant and VOCs are not considered to a concern in the Site groundwater.

SVOCs were not detected above MDLs in the groundwater samples analyzed as part of the RI. SVOCs in groundwater are not a concern at the Site.

The groundwater samples collected during the RI were analyzed for both total metals and dissolved metals. Seven (7) analytes (cobalt, iron, lead, magnesium, manganese, sodium, and vanadium) were detected above their respective GWQS/GVs in the total metals (unfiltered) groundwater monitoring wells at the Site.

The detected concentrations of cobalt (10.7 ug/l), lead (40.9 ug/l), magnesium (368.5 ug/l and 441.7 ug/l) and vanadium (20.6 ug/l) slightly exceeded their respective GWQS/GVs and were not wide spread with limited detections. The elevated concentrations of iron are likely associated with the turbidity levels in the groundwater samples. The turbidity of monitoring wells MW-1, -2 and -3 were greater than 1,000 NTUs with iron concentrations ranging from 4,500 ug/l to 15,000
ug/l. The turbidity at MW-4 was approximately 500 NTUs and the concentration of iron detected was 355 ug/l, slightly above its GWQS/GV of 300 ug/l. The detection of magnesium and sodium in the four (4) monitoring well locations is likely associated with road salt use at the former hospital and city streets surrounding the Site.

Due to the high turbidity discussed above, additional sample volume was collected and filtered at the laboratory and also analyzed for metals. The analytes (sodium and magnesium) detected in the dissolved metal sample from MW-2 is likely associated with road salt used along Delaware Avenue, which is about 25 feet from the well location. Metal analytes in groundwater are not a concern at the Site.

No PCBs were detected above MDLs in the groundwater sample analyzed for PCBs as part of the RI. PCBs in groundwater are not a concern at the Site.

No pesticides were detected above MDLs in the groundwater sample analyzed for pesticides as part of the RI. Pesticides in groundwater are not a concern at the Site.

No herbicides were detected above MDLs in the groundwater sample analyzed for herbicides as part of the RI. Herbicides in groundwater are not a concern at the Site.

Cyanide was not detected above MDLs in the groundwater samples analyzed for total cyanide as part of the RI and is not a concern at the Site.

It appears that No. 6 fuel oil from the former-leaking USTs has migrated through the stone fill beneath the floor, resulting in an approximate two-foot layer of contaminated sub-base fill beneath the concrete floor in the basement of the Power Plant based on historic investigation activities. The two (2) soil probes completed as part of the RI in the eastern portion of the Power Plant did not encounter oil in the sub-base material (see Figure 5). However, the No. 6 fuel oil remaining beneath and proximate to the western portion of the building will require remedial action.

**Radiological Survey:**
The survey did not identify alpha, beta or gamma radiation at elevated levels within the individual soil/fill samples retained from the RI locations.

The results of the gamma walkover survey did not identify gamma radiation at elevated levels on the exterior accessible portions of the Site.

9.2 Remedial Alternatives Analysis

An Alternatives Analysis was completed to evaluate potential remedial alternatives that satisfy site-specific remedial action objectives. Based on that analysis, the selected remedy Alternative #2 - Track 4 Restricted Residential Soil Cleanup, includes fill material excavation, cover system, SMP and an Environmental Easement, which fully satisfies the remedial action objectives. This alternative includes the following components:

- **Soil Excavation Activities** to address the fill/soil material impacted with SVOCs and metals that exceed their respective RRSCOs in the upper 2 fbgs at the Site (see Figure 7). The fill/soil that has exceedances of the RRSCOs and is deeper than 2 fbgs (TP(SB)-3, TP(SB)-13, and SB-109) that will remain in place, as well as the cover system, will be managed in accordance with the SMP.

- **Cover System** consisting of building footprints, asphalt parking lots, concrete walkways, NYSDEC acceptable backfill, and vegetative cover would be utilized at the Site.

- **Site Management Plan** implementation.

- **Environmental Easement** filed with Erie County.

The selected remedial alternative fully satisfies the remedial action objectives and is protective of human health and the environment under the Track 4 cleanup requirements. Therefore, this alternative is the recommended final remedial approach for the 3 Gates Circle Site.

An electronic copy of this report is presented in Appendix I.
10.0 REFERENCES


4. Benchmark Environmental Engineering & Science, PLLC. Phase I/II Environmental Site Assessment, Former Millard Fillmore Hospital, Buffalo, New York, prepared for Chason Affinity Companies, LLC, November 2012.


TABLES
### TABLE 1
SUMMARY OF REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PROGRAM

**REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT**

**3 GATES CIRCLE SITE**

**BUFFALO, NEW YORK**

<table>
<thead>
<tr>
<th>Sample Identifier</th>
<th>Depth Sampled/Screened (fbgs)</th>
<th>Analysis</th>
<th>Date Sampled</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subsurface Soil/Fill</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP(SB)-1</td>
<td>0.7-4</td>
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**Groundwater**

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## TABLE 1B
SUMMARY OF INVESTIGATION SOIL TYPE AND RRSCO EXCEEDANCES

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### Notes:
1. Soil probed were completed in building basements. Sample depth provided are from below basement floor.
2. Fill Sample Results Exceeding RRSCOs
3. Fill Sample Results Below RRSCOs
4. Total # VOC Samples 40
5. Total # SVOC Samples 70
6. Total # Metals Samples 56
7. Total # PCB Samples 16
8. Total # Pesticides Samples 6
9. Total # Herbicides Samples 6
10. % VOC Samples Exceeding RRSCOs 19
11. % SVOC Samples Exceeding RRSCOs 19
12. % Metals Exceeding RRSCOs 7
13. % PCBs Exceeding RRSCOs 0
14. % Pesticides Exceeding RRSCOs 0
15. % Herbicides Exceeding RRSCOs 0
<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Unrestricted Use</th>
<th>Restituted Residential Use</th>
<th>SCOs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOD/kg</td>
<td>SOD/kg</td>
<td>SOD/kg</td>
</tr>
<tr>
<td>PCBs</td>
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<td>1</td>
<td>--</td>
</tr>
<tr>
<td>RCRA Metals</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Arsenic</td>
<td>13</td>
<td>16</td>
<td>--</td>
</tr>
<tr>
<td>Barium</td>
<td>350</td>
<td>400</td>
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</tr>
<tr>
<td>Chromium</td>
<td>30</td>
<td>180</td>
<td>--</td>
</tr>
<tr>
<td>Lead</td>
<td>63</td>
<td>400</td>
<td>--</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.18</td>
<td>0.81</td>
<td>--</td>
</tr>
<tr>
<td>Notes: 1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds were reported as non-detect. 2. Values per NYSDEC Part 375 Soil Cleanup Objectives (SCOs). 3. Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Definitions:**
- **ND** = Parameter not detected above laboratory detection limit.
- "--" = No value available for the parameter; Parameter not analyzed for.
- **Bold** = Result exceeds Unrestricted Use SCOs.
- **Bold** = Result exceeds Restricted Residential Use SCOs.
### TABLE 2B

**SUMMARY OF HISTORICAL SOIL/FILL SAMPLE ANALYTICAL RESULTS (BENCHMARK)**

**REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT**

**3 GATES CIRCLE**

**BUFFALO, NEW YORK**

<table>
<thead>
<tr>
<th>Parameter 1</th>
<th>Unrestricted SCOs 2</th>
<th>Restricted Residential SCOs 2</th>
<th>Sample Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SB-2 (0.5-2)</td>
<td>SB-4 (0.5-2)</td>
<td>SB-5 (2-4)</td>
</tr>
<tr>
<td></td>
<td>10/11/2012</td>
<td>10/12/2012</td>
<td>10/12/2012</td>
</tr>
<tr>
<td><strong>Volatile Organic Compounds (VOCs) - mg/kg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetone</td>
<td>0.05 100</td>
<td>ND ND 0.031 NA NA 0.0093 J</td>
<td></td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>0.05 100</td>
<td>0.0078 ND 0.015 NA NA 0.0077 J</td>
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</tr>
<tr>
<td>Trichloroethene</td>
<td>0.47 21</td>
<td>0.0023 ND 0.0048 NA NA 0.0032 J</td>
<td></td>
</tr>
<tr>
<td>1,2,4-Trimethylbenzene</td>
<td>3.8 52</td>
<td>0.0012 ND ND NA NA ND</td>
<td></td>
</tr>
<tr>
<td><strong>Semi-Volatile Organic Compounds (SVOCs) - mg/kg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acenaphthene</td>
<td>20 100</td>
<td>ND ND 0.031 0.059 ND ND</td>
<td></td>
</tr>
<tr>
<td>Anthracene</td>
<td>100 100</td>
<td>ND 0.01 0.065 0.14 0.025 ND</td>
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</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>1 1</td>
<td>0.049 0.042 0.18 1.7 0.087 0.021 J</td>
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</tr>
<tr>
<td>Benzo(b)fluoranthenes</td>
<td>1 1</td>
<td>0.13 0.044 0.16 2.8 0.074 0.015 J</td>
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</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>100 100</td>
<td>0.11 0.029 0.14 2.4 0.096 0.019 J</td>
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</tr>
<tr>
<td>Benz[a]pyrene</td>
<td>0.8 3.9</td>
<td>ND 0.025 0.097 1.2 0.054 ND</td>
<td></td>
</tr>
<tr>
<td>Carbazole</td>
<td>-- --</td>
<td>ND ND 0.025 0.15 ND ND</td>
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</tr>
<tr>
<td>Chrysene</td>
<td>1 3.9</td>
<td>0.063 0.043 0.22 2.2 0.088 0.024 J</td>
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</tr>
<tr>
<td>Chloroantracene</td>
<td>0.33 0.33</td>
<td>ND 0.037 0.65 0.02 ND</td>
<td></td>
</tr>
<tr>
<td>Fluoranthenes</td>
<td>100 100</td>
<td>0.074 0.086 0.37 2.4 0.12 0.042 J</td>
<td></td>
</tr>
<tr>
<td>Fluorene</td>
<td>30 100</td>
<td>ND ND 0.034 0.032 ND ND</td>
<td></td>
</tr>
<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>0.5 0.5</td>
<td>0.092 0.032 0.11 3 0.071 ND</td>
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</tr>
<tr>
<td>2-Methylphenanthrene</td>
<td>-- --</td>
<td>ND ND 0.023 0.049 0.013 ND</td>
<td></td>
</tr>
<tr>
<td>Naphthalene</td>
<td>12 100</td>
<td>ND ND 0.028 0.031 ND ND</td>
<td></td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>100 100</td>
<td>ND 0.063 0.3 0.79 0.079 0.029 J</td>
<td></td>
</tr>
<tr>
<td>Pyrene</td>
<td>100 100</td>
<td>0.067 0.073 0.33 1.9 0.13 0.031 J</td>
<td></td>
</tr>
<tr>
<td>Total SVOCs</td>
<td>-- --</td>
<td>0.674 0.493 2.34 21.301 0.957 0.2 J</td>
<td></td>
</tr>
<tr>
<td><strong>PCBs - mg/kg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCBs</td>
<td>ND ND ND ND ND ND</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Metals - mg/kg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>13 16</td>
<td>5.1 4.8 4.3 4.9 8.5 3.7 J</td>
<td></td>
</tr>
<tr>
<td>Cadmium</td>
<td>2.5 4.3</td>
<td>ND ND 0.27 0.58 1.1 0.31 J</td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td>30 150</td>
<td>16.5 14.1 10.6 16.6 15.8 10.8 J</td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>63 400</td>
<td>14 18.3 103 34.8 124 24.4 J</td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td>0.18 0.81</td>
<td>0.036 ND 4.2 0.034 0.75 0.4 J</td>
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</tr>
<tr>
<td>Barium</td>
<td>350 400</td>
<td>62.3 86.8 55 123 156 78.9 J</td>
<td></td>
</tr>
</tbody>
</table>

**Definitions:**
- **NA** = Parameter is not applicable
- **ND** = Parameter not detected above laboratory detection limit.
- **"--"** = Sample not analyzed for parameter or no SCO available for the parameter.
- **J** = Estimated value; result is less than the sample quantitation limit but greater than zero.
- **Bold** = Result exceeds 6NYCRR Part 375 Unrestricted SCO.
- **Bold** = Result exceeds 6NYCRR Part 375 Restricted Residential SCO.

**Notes:**
1. Values per NYSDEC Part 375 Industrial Soil Cleanup Objectives (December 2006)
2. Lab data collected in ug/Kg and converted to mg/kg
3. Any result that exceeds Commercial SCOs also exceeds Restricted Residential and Unrestricted SCOs
4. Any result that exceeds Restricted Residential also exceeds Unrestricted SCOs
### Summary of Remedial Investigation: Subsurface Soil Fill Sample Analysis Results

#### Remedial Investigation / Alternative Analysis Report

**Engineering**

3 GATES CIRCLE
BUFFALO, NEW YORK

**Restricted Use**

TP(SB)-1

**Unrestricted Use**

(0.7-4')

(0.7-2')

(14-16')

(0.7-2')

(14-15.5')

(8-10')

(0.7-2')

(14-16')

(6-8')

(10-11.3')

**SCOs**

- **VOCs**
  - **1,2,4-Trimethylbenzene**
    - TP(SB)-1: ND
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **1,3,5-Trimethylacetone**
    - TP(SB)-1: 0.05
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **2-Methyltert-butyl ether (MTBE)**
    - TP(SB)-1: ND
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **100% trichloroethylene**
    - TP(SB)-1: 0.05
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **Methyl tert-butyl ether**
    - TP(SB)-1: ND
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **Dibenzofuran**
    - TP(SB)-1: 0.05
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **Naphthalene**
    - TP(SB)-1: 10
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **Phenanthrene**
    - TP(SB)-1: 100
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **Aluminum**
    - TP(SB)-1: 0.22
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: ND
    - TP(SB)-7: ND
    - TP(SB)-10: ND
  - **Arsenic**
    - TP(SB)-1: 2.3
    - TP(SB)-3: 1.7
    - TP(SB)-4: 3.2
    - TP(SB)-5: 1.8
    - TP(SB)-6: 9
    - TP(SB)-7: 1.6
    - TP(SB)-10: 3.3
  - **Beryllium**
    - TP(SB)-1: 7.2
    - TP(SB)-3: 72
    - TP(SB)-4: --
    - TP(SB)-5: --
    - TP(SB)-6: --
    - TP(SB)-7: --
    - TP(SB)-10: --
  - **Cadmium**
    - TP(SB)-1: 2.5
    - TP(SB)-3: ND
    - TP(SB)-4: ND
    - TP(SB)-5: ND
    - TP(SB)-6: 0.19 J
    - TP(SB)-7: ND
    - TP(SB)-10: 0.07 J
  - **Calcium**
    - TP(SB)-1: --
    - TP(SB)-3: --
    - TP(SB)-4: --
    - TP(SB)-5: --
    - TP(SB)-6: --
    - TP(SB)-7: --
    - TP(SB)-10: --
  - **Chromium**
    - TP(SB)-1: 30
    - TP(SB)-3: 10
    - TP(SB)-4: 5.8
    - TP(SB)-5: 6
    - TP(SB)-6: 3.8
    - TP(SB)-7: 5.4
    - TP(SB)-10: 10
  - **Lead**
    - TP(SB)-1: 63
    - TP(SB)-3: 400
    - TP(SB)-4: 230 J
    - TP(SB)-5: 6.3
    - TP(SB)-6: 11
    - TP(SB)-7: 11
    - TP(SB)-10: 12
  - **Manganese**
    - TP(SB)-1: 1600
    - TP(SB)-3: --
    - TP(SB)-4: --
    - TP(SB)-5: 0.02 J
    - TP(SB)-6: 0.03 J
    - TP(SB)-7: ND
    - TP(SB)-10: 0.06 J
  - **Silver**
    - TP(SB)-1: 2
    - TP(SB)-3: 180
    - TP(SB)-4: --
    - TP(SB)-5: --
    - TP(SB)-6: --
    - TP(SB)-7: --
    - TP(SB)-10: --
  - **Sodium**
    - TP(SB)-1: --
    - TP(SB)-3: --
    - TP(SB)-4: --
    - TP(SB)-5: --
    - TP(SB)-6: --
    - TP(SB)-7: --
    - TP(SB)-10: --
  - **Total PCBs**
    - TP(SB)-1: 0.1
    - TP(SB)-3: --
    - TP(SB)-4: --
    - TP(SB)-5: --
    - TP(SB)-6: --
    - TP(SB)-7: --
    - TP(SB)-10: --
  - **4,4'-DDE**
    - TP(SB)-1: 0.0033
    - TP(SB)-3: --
    - TP(SB)-4: --
    - TP(SB)-5: --
    - TP(SB)-6: --
    - TP(SB)-7: --
    - TP(SB)-10: --
  - **4,4'-DDT**
    - TP(SB)-1: 0.0033
    - TP(SB)-3: --
    - TP(SB)-4: --
    - TP(SB)-5: --
    - TP(SB)-6: --
    - TP(SB)-7: --
    - TP(SB)-10: --
  - **Dieldrin**
    - TP(SB)-1: 2.5
    - TP(SB)-3: ND
    - TP(SB)-4: MD
    - TP(SB)-5: MD
    - TP(SB)-6: MD
    - TP(SB)-7: MD
    - TP(SB)-10: MD

**Definitions:**

- **ND** = Parameter not detected above laboratory detection limit.
- **--** = No value available for the parameter; Parameter not analysed for.
- **J** = Estimated value; result is less than the sample quantitation limit but greater than zero.
- **B** = Compound was found in the blank and sample.

**Notes:**

- The data are preliminary and may change as the investigation proceeds.
- All values are reported in mg/kg and converted to ug/kg for comparisons to SCOs.
- The data were collected in accordance with New York State Department of Environmental Conservation (NYSDEC) regulations.

**References:**

1. **New York State Department of Environmental Conservation (NYSDEC).**
2. **Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.**

**Definitions:**

- **ND** = Parameter not detected above laboratory detection limit.
- **--** = No value available for the parameter; Parameter not analysed for.
- **J** = Estimated value; result is less than the sample quantitation limit but greater than zero.
- **B** = Compound was found in the blank and sample.

**Notes:**

- The data are preliminary and may change as the investigation proceeds.
- All values are reported in mg/kg and converted to ug/kg for comparisons to SCOs.
- The data were collected in accordance with New York State Department of Environmental Conservation (NYSDEC) regulations.

**References:**

1. **New York State Department of Environmental Conservation (NYSDEC).**
2. **Sample results were reported by the laboratory in ug/kg and converted to mg/kg for comparisons to SCOs.**
## TABLE 2

**SUMMARY OF REMEDIAL INVESTIGATION SUBSURFACE SOIL/FILL SAMPLE ANALYSIS RESULTS**

**SITE: GATES CIRCLE**  
**BUFFALO, NY.**

### 3.0 Grab Samples

<table>
<thead>
<tr>
<th>Sample Site</th>
<th>Analyte</th>
<th>Concentration (mg/kg)</th>
<th>Range of Concentration</th>
<th>Maximum EIRR</th>
<th>Exceedances of EIRR</th>
<th>Summary of Exceedances</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB-102/MW-2</td>
<td>SVOCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SB-103/MW-3</td>
<td>SVOCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP(SB)-12</td>
<td>SVOCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### SVOCs

<table>
<thead>
<tr>
<th>Sample Site</th>
<th>Analyte</th>
<th>Concentration (mg/kg)</th>
<th>Range of Concentration</th>
<th>Maximum EIRR</th>
<th>Exceedances of EIRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB-102/MW-2</td>
<td>SVOCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SB-103/MW-3</td>
<td>SVOCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP(SB)-12</td>
<td>SVOCs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. SVOCs = Semi-Volatile Organic Compounds
2. ND = Non-Detect
3. J = Estimated value; result is less than the sample quantitation limit but greater than zero.
4. Total X = Total Xylenes
5. Total Xylenes

**Summary:**

- SVOCs concentrations were measured for all samples.
- No SVOCs concentrations exceeded the EIRR limits.
- All samples from SB-102/MW-2, SB-103/MW-3, and TP(SB)-12 sites were analyzed for SVOCs.

**Additional Information:**

- Benchmark Environmental Engineering & Science, PLLC conducted the analysis.

**Source:**

The information above is based on data collected during the Remedial Investigation from the specified sites.

**Analysis Method:**

- SVOCs were determined using gas chromatography/mass spectrometry (GC/MS).
- Concentration limits were established based on the Environmental Investigation Report (EIRR) guidelines.

---

**Legend:**

- **ND**: Non-Detect
- **J**: Estimated value
- **SVOCs**: Semi-Volatile Organic Compounds
- **EIRR**: Environmental Investigation Report Requirements
# Table 4
## Summary of Remedial Investigation Groundwater Analytical Results

### Remedial Investigation / Alternative Analysis Report

**3 Gates Circle Site**  
**Buffalo, New York**

<table>
<thead>
<tr>
<th>Parameter Type</th>
<th>GWQS</th>
<th>Sample Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volatile Organic Compounds (VOCs) - ug/L</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td>1</td>
<td>ND</td>
</tr>
<tr>
<td>Tetrachloroethylene</td>
<td>5</td>
<td>ND</td>
</tr>
<tr>
<td><strong>Semi-Volatile Organic Compounds (SVOCs) - ug/L</strong></td>
<td></td>
<td>ND</td>
</tr>
<tr>
<td><strong>Total Metals - ug/L</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum</td>
<td>--</td>
<td>5,120</td>
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<tr>
<td>Arsenic</td>
<td>25</td>
<td>1.7</td>
</tr>
<tr>
<td>Barium</td>
<td>1000</td>
<td>380</td>
</tr>
<tr>
<td>Cadmium</td>
<td>5</td>
<td>0.1 J</td>
</tr>
<tr>
<td>Calcium</td>
<td>--</td>
<td>135,000</td>
</tr>
<tr>
<td>Chromium</td>
<td>50</td>
<td>7.7 J</td>
</tr>
<tr>
<td>Cobalt</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Copper</td>
<td>200</td>
<td>8.9</td>
</tr>
<tr>
<td>Cyanide</td>
<td>250</td>
<td>--</td>
</tr>
<tr>
<td>Iron</td>
<td>300</td>
<td>8,990</td>
</tr>
<tr>
<td>Lead</td>
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<td>10.0</td>
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<tr>
<td>Magnesium</td>
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<td>71,600</td>
</tr>
<tr>
<td><strong>Dissolved Metals - ug/L</strong></td>
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<td></td>
</tr>
<tr>
<td>Aluminum</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Arsenic</td>
<td>25</td>
<td>0.6 J</td>
</tr>
<tr>
<td>Barium</td>
<td>1000</td>
<td>328.9 J</td>
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<tr>
<td>Cadmium</td>
<td>5</td>
<td>0.1 J</td>
</tr>
<tr>
<td>Calcium</td>
<td>--</td>
<td>205,000 J</td>
</tr>
<tr>
<td>Chromium</td>
<td>50</td>
<td>1.7 J</td>
</tr>
<tr>
<td>Cobalt</td>
<td>5</td>
<td>--</td>
</tr>
<tr>
<td>Copper</td>
<td>200</td>
<td>--</td>
</tr>
<tr>
<td>Iron</td>
<td>300</td>
<td>--</td>
</tr>
<tr>
<td>Lead</td>
<td>25</td>
<td>0.2 J</td>
</tr>
<tr>
<td>Magnesium</td>
<td>35,000</td>
<td>--</td>
</tr>
<tr>
<td><strong>Pesticides and Herbicides - ug/L</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PCB (ug/L)</strong></td>
<td>Total PCBs</td>
<td>0.09</td>
</tr>
<tr>
<td><strong>Notes:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds or analytes were reported as non-detected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Values per NYSDEN Division of Water Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations - Class GA (TOGS 1.1.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Definitions:**

- **ND** = Parameter not detected above laboratory detection limit.
- **--** = No value available for the parameter; Parameter not analysed for.
- **J** = Estimated value; result is less than the reporting limit but greater than zero.
- **Bold** = Result exceeds GWQS.
# TABLE 5

SUMMARY OF REMEDIAL ALTERNATIVES COSTS

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

3 GATES CIRCLE SITE

BUFFALO, NEW YORK

<table>
<thead>
<tr>
<th>Remedial Alternative</th>
<th>Estimated Capital Cost</th>
<th>Estimated Annual OM&amp;M Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Further Action</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Alternative #2- Track 4 Restricted Residential Cleanup</td>
<td>$129,000</td>
<td>$2,500</td>
</tr>
<tr>
<td>Fill Material Excavation, Cover System &amp; Implementation of a SMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative #3- Track 2 Restricted Residential Cleanup</td>
<td>$472,000</td>
<td>$2,500</td>
</tr>
<tr>
<td>Fill Material Excavation, Environmental Easement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative #4- Unrestricted Use Cleanup</td>
<td>$1,786,000</td>
<td>$0</td>
</tr>
</tbody>
</table>
### TABLE 6

**ALTERNATIVE 2 - TRACK 4 RESTRICTED RESIDENTIAL COST ESTIMATE**

*Impacted Fill Material Excavation, Cover System & Implementation of a SMP*

**REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT**

**3 GATES CIRCLE SITE**

**BUFFALO, NEW YORK**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impacted Soil/Fill Removal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Characterization</td>
<td>3</td>
<td>EA</td>
<td>$750</td>
<td>$2,250</td>
</tr>
<tr>
<td>Soil/Fill Excavation</td>
<td>872</td>
<td>TON</td>
<td>$15</td>
<td>$13,080</td>
</tr>
<tr>
<td>Transportation &amp; Disposal of Exterior Soil/Fill (Use as Daily Cover)</td>
<td>872</td>
<td>TON</td>
<td>$35</td>
<td>$30,520</td>
</tr>
<tr>
<td>Groundwater Handling and Treatment</td>
<td>1</td>
<td>EST</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Verification Sampling</td>
<td>50</td>
<td>EA</td>
<td>$300</td>
<td>$15,000</td>
</tr>
<tr>
<td><strong>Site Restoration</strong></td>
<td></td>
<td></td>
<td></td>
<td>$63,600</td>
</tr>
<tr>
<td>Cover System - Part 375&lt;sup&gt;2&lt;/sup&gt; Compliant Backfill, Place &amp; Compact</td>
<td>545</td>
<td>CY</td>
<td>$15</td>
<td>$8,175</td>
</tr>
<tr>
<td>2&quot; Stone, compacted</td>
<td>55</td>
<td>SY</td>
<td>$5</td>
<td>$273</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$72,048</td>
</tr>
<tr>
<td>Final Engineering Report/Site Management Plan</td>
<td></td>
<td></td>
<td></td>
<td>$30,000</td>
</tr>
<tr>
<td><strong>Subtotal Capital Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td>$102,048</td>
</tr>
<tr>
<td>Health and Safety (2%)</td>
<td></td>
<td></td>
<td></td>
<td>$1,441</td>
</tr>
<tr>
<td>Engineering/Contingency (35%)</td>
<td></td>
<td></td>
<td></td>
<td>$25,217</td>
</tr>
<tr>
<td><strong>Total Capital Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td>$128,710</td>
</tr>
<tr>
<td><strong>Annual Periodic Review Report per SMP:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Certification</td>
<td>1</td>
<td>Yr</td>
<td>$2,500</td>
<td>$2,500</td>
</tr>
<tr>
<td><strong>Total Annual OM&amp;M Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td>$2,500</td>
</tr>
<tr>
<td><strong>Capital Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td>$129,000</td>
</tr>
</tbody>
</table>

**Notes:**

1. Assumes SVOC and metals-impacted soil/fill can be disposed of as non-hazardous waste. TCLP waste characterization will be required;
2. Per 6NYCRR 375-6.7(d)(ii)(b)
# Table 7

## Alternative 3 - Track 2 Restricted Residential Cost Estimate

Impacted Fill Material Excavation & Environmental Easement

**Remedial Investigation / Alternative Analysis Report**

**3 Gates Circle Site**

**Buffalo, New York**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impacted Soil/Fill Removal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Characterization</td>
<td>7</td>
<td>EA</td>
<td>$750</td>
<td>$5,250</td>
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<tr>
<td>Soil/Fill Excavation</td>
<td>4856</td>
<td>TON</td>
<td>$15</td>
<td>$72,840</td>
</tr>
<tr>
<td>Transportation &amp; Disposal of Exterior Soil/Fill (Use as Daily Cover)</td>
<td>4856</td>
<td>TON</td>
<td>$35</td>
<td>$169,960</td>
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<tr>
<td>Groundwater Handling and Treatment</td>
<td>1</td>
<td>EST</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Verification Sampling</td>
<td>75</td>
<td>EA</td>
<td>$300</td>
<td>$22,500</td>
</tr>
<tr>
<td><strong>Site Restoration</strong></td>
<td></td>
<td></td>
<td></td>
<td>$275,300</td>
</tr>
<tr>
<td>Part 375°C Compliant Backfill, Place &amp; Compact</td>
<td>3035</td>
<td>CY</td>
<td>$15</td>
<td>$45,525</td>
</tr>
<tr>
<td>2&quot; Stone, compacted</td>
<td>304</td>
<td>SY</td>
<td>$5</td>
<td>$1,518</td>
</tr>
<tr>
<td><strong>Subtotal:</strong></td>
<td></td>
<td></td>
<td></td>
<td>$322,343</td>
</tr>
<tr>
<td><strong>Final Engineering Report/Site Management Plan</strong></td>
<td></td>
<td></td>
<td></td>
<td>$30,000</td>
</tr>
<tr>
<td><strong>Subtotal Capital Cost</strong></td>
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<td></td>
<td></td>
<td>$352,343</td>
</tr>
<tr>
<td>Health and Safety (2%)</td>
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<td></td>
<td></td>
<td>$6,447</td>
</tr>
<tr>
<td>Engineering/Contingency (35%)</td>
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<td></td>
<td></td>
<td>$112,820</td>
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<tr>
<td><strong>Total Capital Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td>$472,000</td>
</tr>
<tr>
<td><strong>Annual Periodic Review Report per SMP:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Certification</td>
<td>1</td>
<td>Yr</td>
<td>$2,500</td>
<td>$2,500</td>
</tr>
<tr>
<td><strong>Total Annual OM&amp;M Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td>$2,500</td>
</tr>
</tbody>
</table>

**Capital Cost** $472,000

**Notes:**
1. Assumes SVOC and metals-impacted soil/fill can be disposed of as non-hazardous waste. TCLP waste characterization will be required;
2. Per 6NYCRR 375-6.7(d)(ii)(b)
### TABLE 8

**ALTERNATIVE 4 - UNRESTRICTED USE CLEANUP COST ESTIMATE**

**Impacted Fill Material Excavation**

REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT

3 GATES CIRCLE SITE

BUFFALO, NEW YORK

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Units</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacted Soil/Fill Removal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Characterization</td>
<td>21</td>
<td>EA</td>
<td>$750</td>
<td>$15,750</td>
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<tr>
<td>Soil/Fill Excavation</td>
<td>19632</td>
<td>TON</td>
<td>$15</td>
<td>$294,480</td>
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<tr>
<td>Transportation &amp; Disposal of Exterior Soil/Fill (Use as Daily Cover)</td>
<td>19632</td>
<td>TON</td>
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<td>$687,120</td>
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<td>Groundwater Handling and Treatment</td>
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<td>EST</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Verification Sampling</td>
<td>200</td>
<td>EA</td>
<td>$500</td>
<td>$100,000</td>
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<tr>
<td><strong>Site Restoration</strong></td>
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</tr>
<tr>
<td>Part 375 Compliant Backfill, Place &amp; Compact</td>
<td>12270</td>
<td>CY</td>
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<td>$184,050</td>
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<td><strong>Subtotal Capital Cost</strong></td>
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<td></td>
<td>$1,310,650</td>
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<tr>
<td>Health and Safety (2%)</td>
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<td>$25,713</td>
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<tr>
<td>Engineering/Contingency (35%)</td>
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<td></td>
<td>$449,978</td>
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<td><strong>Total Capital Cost</strong></td>
<td></td>
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<td></td>
<td>$1,786,340</td>
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<tr>
<td><strong>Capital Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td>$1,786,000</td>
</tr>
</tbody>
</table>

**Notes:**
1. Assumes SVOC and metals-impacted soil/fill can be disposed of as non-hazardous waste. TCLP waste characterization will be required;
2. Per 6NYCRR 375-6.7(d)(ii)(b)
FIGURES
FIGURE 5

GROUNDWATER ISOPOTENTIAL MAP

LEGEND:
- PROPERTY BOUNDARY
- MW-3 APPROXIMATE BORING/MONITORING WELL LOCATION
- GROUNDWATER ELEVATION
- GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION

SCALE IN FEET (approximate)

SCALE: 1 INCH = 100 FEET

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JANUARY 2015
 APPROXIMATE LIMITS OF POTENTIAL NO. 6 FUEL OIL IMPACTS TO BE ADDRESSED AS PART OF IRM

**LEGEND:**
- PROPERTY BOUNDARY
- BENCHMARK BORINGS (OCTOBER 2012)
- STOHL BORINGS (JULY 2012)
- APPROXIMATE SOIL PROBE LOCATION
- APPROXIMATE SOIL BORING LOCATION
- APPROXIMATE BORING/MONITORING WELL LOCATION
- APPROXIMATE LIMITS OF POTENTIAL NO. 6 FUEL OIL IMPACTS TO BE ADDRESSED AS PART OF IRM

**SCALE:** 1 INCH = 100 FEET

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**DATE:** JANUARY 2015

**FIGURE 7**
GATES CIRCLE HOLDINGS, LLC
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
REMEDIATION INVESTIGATION/ALTERNATIVE ANALYSIS REPORT

**ALTERNATIVE 2 - TRACK 4 RESTRICTED RESIDENTIAL CLEANUP**

**FILE:** F:\CAD\Benchmark\Gates Circle Associates\RI-AAR\Figure 7; Alternative #2 - Track 4 Restricted Residential Cleanup.dwg
APPROXIMATE LIMITS OF POTENTIAL NO.6 FUEL OIL IMPACTS TO BE ADDRESSED AS PART OF IRM: 40'x40'x4' Hg, 240 CY, 40'x40'x4' SVOCs, 240 CY, 50'x50'x9' SVOCs, 835 CY, 50'x50'x8' Hg, 740 CY, 50'x50'x8' SVOCs, 740 CY.
SUMMARY OF ACCEPTABLE FILL MATERIAL ANALYTICAL SAMPLING LOCATION AND PARAMETERS

GATES CIRCLE HOLDINGS, LLC

REMEDIAL INVESTIGATION/Alternatives Analysis Report

BUFFALO, NEW YORK

JOB NO. 0309-014-001

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

FEBRUARY 2015

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FIGURE 12
GATES CIRCLE HOLDINGS LLC
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
3 GATES CIRCLE SITE
REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT
CROSS SECTION A-A'

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DISCLAIMER:

SCALE: 10V:1H

SB-9
TP(SB)-1
TP(SB)-5
TP(SB)-6
17
SB-106
TP(SB)-3
TP(SB)-12

BUILDING BASEMENT
FILL
CONCRETE / SUB-BASE
FOUNDATION BACKFILL MATERIAL (TYP)
PAVEMENT / SUB-BASE
BUILDING BASEMENT
REDISH BROWN CLAY
REDISH BROWN SILTY SAND

FILL
SB-9

BUILDING BASEMENT

HORIZONTAL DISTANCE (FEET)
0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

EAST
A'

WEST
A

0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

FEBRUARY 2015

FIGURE 12
GATES CIRCLE HOLDINGS LLC
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
3 GATES CIRCLE SITE
REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT
CROSS SECTION A-A'

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DISCLAIMER:

SCALE: 10V:1H

SB-9
TP(SB)-1
TP(SB)-5
TP(SB)-6
17
SB-106
TP(SB)-3
TP(SB)-12

BUILDING BASEMENT
FILL
CONCRETE / SUB-BASE
FOUNDATION BACKFILL MATERIAL (TYP)
PAVEMENT / SUB-BASE
BUILDING BASEMENT
REDISH BROWN CLAY
REDISH BROWN SILTY SAND

FILL
SB-9

BUILDING BASEMENT

HORIZONTAL DISTANCE (FEET)
0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

EAST
A'

WEST
A

0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

FEBRUARY 2015

FIGURE 12
GATES CIRCLE HOLDINGS LLC
BUFFALO, NEW YORK
BROWNFIELD CLEANUP PROGRAM
3 GATES CIRCLE SITE
REMEDIAL INVESTIGATION / ALTERNATIVE ANALYSIS REPORT
CROSS SECTION A-A'

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DISCLAIMER:

SCALE: 10V:1H

SB-9
TP(SB)-1
TP(SB)-5
TP(SB)-6
17
SB-106
TP(SB)-3
TP(SB)-12

BUILDING BASEMENT
FILL
CONCRETE / SUB-BASE
FOUNDATION BACKFILL MATERIAL (TYP)
PAVEMENT / SUB-BASE
BUILDING BASEMENT
REDISH BROWN CLAY
REDISH BROWN SILTY SAND

FILL
SB-9

BUILDING BASEMENT

HORIZONTAL DISTANCE (FEET)
0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

EAST
A'

WEST
A

0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

0' 100' 200' 300' 400' 500' 600' 700' 800'
0' -10' -20'

FEBRUARY 2015