Remedial Investigation/ Interim Remedial Measures/ Alternatives Analysis Report

2424 Hamburg Turnpike Site
BCP Site No. C915296
Lackawanna, New York

August 2017

B0345-015-001

Prepared For:

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Prepared By:

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RI/AA/IRM REPORT
2424 Hamburg Turnpike Site

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Certification

I, Thomas H. Forbes, certify that I am currently a NYS registered professional engineer as defined in 6NYCRR Part 375 and this Remedial Investigation/Interim Remedial Measures/Alternatives Analysis (RI/IRM/AA) Report was prepared in general accordance with applicable statutes and regulations and in general conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10); and activities were performed in general accordance with the DER-approved work plan and any DER-approved modifications.

DATE:_____ SEAL:

1.0 INTRODUCTION

This Remedial Investigation/Interim Remedial Measures/Alternatives Analysis (RI/IRM/AA) Report has been prepared on behalf of 2424 Hamburg Turnpike, LLC for the 2424 Hamburg Turnpike Site in the City of Lackawanna, Erie County, New York (Site, see Figures 1 and 2).

2424 Hamburg Turnpike, LLC elected to pursue cleanup and redevelopment of the Site under the New York State Brownfield Cleanup Program (BCP), and executed a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in 2015 (BCP Site No. C915296). On April 15, 2016, the RI/AA Work Plan (Ref. 1) was approved by the NYSDEC with concurrence from the New York State Department of Health (NYSDOH). Benchmark Environmental Engineering & Science, PLLC, in association with TurnKey Environmental Restoration, LLC (Benchmark-TurnKey), performed RI field activities (completion of soil borings and test pits as well as installation of monitoring wells) at the Site in June 2016. An IRM Work Plan (Ref. 2) was submitted to and approved by NYSDEC in January 2017.

1.1 Purpose and Scope

This RI/IRM/AA Report has been prepared on behalf of 2424 Hamburg Turnpike, LLC to describe and present the findings of the 2016 RI activities; and evaluate remedial alternatives for the Site. This Report contains the following sections:

- Section 2.0 presents the approach for the Remedial Investigations.
- Section 3.0 describes the physical characteristics of the Site as they pertain to the investigation findings.
- Section 4.0 presents the investigation results by media.
- Section 5.0 describes the IRM performed at the Site.
- Section 6.0 describes the fate and transport of the constituents of concern (COCs).
- Section 7.0 presents the qualitative risk assessment.
- Section 7.0 evaluates remedial alternatives for the Site.
- Section 9.0 presents describes the post-remedial requirements for the Site.
- Section 10.0 provides a list of references for this report.

1.2 Background

1.2.1 Property and Site Description

The BCP property, located at 2424 Hamburg Turnpike (Tax ID No. 141.59-5-2), is situated in a mixed commercial and industrial zoned area of the City of Lackawanna, Erie County, New York and consists of one parcel measuring 1.04-acres.

The Site is currently unoccupied with two vacant commercial buildings consisting of a former automobile service building with four repair bays and seven (former) in-ground hydraulic lifts, and one shed with unknown contents. The Site also includes green space and asphalt paved areas as well as concrete slabs suspected to have been associated with former on-site structures (see Figure 2).

Prior to being vacated, the Site was used as an automobile filling and service station (Stop-N-Gas) beginning in at least 1957 when three 10,000-gallon underground storage tanks (USTs) were installed on-site. Petroleum bulk storage (PBS) records indicate that the three USTs were closed/removed in 1994.

The Site, located on the east side of Hamburg Turnpike (aka Route 5), is bound by an active gasoline station to the north, a retail store to the south, vacant land to the east and Hamburg Turnpike with vacant industrial land to the west.

1.2.2 Previous Investigations

The following assessments and investigations, some completed by others under spill incidents related to the Site, have occurred at the Site, and are included in Appendix A if available.

1.2.2.1 "Inactive" NYSDEC Spill No. 9407600

NYSDEC Spill Record #9407600 indicates that three 10,000 gallon USTs (two gasoline and one diesel) were removed from the Site in 1994 by Nature's Way. According to the record, petroleum-impacted soil and groundwater were discovered during excavation activities. Approximately 500 cubic yards of contaminated soils were excavated and stockpiled on-site in areas north and south of the existing automotive service building. The stockpiled soil was bio-remediated on-site by the excavation contractor and returned to the excavation subsequent to treatment. Groundwater from the excavation was pumped into a

temporary holding tank, treated through activated carbon and discharged to the ground on-site. The spill was reclassified as "inactive" on August 28, 1995.

1.2.2.2 Administratively "Closed" NYSDEC Spill No. 1204435

NYSDEC Spill Record #1204435 indicates that petroleum contamination was discovered during utility upgrades being completed along Hamburg Turnpike. Specifically, petroleum odors were apparent in the telecommunications manhole located along the western property boundary of the Site. The spill incident appears to have been administratively "closed" by NYSDEC when the Site was accepted into the BCP.

1.2.2.3 2013 Geophysical Survey Results

AMEC Environment and Infrastructure, Inc. (AMEC) completed a geophysical survey of the Site on July 23, 2013 (Ref. 3). AMEC identified four underground anomalies referred to in their report as possible "remnants of the pump islands (subsurface reinforced concrete pads) or related to USTs, associated appurtenances and/or miscellaneous buried metals."

1.2.2.4 2014 Phase II Environmental Investigation Report

TurnKey completed a Phase II Environmental Investigation (Ref. 4) consisting of 10 soil borings (SB-1 through SB-10), three of which were converted into temporary one-inch diameter monitoring wells (SB-4/TMW-1, SB-5/TMW-2 and SB-7/TMW-3), to assess subsurface conditions on-site, including the area of potential contamination discovered during utility upgrade activities along Hamburg Turnpike (SB-7/TMW-3, Spill No. 1204435) and areas proximate to the in-ground lifts within the service building and the four underground anomalies identified during the geophysical survey.

Elevated photoionization detector (PID) readings above background (0.0 ppm) and petroleum odors were identified in 7 of the 10 soil borings (SB-4 through SB-10) with the highest PID reading noted as 1,098 parts per million (ppm) at SB-6 (2-4'). In addition, approximately one-inch of floating petroleum product was noted in temporary monitoring well TMW-1 completed north of the former UST excavation area.

Six soil samples were analyzed by the laboratory for Target Compound List (TCL) plus CP-51 (Ref. 5) volatile organic compounds (VOCs) and CP-51 semi volatile organic compounds (SVOCs) and two groundwater samples were analyzed for TCL plus CP-51 VOCs. The laboratory analytical results indicate that:

- Petroleum VOCs were detected at concentrations above CP-51 and/or Part 375 Protection of Groundwater, Unrestricted and/or Restricted-Residential Use Soil Cleanup Objectives SCOs (USCOs and RSCOs) in all six soil samples.
- Three soil samples exhibited SVOC concentrations above CP-51 and/or Part 375 Protection of Groundwater, USCOs, RSCOs, Commercial and/or Industrial Use SCOs (CSCOs and ISCOs).
- Both groundwater samples exhibited petroleum VOCs at concentrations above Class GA Groundwater Quality Standards (GWQS) with the more significant concentrations (16,333 micrograms per liter (ug/L) total VOCs) identified at TMW-2. Due to the presence of product at TMW-1, concentrations exceeding GWQS are assumed to be present.

2.0 INVESTIGATION APPROACH

The purpose of the RI field activities was to define the nature and extent of contamination on the BCP Site, and to collect data of sufficient quantity and quality to perform the remedial alternatives evaluation. The RI was completed across the BCP Site to supplement previous environmental data and delineate or identify areas requiring remediation. On-site field activities included soil boring advancement; test pit excavations; surface soil/fill sampling; monitoring well installation; and groundwater quality sample collection.

Field team personnel collected environmental samples in accordance with the rationale and protocols described in the Field Sampling Plan (FSP) presented in the Quality Assurance Project Plan (QAPP). United States Environmental Protection Agency (USEPA) and NYSDEC-approved sample collection and handling techniques were used. Samples for chemical analysis were analyzed in accordance with USEPA SW-846 methodology with an equivalent Category B (Level IV) deliverable package to meet the definitive-level data requirements. Analytical results were evaluated by a third-party data validation expert in accordance with provisions described in the QAPP.

The RI sampling activities and analysis described below are summarized on Table 1. Figure 3 presents the RI and historic (Phase II) sample locations, as well as subsurface utility locations. Appendix B contains photographs of field activities.

2.1 Soil/Fill Investigation

A soil/fill investigation was completed across the Site to supplement previous environmental data and further delineate contamination on-site. Field activities included soil boring advancement; test pit excavations; and surface and subsurface soil/fill sampling. Appendix C includes test pit logs, and Appendix D includes field borehole logs.

2.1.1 Surface Soil/Fill Investigation

The RI included collection of two surface soil/fill samples collected from 0-2 inches below ground surface as requested by NYSDEC. The first sample was collected from the northeastern portion of the Site, and the second was collected from the eastern portion of the Site, north of the excavation described in Section 1.2.2.1.

A dedicated stainless steel hand trowel or spoon was used to collect a representative aliquot of soil/fill at each grab sample location. If the area was vegetated, the sod/vegetation was removed prior to sample collection. Representative samples were described in the field by qualified Benchmark-TurnKey personnel, scanned for total volatile organic vapors with a calibrated Photovac 3000 PID equipped with a 10.6 eV lamp (or equivalent), and characterized for impacts via visual and/or olfactory observations. Samples were transferred to laboratory supplied, pre-cleaned sample containers for analysis. RI surface samples were analyzed for TCL SVOCs, Target Analyte List (TAL) metals, polychlorinated biphenyls (PCBs), pesticides, and herbicides using USEPA SW-846 methodology. No surface samples were analyzed for TCL VOCs since PID readings were below 5 ppm (in accordance with Table 1 of the approved RI/AA Work Plan).

2.1.2 Subsurface Soil/Fill Investigation

2.1.2.1 Test Pit Excavation

An excavator was used to complete six test pits at the Site in the areas shown on Figure 3. RI test pits were excavated to depths ranging between 15 and 17 feet below ground surface (fbgs). A Benchmark-TurnKey field geologist observed the excavations and created a field log (including photographs) for each test pit location. Real time air and particulate monitoring was conducted while the excavations were open using a PID and a particulate monitor. Excavated soil was placed on plastic sheeting near the each test pit location. Soil samples were collected at 2-foot intervals to the bottom of the investigation locations for observation, classification, and field (PID) screening. Select samples were collected for analytical testing based on visual and olfactory observations, PID screening, and engineering judgment. Excavated soil/fill was returned to the investigation location in the general order that it was excavated.

2.1.2.2 Soil Boring Advancement

TurnKey's 2014 Phase II included completion of 10 soil borings in areas of potential environmental concern. As shown on Figure 3, an additional nine soil borings were completed during the RI, five of which were converted into permanent monitoring wells.

Four soil borings, consisting of two interior borings and two exterior borings (northeast and southeast corners of the Site), were completed using a truck-mounted

Geoprobe equipped with a 4-foot macro-core sampler. The five remaining test boring (monitoring well) locations were advanced through the overburden soil/fill into the underlying native soils using a rotary drill rig with 4¼-inch inside diameter (I.D.) hollow stem auger (HSA). The depth to native soils ranged from 2 to 8 fbgs. Soil/fill samples were obtained by driving a 1 3/8-inch I.D. by 24-inch long split spoon sampler 24 inches ahead of the lead cutting shoe of the HSA, in general accordance with ASTM D1586. Soil samples were collected at approximate 2-foot intervals to the bottom of the boring for classification and screening with the PID equipment. Select samples were collected for analytical testing based on visual and olfactory observations, field (PID) screening, and engineering judgment. Drilling fluids were not used while advancing the HSA so overburden groundwater could be identified. Spoils generated from the test borings were placed in drums for later disposal.

2.1.2.3 Subsurface Soil/Fill Sampling and Analysis

Subsurface soil/fill samples were collected using dedicated stainless steel sampling tools. Representative samples were placed in pre-cleaned laboratory provided sample bottles, cooled to 4ºC in the field, and transported under chain-of-custody command to TestAmerica Laboratory, located in Amherst, New York, a NYSDOH Environmental Laboratory Accreditation Program (ELAP)-certified analytical laboratory. All test pit and boring soil/fill samples were analyzed for TCL VOCs and TCL SVOCs. Select samples were analyzed for TAL metals, PCBs, pesticides, and herbicides.

2.2 Groundwater Investigation

The RI included installation of five groundwater monitoring wells screened within the native soil unit to investigate groundwater flow and quality. The five test borings described in Section 2.1.2.2 were converted to monitoring wells RI MW-1 through RI MW-5. The monitoring wells were installed in northern and southern portions of the Site as well as areas south, west, and northwest of the historic automotive repair building.

2.2.1 Monitoring Well Installation

The groundwater monitoring wells were constructed of 2-inch I.D. flush coupled PVC riser and screen. The screened interval consists of an approximate 10-foot long section of machine slotted pipe. A sand filter was placed in the boring around the annulus space of the well screen such that the sand extends a minimum of one foot above the top of the

screen. A bentonite-chip layer was placed above the sand filter to provide a seal from the overlying overburden conditions. A mixture of cement/bentonite grout was placed above the bentonite-chip layer to ground surface. The newly installed monitoring wells were completed with flush-mount road-boxes within a 2-foot by 2-foot by 1-foot square concrete pad. Each well riser was capped with a lockable anchored J-plug. Table 2 summarizes the monitoring well construction details. Appendix D includes the monitoring well completion logs.

2.2.2 Groundwater Sample Collection

The monitoring wells were developed to remove residual sediments and ensure good hydraulic connection with the water-bearing zone. Upon installation, but not within 24 hours, newly installed monitoring wells were developed in accordance with Benchmark-TurnKey and NYSDEC protocols. Development of the monitoring wells was accomplished with dedicated disposable polyethylene bailers via surge and purge methodology. Field parameters including pH, oxidation-reduction potential (ORP), dissolved oxygen (DO), temperature, turbidity, and specific conductance were measured periodically (i.e., every well volume or as necessary) during development. Field measurements continued until they became relatively stable. Stability was defined as variation between measurements of approximately 10 percent or less with no overall upward or downward trend in the measurements. A minimum of three well volumes were evacuated from each monitoring well. Monitoring wells RI MW-1 through RI MW-5 were developed on June 22, 2016.

Prior to sample collection, static water levels were measured to interpret groundwater flow direction within the overburden soil/fill. Following water level measurement, Benchmark-TurnKey personnel purged and sampled the wells using a pump and dedicated tubing following low-flow/minimal drawdown purge and sample collection procedures. Table 3 summarizes the groundwater elevations.

Prior to sample collection, groundwater was evacuated from each well at a low-flow rate (typically less than 0.1 L/min). Field measurements for pH, ORP, specific conductance, temperature, turbidity, DO, and water level were periodically monitored for stabilization. Visual and olfactory field observations were also recorded. 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.

During collection of groundwater samples from wells RI MW-1 through RI MW-5 on July 27, 2016, field parameters and visual and olfactory field observations were recorded. All collected groundwater samples were placed in pre-cleaned, pre-preserved laboratory provided sample bottles, cooled to 4°C in the field, and transported under chain-of-custody command to TestAmerica for laboratory analysis.

2.2.3 Groundwater Sample Analyses

Groundwater samples collected from all monitoring wells were analyzed for TCL VOCs, TCL SVOC, TAL metals (total and dissolved), pesticides, herbicides, and PCBs.

2.3 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 (see Table 1) and analyzed to ensure the reliability of the generated data and to support the required third-party data usability assessment effort. Site-specific QA/QC samples include matrix spikes, matrix spike duplicates, and blind duplicates in accordance with the NYSDEC-approved RI Work Plan.

2.4 Site Mapping

A Site map was developed during the RI. Benchmark-TurnKey personnel employed a Trimble GeoXH handheld GPS unit to identify the locations of all soil borings, test pits, sample points, and newly installed monitoring wells relative to State planar grid coordinates. Monitoring well elevations were measured by Benchmark-TurnKey's surveyor. An isopotential map showing the general direction of groundwater flow was prepared based on water level measurements relative to USGS vertical datum (see Figure 4).

3.0 SITE PHYSICAL CHARACTERISTICS

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

3.1 Site Topography and Drainage

The Site is located within the Lake Erie-Niagara River Major Drainage Basin, which is typified by little topographic relief and gentle slope toward Lake Erie, except in the immediate vicinity of major drainage ways. Generally, the Site is topographically flat and almost entirely covered by the existing buildings, concrete slabs, and asphalt paving. Lake Erie is located approximately one mile west of the Site and Smokes Creek is located approximately 0.4 miles south of the Site. The Site has an average elevation of approximately 580 feet above mean sea level based on USGS topographic mapping of the area.

Precipitation (i.e., rain or snow melt) generally moves radially from the Site via overland flow to catch basins located along Hamburg Turnpike.

3.2 Site Geology and Hydrogeology

Based on observations during the RI, the typical subsurface profile consists of:

- Fill with sand, gravel, slag, black fines, and/or cinders ranging in thickness from grade to 8 fbgs. Test pits TP-2 and TP-3, which were completed within the former excavation area that was backfilled with bioremediated soils, were noted to include reworked lean clay with fill material to 8 fbgs.
- Silty clay and/or lean clay beneath fill material ranging in thickness between 2 to 11 feet overlaying an organic/peat layer that ranges at depths between 7 and 14 feet.
- Sand, clay and/or mixtures of sand and clay to maximum investigation depths between 12 and 20 fbgs.

The water table was observed generally between 10 and 14 fbgs, typically beneath the organic peat layer. Note that a shallow apparent perched water table was generally noted beneath the fill and above the organic peat layer at depths ranging between 4 and 7 fbgs.

Figure 4 is the isopotential map and depicts groundwater at the Site generally flowing in a north-northwesterly direction. Table 3 summarizes the groundwater elevation data.

4.0 INVESTIGATION RESULTS BY MEDIA

The following sections discuss the analytical results of the 2014 Phase II and/or RI. Tables 4 and 5 (Phase II) and 6 through 8 (RI) summarize the results with a comparison to cleanup objectives. The RI results are discussed in the context of pre-IRM conditions. Appendix E includes the laboratory analytical data packages. Figure 3 shows the locations of samples collected.

4.1 Surface Soil/Fill Results

Table 6 presents the two RI surface soil sample results with a comparison to the Part 375 USCOs and CSCOs. Figure 5 illustrates the samples that exceed their respective 6NYCRR Part 375 CSCOs.

4.1.1 Volatile Organic Compounds

Surface soil/fill was not analyzed for VOCs.

4.1.2 Semi Volatile Organic Compounds

One SVOC (benzo(a)pyrene) was detected slightly above its CSCO at an estimated concentration of 3.2 milligrams per kilogram (mg/kg) at RI SS-1. Individual concentrations of benzo(a)anthracene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene exceeded USCOs at RI SS-1 and RI SS-2. Benzo(k)fluoranthene exceeded the USCO at RI SS-1.

4.1.3 Inorganic Compounds

No metal concentrations exceeded CSCOs. Select individual metal concentrations were identified slightly above USCOs. Specifically, lead and zinc slightly exceeded USCOs at RI SS-1 and RI SS-2. Concentrations of chromium, copper, and manganese slightly exceeded USCOs at RI SS-1.

4.1.4 Pesticides, Herbicides, and Polychlorinated Biphenyls

Pesticides, herbicides, and PCBs were reported as non-detect.

4.1.5 Surface Soil/Fill Summary

As described above, the surface soil/fill had only minor SVOC and metal impacts; the only exceedance of CSCOs was benzo(a)pyrene at RI SS-1. Individual concentrations of SVOCs and metals were identified at concentrations slightly above USCOs. The SVOCs and metals identified are ubiquitous to industrial soil/fill and have been identified at numerous Sites nearby.

4.2 Subsurface Soil/Fill Results

Table 4 summarizes the analytical results for the six soil samples from the Phase II soil boring investigation. Table 7 present a comparison of the 26 RI subsurface soil sample results to the Part 375 USCOs and CSCOs. Figure 5 illustrates the samples that exceed their respective CSCOs.

4.2.1 Grossly Contaminated Soil/Fill

According to 6NYCRR Part 375-1.2(u), "Grossly Contaminated Media" means soil, sediment, surface water, or groundwater which contains sources or substantial quantities of mobile contamination in the form of non-aqueous phase liquid (NAPL), as defined in subdivision 375-1.2(ac), that is identifiable either visually, through strong odor, by elevated contaminant vapor levels, or is otherwise readily detectable without laboratory analysis.

Specific to the 2424 Hamburg Turnpike BCP Site and for purposes of this Report, evidence of grossly contaminated soil (GCS) was identified during Phase II and RI activities. Consistent with the above-referenced definition, GCS is specifically referred to herein as soil/fill with evidence of substantial quantities of LNAPL and/or PID readings in excess of 100 ppm with strong odors. GCS was identified within the footprint of the historic automotive repair building as well as areas west of the existing building. GCS was also observed north of the former UST excavation area (north of the historic automotive repair building). GCS depths varied between 1 and 18 fbgs with the maximum PID readings identified from 5 to 9 fbgs. GCS was observed within the following borings:

- RI MW-3: petroleum-like odors from 4 to 8 fbgs; a maximum PID reading of 712 ppm at 5 fbgs; and PID readings >100 ppm from 3 to 5 fbgs. PID readings of 3 ppm or less from 7 fbgs to bottom of boring at 16 fbgs.

- SB-4/TMW-1: strong petroleum-like odors from 4 to 8 fbgs; a maximum PID reading of 697 ppm noted at 7 fbgs; PID readings >100 ppm from 5 to 8 fbgs; and approximately one-inch of LNAPL noted in the temporary monitoring well during sampling. PID readings of 3 ppm or < from 11 fbgs to bottom of boring at 16 fbgs.
- SB-5/TMW-2: strong petroleum-like odors from 4 to 8 fbgs; a maximum PID reading of 850 ppm noted at 7 fbgs; and PID readings >100 ppm from 1 to 9 fbgs. No PID readings above background (0.0 ppm) from 13 fbgs to bottom of boring at 16 fbgs.
- SB-6: petroleum-like odors from 2 to 8 fbgs; a maximum PID reading of 1,098 ppm noted at 3 fbgs; and PID readings >100 from 1 to 7 fbgs. PID readings of 5.3 ppm or < from 9 fbgs to the bottom of the boring at 16 fbgs.
- SB-8: petroleum-like odors from 4 to 8 fbgs; and a maximum PID reading of 362 ppm noted at 7 fbgs. PID readings from 0.0 to 14 ppm from 9 fbgs to the bottom of the boring at 16 fbgs.
- SB-9: petroleum-like odors from 2 to 11 fbgs; a maximum PID reading of 900 ppm at 7 fbgs; and PID readings >100 ppm from 1 to 11 fbgs. PID readings <20 ppm noted from 13 fbgs to bottom of the boring at 16 fbgs.
- SB-10: petroleum-like odors from 4 to 9 fbgs; a maximum PID reading of 299 ppm at 7 fbgs; and PID readings >100 ppm from 5 to 9 fbgs. PID readings ranged from 0.0 to 1.3 ppm from 11 fbgs to the bottom of the boring at 16 fbgs.
- RI SB-11: strong petroleum-like odors from 6 to 10 fbgs; a maximum PID of 1,116 ppm at 9 fbgs; and PID readings >100 ppm from 6 to 14 fbgs. PID reading of 2.6 ppm at bottom of boring at 16 fbgs.
- RI SB-12: strong petroleum odors from 3.5 to 9 fbgs; a maximum PID reading of 1,085 ppm; and PID readings >100 ppm from 5 to 18 fbgs. PID readings < 2 ppm from 19 fbgs to bottom of boring at 20 fbgs.

GCS was also observed in the following test pits:

- RI TP-4: petroleum-like odors from 3 to 7 fbgs; and a maximum PID reading of 141 ppm at 6 fbgs. No PID readings above background (0.0 ppm) from 7 fbgs to the bottom of the test pit at 15 fbgs.
- RI TP-5: petroleum-like odors from 3.5 to 7 fbgs; and a maximum PID reading of 1,235 ppm at 4 fbgs. No PID readings above background (0.0 ppm) from 6 fbgs to bottom of test pit at 12 fbgs.

4.2.2 Field Observations

As indicated on Table 7, elevated PID readings were observed within RI test pits and soil borings completed on-site except for investigation locations on the northern and southern portions of the Site and the former UST excavation area north of the historic automotive repair building. Petroleum-like odors were noted at boring and test pit locations with elevated PID readings. During the Phase II, an approximate one-inch thick layer of floating petroleum product was noted on water at SB-4/TMW-1 located north of the former UST excavation area. Appendices C and D include test pit and borehole logs.

4.2.3 Volatile Organic Compounds

No individual VOCs were detected above Part 375 CSCOs in subsurface soil/fill samples. Certain petroleum-related VOCs exceeded USCOs at RI sample locations RI MW-3, RI SB-11, and RI SB-12 and Phase II sample locations SB-4 through SB-9. 2-butanone (MEK) slightly exceeded the USCO at RI TP-4 (7-9'). Acetone exceeded the USCO at seven RI samples; however, acetone is a common laboratory contaminant and is likely not indicative of site conditions.

4.2.4 Semi-Volatile Organic Compounds

Benzo(a)pyrene was detected at a concentration above its CSCO in RI subsurface sample locations RI MW-2 (2-4'), RI MW-5 (4-6'), and RI SB-14 (4-6'), , respectively, and Phase II sample locations SB-5 and SB-6. Five additional polycyclic aromatic hydrocarbons (PAHs) including benzo(a)anthracene, benzo(b)fluoranthene, chrysene, dibenz(a,h) anthracene, and indeno(1,2,3-cd)pyrene) exceeded CSCOs at Phase II boring SB-5. One or more individual PAH concentrations exceeded USCOs at 9 of the 26 RI subsurface sample locations and 3 of the 6 Phase II sample locations.

4.2.5 Inorganic Compounds

Only arsenic was detected slightly above its respective Part 375 CSCO in subsurface soil/fill at two sample locations: RI TP-6 (17.6 mg/kg at 4-6 fbgs) and RI SB-11 (16.4 mg/kg at 9-11). One or more individual metal concentrations exceeded USCOs at all eight subsurface sample locations sampled.

4.2.6 Pesticides, Herbicides and Polychlorinated Biphenyls

No pesticides, herbicides or PCBs were identified at concentrations exceeding CSCOs. Pesticides were reported as non-detect except for 4,4'-DDE at RI TP-2 (4-6') identified at 0.0084 mg/kg which slightly exceeds the USCO of 0.0033 mg/kg.

4.2.7 Subsurface Soil/Fill Summary

GCS was identified on the Site within the footprint of the historic automotive repair building, west of the repair building and north of the former UST excavation area. GCS was noted to include strong petroleum-like odors and PID readings >100 ppm (up to 1,235 ppm). An approximate one-inch thick layer of product was identified north of the former UST excavation area during the Phase II investigation at SB-4/TMW-1. No VOCs, pesticides, herbicides, or PCBs were detected above Part 375 CSCOs. Only one metal, arsenic, was detected slightly above its respective Part 375 CSCO in subsurface soil/fill at two sample locations. Benzo(a)pyrene was detected above Part 375 CSCOs at four RI sample locations and two Phase II sample locations. Five additional PAHs exceeded CSCOs at one Phase II boring location. Total PAH concentrations were reported at less than 500 ppm except for SB-5.

4.3 Groundwater Results

Table 8 presents a comparison of the detected groundwater concentration in all five RI monitoring wells to the Class GA Groundwater Quality Standards/Guidance Values (GWQS/GVs) per NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (June 1988). Historic groundwater analytical results are summarized in Table 5. Figure 4 illustrates the samples that exceed their respective GWQS/GVs.

4.3.1 Field Observations

During the 2014 Phase II, approximately one-inch of LNAPL was noted on groundwater at SB-4/TMW-1. During the RI groundwater sampling event, petroleum-like odors were noted at MW-3. Appendix F includes the groundwater sampling field logs.

4.3.2 Volatile Organic Compounds

Petroleum-related VOCs exceeded GWQS/GV at RI wells northwest and west of the historic automotive repair building at MW-2 and MW-3 and Phase II temporary wells located west and southwest of the historic automotive repair building at TMW-2 and TMW-3. VOCs at RI wells MW-1, MW-4, and MW-5 were reported as non-detect or at concentrations significantly below GWQS/GVs.

4.3.3 Semi-Volatile Organic Compounds

Only naphthalene at MW-3 and an estimated concentration of phenol at MW-4 exceeded GWQS/GVs. All other SVOCs were either non-detect or at concentrations significantly below GWQS/GVs.

4.3.4 Inorganic Compounds

Total metal concentrations above GWQS/GVs included naturally occurring minerals such as iron, manganese, and sodium. Total arsenic was detected at a concentration above GWQS/GV in MW-2 and MW-5.

Dissolved metal concentrations above GWQS/GVs were limited to naturally occurring minerals including iron, manganese, and sodium. Dissolved arsenic was not detected in any sample.

4.3.5 Pesticides, Herbicides and Polychlorinated Biphenyls

Herbicides and PCBs were reported as non-detect. Pesticides were non-detect except for an estimated concentration of 4'4'-DDD at MW-5 which was significantly below the GWQS/GV.

4.3.6 Groundwater Summary

Petroleum-related VOCs concentrations exceeded GWQS/GVs at RI and Phase II wells located northwest, west and southwest of the historic automotive repair building.

SVOCs were predominantly reported as non-detect, trace (estimated), or detected at concentrations below GWQS/GVs. Only naphthalene at MW-3 and an estimated concentration of phenol at MW-4 exceeded GWQS/GVs.

Total and dissolved metals detected at concentrations above GWQS/GVs include naturally occurring minerals such as iron, manganese, and sodium. Additionally, total arsenic

was detected above its respective GWQS/GV at MW-2 and MW-5; however, dissolved arsenic was not detected.

Herbicides and PCBs were reported as non-detect. Pesticides were non-detect except for an estimated concentration of 4'4'-DDD at MW-5 which was significantly below the GWQS/GV.

The visual and olfactory evidence of impact observed at Phase II temporary well TMW-1 and the petroleum-like odors at RI well MW-3 are likely associated with the GCS present on the Site**.** Removal/treatment of GCS and removal of in-ground lifts will mitigate these groundwater impacts. Groundwater flows in a north-northwesterly direction.

4.4 Data Usability Summary

In accordance with the RI/AA Work Plan, the laboratory analytical data from this investigation was assessed and, as required, submitted for independent review. Data Validation Services located in North Creek, New York performed the data usability summary assessment, 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 Report (DUSR), included as Appendix G, was prepared using guidance from the USEPA Region 2 validation Standard Operating Procedures, USEPA National Functional Guidelines for Data Review, and professional judgment. Appendix G includes the DUSR for the analytical data collected between 06/02/2016 and 07/27/2016, which were prepared in accordance with Appendix 2B of NYSDEC's DER-10 guidance.

The RI sample analyses were primarily conducted in compliance with the required analytical protocols. The sample results were usable either as reported, usable with minor qualification or edited, with the exception of the volatile results in RI-TP-5 (7-9) that were rejected and not usable due to an apparent matrix effect with low internal standard recoveries from 7% to 13%. 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. The findings of the DUSR do not significantly affect the analytical data for the Site.

4.5 Constituents of Concern (COCs)

Based on the historic use of the Site, Phase II investigation, and the RI, the COCs are presented below:

- ***Soil/Fill:*** GCS, PAHs, and arsenic
- ***Groundwater:*** LNAPL and petroleum VOCs

5.0 INTERIM REMEDIAL MEASURES

In accordance with the January 2017 NYSDEC-approved IRM Work Plan (Ref. 2), IRM field activities were conducted March 9 through May 1, 2017. The IRM was completed to immediately address known environmental impacts related to past use of the Site. The IRM details will be included in the Final Engineering Report discussed in Section 9.1. The IRM activities implemented are summarized below and shown on Figure 5:

- Extraction of 270 gallons of hydraulic oil from within the in-ground lifts followed by off-site recycling by American Recyclers Company in Tonawanda, NY.
- Removal of seven in-ground lifts from the former automotive repair building followed by off-site recycling at Niagara Metals in Niagara Falls, NY.
- Excavation of GCS encountered during in-ground lift removal activities followed by off-site disposal of 885.86 tons of GCS at the Chaffee Landfill in Chaffee, NY.
- Discharge of 140,000 gallons of excavation water, which was pretreated with bag filters and activated carbon, to the sanitary sewer under a discharge permit from Erie County Sewer District No. 6. The solids and water generated from the final cleaning of the Frac tank were disposed off-site at American Recyclers Company in Tonawanda, NY.
- Collection of confirmatory samples from the sidewalls (8 samples) and bottom (3 samples) of the excavation for analysis of CP-51 VOCs and SVOCs. Five of the eight sidewall samples exceeded the CSCOs for one or more analytes.
- Backfilling of the excavation with the concrete from the floor and clean soil from the Tonawanda Terminals Corp. Biotreatment Facility in Tonawanda, NY.

Analytical data from IRM post-excavation confirmatory samples were reviewed and qualified by a third party data validator. Appendix G contains the Data Usability Summary Report (DUSR) that concludes the results are usable either as reported or with qualification/ edit. Residual soil/fill impact remains on the north, west, and east sides of the excavation; however, additional soil/fill could not be removed without compromising the integrity of the existing building foundation. Table 9 summarizes the post-excavation confirmatory sample results. Appendix E includes the post-excavation confirmatory soil laboratory data packages. Appendix H contains manifests, scale receipts, and disposal records.

6.0 FATE AND TRANSPORT OF SITE CONTAMINANTS

The surface and subsurface soil/fill, and groundwater analytical results were incorporated with the physical characterization of the Site to evaluate the fate and transport of contaminants in Site media. The mechanisms by which the COCs can migrate to other areas or media are briefly outlined below. In all instances, the potential pathways are evaluated in the context of post-IRM conditions.

6.1 Fugitive Dust Generation

Chemicals present in soil/fill can be released to ambient air because of fugitive dust generation. Historic use of the Site has impacted subsurface soil/fill and, as such, fugitive dust generation during intrusive activities related to remediation and redevelopment is considered a relevant potential short-term migration pathway.

Particulate monitoring in accordance with the approved Community Air Monitoring Plan (CAMP) will be completed during intrusive activities and, if required, dust mitigation measures will be employed during future remediation and redevelopment.

6.2 Volatilization

Volatile chemicals present in soil/fill and groundwater may be released to ambient or indoor air through volatilization either from or through the soil/fill underlying building structures. Volatile chemicals typically have a low organic-carbon partition coefficient (K_{oc}), low molecular weight, and a high Henry's Law constant.

No VOCs were detected in subsurface soil/fill above 6NYCRR Part 375 CSCOs. Surface soil/fill samples were not analyzed for VOCs since these compounds would have volatilized over time. Groundwater samples collected northwest, west and southwest of the historic automotive repair building yielded petroleum VOCs at concentrations above GWQS/GVs. Approximately one-inch of LNAPL was observed north of the former UST excavation area during the Phase II and petroleum-like odors were identified during groundwater sampling at MW-3. Due to the remaining GCS and/or soils exhibiting nuisance characteristics (i.e., petroleum-like odors, elevated PID readings, and petroleum constituents in groundwater) along the edges of the building interior and exterior to the building, 2424 Hamburg Turnpike, LLC will install an active sub-slab depressurization (ASD) system within the existing buildings (if the buildings are to remain as part of the redevelopment plan) as

well as future buildings. Accordingly, volatilization from subsurface petroleum is considered a relevant migration pathway.

6.3 Surface Water Runoff and Transport

Precipitation waters and overland flow likely drain toward drain inlets along Hamburg Turnpike located along the western property border. Under the current use scenario, the potential for soil particle transport with surface water runoff is low as the Site is mostly flat lying and primarily covered by building, asphalt, concrete, and vegetation.

Under the reasonably anticipated future commercial use scenario, the Site will be substantially covered by hardscape (asphalt, buildings, etc.), and a minimum one-foot of vegetated clean soil, mitigating transport of subsurface (i.e., covered) soil/fill via storm water runoff. Although storm water runoff during excavation activities is possible during the future use scenario, erosion controls are typical construction practice and would be implemented as a component of the Site Management Plan required for BCP Sites that do not achieve unrestricted use conditions. Therefore, surface water runoff is not considered a relevant migration pathway.

6.4 Leaching

Leaching refers to chemicals present in soil/fill migrating downward to groundwater because of infiltration of precipitation. Petroleum VOC concentrations exceeded GWQS/GVs at RI and Phase II wells located northwest, west and southwest of the historic automotive repair building. SVOCs were predominantly reported as non-detect, trace (estimated), or detected at concentrations below GWQS/GVs. Only naphthalene at MW-3 and an estimated concentration of phenol at MW-4 exceeded GWQS/GVs. Total and dissolved metals detected at concentrations above GWQS/GVs include naturally occurring minerals such as iron, manganese, and sodium. Additionally, total arsenic was detected above its respective GWQS/GV at MW-2 and MW-5; however, dissolved arsenic was not detected and, as such, is relatively immobile. Herbicides and PCBs were reported as non-detect. Pesticides were non-detect except for an estimated concentration of 4'4'-DDD at MW-5 which was significantly below the GWQS/GV.

The presence of petroleum constituents and nuisance conditions in overburden groundwater indicates that the chemical migration via leaching pathway is likely a relevant

migration pathway. However, this pathway will be significantly reduced following the completed IRM and planned remedial actions.

6.5 Groundwater Transport

As illustrated by Figure 4, groundwater underlying the Site primarily migrates in a north-northwesterly direction. VOCs are present in groundwater at concentrations above GWQS/GV and visual and/or olfactory concerns were observed in groundwater at certain locations in the central portion of the Site. IRMs completed (i.e., removal of GCS and in-ground lifts within the building) and planned remedial actions will improve overall groundwater quality over time.

The Site and surrounding areas are serviced by municipal (supplied) water, with no evidence of potable wells in the area of the subject property. Furthermore, COCs were not present in the furthest downgradient monitoring well (MW-1) on-site and the downgradient/ cross gradient off-site property includes Route 5, a major roadway. As such, COCs present on-site would not reach off-site receptors at significant exposure point concentrations via groundwater transport; therefore, this is not a relevant migration pathway.

6.6 Exposure Pathways

Based on the analysis of chemical fate and transport provided above, the pathways through which Site COCs could potentially migrate to other areas or media are fugitive dust emissions via physical disturbance of soil particles during remedial measures and redevelopment; leaching of contaminants from the residual impacted soil/fill to groundwater; and, to a lesser extent, groundwater transport.

However, it is unlikely that on-site or off-site receptors would be exposed to any site-related COCs given the completed IRM and planned final remedial actions (dual phase extraction and installation of an ASD system within the current and future buildings); the planned Site Management Plan (SMP) and Environmental Easement restricting potable use of groundwater; and NYSDEC and NYSDOH requirements for dust controls during future excavation at remedial program construction sites.

7.0 QUALITATIVE RISK ASSESSMENT

7.1 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 the following five elements:

- Receptor population
- Contaminant source
- Contaminant release and transport mechanism
- Point of exposure
- Route of exposure

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.

7.1.1 Receptor Population

The receptor population includes the people who are or may be exposed to contaminants at a point of exposure. 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 presently unoccupied. Under current use conditions, receptors would be limited to trespassers who may traverse the Site (although presently mitigated by concrete barricades) and construction workers that may access the Site during remediation or to service utilities or similar duties. Trespassers might be comprised of adolescents and adults, whereas construction workers would be limited to adults.

The reasonably anticipated future use of the Site is for commercial/industrial purposes consistent with surrounding property use and Site zoning. Exposed receptors

under the future use scenario may be comprised of indoor workers, outdoor workers (e.g., groundskeepers or maintenance staff), and construction workers who may be employed at or perform work on the property. Site visitors/customers may also be considered receptors; however, their exposure would be similar to that of the indoor worker but at a lesser frequency and duration. Therefore, consideration of the indoor worker is conservatively protective of the site visitor.

7.1.2 Contaminant Sources

The source of contamination is defined as either the source of contaminant release to the environment (such as a waste disposal area or point of discharge) or the impacted environmental medium (soil, air, biota, water) at the point of exposure. Section 4.0 discusses the COCs present in unremediated Site media at elevated concentrations. Following the IRM, limited areas containing SVOCs (specifically PAHs), petroleum constituents, and arsenic in soil/fill remain. Groundwater contains elevated concentrations of VOCs within the same general soil/fill area impacted by GCS; however, these concentrations are expected to decrease over time following the IRM (i.e., GCS and hydraulic lift removal) and planned remedial activities.

7.1.3 Contaminant Release and Transport Mechanisms

Contaminant release and transport mechanisms carry contaminants from the source to points where people may be exposed, and are specific to the type of contaminant and site use. For the non-volatile COCs present in Site soil/fill, contaminant release and transport mechanisms will generally be limited to fugitive dust migration and direct contact during future planned intrusive work/remedial activities since the Site is currently covered by concrete, asphalt, buildings, and vegetation. For the volatile COCs in the unsaturated zone, the contaminant release and transport mechanism is limited to volatilization during additional intrusive remedial activities and future Site redevelopment.

7.1.4 Point of Exposure

The point of exposure is a location where actual or potential human contact with a contaminated medium may occur. Based on the sporadic exceedances of commercial SCOs in soil/fill for certain ubiquitous parameters (i.e., arsenic and PAHs), the point of exposure is

defined as those areas that will remain after planned remedial activities. For both the current and future use scenarios, groundwater is not considered a relevant mechanism for exposure due to the availability of a local municipal potable water source and requirement for an Environmental Easement that will restrict the use of Site groundwater.

7.1.5 Route of Exposure

The route of exposure is the manner in which a contaminant actually enters or contacts the body (i.e., ingestion, inhalation, dermal absorption). Based on the types of receptors and points of exposure identified above, potential routes of exposure are listed below:

Current Use Scenario

- Environmental Personnel/Construction and Outdoor Workers (short-term) – skin contact, inhalation, and incidental ingestion

Future Use Scenario

- Indoor Worker/Visitor/Vendor – inhalation
- Construction and Outdoor Workers (short-term) – skin contact, inhalation, and incidental ingestion

7.1.6 Exposure Assessment Summary

Based on the above assessment, the potential exposure pathways for the current and future use conditions are listed below.

Current Use Scenario

- Environmental Personnel/Construction and Outdoor Worker – direct contact, incidental ingestion, and inhalation of non-volatile COCs present in site-wide soil/fill, and inhalation of volatile organics present in impacted soil/fill during intrusive activities.

Future Use Scenario

- Indoor Worker/Visitor/Vendor – inhalation of volatile (weathered) organics present in petroleum-impacted soil/fill via the process known as soil vapor intrusion.

- Construction and Outdoor Worker – direct contact, incidental ingestion and inhalation of non-volatile COCs present in site-wide soil/fill, and inhalation of volatile (weathered) organics present in impacted soil/fill during intrusive activities.

In most instances, these exposures can be readily mitigated through the use of personal protective equipment (PPE); proper soil/fill management during intrusive activities; engineering controls including placement of asphalt, building, and landscape cover; and construction of vapor barriers or ASD systems in newly constructed buildings.

7.2 Fish and Wildlife Impact Assessment (FWIA)

The historical use of the Site has eliminated the majority of native species. The Site is currently unoccupied with buildings, asphalt and concrete surfaces, providing no wildlife habitat or food value. No federally listed or proposed threatened or endangered species are known to exist in the project area (USFWS 1999).

The Site is slated for commercial/industrial redevelopment, which is consistent with surrounding property. Roadways, buildings, parking facilities, and maintained ornamental landscaping will substantially limit availability of suitable cover type for reestablishment of biota. Based on the Fish and Wildlife Resource Impact Analysis Decision Key included as Appendix I (NYSDEC DER-10 Appendix 3C), no fish and wildlife resources impact analysis is warranted.

7.3 Qualitative Off-Site Exposure Assessment

During the RI, test pits and soil borings (including those for installation of monitoring wells) were advanced across the Site, including areas proximate to Site property boundaries. These sampling locations were used in conjunction with previously collected data to complete this qualitative off-site exposure assessment and evaluate potential remedial measures to address Site contamination. The following suggest a potential for off-site impacts:

- Western Boundary of the Site (west of the historic automotive repair building): GCS with petroleum-like odors and corresponding PID readings between 850 and 1,098 ppm were observed in borings completed west of the historic automotive repair building at SB-5/TMW-2 and SB-6. In addition, petroleum contamination was previously discovered during utility upgrades being completed

along Hamburg Turnpike proximate to a manhole located northwest of Phase II sample location SB-7/TMW-3.

- Eastern Boundary of Site: During the RI, petroleum-like odors (with corresponding PID readings up to 1,116 ppm) were observed in interior borings completed within the footprint of the historic automotive repair portion of the building proximate to the eastern boundary of the Site. However, the hydraulic lifts and majority of the GCS were removed during the IRM, with residual impact remaining beneath the building foundation.

8.0 REMEDIAL ALTERNATIVES EVALUATION

8.1 Remedial Action Objectives

The remedial actions for the 2424 Hamburg Turnpike Site must satisfy Remedial Action Objectives (RAOs). RAOs are site-specific statements that convey the goals for minimizing substantial risks to public health and the environment. For the 2424 Hamburg Turnpike Site, appropriate RAOs have been defined as:

Soil/Fill

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding NYSDEC Class GA GWQS/GVs or with evidence of LNAPL or nuisance characteristics.

RAOs for Environmental Protection

- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
- Remove the source of ground or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the Site.

8.2 General Response Actions

General Response Actions (GRAs) are broad classes of actions that are developed to achieve the RAOs and form the foundation for the identification and screening of remedial technologies and alternatives.

The GRAs available to address the RAOs for soil/fill include:

- Institutional controls (e.g., Site Management Plan, Environmental Easement)
- Engineering controls (e.g., cover system)
- Treatment (e.g., in-situ or ex-situ)
- Excavation and off-site disposal or treatment

The GRAs available to address the RAOs for groundwater include:

- Monitored natural attenuation
- Institutional controls
- Engineering controls
- Treatment

The GRAs available to address the RAOs for in-ground lifts include:

- Removal and off-site disposal/recycling of lifts and contents

The GRAs available to address the RAOs for soil vapor include:

- Engineering controls (e.g., ASD system)

8.3 Standards, Criteria, and Guidance

According to DER-10 Section 1.3(b)71, standards, criteria, and guidance (SCGs) refers to: "*standards and criteria that are generally applicable, consistently applied, and officially promulgated, that are either directly applicable or not directly applicable but are relevant and appropriate, unless good cause exists why conformity should be dispensed with, and with consideration being given to guidance determined, after the exercise of scientific and engineering judgment, to be applicable. This term incorporates both the CERCLA concept of 'applicable or relevant and appropriate requirements' (ARARs) and the USEPA's 'to be considered' (TBCs) category of non-enforceable criteria or guidance. For purposes of this Guidance, 'soil SCGs' means the soil cleanup objectives and supplemental soil cleanup objectives identified in 6NYCRR 375-6.8 and the Commissioner Policy on Soil Cleanup Guidance (CP-Soil).*"

Additional discussions concerning the specific chemical-, action-, and location-specific SCGs that may be applicable, relevant, or appropriate to remedy selection for the Site are presented below. In each case, the identified SCGs are generally limited to

regulations or technical guidance in lieu of the environmental laws from which they are authorized, as the laws are typically less prescriptive in nature and inherently considered in the regulatory and guidance evaluations. Table 10 summarizes the SCGs by media that may be applicable or relevant and appropriate to the Site.

8.3.1 Chemical-Specific SCGs

Chemical-specific SCGs are usually health- or risk-based concentrations in environmental media (e.g., air, soil, water), or methodologies that when applied to site-specific conditions, result in the establishment of concentrations of a chemical that may be found in, or discharged to, the ambient environment. The determination of potential chemical-specific SCGs for a site is based on the nature and extent of contamination; potential migration pathways and release mechanisms for site contaminants; reasonably anticipated future site use; and likelihood that exposure to site contaminants will occur.

Previous sampling events during Phase II and RI activities included the collection and analysis of surface soil/fill, subsurface soil/fill, and groundwater samples.

One of the remedial alternatives to be assessed for the Site is a Track 4 cleanup for soil/fill. This approach requires institutional controls (e.g., groundwater and land use restrictions, Site Management Plan, and Environmental Easement) and engineering controls (e.g., a soil cover system, active ASD systems in future buildings) as components of the final remedy to reduce future potential exposure to impacted soil/fill.

Site-specific action levels (SSALs) were developed for the Site. These SSALs will be applicable to soil/fill that greatly exceed CSCOs, have the potential to impact groundwater, or otherwise represent an unacceptable risk to public health or the environment in the context of reasonably anticipated future use and a Track 4 cleanup and therefore require corrective action. These SSALs were developed based on the removal of source areas, including areas that have a greater potential for contaminant migration, and the feasibility of achieving the SSALs based on the nine factors outlined in 6NYCRR Part 375-1.8(f) and described in Section 7.4. The SSALs only apply to a Track 4 cleanup with a cover system to be installed over all areas with remaining soil/fill concentrations above CSCOs, an SMP, and Environmental Easement. The following SSALs were developed and used to designate soil/fill areas requiring remediation:

- Total PAHs >500 mg/kg; this alternative Soil Cleanup Level was employed in lieu of individual CSCOs, per NYSDEC Commissioner Policy on Soil Cleanup Guidance (CP-51).
- GCS (evidence of substantial quantities of LNAPL and/or PID readings in excess of 100 ppm with strong odor).

8.3.2 Location-Specific SCGs

Location-specific SCGs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in a specific location. Some examples of these unique locations include floodplains, wetlands, historic places, and sensitive ecosystems or habitats. The location of the site is a fundamental determinant of its impact on human health and the environment.

8.3.3 Action-Specific SCGs

Action-specific SCGs are restrictions placed on particular treatment or disposal technologies. Examples of action-specific SCGs are effluent discharge limits and hazardous waste manifest requirements.

8.4 Evaluation of Alternatives

In addition to achieving RAOs, NYSDEC's BCP calls for remedy evaluation using the following criteria set forth in DER-10 Technical Guidance for Site Investigation and Remediation (Ref. 6) and 6NYCRR 375-1.8(f):

- **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.
- **Compliance with 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, and volume of Site contamination. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the contamination at the Site.
- **Short-Term Impacts and Effectiveness**. This criterion 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 each remedial alternative and presented on a present worth basis. A remedy is cost effective if the costs are proportional to the overall effectiveness.
- **Community Acceptance**. This criterion evaluates the public's comments, concerns, and overall perception of the remedy. Therefore, 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, including a public comment period for the AAR.

8.5 Anticipated 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 of remedial alternatives. The regulations identify 16 criteria that must be considered. These criteria and the resultant outcome for the 2424 Hamburg Turnpike Site are presented below.

1. *Current use and historical and/or recent development patterns:* Prior to being vacated, the Site was used as an automobile filling and service station beginning in at least 1957, when three 10,000-gallon USTs were installed on-site, through approximately 1994 when the tanks were removed. Subsequent to the automobile filling and service station operations, the Site operated as a retail store. The Surrounding properties are currently vacant land or used commercially. The west adjacent property is a portion of the Bethlehem Redevelopment area which was historically used for heavy industrial purposes as a portion of the Bethlehem Steel plant. **Accordingly, commercial or industrial site redevelopment would be consistent with historic site use.**
2. *Applicable zoning laws and maps:* The Site is located in an area of the City zoned for mixed commercial/industrial use. **Use in a commercial or industrial capacity is therefore consistent with current zoning.**
3. *Brownfield opportunity areas as designated set forth in GML 970-r:* The Brownfield Opportunity Area (BOA) Program provides municipalities and community based organizations with assistance to complete revitalization plans and implementation strategies for areas or communities affected by the presence of brownfield sites, and site assessments for strategic sites. **The subject property is located within the City of Lackawanna BOA.**
4. *Applicable comprehensive community master plans, local waterfront revitalization plans as provided for in EL article 42, or any other applicable land use plan formally adopted by a municipality:* The Site lies within the boundaries of the City of Lackawanna Comprehensive Plan Update, specifically within the "Hamburg Turnpike Commercial Corridor," dated July 6, 2016. **Site remediation and redevelopment is consistent with the redevelopment plan.**
5. *Proximity to real property currently used for residential use, and to urban, commercial, industrial, agricultural, and recreational areas:* The adjacent and surrounding land is predominantly commercial and vacant industrial. Residential land use is located nearby to the north and east of the Site. **Maintaining the use of the Site in a commercial or industrial capacity is consistent with surrounding property.**
6. *Any written and oral comments submitted by members of the public on the proposed use as part of the activities performed pursuant to the citizen participation plan:* **No comments have been received from the public relevant to Site use concerns.**
7. *Environmental justice concerns, which include the extent to which the proposed use may reasonably be expected to cause or increase a disproportionate burden on the community in which the site is located, including low-income minority communities, or to result in a disproportionate concentration of commercial or industrial uses in what has historically been a mixed use or residential community:* **Nearby and adjacent property is actively used in a commercial and industrial capacity. Maintaining use of the site in a**

commercial or industrial capacity does not pose environmental justice issues.

8. *Federal or State land use designations:* The property is designated as mixed commercial/industrial by the City of Lackawanna. **Reuse in a restricted capacity (commercial or industrial) is consistent with the current land use designation.**
9. *Population growth patterns and projections:* The City of Lackawanna, encompassing 6.6 square miles, has a population of 17,965 (2015 US Census Bureau), a decrease of 6.0% from the 2000 US Census (19,064 people) and, as such, the redevelopment of the site is not expected to have a significant impact on the housing market**. Reuse of the Site in a non-residential capacity does not materially affect opportunities for residential growth.**
10. *Accessibility to existing infrastructure:* Access to the Site is from Hamburg Turnpike. Utilities (sewer, water, electric) that service adjacent and nearby properties are present along this corridor. **Existing infrastructure supports reuse in a commercial or industrial capacity**.
11. *Proximity of the site to important cultural resources, including federal or State historic or heritage sites or Native American religious sites*: **No such resources or sites are known to be present on or adjacent to the Site.**
12. *Natural resources, including proximity of the site to important federal, State, or local natural resources, including waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species:* The Erie County Internet Mapping System shows that State or Federal Wetlands do not exist on the subject property or adjacent properties. The closest waterbody is Smokes Creek located approximately 0.4 miles south of the Site. There are no known critical habitats of endangered or threatened species in the area of the Site. **The absence of significant ecological resources on or adjacent to the Site indicates that cleanup to restricted use conditions will not pose an ecological threat.**
13. *Potential vulnerability of groundwater to contamination that might emanate from the site, including proximity to wellhead protection and groundwater recharge areas and other areas identified by the Department and the State's comprehensive groundwater remediation and protection program established set forth in ECL article 15 title 31:* Currently, there are no known deed restrictions on the use of groundwater at the Site. Municipal water is supplied or available to the Site and all surrounding properties. Potable water service is provided off-site and on-site by the local municipal water authority. **The cleanup to restricted use conditions will not pose a drinking water threat.**
14. *Proximity to flood plains:* There are no floodplains located on-site or adjacent to the Site. The closest floodplain is located along approx. 0.4 mile south of the Site along Smokes Creek. No flood zones are present on the property; there is no risk

of significant soil erosion due to flooding. **As such, cleanup to commercial standards does not pose a threat to surface water.**

15. *Geography and geology:* The Site is located within the Buffalo-Eighteen Mile drainage basin, with the primary bedrock type that forms the bedrock surface in the City of Lackawanna area consisting predominantly of the Hamilton Group, a Middle Devonian age bedrock that consists mostly of dark gray/black shales and thin silty limestones, and is usually quite fossiliferous. The Site is located within the Skaneateles formation. Surface soils within the vicinity of the Site are described as Lacustrine silt and clay which is described as generally laminated silt and clay deposited in proglacial lakes, generally Calcareous with the potential for land instability with a variable thickness (up to 100 meters). **Geography and geology are consistent with a commercial or industrial re-use.**
16. *Current institutional controls applicable to the site:* **No institutional controls are currently present that would affect redevelopment options.**

Based on the above analysis, use of the Site in a commercial or industrial capacity is consistent with past and current development and zoning on and near the Site, and does not pose additional environmental or human health risk.

8.6 Volume, Nature, and Extent of Contamination

Estimation of the volume, nature, and extent of media that may require remediation to satisfy the RAOs or that needs to be quantified to facilitate evaluation of remedial alternatives is presented in this section. For the unrestricted use scenario, the cleanup goal would involve achieving USCOs. For the reasonably anticipated future use scenario, the cleanup goal would involve achieving CSCOs and SSALs. The volume and extent of media requiring cleanup under these scenarios is presented in Sections 7.6.1 and 7.6.2. In all instances, these volume estimates (and associated cost estimates presented later in this AAR) are projected based on data collected and observations made during the Phase II and RI activities and the contamination removed during the IRM.

8.6.1 Comparison to Unrestricted SCOs (Track 1 Cleanup)

Exceedances of the USCOs were noted in several of soil/fill samples collected across the Site, primarily for petroleum VOCs and SVOCs (PAHs) and metals to varying degrees depending on the media. GCS and nuisance conditions indicating petroleum impact were also identified. Due to the ubiquitous nature of the constituents observed in Site soil/fill, the

extent to which they exceeded the USCOs, and the field evidence of impacts, the entire 1.04-acre property (minus the 0.04 acres removed from inside the building) defines the Track 1 Cleanup area. The depth of impact varies significantly across the Site. Since impacts with USCO exceedances and/or GCS were identified at the bottom of certain borings (up to 11 fbgs at most but up to 18 fbgs at certain borings) and test pits (up to 10 fbgs), a conservative average depth of impact of 15 fbgs has been assumed. Thus, the volume of impacted soil/fill requiring remediation under the unrestricted use scenario is approximately 24,200 cubic yards.

8.6.2 Comparison to Commercial SCOs (Track 4 Cleanup)

The soil/fill data indicates certain areas with exceedances of the Part 375 CSCOs for several ubiquitous constituents. Regarding RI samples, five subsurface soil samples and two surface soil sample exhibited at least one exceedance of the CSCOs for SVOCs and/or metals. Several other sample locations exhibited nuisance conditions (odor, elevated PID) and/or contained GCS. Two soil samples collected during the Phase II exhibited one or more SVOC concentrations above CSCOs. Based on the analytical results, the extent to which CSCOs were exceeded, and the field evidence of impacts, there are three areas that make up the Track 4 Cleanup area: the first area is located within the footprint of the historic automotive repair building, which was substantially removed during the IRM; the second area is west of the historic automotive repair building; and the third area is north of the former UST excavation. The depth of impact varied; a conservative average depth of impact of 10 fbgs has been assumed.

8.6.3 Groundwater Impacts

During the RI sampling work, petroleum-like odors were observed on groundwater at MW-3. During the 2014 Phase II, approximately one inch of LNAPL was noted on groundwater at SB-4/TMW-1.

Petroleum-related VOCs concentrations exceeded GWQS/GVs at RI and Phase II wells MW-2, MW-3, TMW-2 and TMW-3 west and southwest of the historic automotive repair building. SVOCs were predominantly reported as non-detect, trace (estimated), or detected but at concentrations below GWQS/GVs. Only naphthalene (MW-3) and an estimated concentration of phenol (MW-4) exceeded GWQS/GVs. Total and dissolved

metals detected at concentrations above GWQS/GVs include naturally occurring minerals such as iron, manganese, and sodium. Additionally, total arsenic was detected above its respective GWQS/GV at MW-2 and MW-5; however, dissolved arsenic was not detected. Herbicides and PCBs were reported as non-detect. Pesticides were non-detect except for an estimated concentration of 4'4'-DDD (MW-5) that was significantly below the GWQS/GV.

8.7 Alternatives Evaluation

In addition to the evaluation of alternatives to remediate to the likely end use of the Site, NYSDEC regulation and policy calls for evaluation of more restrictive end-use scenarios, such as an unrestricted use scenario (considered under 6NYCRR Part 375 to be representative of cleanup to pre-disposal conditions), and a scenario less restrictive than the reasonably anticipated future use. Per NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, evaluation of a "no action/no further action" alternative is also required to provide a baseline for comparison against other alternatives. The alternatives evaluated below include:

- Alternative 1: No Further Action
- Alternative 2: Unrestricted Use (Track 1) Cleanup
- Alternative 3: Commercial Use (Track 4) Cleanup

8.7.1 Alternative 1 – No Further Action

Under this alternative, the Site would remain in its current state, with no additional remediation beyond the completed IRM and no controls in place.

Overall Protection of Public Health and the Environment – The Site is not protective of human health and the environment, due to the presence of contamination remaining on-site above SCGs; the absence of engineering controls (e.g., cover system); and the absence of institutional controls to prevent more restrictive forms of future Site use (e.g., unrestricted, residential, and restricted residential) or the export of Site soils to uncontrolled off-site locations. Accordingly, no further action is not protective of public health and does not satisfy the RAOs.

Compliance with SCGs – Under the current and reasonably anticipated future use scenario (commercial), the soil/fill and groundwater contamination remaining on-site does not comply with applicable SCGs.

Long-Term Effectiveness and Permanence – The no further action alternative involves no remedial activities (beyond the completed IRM), equipment, institutional controls, or facilities subject to maintenance, and provides no long-term effectiveness or permanence toward achieving the RAOs.

Reduction of Toxicity, Mobility, or Volume of Contamination – The no action alternative does not reduce the toxicity, mobility, or volume of contamination beyond that which was removed during the IRM and through natural degradation/attenuation. Therefore, this alternative is not protective of public health and does not satisfy any of the RAOs.

Short-Term Impacts and Effectiveness – The remaining contamination on-site does pose short-term risks to on-site workers and the environment. Therefore, implementation of the no further action alternative does not satisfy the RAOs.

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

Cost-Effectiveness – There would be no capital or long-term operation, maintenance, or monitoring costs associated with the no further action alternative.

Community Acceptance – Community acceptance will be evaluated based on comments received from the public in response to Fact Sheets and other planned citizen participation activities, including a public comment period for the RI/IRM/AA Report.

8.7.2 Alternative 2 – Unrestricted Use (Track 1) Cleanup

An unrestricted use alternative would necessitate remediation of all soil/fill where concentrations exceed the USCO per 6NYCRR Part 375. For unrestricted use scenarios, excavation and off-site disposal of impacted soil/fill is generally regarded as the most

applicable remedial measure because engineering controls cannot be used to supplement the remedy. As such, the unrestricted use alternative assumes that those areas that exceed USCOs would be excavated and disposed at an off-site commercial solid waste landfill. Therefore, the entire 1.04-acre Site would need to be excavated to approximately 15 fbgs to achieve USCOs. The estimated total volume of impacted soil/fill that would be removed from the Site is approximately 24,282 cubic yards (excluding the estimated 886 cubic yards of soil/fill already removed during the IRM). In order to access impacted material at depth, the existing buildings would need to be demolished, which does not fit into the proposed redevelopment plans.

Based on removal of all source areas, groundwater remediation and monitoring would not be necessary, as concentrations would be expected to decrease significantly. In addition, a restriction on groundwater use would be included as part of the remedial program per 6NYCRR Part 375.

Overall Protection of Public Health and the Environment – Excavation to achieve USCOs followed by off-site disposal would be protective of public health under any reuse scenario. However, this alternative would permanently use and displace approximately 24,282 cubic yards of valuable landfill airspace, causing ancillary environmental issues due to reduced landfill capacity, and require excavating, transporting, and placing 24,282 cubic yards of clean soil from an off-site borrow source to backfill the excavation, also contributing to significant detrimental off-site environmental issues. The unrestricted use alternative would achieve the corresponding Part 375 SCOs, which are designed to be protective of public health under any reuse scenario.

Compliance with SCGs – The excavation and off-site disposal would need to be performed in accordance with applicable, relevant, and appropriate SCGs. Soil excavation activities would necessitate preparation of and adherence to a CAMP in accordance with Appendices 1A and 1B of DER-10.

Long-Term Effectiveness and Permanence – The unrestricted use alternative would achieve removal of all impacted soil/fill; therefore, no soil/fill exceeding the USCOs

would remain on the Site and groundwater quality would be expected to improve. As such, the unrestricted use alternative would provide long-term effectiveness and permanence.

Reduction of Toxicity, Mobility, or Volume of Contamination – Through removal of all remaining impacted soil/fill and LNAPL, the unrestricted use alternative would reduce the toxicity, mobility, and volume of Site contamination permanently and significantly. However, since this alternative transfers Site soil/fill from one environment to another, an overall reduction of toxicity and volume would not occur. Mobility of soluble constituents would be reduced in the commercial landfill with a liner, cover system, and leachate collection.

Short-Term Impacts and Effectiveness – The principal advantage of a large-scale excavation to achieve USCOs is reliability of effectiveness in the long-term. In the short-term, there would be significant increase in exposure of impacted soil/fill to on-site workers and the community under this alternative. Remaining excavation activities would be completed over an approximate 3-month period, and backfilling would take over 1 month Commercial construction equipment would be used, a health and safety plan would be followed, and community air monitoring would be completed during excavation activities. However, primary disadvantages include increased truck traffic during excavation and backfill; noise; and air emissions, including fugitive dust and odors. This action would result in potential storm water impacts at the borrow source(s) and on-site; diesel fuel consumption on the order of 17,340 gallons (assuming 80 miles round trip to a local landfill; 8 miles per gallon) to transport the 1,734 truckloads (14 cubic yards per truckload) of impacted soil/fill, with several thousands of gallons also consumed by excavation and grading equipment. The USEPA's estimated CO_2 generation rate for diesel engines is approximately 22.2 pounds per gallon of diesel consumed. Accordingly, this alternative would produce approximately 385,000 pounds of greenhouse gas. Therefore, this alternative represents a significant adverse effect in the short-term; however, the RAOs would be achieved once the soil/fill is removed from the Site and backfill soils are in place (est. 4-6 months).

Implementability – Significant technical and administrative implementation issues would be encountered in completion of the unrestricted use alternative. Technical implementation issues include, but are not limited to, shoring/stabilization excavation sidewalls to prevent sloughing during deep excavation and the need for construction maintenance. In addition, groundwater and/or storm water handling, treatment, and/or discharge/disposal would be required. Given the high volume of soil/fill required for removal, a high volume of truck traffic on a relatively small Site would be needed to transport the impacted soil/fill off-site.

Administrative implementability issues may include: the need for rezoning of the area to allow for unrestricted uses, which are not consistent with current surrounding land use or the reasonably anticipated future use of the Site; coordinating and securing disposal contracts with numerous permitted off-site landfills since no single location may be able to accept the volume of soil/fill generated under this alternative; and difficulty locating local borrow sources for such a large volume of backfill.

Cost-Effectiveness – The capital cost of implementing the unrestricted use alternative is estimated at over $3.5 million. Table 11 provides a detailed breakdown of these costs.

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

8.7.3 Alternative 3 – Commercial Use (Track 4) Cleanup

Under Alternative 3, the Site would be cleaned up to facilitate reasonably anticipated commercial or industrial use (see Figure 6). Initially, soil vapor extraction with air sparging (SVE/AS) was evaluated; however, Benchmark-TurnKey determined the technology combination was not viable for the following reason:

- The impacted groundwater occurs in the slag/fill (e.g., wells TMW-2, TMW-3) at depths of 4 to nominally 8 fbgs. In order to create the microbubbles necessary to "strip" the petroleum VOCs from the groundwater, it is necessary to install the air sparge screen nominally 5 feet below the area to be treated in order to affect a large enough radius of influence with the microbubbles (i.e., a depth of

approximately 13 fbgs). Immediately underlying the slag/fill are layers of peat and lean clay. The hydraulic conductivity of the peat and lean clay is too low to allow for air injection. As such, air sparging is an ineffective technology for the conditions at this Site.

Therefore, Alternative 3 consists of the following:

- Completing a pilot study prior to final design to determine dual phase (soil vapor and groundwater) extraction (DPE) well zone of influence and operational parameters
- Installing DPE wells: two within the former automotive repair building, six west of the building, and one north of the former UST excavation. Operating the DPE system for a period of 2 years.
- Engineering Controls:
  - Placing a cover system including building foundations, hardscape, or a minimum 12 inches of clean soil or gravel.
  - Installing an ASD system within the existing building prior to occupancy, as well as future buildings, to mitigate concerns associated with potential vapor intrusion from beneath the building.
- Institutional Controls:
  - Implementing an SMP including an Environmental Easement, EC/IC Plan, Site Monitoring Plan, Excavation Work Plan, O&M Plan, Site use limitations, and groundwater use restrictions.

Based on the findings of the Phase II and RI, GCS was identified within the footprint of the historic automotive repair building as well as areas west of the existing building. GCS was also observed north of the former UST excavation area (north of the historic automotive repair building). GCS depths vary between 1 and 18 fbgs with the maximum PID readings identified from 5 to 9 fbgs. During IRM activities, the majority of the GCS was removed from within the building and the excavation was backfilled with concrete, clean overburden soil/fill, and imported BUD-approved soil. The remaining impacts within the building footprint were documented through end-point sampling.

The areas of the Site not covered by the building, concrete or asphalt would receive a cover as described above under Engineering Controls. Specific details of the remediation will be provided in the Remedial Action Work Plan (RAWP) and submitted to the Department for review and approval.

Overall Protection of Public Health and the Environment – This alternative meets NYSDEC requirements for a Track 4 cleanup under the BCP regulations and is protective of public health and the environment. The RAOs for the Site would be satisfied through: the completed IRM excavation; additional planned remedial activities, including removal and treatment of impacted soil vapor and groundwater via dual phase extraction; installation of ASD system(s) in the existing and future buildings to mitigate potential VOC vapor intrusion concerns associated with possible remaining GCS; and, the use of EC/ICs to prevent potential future exposure, and limit the future use to commercial/industrial purposes. Groundwater quality will be monitored over time in accordance with the SMP and is expected to continue to improve via natural attenuation as the contamination sources will have been removed. Furthermore, groundwater is not used for drinking water purposes in the area of the Site; drinking water is supplied by the local municipality. Accordingly, the Commercial (Track 4) Use Cleanup alternative is protective of public health and fully satisfies the RAOs for the Site.

Compliance with SCGs – The planned remedial activities will be performed in accordance with applicable, relevant, and appropriate SCGs including NYSDEC DER-10. The SMP will include: an EC/IC Plan that describes the procedures for the implementation and management of all EC/ICs at the Site; a Site Monitoring Plan that describes the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site, including the soil cover system and all affected Site media; an Excavation Work Plan to address any impacted soil/fill encountered during post-development intrusive and/or maintenance activities; an O&M Plan that describes the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site; and, a Site-wide inspection program to assure that the EC/ICs placed on the Site have not been altered and remain effective.

Long-Term Effectiveness and Permanence – Removal of in-ground lifts and GCS during the IRM and construction of a cover system will prevent direct contact with soil/fill exceeding CSCOs and SSALs. Removal and treatment of impacted soil vapor and groundwater with DPE wells will remediate the vadose zone and improve groundwater

quality on the Site. Installation of an ASD system within the existing and future buildings will mitigate potential on-site VOC vapor intrusion concerns associated with potential vapors beneath the building. An SMP will address any impacted soil/fill encountered during future Site intrusive/maintenance activities, and provides a mechanism to assure that the EC/ICs placed on the Site have not been altered and remain effective. Furthermore, an Environmental Easement for the Site will be filed with Erie County, which will limit future Site use to industrial/commercial uses, restrict groundwater use, and reference the Department-approved SMP. As such, this alternative will provide long-term effectiveness and permanence.

Reduction of Toxicity, Mobility, or Volume of Contamination – This alternative will reduce the toxicity, mobility, and volume of COCs significantly and permanently. Removal of in-ground lifts and excavation of GCS during the IRM removed soil/fill exceeding CSCOs/SSALs from the Site. Removal of impacted soil vapor and groundwater using DPE wells will remove and destroy remaining contamination through treatment. Installation of an ASD system within the existing and future buildings will not reduce the toxicity or volume, but will mitigate potential on-site VOC vapor intrusion concerns by venting vapors from beneath the building to the exterior. The SMP will include an Excavation Work Plan to address any impacted soil/fill encountered during future Site intrusive/maintenance activities and a Site-wide inspection program to assure that the EC/ICs placed on the Site have not been altered and remain effective. Accordingly, this alternative satisfies this criterion.

Short-Term Impacts and Effectiveness – The short-term adverse impacts and risks to the community, workers, and environment will be controlled during implementation of the remedy. During intrusive remedial activities, including DPE well installation and cover system placement, increased truck traffic and handling of contaminated soil/fill could potentially cause adverse short-term effects. Community air monitoring for vapors, dust particulates, and odors will be performed during intrusive activities to assure conformance with community air monitoring action levels. The potential for chemical exposure and physical injury are reduced through safe work practices; proper personal protection equipment (PPE); environmental monitoring; establishment of work zones and Site control;

and appropriate decontamination procedures. The planned remedial activities will be completed within one construction season and performed in accordance with a Department-approved Work Plan, including a health and safety plan (HASP) and CAMP. This alternative achieves the RAOs for the Site.

Implementability – No technical or action-specific administrative implementability issues are associated with the Commercial Use (Track 4) Cleanup alternative.

Cost – The capital cost of implementing a Commercial Use (Track 4) alternative is estimated at $642,000. Total O&M costs over the 30-year period are estimated at $288,000. The total 30-year present worth cost of this alternative is approximately 877,000. Table 12 presents the capital and O&M cost estimate.

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

8.8 Comparison of Remedial Alternatives

The previous sections describe remedial alternatives for the 2424 Hamburg Turnpike Site and evaluate these alternatives against the screening criteria. Table 13 provides a comparison of the alternatives by media to identify remedial measures that will achieve the RAOs for the Site.

8.9 Recommended Remedial Alternative

Based on the alternatives analysis evaluation, *Alternative 3 – Commercial Use (Track 4) Cleanup* is the recommended final remedial approach for the 2424 Hamburg Turnpike Site. This alternative is fully protective of public health and the environment; significantly less disruptive to the community; consistent with current and future land use; and represents a more cost-effective approach than Alternative 2 while fully satisfying the RAOs. The recommended remedial alternative would involve:

- The completed IRMs.

- Installing and operating DPE wells within and west of the former automotive repair building and north of the former UST excavation. Performing a pilot study prior to final design of the DPE well field.
- Engineering Controls:
  - Placing a cover system including building foundations, hardscape, or a minimum 12 inches of clean soil or gravel.
  - Installing an ASD system within the existing building, as well as future buildings, to mitigate potential on-site VOC vapor intrusion concerns associated with possible GCS remaining beneath the building.
- Institutional Controls:
  - Implementing an SMP including an Environmental Easement, EC/IC Plan, Site Monitoring Plan, Excavation Work Plan, O&M Plan, Site use limitations, and groundwater use restrictions.

This remedy is fully protective of public health and the environment; is advantageous over other remedies when evaluated against the remedy selection criteria; and fully satisfies the RAOs for the Site. The components and details of the remaining tasks will be more fully described in an RAWP.

9.0 POST-REMEDIAL REQUIREMENTS

9.1 Final Engineering Report

Following completion of the remedial measures, a Final Engineering Report (FER) will be submitted to the NYSDEC. The FER will include the following information and documentation, consistent with the NYSDEC regulations contained in 6NYCRR Part 375-1.6(c):

- Background and Site description.
- Summary of the Site remedy that satisfied the RAOs for the Site.
- Certification by a Professional Engineer to satisfy the requirements outlined in 6NYCRR Part 375-1.6(c)(4).
- Description of engineering and institutional controls at the Site.
- Site map showing the areas remediated.
- Documentation of imported materials.
- Documentation of materials disposed off-site.
- Copies of daily inspection reports and, if applicable, problem identification and corrective measure reports.
- Air monitoring data and reports.
- Photo documentation of remedial activities.
- Text describing the remedial activities performed; a description of any deviations from the Work Plan and associated corrective measures taken; and other pertinent information necessary to document that the site activities were carried out in accordance with this Work Plan.
- Analytical data packages and DUSRs.

9.2 Site Management Plan

The Site Management Plan (SMP) covering the 2424 Hamburg Turnpike Site will be prepared and submitted concurrent with the FER. The purpose of the SMP is to assure that proper procedures are in place to provide for long-term protection of public health and the environment after remedial construction is complete. The SMP is comprised of four main components:

- Engineering and Institutional Control Plan
- Site Monitoring Plan
- Operation and Maintenance Plan
- Inspections, Reporting, and Certifications

9.2.1 Engineering and Institutional Control Plan

An institutional control in the form of an Environmental Easement will be necessary to limit future use of the Site to restricted (commercial or industrial) applications and prevent groundwater use for potable purposes or as industrial process water without prior approval from NYSDOH or an authorized county health department.

The Engineering and Institutional Control (EC/IC) Plan will include a complete description of all institutional and/or engineering controls employed at the Site, including the mechanisms that will be used to continually implement, maintain, monitor, and enforce such controls. The EC/IC Plan will include:

- A description of all EC/ICs on the Site.
- The basic implementation and intended role of each EC/IC.
- A description of the key components of the ICs set forth in the Environmental Easement.
- A description of the features to be evaluated during each required inspection and periodic review, including the EC/IC certification, reporting, and Site monitoring.
- A description of plans and procedures to be followed for construction of a soil cover system as required.
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the Site remedy, as determined by the NYSDEC.

9.2.2 Site Monitoring Plan

The Site Monitoring Plan will describe the measures for evaluating the performance and effectiveness of the remedy to reduce or mitigate contamination at the Site, including:

- Sampling and analysis of all appropriate media (e.g., groundwater).
- Assessing compliance with applicable NYSDEC SCGs, particularly ambient groundwater standards and Part 375 SCOs for soil.

- Assessing achievement of the remedial performance criteria.
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

To address these issues adequately, this Site Monitoring Plan will provide information on:

- Sampling locations, protocol, and frequency.
- Information on all designed monitoring systems (e.g., well logs).
- Analytical sampling program requirements.
- Reporting requirements.
- QA/QC requirements.
- Inspection and maintenance requirements for monitoring wells.
- Monitoring well decommissioning procedures.
- Annual inspection and periodic certification.

Semi-annual groundwater monitoring to assess overall reduction in contamination on-site will be conducted for the first two years. The frequency thereafter will be discussed with the NYSDEC. Trends in contaminant levels in groundwater in the affected areas will be evaluated to determine if the remedy continues to be effective in achieving remedial goals.

9.2.3 Operation and Maintenance Plan

An Operation & Maintenance (O&M) Plan governing maintenance of the ASD system and cover system will:

- Include the O&M activities necessary to allow individuals unfamiliar with the Site to maintain the ASD system and soil cover system.
- Include an O&M contingency plan.
- Evaluate Site information periodically to confirm that the remedy continues to be effective for the protection of public health and the environment. If necessary, the O&M Plan will be updated to reflect changes in Site conditions or the manner in which the ASD system and cover system is maintained.

9.2.4 Inspections, Reporting, and Certifications

Site-wide inspection will be conducted annually or as otherwise approved by the NYSDEC. All applicable inspection forms and other records, including all media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format in a Periodic Review Report (PRR).

The PRR will be submitted to the NYSDEC annually (or as otherwise approved) beginning 18 months after the Certificate of Completion or equivalent document is issued. The PRR will be prepared in accordance with NYSDEC DER-10 and submitted within 45 days of the end of each certification period. The PRR will include:

- Identification, assessment, and certification of all EC/ICs required by the remedy for the Site.
- Results of the required annual Site inspections and severe condition inspections, if applicable.
- All applicable inspection forms and other records generated for the Site during the reporting period in electronic format.
- A summary of any discharge monitoring data and/or information generated during the reporting period with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (e.g., groundwater), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format.
- A Site evaluation that includes the following:
  - The compliance of the remedy with the requirements of the site-specific RAWP, Record of Decision (ROD), or Decision Document.
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications.
  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Site Monitoring Plan for the media being monitored.

- Recommendations regarding any necessary changes to the remedy and/or Site Monitoring Plan.
- The overall performance and effectiveness of the remedy.

The signed EC/IC Certification will be included in the PRR. For each institutional or engineering control identified for the Site, a Professional Engineer licensed to practice in New York State will certify that all of the following statements are true:

- The inspection of the Site to confirm the effectiveness of the EC/ICs required by the remedial program was performed under my direction.
- The EC/ICs employed at this Site are unchanged from the date the control was put in place, or last approved by the NYSDEC.
- Nothing has occurred that would impair the ability of the control to protect the public health and environment.
- Nothing has occurred that would constitute a violation or failure to comply with any Site Management Plan for this control.
- Access to the Site will continue to be provided to the NYSDEC to evaluate the remedy, including access to evaluate the continued maintenance of this control.
- If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document.
- Use of the Site is compliant with the Environmental Easement.
- The EC systems are effective and performing as designed.
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices.
- The information presented in this report is accurate and complete.

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Plan will be submitted to the NYSDEC for approval. This Plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Plan until it is approved by the NYSDEC.

10.0 REFERENCES

1. Benchmark Environmental Engineering & Science, PLLC. *Remedial Investigation/ Alternatives Analysis (RI/AA) Work Plan, 2424 Hamburg Turnpike Site, Lackawanna, New York, BCP Site No. C915296*, revised April 2016.

2. TurnKey Environmental Restoration, LLC in association with Benchmark Environmental Engineering & Science, PLLC. *Work Plan for Interim Remedial Measures, 2424 Hamburg Turnpike Site, BCP Site No. C915296, Lackawanna, New Work*. January 2017.

3. AMEC Environment and Infrastructure, Inc. (AMEC). *Geophysical Survey Results, 2424 Hamburg Turnpike, Lackawanna, NY*. August 10, 2013.

4. TurnKey Environmental Restoration, LLC. *Phase II Environmental Investigation Report, 2424 Hamburg Turnpike Site, Lackawanna, New York*. January 2014.

5. New York State Department of Environmental Conservation. *CP-51/Soil Cleanup Guidance*. October 21, 2010.

6. New York State Department of Environmental Conservation. *DER-10; Technical Guidance for Site Investigation and Remediation*. May 3, 2010.

TABLES

TABLE 1

SAMPLING AND ANALYSIS SUMMARY

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

Sample Identifier	Data Source	Depth Sampled/ Screened (fbgs)	Analysis							Date Sampled	Comments
			TCL VOCs	TCL SVOCs	PCBs	TAL Metals	Cyanide	Pesticides	Herbicides		
Surface Soil/Fill											
SS-1	Remedial Investigation	0-2"	--	X	X	X	X	X	X	6/6/2016	
SS-2	Remedial Investigation	0-2"	--	X	X	X	X	X	X	6/6/2016	
Subsurface Soil/Fill (Test Pits)											
TP-1	Remedial Investigation	4.5-7	X	X	--	--	--	--	--	6/3/2016	
TP-1	Remedial Investigation	7-9	X	X	--	--	--	--	--	6/3/2016	
TP-2	Remedial Investigation	4-6	X	X	X	X	X	X	X	6/3/2016	MS/MSD
TP-2	Remedial Investigation	10-12	X	X	--	--	--	--	--	6/3/2016	
TP-3	Remedial Investigation	4-10	X	X	X	X	X	X	X	6/6/2016	
TP-3	Remedial Investigation	13-16	X	X	--	--	--	--	--	6/6/2016	
TP-4	Remedial Investigation	1-3	X	X	X	X	X	X	X	6/6/2016	
TP-4	Remedial Investigation	7-9	X	X	--	--	--	--	--	6/6/2016	
TP-5	Remedial Investigation	1-3	--	X	--	X	X	--	--	6/6/2016	
TP-5	Remedial Investigation	7-9	X	X	--	--	--	--	--	6/6/2016	
TP-6	Remedial Investigation	4-6	--	X	--	X	X	--	--	6/3/2016	
TP-6	Remedial Investigation	14-16	--	X	--	X	X	--	--	6/3/2016	
Blind Duplicate	Remedial Investigation	--	X	X	X	X	X	X	X	6/6/2016	
Subsurface Soil/Fill (Borings)											
SB-11	Remedial Investigation	9-11	X	X	X	X	X	--	--	6/2/2016	
SB-11	Remedial Investigation	14-16	X	X	--	--	--	--	--	6/2/2016	
SB-12	Remedial Investigation	9-11	X	X	X	X	X	--	--	6/2/2016	
SB-13	Remedial Investigation	2-4	X	X	--	--	--	--	--	6/2/2016	
SB-13	Remedial Investigation	7-9	X	X	--	--	--	--	--	6/2/2016	
SB-14	Remedial Investigation	4-6	X	X	--	--	--	--	--	6/2/2016	
SB-14	Remedial Investigation	14-16	X	X	--	--	--	--	--	6/2/2016	
Subsurface Soil/Fill (MW/Borings)											
MW-1	Remedial Investigation	4-6	X	X	--	--	--	--	--	6/2/2016	
MW-1	Remedial Investigation	16-18	X	X	--	--	--	--	--	6/2/2016	
MW-2	Remedial Investigation	2-4	X	X	--	--	--	--	--	6/2/2016	
MW-2	Remedial Investigation	16-18	X	X	--	--	--	--	--	6/2/2016	
MW-3	Remedial Investigation	4-6	X	X	--	--	--	--	--	6/1/2016	
MW-4	Remedial Investigation	10-12	X	X	--	--	--	--	--	6/1/2016	
MW-5	Remedial Investigation	4-6	X	X	--	--	--	--	--	6/1/2016	
Groundwater (Monitoring Wells)											
MW-1	Remedial Investigation	--	X	X	X	X	--	X	X	7/27/2016	
MW-2	Remedial Investigation	--	X	X	X	X	--	X	X	7/27/2016	
MW-3	Remedial Investigation	--	X	X	X	X	--	X	X	7/27/2016	MS/MSD
MW-4	Remedial Investigation	--	X	X	X	X	--	X	X	7/27/2016	
MW-5	Remedial Investigation	--	X	X	X	X	--	X	X	7/27/2016	
Equipment Blank	Remedial Investigation	--	X	X	X	X	--	X	X	7/27/2016	
Trip Blank	Remedial Investigation	--	X	--	--	--	--	--	--	7/27/2016	
Blind Duplicate	Remedial Investigation	--	X	X	X	X	--	X	X	7/27/2016	

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 2

MONITORING WELL CONSTRUCTION DETAILS

2424 HAMBURG TURNPIKE SITE
BUFFALO, NEW YORK

Well Identification		Well Elevations				Well Screen Data			
Well Number	Date Completed	TOR Elevation (fmsl)	Ground Elevation (fmsl)	Total Depth (fbTOR)	Bottom of Well Elevation (fmsl)	Well Diameter (inches)	Length of Well Screen (feet)	Screen Interval (fmsl)	Screen Interval (fbTOR)
MW-1	06/02/2016	578.75	579.03	18.00	560.75	2	10	571.25 to 561.25	7.50 to 17.50
MW-2	06/02/2016	577.96	578.21	18.00	559.96	2	10	570.96 to 560.96	7.00 to 17.00
MW-3	06/01/2016	577.58	577.78	16.00	561.58	2	10	571.58 to 561.58	6.00 to 16.00
MW-4	06/01/2016	577.18	577.51	16.00	561.18	2	10	571.18 to 561.18	6.00 to 16.00
MW-5	06/01/2016	575.71	576.28	20.00	555.71	2	10	565.71 to 555.71	10.00 to 20.00

Abbreviations:

fmsl = feet above mean sea level

TOR = top of riser

fbTOR = feet below top of riser

TABLE 3

SUMMARY OF GROUNDWATER ELEVATIONS

2424 HAMBURG TURNPIKE SITE
BUFFALO, NEW YORK

Location	Date	Grade	TOR Elevation [1] (fmsl)	DTP (if present) (fbTOR)	DTW (fbTOR)	Product Thickness (feet)	Groundwater Elevation [2] (fmsl)
MW-1	7/27/2016	579.03	578.75	NP	5.65	NP	573.10
MW-2	7/27/2016	578.21	577.96	NP	4.87	NP	573.09
MW-3	7/27/2016	577.78	577.58	NP	4.35	NP	573.23
MW-4	7/27/2016	577.51	577.18	NP	4.00	NP	573.18
MW-5	7/27/2016	576.28	575.71	NP	1.78	NP	573.93

Notes:

1. Wells surveyed on July 11, 2016.
2. All elevations are feet above mean sea level (fmsl).

fbTOR = Feet below top of riser
DTP = Depth to product
DTW = Depth to water

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 4

SUMMARY OF HISTORIC SOIL ANALYTICAL RESULTS

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PARAMETER[1]	Unrestricted SCOs[2]	Commercial Use SCOs[2]	Phase II Environmental Investigation Sample Location					
			SB-4 (6-8')	SB-5 (6-8')	SB-6 (2-4')	SB-7 (2-4')	SB-8 (6-8')	SB-9 (6-8')
			01/14/2014					
Photoionization Detector (PID) - ppm								
Interval or Maximum	--	--	697 max	850 max	1098 max	67 max	362 max	900 max
Volatile Organic Compounds (VOCs) - mg/Kg [3]								
1,2,4-Trimethylbenzene	**3.6**	**190**	**180**	**74**	**14**	3.1	**110**	**49**
1,3,5-Trimethylbenzene	**8.4**	**190**	**21**	**21**	3.3	0.96	**35**	**10**
Benzene	**0.06**	**44**	**1 J**	**0.8**	**1.5**	**0.083**	**11**	**1.6**
Ethylbenzene	**1**	**390**	**14**	**14**	**5.7**	0.25	**39**	**8**
Isopropylbenzene (Cumene)	--	--	**9.9**	2.1	0.46	0.046 J	**3.2**	1.6
Methylcyclohexane	--	--	43	16	1.8	0.39	49	12
n-Butylbenzene	**12**	**500**	**26**	4.4	0.6	0.23	5.2	3.2
n-Propylbenzene	**3.9**	**500**	**48**	**11**	2.5	0.23	**18**	**8.2**
p-Isopropyltoluene	--	--	4.6	0.9	0.14	0.056 J	0.81	0.62
sec-Butylbenzene	**11**	**500**	8.2	1.3	0.22	0.06	1.5	0.98
Toluene	**0.7**	**500**	**2.3 J**	**8.3**	**16**	0.26	**2.2**	**1**
Total Xylenes	**0.26**	**500**	**12.6 J**	**79**	**29.3**	**1.88**	**16.36**	**16.87**
Semi-Volatile Organic Compounds (SVOCs) - mg/Kg [3]								
Acenaphthene	**20**	**500**	0.49	3.3	ND	ND	ND	0.083 J
Acenaphthylene	**100**	**500**	0.34	21	ND	0.1 J	ND	0.2
Anthracene	**100**	**500**	0.86	39	0.76 J	0.075 J	0.074 J	0.36
Benzo(a)anthracene	**1**	**5.6**	**1.1**	**71**	**1.6 J**	0.19	0.11 J	0.47
Benzo(a)pyrene	**1**	**1**	0.76	**63**	**1.6 J**	0.19	0.071 J	0.39
Benzo(b)fluoranthene	**1**	**5.6**	**1.2**	**79**	**2.3 J**	0.26	0.12 J	0.48
Benzo(ghi)perylene	**100**	**500**	0.47	38	1.6 J	0.13 J	0.06 J	0.25
Benzo(k)fluoranthene	**0.8**	**56**	0.38	**33**	**1 J**	0.096 J	0.051 J	0.21
Chrysene	**1**	**56**	**1.2**	**71**	**1.6 J**	0.18	0.16	0.46
Dibenzo(a,h)anthracene	**0.33**	**0.56**	0.12 J	**10**	ND	ND	ND	0.051 J
Fluoranthene	**100**	**500**	3.2	**140**	3.4	0.27	0.3	1
Fluorene	**30**	**500**	1.3	24	1.4 J	0.056 J	0.13 J	0.35
Indeno(1,2,3-cd)pyrene	**0.5**	**5.6**	**0.54**	**41**	**1.8 J**	0.14 J	0.06 J	0.25
Naphthalene	**12**	**500**	8	**50**	**48**	0.6	10	3.3
Phenanthrene	**100**	**500**	3.8	**130**	3.2	0.18	0.42	1.3
Pyrene	**100**	**500**	2.3	**110**	2.7	0.22	0.23	0.76

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) (December 2006).
3. 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. Or parameter not analysed for.

J = Estimated value; result is less than the sample quantitation limit but greater than zero.

Bold	= Result exceeds Unrestricted SCO's.
Bold	= Result exceeds Restricted Residential SCO's.

TABLE 5

SUMMARY OF HISTORIC GROUNDWATER ANALYTICAL RESULTS

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PARAMETER[1]	NYS GWQS [2]	PHASE II SAMPLE LOCATION	
		TMW-2	TMW-3
		01/14/2014	
Volatile Organic Compounds (VOCs) - ug/L			
1,2,4-Trimethylbenzene	**5**	**2000**	**85**
1,2-Dichloroethane (EDC)	**0.6**	ND	0.34 J
1,3,5-Trimethylbenzene	**5**	**490**	**22**
Acetone	**50**	**140 J**	15
Benzene	**1**	**520**	**6.3**
Carbon disulfide	**--**	ND	1.1 J
Cyclohexane	**--**	180 J	5.4 J
Ethylbenzene	**5**	**1500**	**8.6**
Isopropylbenzene (Cumene)	**5**	**56 J**	1.8 J
Methylcyclohexane	**--**	97 J	8.8 J
Naphthalene	**10**	**340**	9.2
n-Butylbenzene	**5**	ND	2 J
n-Propylbenzene	**5**	**210**	**6.7**
sec-Butylbenzene	**5**	ND	0.79 J
Toluene	**5**	**3000**	**12**
Total Xylenes	**5**	**7800**	**70**
Total VOCs	**--**	16333	255

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 TOGS 1.1.1 Class GA Groundwater Quality Standards.

Definitions:

ND = Parameter not detected above laboratory detection limit.

"--" = No value available for the parameter. Or parameter not analysed for.

J = Estimated value; result is less than the sample quantitation limit but greater than zero.

Bold = Exceeds NYS GWQS

TABLE 6

SUMMARY OF REMEDIAL INVESTIGATION SURFACE SOIL/FILL ANALYTICAL RESULTS

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PARAMETER [1]	Unrestricted Use SCOs [2]	Commercial Use SCOs [2]	Sample Location	
			RI SS-1 (0-2")	RI SS-2 (0-2")
			06/06/2016	
Semi-Volatile Organic Compounds (SVOCs) - mg/Kg [3]				
Acenaphthylene	**100**	**500**	0.77 J	ND
Anthracene	**100**	**500**	1.2 J	ND
Benzo(a)anthracene	**1**	**5.6**	**3.9 J**	**1.1 J**
Benzo(a)pyrene	**1**	**1**	**3.2 J**	0.92 J
Benzo(b)fluoranthene	**1**	**5.6**	**4.4**	**1.1 J**
Benzo(ghi)perylene	**100**	**500**	2.5 J	0.73 J
Benzo(k)fluoranthene	**0.8**	**56**	**1.9 J**	0.65 J
Chrysene	**1**	**56**	**4.1**	**1.1 J**
Fluoranthene	**100**	**500**	8.1	2.1
Indeno(1,2,3-cd)pyrene	**0.5**	**5.6**	**2.4 J**	**0.63 J**
Phenanthrene	**100**	**500**	3.9	0.99 J
Pyrene	**100**	**500**	5.8	1.6 J
Metals - mg/Kg				
Aluminum	**--**	**--**	14400	8630 F1
Arsenic	**13**	**16**	9.8	5
Barium	**350**	**400**	121	61.8 F1
Beryllium	**7.2**	**590**	1.2	0.56
Cadmium	**2.5**	**9.3**	1.4	1
Calcium	**--**	**--**	44800	69000
Chromium	**30**	**1500**	**211**	26.4
Cobalt	**--**	**--**	6.1	4.7
Copper	**50**	**270**	**53.1**	31.5
Iron	**--**	**--**	41700	17700
Lead	**63**	**1000**	**122**	**125 F2 F1**
Magnesium	**--**	**--**	10500	31700 F2
Manganese	**1600**	**10000**	**2920**	662 F2
Mercury	**0.18**	**2.8**	0.12	0.11
Nickel	**30**	**310**	27.4	18
Potassium	**--**	**--**	2630	1910 F1
Sodium	**--**	**--**	247	198
Vanadium	**--**	**--**	39.2	21.3 F1
Zinc	**109**	**10000**	**297**	**243**

Notes:

1. Only those parameters detected at a minimum of one sample location are presented in this table; all other compounds
2. Values per 6NYCRR 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

Definitions:

ND = Parameter not detected above laboratory detection limit.
"--" = No value available for the parameter. Or parameter not analysed for.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
F1 = MS and/or MSD Recovery is outside acceptance limits.
F2 = MS/MSD RPD exceeds control limits.

Bold = Result exceeds Unrestricted Use SCOs.
Bold = Result exceeds Commercial Use SCOs.

TABLE 7

SUMMARY OF REMEDIAL INVESTIGATION SUBSURFACE SOIL/FILL ANALYTICAL RESULTS

2424 HAMBURG TURNPIKE SITE

BUFFALO, NEW YORK

PARAMETER [1]	Unrestricted Use SCOs [2]	Commercial Use SCOs [2]	REMEDIAL INVESTIGATION SAMPLE LOCATION (DEPTH)																										
			RI MW-1 (4-6)	RI MW-1 (16-18)	RI MW-2 (2-4)	RI MW-2 (16-18)	RI MW-3 (4-6)	RI MW-4 (10-12)	RI MW-5 (4-6)	RI TP-1 (4.5-7)	RI TP-1 (7-9)	RI TP-2 (4-6)	RI TP-2 (10-12)	RI TP-3 (4-10)	RI TP-3 (13-16)	RI TP-4 (1-3)	RI TP-4 (7-9)	RI TP-5 (1-3)	RI TP-5 (7-9)	RI TP-6 (4-6)	RI TP-6 (14-16)	RI SB-11 (9-11)	RI SB-11 (14-16)	RI SB-12 (9-11)	RI SB-13 (2-4)	RI SB-13 (7-9)	RI SB-14 (4-6)	RI SB-14 (14-16)
			6/2/2016				06/01/2016							06/06/2016						06/03/2016		06/02/2016							
Photoionization Detector (PID) - ppm																													
Interval or Maximum	--	--	0	0.0	84 max	0.0	712 max	0.0	0.0	0.0	0.0	--	--	--	--	0.0 to 21.5	141 max	1235 max	1235 max	0.0	0.0	1116 max	2.6 to 127	1085 max	0.0	0.0	0.0	0.0
Volatile Organic Compounds (VOCs) - mg/Kg [3]																													
2-Butanone (MEK)	**0.12**	**500**	ND	ND	0.0099 J-	ND	ND	0.052 J	ND	ND	0.1	ND	ND	ND	ND	ND	**0.23**	--	ND	--	--	ND	ND	ND	ND	0.023 J	ND	ND
Acetone	**0.05**	**500**	0.013 J	0.0095 J	**0.077 UJ**	0.0055 J	ND	**0.25 U**	0.02 U	0.0083 J	**0.47**	0.0096 J F1	**0.015 J**	ND	**0.056**	ND	**0.71 B**	--	ND	--	--	ND	0.0063 J	ND	ND	**0.12**	0.021 J	0.0096 J
Benzene	**0.06**	**44**	ND	ND	0.0026 J-	ND	**0.23 J**	0.0018 J	0.0015	ND	ND	ND	ND	ND	ND	ND	ND	--	ND	--	--	**7.1**	0.00027 J	**1.7**	ND	ND	ND	ND
Chloroform	**0.37**	**350**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00047 J	ND	ND	--	ND	--	--	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	**--**	**--**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0022 J	ND	0.049	--	ND	--	--	3.1	0.0055	51	ND	ND	ND	ND
Ethylbenzene	**1**	**390**	ND	ND	0.0011 J-	ND	**12**	ND	ND	ND	ND	ND	ND	0.0055 J	0.00055 J	0.057 J	0.0064 J*	--	ND	--	--	**3.3**	0.0023 J	13	ND	ND	ND	ND
Isopropylbenzene (Cumene)	**--**	**--**	ND	ND	0.0019 J-	ND	1.8	ND	ND	ND	ND	ND	ND	0.016 J	ND	0.013	0.0065 J	--	ND	--	--	0.14 J	ND	6.5	ND	ND	ND	ND
Methyl tert butyl ether (MTBE)	**0.93**	**500**	ND	ND	ND	ND	ND	ND	ND	ND	0.0014 J	ND	ND	ND	0.0015 J	ND	0.0026 J	--	ND	--	--	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	**--**	**--**	ND	ND	0.037 J-	ND	7.9 *	ND	0.0036 J	ND	ND	ND	ND	0.027 J	0.00096 J	0.042 J	0.0058 J	--	ND	--	--	1.8	0.005 J	58	ND	ND	ND	ND
Methylene chloride	**0.05**	**500**	ND	0.0042 U	0.033 UJ	ND	ND	0.012 J	ND	ND	0.017 U	0.0039 U	0.0045 U	ND	0.0057 J	ND	0.0081 J	--	ND	--	--	ND	0.0049 U	ND	ND	0.0087 U	0.0031 U	0.006 U
Toluene	**0.7**	**500**	ND	ND	0.00091 J-	ND	**9.1**	ND	0.0014 J	ND	ND	ND	ND	ND	0.0008 J	ND	0.0038 J	--	ND	--	--	**1**	ND	**3.5**	ND	ND	ND	ND
Total Xylenes	**0.26**	**500**	ND	ND	0.0032 J-	ND	**66**	ND	ND	ND	ND	ND	ND	ND	0.0011 J	0.061 J	0.029	--	0.0087 R	--	--	**8.6**	0.0032 J	**63**	ND	ND	ND	ND
Semi-Volatile Organic Compounds (SVOCs) - mg/Kg [3]																													
2-Methylnaphthalene	**--**	**--**	ND	ND	ND	ND	8.9	0.067 J	2.9	ND	ND	ND	ND	0.79 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND	ND	ND	ND
Acenaphthene	**20**	**500**	ND	ND	ND	ND	0.14 J	ND	0.51 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	**100**	**500**	ND	ND	0.77 J	ND	0.16 J	ND	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23 J	0.35 J	ND
Anthracene	**100**	**500**	ND	ND	ND	ND	0.3 J	0.11 J	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.31 J	ND
Benzo(a)anthracene	**1**	**5.6**	0.23 J	ND	**1.7 J**	ND	1	0.16 J	**3.8**	0.99 J	**1.3 J**	0.25 J	0.035 J	ND	ND	0.83 J	ND	ND	ND	0.38 J	ND	0.46 J	ND	0.054 J	0.51 J	0.37 J	**1.5**	ND
Benzo(a)pyrene	**1**	**1**	0.25 J	ND	**1.9 J**	ND	0.98	0.13 J	**3.4**	0.91 J	1 J	ND	0.03 J	ND	ND	0.67 J	ND	ND	ND	0.41 J	ND	0.4 J	ND	ND	0.47 J	0.26 J	**1.5**	ND
Benzo(b)fluoranthene	**1**	**5.6**	0.3 J	ND	**2.5 J**	ND	**1.3**	0.12 J	**4.5**	**1.1 J**	1 J	0.28 J	0.055 J	ND	ND	0.82 J	ND	ND	ND	0.54 J	ND	0.81 J	ND	ND	0.61 J	0.37 J	**1.7**	ND
Benzo(ghi)perylene	**100**	**500**	0.2 J	ND	1.6 J	ND	0.64 J	0.081 J	2.4	0.74 J	0.8 J	0.14 J	ND	ND	ND	0.76 J	ND	ND	ND	0.39 J	ND	ND	ND	ND	0.33 J	0.18 J	1.2	ND
Benzo(k)fluoranthene	**0.8**	**56**	0.17 J	ND	**1.2 J**	ND	0.5 J	0.12 J	**2.1**	0.76 J	**0.96 J**	ND	ND	ND	ND	0.52 J	ND	ND	ND	0.27 J	ND	ND	ND	ND	0.25 J	ND	**1.2**	ND
Biphenyl	**--**	**--**	ND	ND	ND	ND	ND	ND	0.54 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	**--**	**--**	ND	ND	ND	ND	0.18 J	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	**1**	**56**	ND	ND	**1.8 J**	ND	1	0.14 J	**3.7**	1 J	**1.3 J**	0.26 J	ND	ND	ND	ND	ND	ND	ND	0.44 J	ND	ND	ND	ND	0.47 J	ND	**1.5**	ND
Dibenzofuran	**7**	**350**	ND	ND	ND	ND	0.23 J	0.05 J	2.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-octyl phthalate	**--**	**--**	ND	0.062 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	**100**	**500**	0.3 J	ND	2.7 J	ND	1.9	0.42	9.9	1.7 J	2.2 J	0.44 J F2	0.061 J	0.37 J	ND	0.63 J	ND	ND	ND	0.55 J	ND	0.84 J	ND	0.1 J	0.78 J	0.81 J	2.5	ND
Fluorene	**30**	**500**	ND	ND	ND	ND	0.37 J	0.099 J	3.9	ND	ND	ND	ND	0.41 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	**0.5**	**5.6**	0.17 J	ND	**1.4 J**	ND	**0.61 J**	0.068 J	**2.1**	**0.65 J**	**0.67 J**	ND	ND	ND	ND	**0.53 J**	ND	ND	ND	0.3 J	ND	ND	ND	ND	0.3 J	ND	**1.1**	ND
Naphthalene	**12**	**500**	ND	ND	ND	ND	6	0.088 J	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.88	ND	ND	ND	ND
Phenanthrene	**100**	**500**	ND	ND	1.1 J	ND	1.4	0.45	12	0.81 J	2 J	0.24 J	0.038 J	1.2 J	ND	ND	ND	ND	ND	ND	ND	0.52 J	ND	0.077 J	0.3 J	0.74 J	1.1	ND
Pyrene	**100**	**500**	0.27 J	ND	2.4 J	ND	1.4	0.3 J	7.1	1.5 J	1.9 J	0.39 J	0.056 J	0.34 J	ND	0.58 J	ND	ND	ND	0.54 J	ND	0.83 J	ND	0.081 J	0.6 J	0.58 J	2.2	ND
Metals - mg/Kg																													
Aluminum	**--**	**--**	--	--	--	--	--	--	--	--	--	12900 J-	--	5410	--	11300	--	25000	--	9660 B	8050 B	226000	--	13600	--	--	--	--
Arsenic	**13**	**16**	--	--	--	--	--	--	--	--	--	5.3	--	2.8	--	11.3	--	5.1	--	**17.6**	3.6	**16.4**	--	ND	--	--	--	--
Barium	**350**	**400**	--	--	--	--	--	--	--	--	--	102 J	--	39.4	--	115	--	213	--	88.8	36.8	182	--	178	--	--	--	--
Beryllium	**7.2**	**590**	--	--	--	--	--	--	--	--	--	0.63	--	0.5	--	1.4	--	4.5	--	1.5	0.36	1.2	--	0.74	--	--	--	--
Cadmium	**2.5**	**9.3**	--	--	--	--	--	--	--	--	--	0.55	--	0.31	--	**3**	--	1.3	--	ND	ND	1.6	--	1	--	--	--	--
Calcium	**--**	**--**	--	--	--	--	--	--	--	--	--	53800 J-	--	210000	--	58000	--	150000	--	60200 B	29500	7150	--	34600	--	--	--	--
Chromium	**30**	**1500**	--	--	--	--	--	--	--	--	--	23.6 J-	--	10.3	--	**65.1**	--	**49.1**	--	**184 B**	11.5	**36.6**	--	22.9	--	--	--	--
Cobalt	**--**	**--**	--	--	--	--	--	--	--	--	--	7.4	--	2.3	--	4	--	2.3	--	7.7	5.5	11.5	--	3.4	--	--	--	--
Copper	**50**	**270**	--	--	--	--	--	--	--	--	--	32.5	--	16.7	--	**49.4**	--	19.2	--	**179**	16.9	**62.4**	--	35	--	--	--	--
Iron	**--**	**--**	--	--	--	--	--	--	--	--	--	17400 J-	--	9730	--	47000	--	15200	--	185000 B^	12600	371000	--	203000	--	--	--	--
Lead	**63**	**1000**	--	--	--	--	--	--	--	--	--	**167 J**	--	45.8	--	**268**	--	**64.5**	--	**77.6**	7.6	**89.9**	--	31.7	--	--	--	--
Magnesium	**--**	**--**	--	--	--	--	--	--	--	--	--	18400	--	11500	--	5240	--	20200	--	9860	10700	4590	--	3070	--	--	--	--
Manganese	**1600**	**10000**	--	--	--	--	--	--	--	--	--	407 J	--	569	--	**3230**	--	**3470**	--	**3760 B**	253	337	--	1090 B	--	--	--	--
Mercury	**0.18**	**2.8**	--	--	--	--	--	--	--	--	--	0.16	--	**0.64**	--	0.15	--	0.053	--	0.15	ND	0.17	--	0.12	--	--	--	--
Nickel	**30**	**310**	--	--	--	--	--	--	--	--	--	21.9	--	11.8	--	17.9	--	10	--	**63.6**	15.1	**46.5**	--	**31.1**	--	--	--	--
Potassium	**--**	**--**	--	--	--	--	--	--	--	--	--	3440 J	--	1380	--	785	--	1390 B	--	767	2020	3470	--	2300 B	--	--	--	--
Sodium	**--**	**--**	--	--	--	--	--	--	--	--	--	231	--	236	--	564	--	793	--	470	ND	272	--	ND	--	--	--	--
Vanadium	**--**	**--**	--	--	--	--	--	--	--	--	--	28.7	--	14.5	--	30.6	--	20.6	--	38.7	17.1	45.2	--	28.4	--	--	--	--
Zinc	**109**	**10000**	--	--	--	--	--	--	--	--	--	**194 J**	--	**231**	--	**578**	--	**141**	--	**165**	37.3	**281**	--	66.3	--	--	--	--
Cyanide - Total	**27**	**27**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	ND	--	ND	2.9	ND	--	ND	--	--	--	--
Polychlorinated biphenyls- mg/Kg [3]																													
Total PCBs	**0.1**	**1**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	ND	--	ND	--	--	--	--
Pesticides and Herbicides - mg/Kg [3]																													
2,4,5-T	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
2,4-D	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDD	**0.0033**	**92**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE	**0.0033**	**62**	--	--	--	--	--	--	--	--	--	**0.0084 J+**	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	**0.0033**	**47**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Alachlor	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Aldrin	**0.005**	**0.68**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
alpha-BHC	**0.02**	**0.68**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
alpha-Chlordane	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC	**0.036**	**3**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Chlordane	**0.094**	**24**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
delta-BHC	**0.04**	**500**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Dieldrin	**0.005**	**1.4**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan I	**2.4**	**200**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan II	**2.4**	**200**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Endosulfan sulfate	**2.4**	**200**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Endrin	**0.014**	**89**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Endrin aldehyde	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Endrine ketone	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
gamma-Chlordane	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor	**--**	**--**	--	--	--	--	--	--	--	--	--	ND	--	ND	--	ND	--	--	--	--	--	--	--	--	--	--	--	--

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 6NYCRR 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

Definitions:

B = Compound was found in the blank and sample.
F1 = MS and/or MSD Recovery is outside acceptance limits.
F2 = MS/MSD RPD exceeds control limits.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
J- = The analyte was positively identified; the associated numerical value is an estimated quantity that may be biased low.
J+ = The analyte was positively identified; the associated numerical value is an estimated quantity that may be biased high.
ND = Parameter not detected above laboratory detection limit.
R = Rejected by third party data validator.
U = The analyte was analyzed for, but was not detected above the level of the associated reported quantitation limit.
UJ = The analyte was analyzed for, but was not detected. The associated reported quantitation limit is approximate and may be inaccurate or imprecise.
"--" = No value available for the parameter. Or parameter not analysed for.
* = ISTD response or retention time outside acceptable limits.
^ = ICV, CCV, ICB, CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.

Bold = Result exceeds Unrestricted Use SCOs.
Bold = Result exceeds Commercial Use SCOs.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 8

SUMMARY OF RI GROUNDWATER ANALYTICAL RESULTS

2424 HAMBURG TURNPIKE SITE
BUFFALO, NEW YORK

Parameter [1]	NYSDEC Class GA GWQS[2]	Sample Location and Date				
		MW-1	MW-2	MW-3	MW-4	MW-5
		7/27/2016	7/27/2016	7/27/2016	7/27/2016	7/27/2016
Volatile Organic Compounds (VOCs) - ug/L						
Acetone	**50**	ND	12	4.4 J	9.1 J	5.4 J
Benzene	**1**	ND	**8.9**	**8.8**	0.77	ND
Carbon disulfide	**--**	ND	0.4 J	ND	ND	0.55 J
Ethylbenzene	**5**	ND	**6.3**	3.5	ND	ND
Methyl tert butyl ether (MTBE)	**10**	ND	5.1	0.5 J	0.49 J	ND
Methylcyclohexane	**--**	ND	ND	0.97 J	ND	ND
Toluene	**5**	ND	**8.6**	5	ND	ND
Total Xylenes	**5**	ND	**40**	**9.5**	ND	ND
Semi-Volatile Organic Compounds (SVOCs) - ug/L						
2,4-Dimethylphenol	**50**	1.7 J	1 J	0.97 J	ND	ND
2-Methylnaphthalene	**--**	ND	ND	9.4	5.4	ND
2-Methylphenol	**--**	1.6 J	ND	ND	ND	ND
3-Methylphenol/4-Methylphenol	**--**	1.7 J	ND	ND	ND	ND
Acenaphthene	**20**	ND	ND	0.78 J	1.9 J	ND
Acenaphthylene	**--**	ND	ND	0.45 J	1.9 J	ND
Acetophenone	**--**	ND	0.84 J	ND	ND	ND
Anthracene	**50**	ND	ND	ND	1.3 J	ND
Benzaldehyde	**--**	ND	ND	8.7 F1	ND	ND
Biphenyl	**5**	ND	ND	ND	0.81	ND
Carbazole	**--**	ND	ND	2.6 J	5.6	ND
Dibenzofuran	**--**	ND	ND	1.4 J	3.3 J	ND
Fluoranthene	**50**	ND	ND	ND	1.9 J	ND
Fluorene	**50**	ND	ND	2.4 J	7.7	ND
Naphthalene	**10**	ND	ND	**24**	9.1	ND
Phenanthrene	**50**	ND	ND	1.2 J	10	ND
Phenol	**1**	1 J	ND	ND	**2.1 J**	ND
Pyrene	**50**	ND	ND	ND	1.1 J	ND
Total Metals - ug/L [3]						
Aluminum	**--**	490	5000	280	ND	3100
Arsenic	**25**	ND	**63**	16	ND	**48**
Barium	**1,000**	220	660	270	65	350
Calcium	**--**	97500	138000	112000	74700	159000
Chromium	**50**	ND	7.6	ND	ND	5.5
Cobalt	**--**	ND	4.4	ND	ND	4.6
Copper	**200**	ND	16	ND	ND	ND
Iron	**300**	**15800**	**26500**	**16700**	**3900**	**19000**
Lead	**25**	ND	16	ND	ND	ND
Magnesium	**35,000**	28800	23100	23900	20400	31900
Manganese	**300**	ND	**870**	**2500**	**830**	**1100**
Nickel	**100**	ND	15	ND	ND	19
Potassium	**--**	33300	6900	7100	11300	4300
Sodium	**20,000**	**79800**	**90900**	**28100**	**31000**	**42800**
Vanadium	**--**	ND	10	ND	ND	6.9
Zinc	**2,000**	ND	28	ND	ND	26
Dissolved Metals - ug/L [3]						
Barium	**1,000**	--	530 J-	--	--	320 J-
Calcium	**--**	--	129000 J-	--	--	145000 J-
Iron	**300**	--	**840 J-**	--	--	**1700 J-**
Magnesium	**35,000**	--	17900 J-	--	--	29500 J-
Manganese	**300**	--	**790 J-**	--	--	**830 J-**
Nickel	**300**	--	ND	--	--	13 J-
Potassium	**--**	--	5500 J-	--	--	3100 J-
Sodium	**20,000**	--	**98300 J-**	--	--	**38200 J-**
Zinc	**2,000**	--	15 J-	--	--	15 J-
Polychlorinated biphenyls (PCBs) - ug/L						
Total PCBs	**0.09**	ND	ND	ND	ND	ND
Pesticides and Herbicides - ug/L						
4,4'-DDD	**0.3**	ND	ND	ND	ND	0.011 J
alpha-BHC	**--**	ND	ND	ND	ND	ND

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 TOGS 1.1.1 Class GA Groundwater Quality Standards (GWQS).
3. Sample results were reported by the laboratory in mg/L and converted to ug/L

Definitions:

ND = Parameter not detected above laboratory detection limit.
"--" = No GWQS available or sample not anazlyzed for compound
F1 = MS and/or MSD Recovery is outside acceptance limits.
J- = The analyte was positvely identified, the associated numerical vale is an estimated quantity that may be biased low.
J = Estimated value - Below calibration range.
BOLD = Result exceeds GWQS.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 9

SUMMARY OF IRM POST-EXCAVATION CONFIRMATORY ANALYTICAL RESULTS

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

PARAMETER [1]	Commercial Use SCOs [2]	REMEDIAL INVESTIGATION SAMPLE LOCATION (DEPTH)										
		IRM NW-1 (4-12)	IRM NW-2 (4-12)	IRM SW-1 (4-12)	IRM SW-2 (4-12)	IRM EW-1 (4-12)	IRM EW-2 (4-12)	IRM WW-1 (4-12)	IRM WW-2 (4-12)	IRM BOTTOM 1 (12-13)	IRM BOTTOM 2 (12-13)	IRM BOTTOM 3 (12-13)
		4/18/2017	4/18/2017	5/1/2017	5/1/2017	04/18/2017	04/18/2017	04/18/2017	5/1/2017	04/18/2017	04/18/2017	05/01/2017
Photoionization Detector (PID) - ppm												
Interval or Maximum	--	1400	28.6	236.1	750.1	37.2	204.1	110.7	249.2	0	0	1.3
Volatile Organic Compounds (VOCs) - mg/kg [3]												
1,2,4-Trimethylbenzene	**190**	120 F2	16	110 D	130 F2	**450**	**420**	76	58	0.06 *	0.04	0.0064 J
1,3,5-Trimethylbenzene	**190**	50 F2	16	18 D	30 F2	160	140	25	11	0.015 *	0.013	0.0027 J
4-Isopropyltoluene	**--**	2.3 F2 F1	0.26	2.2 D	2 J F1	4 J	3.8 J	1.3	ND	ND	0.00076 J	ND
Benzene	**44**	ND	1.4	2.9 D	ND	16	20	0.56 J	0.72 J	0.0011 J	0.0017 J	ND
Ethylbenzene	**390**	4.9 F2 F1	2.9	18 D	5 J F1	140	130	6	6.9	0.0098 J	0.0084 J	0.001 J
Isopropylbenzene (Cumene)	**--**	2 F1	0.6	1.7 D	1.9 J	13	13	1.6	1.6	ND	0.018	0.0068 J
Methyl tert butyl ether (MTBE)	**500**	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0015 J	ND
n-Butylbenzene	**500**	21 F2	5.7	11 D	16 F2	43	38	9.2	6	ND	ND	ND
n-Propylbenzene	**500**	6.9 F2 F1	4.3	8.9 D	8.4 F2 F1	69	66	6.6	9.9	0.0071 J *	0.0054 J	0.011
sec-Butylbenzene	**500**	ND	0.51	2.6 D	2.4 J F1	7 J	6.1 J	1.3	0.94 J	ND	ND	ND
Toluene	**500**	0.96 J	0.54	8.8 D	ND	5.2 J	4.4 J	2.4	0.63 J	0.003 J	0.0076 J	0.0026 J
m&p-Xylene	**500**	21 F2	9.7	36 D	22	**620**	**570**	40	5.9	0.03	0.042	0.0096 J
o-Xylenes	**500**	1 J	0.34	2.5 D	1.2 J	9	7.3 J	8.9	0.37 J	0.0039 J	0.01	0.0042 J
Total Xylenes	**500**	22 F2 F1	10	39 D	23 F1	**630**	**580**	49	6.3	0.034	0.052	0.014
Semi-Volatile Organic Compounds (SVOCs) - mg/kg [3]												
Acenaphthene	**500**	1.3 J	0.2 J	0.21 J	ND	ND	ND	0.5 J	0.77 J	ND	ND	ND
Acenaphthylene	**500**	ND	ND	0.38 J	0.34 J	ND	ND	0.46 J	0.5 J	ND	ND	ND
Anthracene	**500**	2.2 J F1	ND	0.44 J	0.35 J	ND	ND	1.4 J	1.2 J	ND	ND	ND
Benzo(a)anthracene	**5.6**	2.8 J F1	0.23 J	0.86 J	0.62 J	0.42 J	0.42 J	2 J	1.4 J	ND	ND	ND
Benzo(a)pyrene	**1**	**2 J**	0.27 J	0.79 J	0.51 J	ND	ND	**1.4 J**	**1.1 J**	ND	ND	ND
Benzo(b)fluoranthene	**5.6**	2.3 J	0.47 J	1.2	0.77 J	0.5 J	0.52 J	2.1	1.6 J	ND	ND	ND
Benzo(ghi)perylene	**500**	1.3 J	0.27 J	0.73 J	0.48 J	ND	ND	0.93 J	0.88 J	ND	ND	ND
Benzo(k)fluoranthene	**56**	1.6 J	ND	0.39 J	0.28 J	ND	ND	0.78 J	0.74 J	ND	ND	ND
Chrysene	**56**	2.4 J	0.34 J	0.9 J	0.57 J	ND	ND	1.7 J	1.3 J	ND	ND	ND
Fluoranthene	**500**	8.1 F1	0.44 J	1.9	1.4	1 J	1.2 J	5.2	3.7	ND	ND	ND
Fluorene	**500**	3 J F1	0.18 J	0.5 J	0.35 J	0.4 J	0.4 J	2.8	2.4	ND	ND	ND
Indeno(1,2,3-cd)pyrene	**5.6**	1.3 J	0.25 J	0.62 J	0.42 J	ND	ND	0.92 J	0.82 J	ND	ND	ND
Naphthalene	**500**	11 F2	0.7 J	8	8	18	27	8.4	7	ND	ND	ND
Phenanthrene	**500**	11	0.33 J	1.6	1.2	1.3 J	1.4 J	7.2	5	ND	ND	ND
Pyrene	**500**	6 F1	0.34 J	1.5	1	0.89 J	0.93 J	3.8	2.7	ND	ND	ND

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 6NYCRR 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

Definitions:

F1 = MS and/or MSD Recovery is outside acceptance limits.
F2 = MS/MSD RPD exceeds control limits.
J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
ND = Parameter not detected above laboratory detection limit.
ND = Based on results of DUSR
* = ISTD response or retention time outside acceptable limits.
D = Sample was diluted
Bold = Result exceeds Commercial Use SCO.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC

TABLE 10

STANDARDS, CRITERIA, AND GUIDANCE (SCGs)

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

Citation	Title	Regulatory Agency
General		
29CFR 1910.120	Hazardous Waste Operations and Emergency Response	US Dept. of Labor, OSHA
29CFR 1910.1000	OSHA General Industry Air Contaminants Standard	US Dept. of Labor, OSHA
29CFR 1926	Safety and Health Regulations for Construction	US Dept. of Labor, OSHA
Not Applicable	Analytical Services Protocol	NYSDEC
6NYCRR Part 608	Use and Protection of Waters	NYSDEC
6NYCRR Part 621	Uniform Procedures Regulations	NYSDEC
6NYCRR Parts 750-757	State Pollutant Discharge Elimination System	NYSDEC
Section 404	Clean Water Act	USACE
Soil/Fill		
6NYCRR Part 375	Environmental Remediation Programs	NYSDEC
DEC Policy CP-51	Soil Cleanup Guidance	NYSDEC
Groundwater		
6NYCRR Part 700-705	Surface Water and Ground Water Classification Standards	NYSDEC
TOGS 1.1.1	Ambient Water Quality Standards and Guidance Values	NYSDEC
TOGS 2.1.3	Primary and Principal Aquifer	NYSDEC
Air		
Air Guide No. 1	Guidelines for the Control of Toxic Ambient Air Contaminants	NYSDEC
DER-10 Appendix 1B	Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites	NYSDEC
NYSDOH, October 2006	Final - Guidance for Evaluating Soil Vapor Intrusion in the State of NY	NYSDOH
Solid Waste		
6NYCRR 360	Solid Waste Management Facilities	NYSDEC
6NYCRR 364	Waste Transporters	NYSDEC

TABLE 11

COST ESTIMATE FOR UNRESTRICTED USE (TRACK 1) ALTERNATIVE

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

Item	Quantity	Units	Unit Cost	Total Cost	Remarks
Building Demolition					
Lead/Asbestos Evaluation	1	LS	$ 10,000	$ 10,000	Allowance for Hazardous Material removal
Hazardous Material Abatement	1	LS	$ 10,000	$ 10,000	
Permit & Demolition	1	LS	$ 20,000	$ 20,000	
Loading/Trucking/Disposing C&D Material	40	TON	$ 45	$ 1,800	
Subtotal:				**$ 42,000**	
Impacted Soil/Fill Removal					
Soil/Fill Excavation and Loading	36,423	TON	$ 6	$ 218,538	1.04-acre area @15 fbgs-IRM volume
Transporation and Disposal at TSDF	36,423	TON	$ 32	$ 1,165,536	1.5 tons per CY
Post-Excavation Confirmatory Sampling	105	EA	$ 375	$ 39,375	Full suite analyses
Data Validation	105	EA	$ 105	$ 11,025	Full suite analyses
Subtotal:			.	**$ 1,435,000**	
Backfilling/Site Restoration					
Import, Backfill, Place & Compact	36,423	TON	$ 22	$ 801,306	
Backfill Characterization Sampling	64	Ea	$ 100	$ 6,356	VOCs
Data Validation	64	EA	$ 25	$ 1,589	
Backfill Characterization Sampling	30	EA	$ 500	$ 15,141	SVOCs, PCBs, Pesticides, Metals
Data Validation	30	EA	$ 80	$ 2,423	
Subtotal:				**$ 827,000**	
Groundwater & Odor Management					
Odor Control	1	LS	$ 50,000	$ 50,000	
GW Treatment System O&M	1	LS	$ 80,000	$ 80,000	
Subtotal:				**$ 130,000**	
Subtotal Capital Cost				**$ 2,434,000**	
Contractor Mobilization/Demobilization (5%)				$ 121,700	
Health and Safety (2%)				$ 48,680	
Engineering/Contingency (35%)				$ 851,900	
Total Capital Cost for Unrestricted Use (Track 1) Alternative				**$ 3,457,000**	

TABLE 12

COST ESTIMATE FOR COMMERCIAL USE (TRACK 4) ALTERNATIVE

DUAL PHASE EXTRACTION/COVER SYSTEM
2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

Item	Quantity	Units	Unit Cost	Total Cost	Remarks
DPE Installation/Operation					
Pilot Test	1	LS	$ 14,000	$ 14,000	
DPE Wells	1	LS	$ 9,000	$ 9,000	Nine DPE wells
Force Main	1	LS	$ 27,000	$ 27,000	
DPE Trailer	1	LS	$ 106,000	$ 106,000	
Groundwater Treatment	1	LS	$ 39,000	$ 39,000	
Start Up	1	LS	$ 18,000	$ 18,000	
Subtotal:				**$ 213,000**	
Cover System					
Demarcation Layer	2	Rolls	$ 2,000	$ 4,000	
Site Restoration (Asphalt)	42,000	SF	$ 5	$ 210,000	
Subtotal:				**$ 214,000**	
ASD System					
Building Assessment & Performance Eval.	1	LS	$ 10,000	$ 10,000	
System Installation and Vacuum Testing	1	LS	$ 15,000	$ 15,000	
Subtotal:				**$ 25,000**	
Subtotal Capital Cost				**$ 452,000**	
Contractor Mobilization/Demobilization (5%)				$ 22,600	
Health and Safety (2%)				$ 9,040	
Engineering/Contingency (35%)				$ 158,200	
Total Capital Cost				**$ 642,000**	
Operation Maintenance & Monitoring:					
Groundwater Monitoring	32	Events	$ 2,643	$ 84,571	Semi-Annual (2 yr); Annual (28 yr)
DPE System OM&M	2	Yr	$ 64,000	$ 128,000	Assumes 2 years of OM&M
ASD System OM&M	30	Yr	$ 500	$ 15,000	Assumes 30 years of OM&M
Annual Certification	30	Yr	$ 2,000	$ 60,000	GW PRR
Total OM&M Cost				**$ 288,000**	
Number of Years (n)				30	
Interest Rate (i)				3%	
p/A value				19.6004	
OM&M Present Worth (PW):				**$ 234,087**	
Total 30-Year PW Cost				**$ 877,000**	

TABLE 13

COMPARISON OF REMEDIAL ALTERNATIVES

2424 HAMBURG TURNPIKE SITE
LACKAWANNA, NEW YORK

Remedial Alternative	NYSDEC DER-10 Evaluation Criteria								
	1. Overall	2. SCGs	3. Eff & Perm	4. Reduction	5. Imp & Eff	6. Implement	7. Cost Eff	8. Community	9. Land Use
Alternative 1 - No Further Action						✓	$0	TBE	
Alternative 2 - Track 1 Cleanup	✓	✓	✓				$3.5 million	TBE	✓
Alternative 3 - Track 4 Cleanup	✓	✓	✓	✓	✓	✓	$877,000	TBE	✓

Notes:

1. Overall Protectiveness of Public Health and the Environment
2. Compliance with Standards, Criteria, and Guidance (SCGs)
3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility, or Volume of Contamination through Treatment or Excavation
5. Short-Term Impacts and Effectiveness
6. Implementability (Technical and Administrative)
7. Cost Effectiveness
8. Community Acceptance
9. Land Use

✓ = Alternative satisfies criterion

TBE = To be evaluated following public comment period

FIGURES

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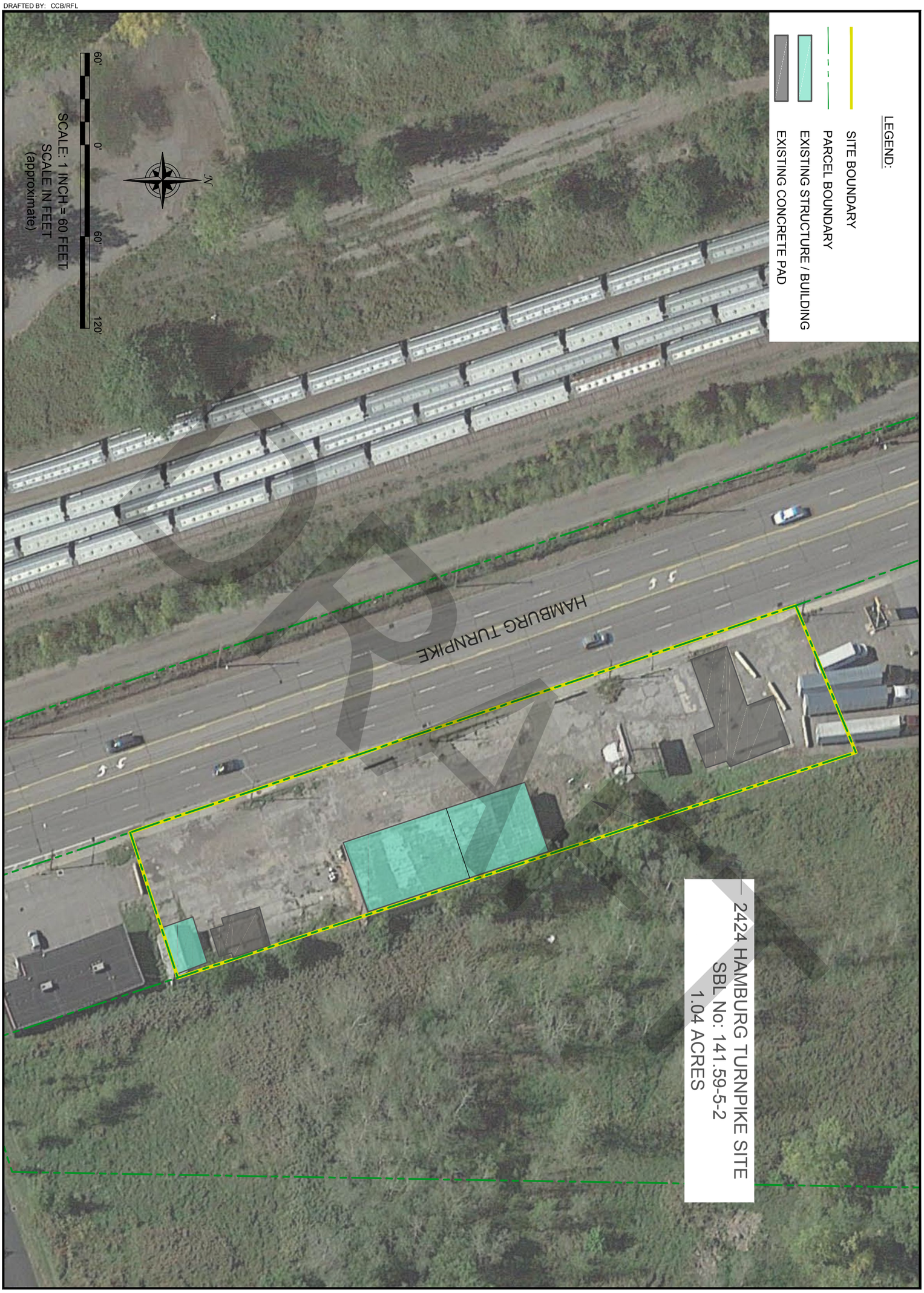


FIGURE 2

SITE PLAN (AERIAL)

RI-IRM-AA REPORT

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PREPARED FOR

2424 HAMBURG TURNPIKE, LLC

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

2558 HAMBURG TURNPIKE
SUITE 300
BUFFALO, NY 14218
(716) 856-0599

JOB NO.: 0345-015-001

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\RI-IRM-AA Report\Figure 3; Sample Locations.dwg

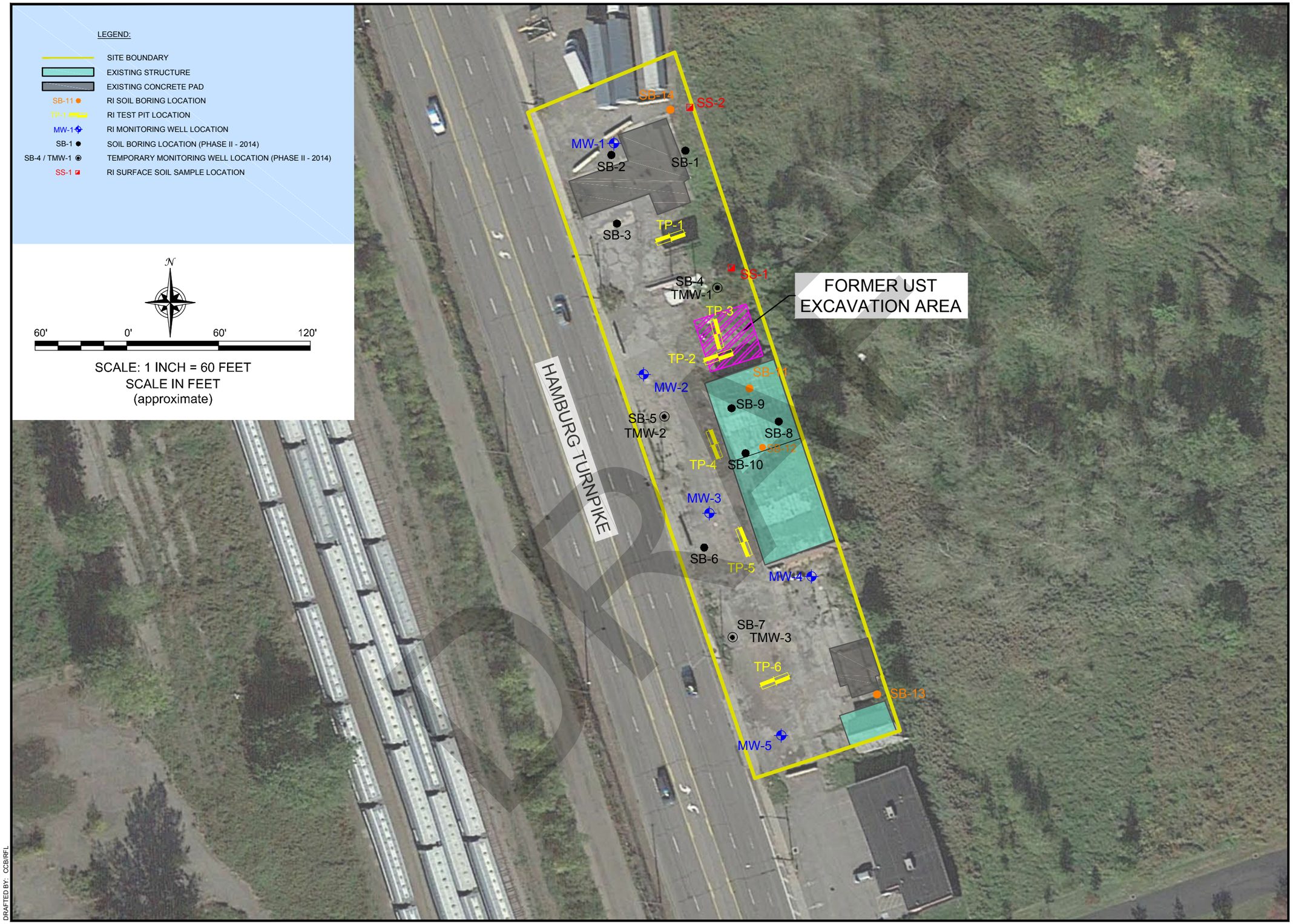
LEGEND:

- SITE BOUNDARY
- EXISTING STRUCTURE
- EXISTING CONCRETE PAD
- SB-11 RI SOIL BORING LOCATION
- TP-1 RI TEST PIT LOCATION
- MW-1 RI MONITORING WELL LOCATION
- SB-1 SOIL BORING LOCATION (PHASE II - 2014)
- SB-4 / TMW-1 TEMPORARY MONITORING WELL LOCATION (PHASE II - 2014)
- SS-1 RI SURFACE SOIL SAMPLE LOCATION

N

60' 0' 60' 120'

SCALE: 1 INCH = 60 FEET
SCALE IN FEET
(approximate)



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JOB NO.: 0345-015-001

SAMPLE LOCATIONS

RI-IRM-AA REPORT
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PREPARED FOR
2424 HAMBURG TURNPIKE, LLC

FIGURE 3

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\RI-IRM-AA Report\Figure 4; Isopotential Map.dwg

LEGEND:

- SITE BOUNDARY
- EXISTING STRUCTURE
- EXISTING CONCRETE PAD
- SB-11 — RI SOIL BORING LOCATION
- TP-1 — RI TEST PIT LOCATION
- MW-1 — RI MONITORING WELL LOCATION
- SB-1 — SOIL BORING LOCATION (PHASE II - 2014)
- TMW-2 — TEMPORARY MONITORING WELL LOCATION (PHASE II - 2014)
- 575 — GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

SAMPLE ID

MW-3	ug/L	GWQS
Benzene	8.5	1
Xylenes (Total)	9.5	5
Naphthalene	24	10
Iron	16,700	300

ANALYTE — ANALYTE CONCENTRATION (GROUNDWATER SAMPLED JULY 2016)

NOTE:
1. ONLY ANALYSES EXCEEDING NYS GROUNDWATER QUALITY STANDARDS (GWQS) SHOWN.
2. VALUES PER NYSDEC TOGS 1.1.1 CLASS GA GWQS.
3. ug/L = MICROGRAMS PER LITER.
4. CONTOUR LINES ARE DASHED WHERE INFERRED.

573.0

MW-1 (573.1)

MW-1	ug/L	GWQS
Iron	15,800	300
Sodium	79,800	20,000

MW-2 (573.1)

MW-2	ug/L	GWQS
Benzene	8.9	1
Ethylbenzene	6.3	5
Toluene	8.6	5
Xylenes (Total)	40	5
Arsenic	63	25
Iron	26,500	300
Manganese	870	300
Sodium	90,900	20,000
Iron - Dissolved	840	300
Manganese - Dissolved	790	300
Sodium - Dissolved	98,300	20,000

TMW-2

TMW-2	ug/L	GWQS
1,2,4-Trimethylbenzene	2,000	5
1,3,5-Trimethylbenzene	490	5
Acetone	140	50
Benzene	520	1
Ethylbenzene	1,500	5
Isopropylbenzene	56	5
Naphthalene	340	10
n-Propylbenzene	210	5
Toluene	5	5
Xylenes (Total)	7,800	5

MW-3 (573.2)

MW-3	ug/L	GWQS
Benzene	8.8	1
Xylenes (Total)	9.5	5
Naphthalene	24	10
Iron	16,700	300
Manganese	2,500	300
Sodium	28,100	20,000

MW-4 (573.2)

MW-4	ug/L	GWQS
Phenol	2.1 J	1
Iron	3,900	300
Manganese	830	300
Sodium	31,000	20,000

573.5

TMW-3

TMW-3	ug/L	GWQS
1,2,4-Trimethylbenzene	85	5
1,3,5-Trimethylbenzene	22	5
Benzene	6.3	1
Ethylbenzene	8.6	5
n-Propylbenzene	6.7	5
Toluene	12	5
Xylenes (Total)	255	5

574.0

MW-5 (573.9)

MW-5	ug/L	GWQS
Arsenic	48	25
Iron	1,900	300
Manganese	1,100	300
Sodium	42,800	20,000
Iron - Dissolved	1,700	300
Manganese - Dissolved	830	300
Sodium - Dissolved	38,200	20,000

N

60' 0' 60' 120'

SCALE: 1 INCH = 60 FEET
SCALE IN FEET
(approximate)

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GROUNDWATER ISOPOTENTIAL MAP AND GROUNDWATER QUALITY EXCEEDANCES

RI-IRM-AA REPORT

2424 HAMBURG TURNPIKE SITE

LACKAWANNA, NEW YORK

PREPARED FOR

2424 HAMBURG TURNPIKE, LLC

FIGURE 4

F:\CAD\Benchmark\2424 Hamburg Turnpike, LLC\RI-IRM-AA Report\Figure 5; Soil Exceedances of CSCOs.dwg

LEGEND:

- SITE BOUNDARY
- EXISTING STRUCTURE
- EXISTING CONCRETE PAD
- SB-11 ● RI SOIL BORING LOCATION
- TP-1 ▬ RI TEST PIT LOCATION
- MW-1 ◈ RI MONITORING WELL LOCATION
- SB-1 ● SOIL BORING LOCATION (PHASE II - 2014)
- TMW-2 ◉ TEMPORARY MONITORING WELL LOCATION (PHASE II - 2014)
- EW-1 ✕ IRM END-POINT SOIL SAMPLE LOCATION

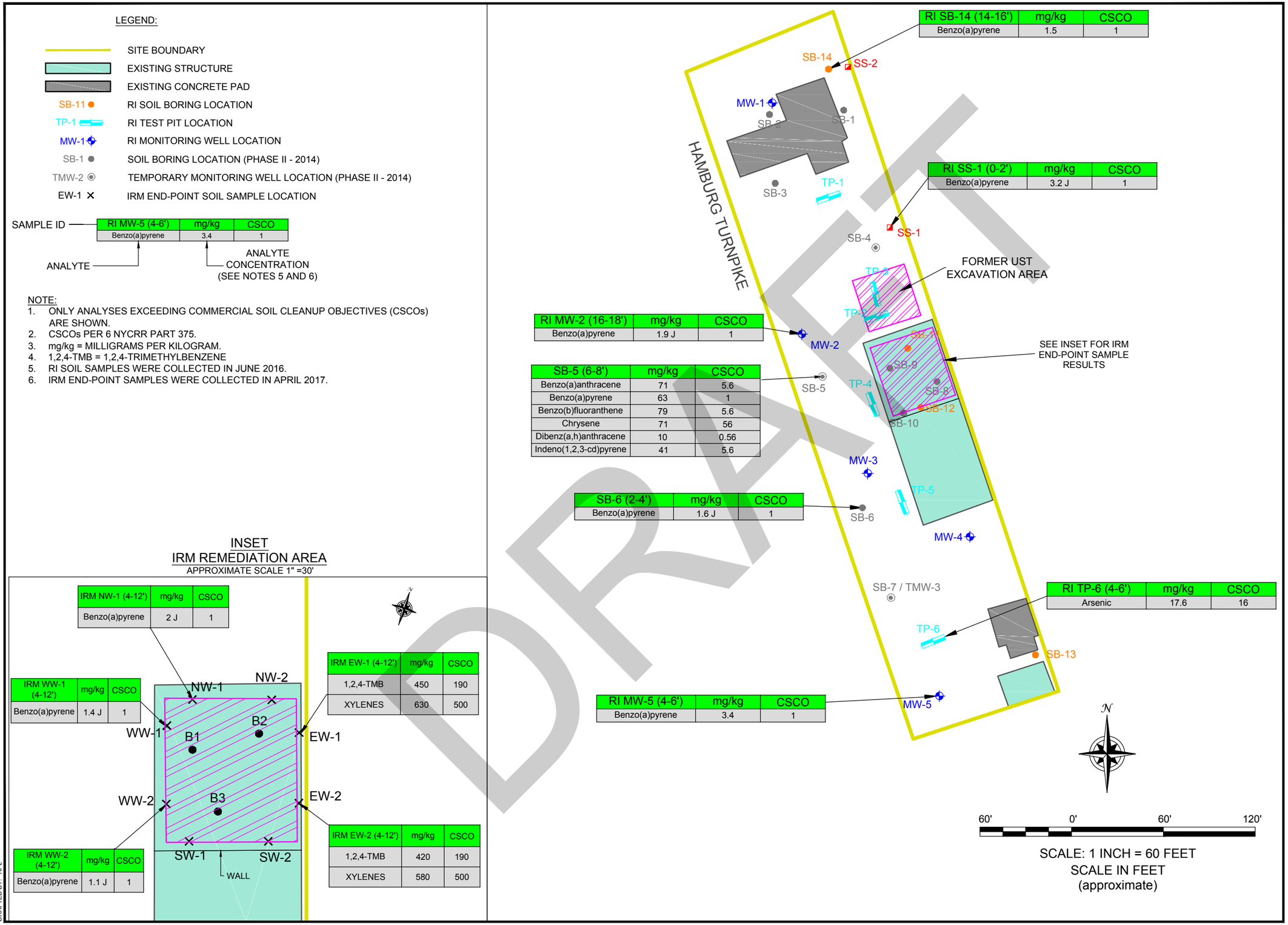
SAMPLE ID — RI MW-5 (4-6')

RI MW-5 (4-6')	mg/kg	CSCO
Benzo(a)pyrene	3.4	1

ANALYTE — Benzo(a)pyrene

ANALYTE CONCENTRATION (SEE NOTES 5 AND 6) — 3.4

NOTE:
1. ONLY ANALYSES EXCEEDING COMMERCIAL SOIL CLEANUP OBJECTIVES (CSCOs) ARE SHOWN.
2. CSCOs PER 6 NYCRR PART 375.
3. mg/kg = MILLIGRAMS PER KILOGRAM.
4. 1,2,4-TMB = 1,2,4-TRIMETHYLBENZENE
5. RI SOIL SAMPLES WERE COLLECTED IN JUNE 2016.
6. IRM END-POINT SAMPLES WERE COLLECTED IN APRIL 2017.



RI SB-14 (14-16')	mg/kg	CSCO
Benzo(a)pyrene	1.5	1

RI SS-1 (0-2')	mg/kg	CSCO
Benzo(a)pyrene	3.2 J	1

RI MW-2 (16-18')	mg/kg	CSCO
Benzo(a)pyrene	1.9 J	1

SB-5 (6-8')	mg/kg	CSCO
Benzo(a)anthracene	71	5.6
Benzo(a)pyrene	63	1
Benzo(b)fluoranthene	79	5.6
Chrysene	71	56
Dibenz(a,h)anthracene	10	0.56
Indeno(1,2,3-cd)pyrene	41	5.6

SB-6 (2-4')	mg/kg	CSCO
Benzo(a)pyrene	1.6 J	1

RI TP-6 (4-6')	mg/kg	CSCO
Arsenic	17.6	16

RI MW-5 (4-6')	mg/kg	CSCO
Benzo(a)pyrene	3.4	1

INSET
IRM REMEDIATION AREA
APPROXIMATE SCALE 1" =30'

IRM NW-1 (4-12')	mg/kg	CSCO
Benzo(a)pyrene	2 J	1

IRM WW-1 (4-12')	mg/kg	CSCO
Benzo(a)pyrene	1.4 J	1

IRM EW-1 (4-12')	mg/kg	CSCO
1,2,4-TMB	450	190
XYLENES	630	500

IRM WW-2 (4-12')	mg/kg	CSCO
Benzo(a)pyrene	1.1 J	1

IRM EW-2 (4-12')	mg/kg	CSCO
1,2,4-TMB	420	190
XYLENES	580	500

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JOB NO.: 0345-015-001

SOIL SAMPLES EXCEEDING CSCOs

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FIGURE 5