RESPONSE AND DEVELOPMENT WORK PLAN

AREA B: SUB-PARCEL B2-1
TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

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1.0 INTRODUCTION

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared this Response and Development Work Plan (RADWP) for a portion of the Tradepoint Atlantic property that has been designated as Area B: Sub-Parcel B2-1 (the Site). Tradepoint Atlantic submitted a letter (**Appendix A**) requesting an expedited remedial plan review to achieve construction deadlines for the proposed development on this Site. The full Parcel B2 comprises 122.7 acres of the approximately 3,100-acre former plant property located as shown on **Figure 1**. Sub-Parcel B2-1 consists of approximately 7.2 acres to be developed in the northwestern portion of Parcel B2.

The conduct of any environmental assessment and cleanup activities on the Tradepoint Atlantic property, as well as any associated development, is subject to the requirements outlined in the following agreements:

- Administrative Consent Order (ACO) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the Maryland Department of the Environment (MDE), effective September 12, 2014; and
- Settlement Agreement and Covenant Not to Sue (SA) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the United States Environmental Protection Agency (USEPA), effective November 25, 2014.

Sub-Parcel B2-1 is part of the acreage that was removed (Carveout Area) from inclusion in the Multimedia Consent Decree between Bethlehem Steel Corporation, the USEPA, and the MDE (effective October 8, 1997) as documented in correspondence received from USEPA on September 12, 2014. Based on this agreement, USEPA determined that no further investigation or corrective measures will be required under the terms of the Consent Decree for the Carveout Area. However, the SA reflects that the property within the Carveout Area will remain subject to the USEPA's Resource Conservation and Recovery Act (RCRA) Corrective Action authorities.

An application to enter the full Tradepoint Atlantic property (3,100 acres) into the Maryland Department of the Environment Voluntary Cleanup Program (MDE-VCP) was submitted to the MDE and delivered on June 27, 2014. The property's current and anticipated future use is Tier 3 (Industrial), and plans for the property include demolition and redevelopment over the next several years.

In consultation with the MDE, Tradepoint Atlantic affirms that it desires to accelerate the assessment, remediation and redevelopment of certain sub-parcels within the larger site due to current market conditions. To that end, the MDE and Tradepoint Atlantic agree that the Controlled Hazardous Substance (CHS) Act (Section 7-222 of the Environment Article) and the CHS Response Plan (Code of Maryland Regulations (COMAR) 26.14.02) shall serve as the

governing statutory and regulatory authority for completing the development activities on the Sub-Parcel B2-1 and complement the statutory requirements of the Voluntary Cleanup Program (Section 7-501 of the Environment Article). Upon submission of a Site RADWP and completion of any remedial activities for the sub-parcel, the MDE shall issue a No Further Action Letter (NFA) upon a recordation of an environmental covenant describing any necessary land use controls for the specific sub-parcel. At such time that all the sub-parcels within the larger parcel have completed remedial activities, Tradepoint Atlantic shall submit to the MDE a request for issuing a Certificate of Completion (COC) as well as all pertinent information concerning completion of remedial activities conducted on the parcel. Once the VCP has completed its review of the submitted information it shall issue a COC for the entire parcel described in Tradepoint Atlantic's VCP application.

Alternatively, Tradepoint Atlantic or other entity may elect to submit an application for a specific sub-parcel and submit it to the VCP for review and acceptance. If the application is received after the cleanup and redevelopment activities described in this RADWP are implemented and a NFA is issued by the MDE pursuant to the CHS Act, the VCP shall prepare a No Further Requirements Determination for the sub-parcel.

If Tradepoint Atlantic or other entity has not carried out cleanup and redevelopment activities described in the RADWP, the cleanup and redevelopment activities may be conducted under the oversight authority of either the VCP or the CHS Act, so long as those activities comport with this RADWP.

The Sub-Parcel B2-1 Development Area (the Site) consists of approximately 7.2 acres currently slated for development and use as an electrical substation, including construction of minor support structures and an access road (**Figure 2**).

This RADWP provides a Site description and history; summary of environmental conditions identified by the Phase I Environmental Site Assessment (ESA); summary of environmental conditions identified by the Parcel B2 Phase II Investigation (supplemented by a limited amount of data collected in Parcel B1); a human health Screening Level Risk Assessment (SLRA) conducted for the identified conditions; and any necessary engineering and/or institutional controls to facilitate the planned development and address the impacts and potential human health exposures. These controls include work practices and applicable protocols that are submitted for approval to support the development and use of the Site. Engineering/institutional controls approved and installed for this RADWP shall be described in closure certification documentation submitted to the MDE demonstrating that exposure pathways on the Site are addressed in a manner that protects public health and the environment. The remaining acreage of Parcel B2 will be addressed in future work associated with completion of the obligations of the ACO and associated VCP requirements. This work will include assessments of risk and, if necessary, RADWPs to address risks associated with future land use.

2.0 SITE DESCRIPTION AND HISTORY

2.1. SITE DESCRIPTION

Parcel B2 includes an area of 122.7 acres as shown in **Figure 1**. The Sub-Parcel B2-1 Development Area consists of 7.2 acres in the northwestern portion of Parcel B2 which will include an electrical substation and supporting structures (**Figure 2**). The Site is currently zoned Manufacturing Heavy-Industrial Major (MH-IM), and is not occupied by a permanent tenant. MCM Management Corporation (MCM) is currently using this area on a temporary basis for vehicle maintenance and repair activities, as well as for staging of construction equipment. One existing building at the Site (former Slab Hauler Repair Shop) will necessarily be demolished prior to development. The sub-parcel has been cleared of all significant vegetation. There is no groundwater use on-site or within the surrounding Tradepoint Atlantic property.

Sub-Parcel B2-1 is at an elevation of approximately 12 feet above mean sea level (amsl). Elevations in the parcel are fairly uniform between 9 and 14 feet over the majority of the sub-parcel area, with several small stockpiles at slightly increased elevations. According to Figure B-2 of the Stormwater Pollution Prevention Plan (SWPPP) Revision 5 dated June 1, 2017, stormwater from the Site is directed to the Tin Mill Canal (TMC), which flows to the Humphrey Creek Wastewater Treatment Plant (HCWWTP) for treatment, and is ultimately discharged to Bear Creek through National Pollution Discharge Elimination System (NPDES) Outfall 014.

2.2. SITE HISTORY

From the late 1800s until 2012, the production and manufacturing of steel was conducted at Sparrows Point. Iron and steel production operations and processes at Sparrows Point included raw material handling, coke production, sinter production, iron production, steel production, and semi-finished and finished product preparation. In 1970, Sparrows Point was the largest steel facility in the United States, producing hot and cold rolled sheets, coated materials, pipes, plates, and rod and wire. The steel making operations at the Facility ceased in fall 2012.

The proposed Sub-Parcel B2-1 Development Area is currently occupied by the former Slab Hauler Repair Shop. A Railroad Office (now under the authority of Tradepoint Atlantic) is located immediately to the northwest of the sub-parcel. According to recent site visits by ARM personnel, both the former Slab Hauler Repair Shop and the Railroad Office remain intact and the area has been observed to be active and is currently used by MCM for vehicle maintenance and repair activities. The Site was also observed to be used as a staging area for MCM's construction and demolition equipment. According to historical site drawings, there were no significant steel making processes conducted within the boundary of Sub-Parcel B2-1. More information regarding historical activities can be found in the agency approved Phase II Investigation Work Plan for Parcel B2 (dated May 17, 2017).

3.0 ENVIRONMENTAL SITE ASSESSMENT RESULTS

3.1. PHASE I ENVIRONMENTAL SITE ASSESSMENT RESULTS

A Phase I ESA was completed by Weaver Boos Consultants for the entire Sparrows Point property on May 19, 2014. Weaver Boos completed site visits of Sparrows Point from February 19 through 21, 2014, for the purpose of characterizing current conditions at the former steel plant. The Phase I ESA identified particular features across the Tradepoint Atlantic property which presented potential risks to the environment. These Recognized Environmental Conditions (RECs) included buildings and process areas where releases of hazardous substances and/or petroleum products potentially may have occurred. The Phase I ESA also relied upon findings identified during a previous visual site inspection (VSI) conducted as part of the RCRA Facility Assessment (RFA) prepared by A.T. Kearney, Inc. dated August 1993, for the purpose of identifying Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) on the property. This 1991 VSI is regularly cited in the Description of Current Conditions (DCC) Report prepared by Rust Environment and Infrastructure, dated January 1998 (included with Weaver Boos' Phase I ESA). Weaver Boos' distinction of a REC or Non-REC was based upon the findings of the DCC Report (which was prepared when the features remained on-site in 1998) or on observations of the general area during their site visit. Weaver Boos made the determination to identify a feature as a REC based on historical information, observations during the site visit, and prior knowledge and experience with similar facilities.

The Phase I ESA and associated reports did not identify any RECs, SWMUs, or AOCs within a reasonable proximity to the Sub-Parcel B2-1 boundary.

3.2. PHASE II INVESTIGATION RESULTS–SUB-PARCEL B2-1

A Phase II Investigation specific to soil conditions was performed for the Site in accordance with the requirements outlined in the ACO as further described in the Phase II Investigation Work Plan – Area B: Parcel B2 (Revision 1) dated May 17, 2017. This Work Plan and an associated comment response letter dated June 14, 2017 were approved by the agencies on June 26, 2017. The agencies later made a determination that three additional soil borings proposed in the June 14, 2017 comment response letter in the vicinity of the Slab Hauler Repair Shop would not be required, as stated in correspondence received from the MDE on December 22, 2017. In addition, a Phase II Investigation specific to soil conditions was performed for Parcel B1 (located within 200 feet of the western boundary of Sub-Parcel B2-1). The investigation of Parcel B1 is further described in the Phase II Investigation Work Plan – Area B: Parcel B1 (Revision 3) dated March 3, 2016, which was approved by the agencies on March 15, 2016. One soil boring obtained during the Parcel B1 Phase II Investigation (B1-135-SB) provided relevant data for discussion in this RADWP. Findings from the Parcel B2 and B1 Phase II Investigations that are relevant to the Sub-Parcel B2-1 Development Area are summarized in this document.

The Phase II Investigations of Parcel B2 and Parcel B1 were developed to target the specific features which represented a potential release of hazardous substances and/or petroleum products to the environment, including RECs, SWMUs, and AOCs (not relevant for Sub-Parcel B2-1 as described above) as well as numerous other targets defined from former operations that would have the potential for environmental contamination. Samples were also collected at site-wide locations to ensure full coverage of the parcels.

A total of 115 soil samples (from 55 boring locations) were collected and analyzed to assess the presence or absence of contamination in Parcel B2. Based on the scope of development and limited footprint for the proposed substation (7.2 acres), a total of 19 Phase II Investigation soil samples (from the 9 boring locations indicated in **Figure 3**: B2-001-SB, B2-002-SB, B2-005-SB, B2-006-SB, B2-041-SB, B2-042-SB, B2-048-SB, B2-051-SB, and B1-135-SB) were selected for a representative evaluation of Sub-Parcel B2-1. This selection includes a single soil boring positioned within Parcel B1 to the west (B1-135-SB). Soil boring B2-005-SB provided analytical soil data from two completion dates (June 1 and June 27, 2017). On the initial date, this soil boring could only be completed to a depth of 1-foot below ground surface (bgs) due to equipment refusal and restrictions due to ongoing utility mark-outs. Another supplemental boring was completed at a nearby location (approximately 25 feet to the southeast of the original location) in order to provide subsurface data once the utilities were marked. The initial shallow boring from June 1, 2017 has been assigned ID# B2-005A-SB, and the boring completed on June 27, 2017 has been assigned ID# B2-005-SB. The final location of boring B2-005-SB is indicated on **Figure 3**. All of the listed borings are located within, or immediately adjacent to, the proposed development area such that the data from these borings should be considered representative of soil conditions within Sub-Parcel B2-1.

Soil samples were analyzed for the USEPA Target Compound List (TCL) semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) diesel range organics (DRO) and gasoline range organics (GRO), Oil & Grease, USEPA Target Analyte List (TAL) metals, hexavalent chromium, and/or cyanide based on the parcel-specific sampling plans for Parcel B2 and Parcel B1. If a sample interval exceeded a photoionization detector (PID) reading of 10 ppm, the respective sample interval was additionally analyzed for volatile organic compounds (VOCs). Shallow soil samples (0 to 1 foot bgs) were also analyzed for polychlorinated biphenyls (PCBs). The laboratory Certificates of Analysis (including Chains of Custody) and relevant Data Validation Reports (50% validated soil data – determined based on the complete datasets obtained from Parcel B2 and Parcel B1) are included as electronic attachments. The Data Validation Reports contain qualifier keys for the flags assigned to individual results in the attached summary tables.

Soil sample results relevant for the Sub-Parcel B2-1 Development Area were screened against the Project Action Limits (PALs) established in the property-wide Quality Assurance Project Plan (QAPP) dated April 5, 2016, or based on other direct agency guidance (e.g., TPH/Oil &

Grease). **Table 1** and **Table 2** provide a summary of the detected organic compounds and inorganics in the soil samples submitted for laboratory analysis, and **Figure 4** presents a summary of the soil sample results that exceeded the PALs. The tables and figures include all locations and analytical data relevant for the proposed Sub-Parcel B2-1 Development Area. The PALs for relevant polynuclear aromatic hydrocarbons (PAHs) have been adjusted upward based on revised toxicity data published in the USEPA Regional Screening Level (RSL) Composite Worker Soil Table. PAL exceedances in the soil samples relevant for Sub-Parcel B2-1 were limited to four inorganics (arsenic, manganese, hexavalent chromium, and lead). Arsenic was the most common PAL exceedance.

No samples evaluated in this RADWP exceeded the PAL for TPH/Oil & Grease (6,200 mg/kg). Potential evidence of non-aqueous phase liquid (NAPL) was observed in a soil core during the completion of one boring located outside of the boundary of development (B2-051-SB). During the completion of this boring, evidence of trace to light tar with a solvent odor was present in a narrow interval between 6 and 6.2 feet bgs. Due to these conditions, a NAPL screening piezometer (B2-051-PZ) was installed at this location with a screen interval from 3 to 13 feet bgs to assess the potential mobility of NAPL to groundwater. Piezometers installed for NAPL screening purposes are typically gauged at standard intervals (0-hour, 48-hour, and >30-day) using an oil-water interface probe. In this case, a 30-day gauging measurement could not be collected; the piezometer was located too close to an active roadway and had to be abandoned prior to the 30 day check. However, there was no evidence of NAPL during any of the completed gauging measurements, and a supplemental groundwater sample was collected at this location to provide additional analytical data (as discussed below). Contingency measures to address the potential presence of NAPL which could be encountered at the Site are addressed in subsequent sections of this RADWP.

Groundwater within Parcel B2 (and Parcel B1) was investigated in accordance with the separate Area B Groundwater Investigation Work Plan (Revision 3) dated October 6, 2015. This separate Work Plan was pre-approved by the agencies on October 5, 2015. During the Area B Groundwater Investigation, three shallow permanent wells were installed and sampled within a reasonable proximity to Sub-Parcel B2-1. These locations (FM01-PZM003, SW08-PZM003, and SW-058-MWS) were installed to facilitate the collection of groundwater samples and to support the definition of the Area B potentiometric surface. In addition, a supplemental groundwater sample was obtained from the NAPL screening piezometer B2-051-PZ prior to its abandonment. Location B2-051-PZ was not specified to be sampled in the Parcel B2 Work Plan, but samples were collected to provide additional analytical data at this location since a 30-day NAPL gauging measurement could not be completed. Groundwater is not anticipated to be encountered in the sub-parcel based on the proposed development plan described herein; therefore, groundwater conditions below the Site are not a significant concern.

The shallow groundwater samples collected from FM01-PZM003, SW08-PZM003, SW-058-MWS, and B2-051-PZ were analyzed for TLC-VOCs, TCL-SVOCs, TAL-Dissolved Metals, TPH-DRO, TPH-GRO, hexavalent chromium, and cyanide. The permanent groundwater wells sampled for the Area B Groundwater Investigation were additionally analyzed for TAL-Metals (total). The groundwater sample collected at B2-051-PZ was also analyzed for Oil & Grease. The agencies have specified the requirements for analysis of TPH/Oil & Grease throughout the investigation process. Samples obtained during the Area B Groundwater Investigation were not required to be analyzed for Oil & Grease based on the requirements specified at the time of implementation. The laboratory Certificates of Analysis (including Chains of Custody) and Data Validation Reports for the Area B Groundwater Investigation (100% validated groundwater data) and for sample B2-051-PZ (non-validated) are included as electronic attachments. The laboratory and data validation reports contain qualifier keys for the flags assigned to the individual results in the attached summary table.

The groundwater analytical results were screened against the PALs established in the property-wide QAPP dated April 5, 2016, or based on other direct agency guidance (e.g., TPH/Oil & Grease). **Table 3** presents a (combined) summary of the detected organic compounds and inorganics in the aqueous samples obtained from these shallow groundwater sample collection points. Similar to the evaluation of soil data, the PALs for relevant PAHs have been adjusted upward based on revised toxicity data published in the USEPA RSL Resident Tapwater Table. **Figure 5** presents a summary of the groundwater results at locations FM01-PZM003, SW08-PZM003, SW-058-MWS, and B2-051-PZ that exceeded the aqueous PALs. Groundwater PAL exceedances in the vicinity of Sub-Parcel B2-1 consisted of one VOC (chloroform), one SVOC (benz[a]anthracene), DRO, and one total/dissolved metal (vanadium). For simplicity, the inorganic PAL exceedances shown on the figure do not include duplicate exceedances of total and dissolved vanadium. If both total and dissolved concentrations exceeded the PAL (as was the case at location FM01-PZM003), the value for total vanadium is displayed on the figure.

While concentrations of these constituents did exceed the aqueous PALs specified in the QAPP, none of the detected levels were significantly elevated and there were no concerns related to vapor intrusion. Each groundwater collection point was also inspected for evidence of NAPL using an oil-water interface probe prior to sampling. None of the piezometers or permanent wells relevant for Sub-Parcel B2-1 showed evidence of NAPL during these checks. The complete findings of the Area B Groundwater Investigation (including the detailed vapor intrusion screening) were presented to the agencies in the Area B Groundwater Phase II Investigation Report (Revision 0) dated September 30, 2016. If groundwater is encountered during development, any potential Construction Worker exposures will be managed by the implementation of health and safety protocols.

3.3. HUMAN HEALTH SCREENING LEVEL RISK ASSESSMENT (SLRA)

3.3.1. Analysis Process

A human health Screening Level Risk Assessment (SLRA) has been conducted for soils to further evaluate the Site conditions in support of the design of necessary response measures. The SLRA included the following evaluation process:

Identification of Exposure Units (EUs): The SLRA was conducted for the entire development area (7.2 acres) evaluated as a single EU. This site-wide evaluation included data from select borings which were completed outside of the proposed development area, but in close proximity to the development boundary (**Figure 3**). The data from these borings should be considered to be representative of the soil conditions within Sub-Parcel B2-1.

Identification of Constituents of Potential Concern (COPCs): Compounds that are present at concentrations at or above the USEPA RSLs set at a target cancer risk of 1E-6 or target non-cancer Hazard Quotient (HQ) of 0.1 were identified as COPCs to be included in the SLRA. A COPC screening analysis is provided in **Table 4** to identify compounds above the relevant screening levels.

Exposure Point Concentrations (EPCs): Due to the limited number of soil borings included in the SLRA (nine total) the maximum reported value for each COPC was used as the EPC for each constituent. Therefore, the COPC soil dataset for the site-wide EU was not divided into surface (0 to 1 foot) and subsurface (>1 foot) depths for estimation of the EPCs, but rather all of the analytical results were evaluated as a single pooled dataset. However, the data were separated by depth (surface, subsurface, and pooled surface/subsurface) to evaluate potential exposures to lead in the site-wide EU. The arithmetic mean for each dataset was calculated for comparison to the Adult Lead Model (ALM) based values, and any individual results exceeding 10,000 would be delineated for possible excavation and removal (if applicable). For PCBs, all results equaling or exceeding 50 mg/kg would be delineated for excavation and removal (if applicable).

Risk Ratios: The maximum results for each COPC were compared to the USEPA RSLs for the Composite Worker and to site-specific Soil Screening Levels (SSLs) for the Construction Worker based on equations derived in the USEPA Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (OSWER 9355.4-24, December 2002). The risk ratios were calculated with a cancer risk of 1E-6 and a non-cancer HQ of 1. Site-specific risk-based evaluations were completed for a range of potential exposure frequencies. For each exposure frequency, risk ratios for the carcinogens were summed to develop a screening level estimate of the cumulative cancer risk. The risk ratios for the non-carcinogens were segregated and summed by target

organ to develop a screening level estimate of the cumulative non-cancer hazard. These calculated risk ratios were used to determine the exposure frequency that would result in risk ratios equivalent to a cumulative cancer risk of 1E-5 or Hazard Index (HI) of 1 for any individual target organ. This analysis indicated that an exposure frequency of 35 days would be allowable in the site-wide EU before additional worker protections or more detailed job safety evaluations might be needed.

There is no potential for human exposure to groundwater for a Composite Worker since groundwater is not used on the Tradepoint Atlantic property (and is not proposed to be utilized). In the event that construction/excavation leads to a potential Construction Worker exposure to groundwater during development, health and safety plans and procedures shall be followed to limit exposure risk.

Assessment of Lead: For lead, the arithmetic mean concentrations for surface soils, subsurface soils, and pooled soils for the site-wide EU were compared to the applicable RSL (800 mg/kg) as an initial screening. If the mean concentrations for the EU were below the applicable RSL, the EU was identified as requiring no further action for lead. If a mean concentration exceeded the RSL, the mean values were compared to calculated ALM values (ALM Version dated 6/21/2009 updated with the 5/17/2017 OLEM Directive) with inputs of 1.8 for the geometric standard deviation and a blood baseline lead level of 0.6 ug/dL. The ALM calculation generates a soil lead concentration of 2,518 mg/kg, which is the most conservative (i.e., lowest) concentration which would yield a probability of 5% of a blood lead concentration of 10 ug/dL. If the arithmetic mean concentrations for the EU were below 2,518 mg/kg, the EU was identified as requiring no further action for lead. The lead averages and screening levels are presented for surface, subsurface, and pooled soils in **Table 5**. For lead, any analytical results equaling or exceeding 10,000 mg/kg would be delineated for possible excavation and removal (if applicable).

Assessment of TPH-DRO/GRO and Oil & Grease: EPCs were not calculated for TPH-DRO/GRO or Oil & Grease. Instead, the individual results were compared to the PAL set to a HQ of 1 (6,200 mg/kg). No samples evaluated for the site-wide EU exceeded the PAL for TPH/Oil & Grease. One soil boring (B2-051-SB) exhibited evidence of potential NAPL contamination in its soil core (trace to light tar with a solvent odor located in a narrow interval from 6 to 6.2 feet bgs), but no utilities are proposed in the vicinity of this soil boring during development. Therefore, these contaminants are not considered to be of significant concern at the Site.

Risk Characterization Approach: For the site-wide EU, if the baseline risk ratio for each non-carcinogenic COPC or cumulative target organ does not exceed 1 (with the exception of lead), and the sum of the risk ratios for the carcinogenic COPCs does not

exceed a cumulative cancer risk of 1E-5, then a no further action determination will be recommended. The pooled soil data has been evaluated as a single dataset using the maximum detected concentration of each COPC as the EPC.

If the baseline estimate of cumulative cancer risk exceeds 1E-5 but is less than or equal to 1E-4, then capping of the EU will be considered to be an acceptable remedy for the Composite Worker. For the Construction Worker, cumulative cancer risks exceeding 1E-5, but less than or equal to 1E-4, will be mitigated via site-specific health and safety requirements. The efficacy of capping for elevated non-cancer hazard will be evaluated in terms of the magnitude of exceedance and other factors such as bioavailability of the COPC. Similarly, for lead, if the ALM results indicate that the mean concentrations would present a 5% to 10% probability of a blood concentration of 10 ug/dL for the EU, then capping of the EU would be an acceptable presumptive remedy. The mean soil lead concentrations corresponding to ALM probabilities of 5% and 10% are 2,518 mg/kg, and 3,216 mg/kg, respectively. If capping of the identified area is not proposed, additional more detailed quantitative evaluation of risk will be required for the EU. This supplemental risk evaluation could include a selective removal (excavation) remedy to reduce site-wide cancer risks and/or non-cancer hazards to acceptable levels.

The USEPA's acceptable risk range is between 1E-6 and 1E-4. If the sum of the risk ratios for carcinogens exceeds a cumulative cancer risk of 1E-4, further analysis of site conditions will be required including the consideration of toxicity reduction in any proposal for a remedy. The magnitude of non-carcinogen hazard exceedances and bioavailability of the COPC will also dictate further analysis of site conditions including consideration of toxicity reduction in any proposal for a remedy. In addition, if the ALM indicates that the mean concentrations would present a >10% probability of a blood concentration of 10 ug/dL for the EU, further analysis of site conditions including toxicity reduction will be completed such that the probability would be reduced to less than 10% after toxicity reduction, but before capping.

3.3.2. **Sub-Parcel B2-1 SLRA Results and Risk Characterization**

The current Composite Worker will be exposed only to surface soils. However, if construction activities were to result in the placement of subsurface material over existing surface soils, a future Composite Worker could be exposed to a mixture of surface and subsurface soils. The Construction Worker may be exposed only to surface soils, but subsurface soils would be encountered for development activities that involve soil disturbances such as excavations or other intrusive earth-moving activities. Pooled data may be applicable for development work that involves disturbances through the surface soil, since workers would likely not be exposed solely to the subsurface soil. Only limited intrusive activities are planned for this development of Sub-Parcel B2-1.

Potential current and future exposure scenarios were evaluated using a pooled dataset for the site-wide EU, with the EPC for each COPC based on the maximum detection. The maximum detected values for each COPC in soils are visible in the COPC screening table provided as **Table 4**. These EPCs were used to for both the Composite Worker and Construction Worker risk assessments discussed herein.

As indicated above, the EPCs for lead are the average (i.e., arithmetic mean) values for the surface, subsurface, and pooled soil datasets. A lead evaluation spreadsheet, providing the computations used to determine lead averages for each dataset in the site-wide EU, is included as an electronic attachment. The average lead concentrations are presented for each dataset in **Table 5**, which indicates that neither surface, subsurface, nor pooled soils exceeded an average lead value of 800 mg/kg. The screening criterion for lead was set at an EU arithmetic mean of 800 mg/kg based on the RSL, with a secondary limit of 2,518 mg/kg based on the May 2017 updated ALM developed by the USEPA (corresponding to a 5% probability of a blood lead level of 10 ug/dL). There were no locations where detections of lead exceeded 10,000 mg/kg.

None of the detections of PCBs at the Site exceeded the mandatory excavation criterion of 50 mg/kg or any of the applicable PALs.

Composite Worker Assessment:

Risk ratios for the estimates of potential EPCs for the Composite Worker scenario are shown in **Table 6**. The results are summarized as follows:

Development Exposure Unit			
Worker Scenario	**Medium**	**Hazard Index (>1)**	**Total Cancer Risk**
Composite Worker	Soil (Maximum Values)	none	1E-5

The current Composite Worker will be exposed only to surface soils. Construction activities could result in the placement of subsurface material over existing surface soils exposing a future Composite Worker to a mixture of surface and subsurface soils. The risk ratios evaluated using the maximum detections from the pooled COPC soil dataset indicated that the cumulative cancer risk for the Composite Worker was equal to 1E-5. For this Composite Worker evaluation, no target organs had a cumulative non-cancer HI above 1 for the site-wide EU.

The carcinogenic risk estimate for the Composite Worker did not exceed 1E-5, and no target organ exceeded a cumulative HI of 1 for any target organ. Thus, conditions at the Site are below the acceptable limits for no further action defined in the Risk Characterization Approach. Based on the risk ratios for Sub-Parcel B2-1, no further action is required to be protective of current or

future Composite Workers either before or after the proposed development. No capping remedy is required for this project.

Construction Worker Assessment:

According to the work schedule provided by Tradepoint Atlantic, intrusive activities (i.e., activities that involve disturbance of potentially impacted soil performed by Construction Workers outside of enclosed vehicle cabs) are expected to be limited to three primary tasks which will be conducted concurrently between July 9 and August 31, 2018:

- Transformer Foundations
- Circuit Breaker Foundations
- Ductbank Installation

Each of these primary tasks (along with other minor tasks) will be performed by a separate work crew. The proposed division of labor between the crews, as provided by Tradepoint Atlantic, is included as **Appendix B**. As shown in the appendix, no individual work crew will exceed an exposure duration of 28 intrusive days. Construction Worker risk ratios were evaluated for several exposure scenarios to determine the exposure frequency for the site-wide EU that would result in risk ratios equivalent to a cumulative cancer risk of 1E-5 or HI of 1 for any individual target organ. Risk ratios for the Construction Worker scenario using the selected exposure duration (35 work days) are shown in **Table 7**. The variables entered for calculation of site-specific Construction Worker SSLs (EU area, input assumptions, and exposure frequency) are indicated as notes on the table. The spreadsheet used for computation of the site-specific Construction Worker SSLs is included in **Appendix C**. The results for the site-wide 35-day exposure scenario are summarized as follows:

Development Exposure Unit			
Worker Scenario	**Medium**	**Hazard Index (>1)**	**Total Cancer Risk**
Construction Worker (35 work day schedule)	Soil (Maximum Values)	none	3E-7

Using the 35-day exposure duration and the maximum detections for each COPC in the site-wide EU, the carcinogenic risk was computed to be 3E-7 for the Construction Worker scenario. This computed carcinogenic risk is less than the acceptable no further action limit (1E-5) as defined in the Risk Characterization Approach. In addition, none of the non-carcinogens caused a cumulative HI to exceed 1 for any target organ system using the 35-day exposure frequency. This assessment indicates that site-specific health and safety protocols or further action would be required for the proposed construction only if intrusive activities exceed 35 work days for an

individual worker. Intrusive activities are defined in this RADWP as any construction activity that involves the disturbance of potentially impacted soil performed by Construction Workers outside of enclosed vehicle cabs. If the duration of intrusive work would exceed the specified limit of 35 days, the work would need to be completed by another crew, or additional health and safety protections would be required.

Based on the anticipated exposure durations given in **Appendix B**, the duration of intrusive work will not exceed the allowable limit of 35 days for any individual or crew. Therefore, general health and safety controls used by Construction Workers (level D protection) are adequate to mitigate risk to Construction Workers for the proposed work. Institutional controls will be required to be established for the protection of future Construction Workers in the event of any future long-term development which could include intrusive activities. These institutional controls will need to include a written notice to the MDE of any future soil disturbance activities, health and safety requirements for any excavations, and proper management and characterization of any removed material.

3.3.3. Evaluation of Comprehensive Environmental Response, Compensation, and Liability (CERCLA) Criteria

Results from the SLRA indicate that no further action is required within the proposed development area to mitigate potential current and future Composite Worker risks. Site-specific health and safety controls will not be required to mitigate Construction Worker risks within the sub-parcel because the proposed schedule of work will not exceed the allowable limit of 35 intrusive work days. The proposed development will include minor grading and the construction of an electrical substation, as shown on the development plan drawings (**Appendix D**). Since the Composite Worker and Construction Worker scenarios were below the criteria requiring additional mitigative responses, no additional protections for the potential current and future Composite Worker and Construction Worker are warranted (beyond protective institutional controls for the Construction Worker).

The undisturbed scenario (i.e., the scenario which does not require a capping remedy) has been evaluated for consistency with the CERCLA Threshold Criteria and the Balancing Criteria as described below. The Threshold Criteria assess the overall protection of human health and the environment, the achievement of media cleanup objectives, and the control of sources of releases at the Site. The Balancing Criteria assess long-term effectiveness and permanence; reduction of toxicity, mobility or volume; short-term effectiveness; implementability; cost effectiveness; and community and State acceptance.

Threshold Criteria:

Protect Human Health and the Environment: The assessment against this criterion evaluates how the undisturbed scenario, as a whole, protects and maintains protection of human health and the environment. The undisturbed scenario evaluated in the SLRA indicates that risks to current and future industrial workers are acceptable despite a limited number of detections of soil constituents in excess of the Composite Worker RSLs. Groundwater does not present a human health hazard since there is no groundwater use. Implementation of the proposed institutional controls will address the residual risk and will also protect hypothetical future Construction Workers by eliminating or controlling potential exposure pathways, thus reducing potential intake and contact of soil and groundwater COPCs by human receptors.

Achieve Media Cleanup Objective: The assessment against this criterion describes how the undisturbed scenario meets the cleanup objective, which is risk reduction, appropriate for the expected current and reasonably anticipated future land use. The objective is to protect workers (current and future Composite Worker and Construction Worker) from potential exposures to site-related soil or groundwater constituents at levels that may result in risks of adverse health effects. Given the controlled access and use restrictions, the proposed undisturbed scenario will attain soil and groundwater objectives.

Control the Source of Releases: In its RCRA Corrective Action proposed remedies, USEPA seeks to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. Controlling the sources of contamination relates to the ability of the undisturbed scenario to reduce or eliminate, to the maximum extent practicable, further releases. None of the soils remaining on-site were identified as exhibiting characteristics of hazardous waste. Sampling results did not indicate localized, discernible source areas associated with the soil conditions observed at the Site, with the possible exception of NAPL at one boring to the east of the development boundary (B2-051-SB). The control measures included with the proposed undisturbed scenario, such as Materials Management Plan requirements and groundwater use restrictions, provide a mechanism to control and reduce potential further releases of COPCs. This is achieved by eliminating the potential for groundwater use and requiring proper planning associated with future intrusive activities.

Balancing Criteria:

Long-Term Reliability and Effectiveness: The assessment against this criterion evaluates the long-term effectiveness of the undisturbed scenario in maintaining protection of human health and the environment. The primary focus of this criterion is the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes. The Composite Worker evaluation

indicated no long-term risks for an industrial worker which might require mitigation. Institutional controls (deed restrictions) will be implemented to protect future Construction Workers against disturbances of the soil that might lead to inadvertent long-term contact with potentially impacted soils or groundwater. These institutional controls are anticipated to include a restriction prohibiting the use of groundwater for any purpose, a written notice to the MDE of any future soil disturbance activities, health and safety requirements for any excavations, and proper management and characterization of any removed material. The Tenant will be required to sign onto the Environmental Covenant with restriction in the No Further Action Letter (NFA). The long-term effectiveness is high, as institutional controls are readily implementable and easily maintained. Given the historical, heavily industrial uses of the Site and the surrounding area, including the presence of landfills, industrial land uses of this area and existing groundwater use restrictions are expected to continue in the long-term.

Reduction of Toxicity, Mobility, or Volume of Waste: The assessment against this criterion evaluates the anticipated performance of specific technologies that a remedial action alternative may employ. A cap is not necessary to reduce toxicity, mobility, or volume of waste in this case. No capping remedy is proposed for this Site.

Short-term Effectiveness: The assessment against this criterion examines how well the proposed undisturbed scenario protects human health and the environment during the construction and implementation. This criterion also includes an estimate of the time required to achieve protection for either the entire site or individual elements associated with specific site areas or threats. The results of the SLRA indicate that risks to the Construction Worker during implementation are mitigated by limiting workers to the specific exposure duration given in the SLRA (35 days). The short-term risk to site workers following general health and safety measures during implementation of the remedy will be low. Short-term effectiveness in protecting on-site workers and the environment will be achieved through establishing appropriate management, construction, health and safety, and security procedures. Proper water management protocols will be implemented to prevent discharges offsite. Security and fences will be used to maintain controlled access during construction to be protective of site visitors.

Implementability: The assessment against this criterion evaluates the technical and administrative feasibility, including the availability of trained and experienced personnel, materials, and equipment. Technical feasibility includes the ability to construct and operate the technology, the reliability of the technology, and the ability to effectively monitor the technology. Administrative feasibility includes the capability of obtaining permits, meeting permit requirements, and coordinating activities of governmental agencies. There are no concerns related to implementability in this case.

Cost Effectiveness: The assessment against this criterion evaluates the capital costs, annual Operating and Maintenance (O&M) costs, and the net present value (NPV) of this remedy relative to other alternatives. The undisturbed scenario does not have an associated remedial cost, regardless of the presence of soil containing COPCs.

State/Support Agency Acceptance: MDE has been involved throughout the Site investigation process. The proposed use restrictions included in this RADWP are generally recognized as commonly employed measures for long-term stewardship. Ultimately State/MDE support will be evaluated based on comments received during the public comment period.

The undisturbed scenario with institutional controls will satisfy the CERCLA Threshold Criteria and Balancing Criteria and will do so in a manner that ensures rapid and reliable implementation and effectiveness. The undisturbed scenario is cost-effective and consistent with the proposed development plan for the Site.

4.0 PROPOSED SITE DEVELOPMENT PLAN

Tradepoint Atlantic is proposing to construct an electrical substation on Sub-Parcel B2-1. Included will be improvements on approximately 7.2 acres of land in the northwestern portion of Parcel B2. The proposed future use is Tier 3B – Restricted Industrial. The remainder of Parcel B2 will be addressed in additional separate development plans in accordance with the requirements of the ACO that will include RADWPs, if necessary.

Certain compounds (inorganics) are present in the soils located near the surface and in the subsurface at concentrations in excess of the PALs. Therefore, soil is considered a potential media of concern. Future adult Composite Workers could potentially contact surface soil during normal duties conducted at the Site. Future Construction Workers may contact impacted surface and/or subsurface soil during earth movement activities associated with future construction activities.

The SLRA has indicated no potential risks to future adult Composite Workers associated with impacts to soil exceeding the PALs. General health and safety controls (level D protection) outlined in the property-wide Health and Safety Plan (HASP provided in **Appendix E**) will mitigate any potential risk to Construction Workers from contacting impacted soil and groundwater during development at the Site. The findings of the SLRA indicated that the screening level estimate of Construction Worker cancer risk for the site-specific 35-day exposure frequency was less than 1E-5 (the acceptable level for no further action). Furthermore, no potential non-cancer hazards above the HI of 1 were identified for any target organ in the development area using the 35-day exposure frequency. If the schedule of site-wide intrusive activities for an individual worker exceeds 35 days, additional site-specific health and safety requirements will be warranted.

A restriction prohibiting the use of groundwater for any purpose at the Site will be included as an institutional control in the No Further Action Letter (NFA) and Certificate of Completion (COC) issued by the MDE, and a deed restriction prohibiting the use of groundwater will be filed. These groundwater use restrictions will protect future Composite Workers from potential exposures. Proper water management is required to prevent unacceptable discharges or risks to Construction Workers during development. Work practices and health and safety plans governing groundwater encountered during excavation activities will provide protection for Construction Workers involved with future development at the Site.

The proposed Sub-Parcel B2-1 Development Area, approximately 7.2 acres, will remain uncapped with only minor grading. The electrical substation and support facilities will be constructed in the graded development area. The development plan for the Site is indicated in **Figure 2**. The process of constructing the proposed substation involves the tasks listed below. As-built and regulatory documentation for the outlined tasks and procedures will be provided in a Sub-Parcel B2-1 Development Completion Report:

- **Development Phase**

1. Erosion and sediment control installation for development.

Installation of erosion and sediment controls will be completed in accordance with the requirements of the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control prior to any construction at the Site. Any soils which are disturbed during the installation of erosion and sediment controls will be replaced on-site and compacted (i.e., may be placed at or near the surface but must be managed to prevent erosion).

2. Grading and site preparation.

As indicated on the development plans in **Appendix D**, minor site grading will occur within the Sub-Parcel B2-1 boundary. Any material that is not suitable for compaction below proposed structures will be excavated and replaced with subbase material, although it is not anticipated that poor soils will be encountered. Borrow materials, if necessary, will be obtained from MDE-approved sources and may include clean fill approved for industrial use and (subject to testing and approval) processed slag aggregate sourced from the Tradepoint Atlantic property. These sources shall be free of organic material, frozen material, or other deleterious material. In the case that there is excess material, the spoils will be stockpiled at a suitable location in accordance with the Materials Management Plan (MMP) for the Sparrows Point Facility (Papadopulos & Associates, et al., June 17, 2015). This work will be coordinated with MDE accordingly. No excess material will leave the 3,100 acre property without prior approval from the MDE.

3. Installation of structures and underground utilities.

The structures associated with the proposed electrical substation will be installed at the grades and lines shown on the development plans in **Appendix D**. Soils relocated or removed during the construction of the substation structures and utilities may be replaced on-site and compacted, but soil removed from utility trenches cannot be used as fill within the utility trenches unless such materials have been approved for this use by the VCP. Additional protocols for the installation of utilities at the Site are provided in Section 5.1.1.

Any water removed will be collected to be sampled as described in Section 5.2 and, if acceptable, taken to the on-site wastewater treatment plant. If analytical results indicate the presence of levels of contaminants exceeding levels that are acceptable for treatment at the wastewater treatment plant (as defined in Section 5.2), the water will either be pre-treated through an on-site treatment system and retested prior to pumping to the wastewater treatment plant or will be disposed of at an appropriate off-site facility.

4. Stormwater management.

A stormwater management plan for the Site is provided with the development plan drawings in **Appendix D**. Tradepoint Atlantic will work with the MDE Industrial & General Permits Division in 2018 to renew the property-wide NPDES permit. A meeting has already been conducted for this purpose. The stormwater management systems for each parcel are reviewed and approved by Baltimore County for each individual development project. A full plan for the property will be designed once more parcels have been completed and there is a greater understanding of how the overall property will be developed. The agencies will be copied when the management plan is submitted.

5.0 DEVELOPMENT IMPLEMENTATION PROTOCOLS

5.1. DEVELOPMENT PHASE

This plan presents protocols for the handling of soils and fill materials in association with the development of Sub-Parcel B2-1. In particular, this plan highlights the minimum standards for construction practices and managing potentially contaminated materials to reduce potential risks to workers and the environment.

Several exceedances of the PALs were identified in soil samples across the Site. The PALs are set based on USEPA's RSLs for industrial soils, or other direct guidance from the MDE. Because PAL exceedances can present potential risks to human health and the environment at certain concentrations, this plan presents material management and other protocols to be followed during the work to adequately mitigate such potential risks for material remaining on-site during the development phase. Following completion of the SLRA, the screening level estimate of Construction Worker cancer risk for the site-specific 35-day exposure frequency was less than 1E-5 (the acceptable level for no further action) for the site-wide EU. Furthermore, none of the potential non-cancer hazards were elevated above the HI of 1 for any exposure scenario when the schedule for intrusive construction activities was limited to 35 days. Since the cumulative duration of intrusive work is not expected to exceed 35 days for an individual worker, general worker protective controls (Level D) and health and safety measures will be sufficient for the proposed development schedule with no additional site-specific requirements.

5.1.1. Soil Excavation and Utility Trenching

A pre-excavation meeting shall be held to address proper operating procedures for working on-site and monitoring excavations and utility trenching in potentially contaminated material. This meeting shall consist of the construction manager and any workers involved with excavation/grading and/or utility work. During the pre-excavation meeting, all workers shall review the proposed excavation and trenching locations and any associated utility inverts. There was one boring location with potential evidence of NAPL identified during the preceding Phase II Investigation within a reasonable proximity to the development area (B2-051-SB). However, because the evidence in soil was minor and a temporary screening piezometer installed at this location did not accumulate NAPL, no special considerations are required prior to work other than review of the NAPL Contingency Plan discussed below. The HASP for the project shall also be reviewed and discussed.

Key soil excavation activities will be monitored through daily inspections by the environmental professional (EP). Soil excavation and removal activities will occur during utility trenching, facility construction, and grading. In general, and based on the existing sampling information, all excavated materials are expected to be suitable for replacement on the Site. However, the EP

will monitor all soil excavation activities for signs of potential contamination that may not have been previously identified (as described below).

To the extent practical, all excavation activities should be conducted in a manner to minimize double or extra handling of materials. Any stockpiles shall be kept within the Site footprint, and in a location that is not subjected to concentrated stormwater runoff. Stockpiles shall be managed as necessary to prevent the erosion and off-site migration of stockpiled materials, and in accordance with the applicable provisions of the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control. Soil designated for replacement on-site which does not otherwise exhibit evidence of contamination (as determined by the EP) may be managed in large stockpiles (no size restriction) as long as they remain within the erosion and sediment controls.

Utility trenches are to be over-excavated to a minimum of one foot on all sides of the proposed utility. All utility trenches will be backfilled with bedding and backfill materials approved by the MDE for industrial use. A general utility cross section is provided as **Appendix F**. Additional preventative measures will be required if evidence of petroleum contamination is encountered, to prevent the discharge to, or migration of, petroleum product along a utility conduit. Contingency measures have been developed to ensure that utilities will be constructed in a manner that will prevent the migration of any encountered NAPL, and that excavated material will be properly managed. The Utility Excavation NAPL Contingency Plan (**Appendix G**) provides protocols to be followed if NAPL is encountered during the construction activities. Preventative measures to inhibit the spread of petroleum product will be conducted in accordance with this plan.

The EP will monitor all soil excavation and utility trenching activities for signs of potential contamination that may not have been previously identified. In particular, soils will be monitored with a hand-held PID for potential VOCs, and will also be visually inspected for the presence of staining, petroleum waste materials, or other indications of contamination that may be different than what was already characterized. If screening of excavated materials by the EP indicates the presence of conditions of potential concern (i.e., sustained PID readings greater than 10 ppm, visual staining, unsuitable waste materials, etc.), such materials shall be segregated for additional sampling and special management. Excavated material exhibiting possible evidence of contamination should be placed in stockpiles (not to exceed 500 cubic yards) on polyethylene sheeting and covered with polyethylene sheeting to minimize potential exposures and erosion when not in use. Stockpiled materials will be sampled in accordance with waste disposal requirements, and properly transported to an appropriate permitted disposal facility. Plans for analysis of segregated soils for any use other than disposal must be submitted to the MDE for approval.

Excavated material that is visibly impacted by NAPL will be segregated and managed in accordance with the requirements specified in the Utility Excavation NAPL Contingency Plan. Excavated material with indicators of possible NAPL contamination will also be containerized or placed in a stockpile (not to exceed 500 cubic yards) on polyethylene sheeting and covered with

polyethylene sheeting until the material can be analyzed for TPH/Oil & Grease and PCBs (total) to characterize the material for appropriate disposal. The MDE will be notified if such materials are encountered during excavation or utility trenching activities.

5.1.2. **Soil Sampling and Disposal**

Excavated materials that are determined by the EP to warrant sampling and analysis because of elevated PID readings or other indicators of potential contamination that has not previously been characterized shall be sampled and analyzed to determine how the materials should be managed. If excavated and stockpiled, such materials should be covered with a polyethylene tarp to minimize potential exposures and erosion. A sampling work plan including a description of the material, estimated volume, and sampling parameters will be submitted to the MDE for approval. All excavated soil may be considered for use as on-site fill depending on the analytical results. All analytical data for the stockpiled material will be evaluated according to the standard Composite Worker SLRA analysis process. Following calculation of Composite Worker risk ratios for the stockpiled materials, if the cancer risk is less than or equal to 1E-5, and the non-cancer hazards (evaluated in terms of the magnitude of the exceedance and other factors such as bioavailability of the COPC) are acceptable, the excavated soil will be replaced on-site. If the cancer risk exceeds 1E-5 but is less than or equal to 1E-4 (and the non-cancer hazards are acceptable), the stockpiled soil will be suitable for use as fill in other areas of the Tradepoint Atlantic property under VCP caps. Otherwise, the materials will be sampled to determine if they would be classified as hazardous waste for disposal.

Soil material that is determined to be a hazardous waste shall be shipped off-site in accordance with applicable regulations to an appropriate and permitted RCRA disposal facility. Soil material may be taken to the on-site landfill (Greys) for proper disposal if the concentrations of excavated sampled materials indicate that the materials are not hazardous, but still are not suitable for reuse. The quantities of all materials that require disposal either off-site or at the on-site landfill, if any, will be recorded and identified in the Development Completion Report.

5.1.3. **Fill**

MDE-approved materials, which may include clean fill approved for industrial use and (subject to testing and approval) processed slag aggregate sourced from the Tradepoint Atlantic property, will be used as compacted subbase for the electrical substation if suitable material is not present on-site. Soil excavated on the sub-parcel has been determined to be suitable for re-use. As described in the SLRA, the risk ratios for COPCs in the Sub-Parcel B2-1 Development Area indicate that soil contaminant concentrations do not exceed acceptable risk levels for current and future Composite Workers. All over-excavated utility trenches will be backfilled with bedding and backfill approved by the MDE for industrial use. Any clean fill material imported to the Site will be screened according to MDE guidance for suitability.

5.1.4. **Erosion/Sediment Control**

Erosion and sediment controls will be installed prior to commencing work in accordance with 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control. The erosion and sediment controls will be approved by the Baltimore County Soil Conservation District. In addition, the following measures will be taken to prevent contaminated soil from exiting the Site:

- Stabilized construction entrance will be placed at site entrance.
- A dry street sweeper will be used as necessary on adjacent roads, and the swept dust will be collected and properly managed.
- Accumulated sediment removed from silt fence, and sediment traps if applicable, shall be periodically removed and returned to the Site.

5.1.5. **Dust Control**

General construction operations, including soil excavation and transport, soil grading, and trenching for utilities will be performed at the Site. These activities are anticipated to be performed in areas of soil impacted with COPCs. Best management practices should be undertaken at the Sparrows Point property as a whole to prevent the generation of dust which could impact other areas of the property outside of the immediate work zone. To limit worker exposure to contaminants borne on dust and windblown particulates, dust control measures will be implemented, if warranted when the above activities are performed in areas with potentially impacted soil. The action level proposed for the purpose of determining the need for dust suppression techniques (e.g. watering and/or misting) and/or continuous monitoring during the development activities at the Site will be 3.0 mg/m^3. The lowest of the site-specific dust action levels, OSHA PELs, and ACGIH TLV was selected as the proposed action level.

If visible dust is generated in the breathing zone, air monitoring will be implemented as follows:

- At the start of intrusive activities;
- Periodically during intrusive activities (15-minute intervals);
- When contaminants other than those previously identified are being handled;
- When a different type of operation is initiated or conditions change;
- If personnel are working in areas with obvious particulate contamination; and
- If a sufficient reasonable interval has passed so that exposures may have significantly changed.

Air monitoring will be performed using a ThermoElectron Corporation Personal Data RAM 1000AN dust monitor, a Met One Instruments, Inc. E-Sampler dust monitor, or another equivalent real-time air monitoring device. If the action level (3.0 mg/m³) is exceeded as a result of conditions occurring at the Site, operations will be stopped and dust suppression implemented. The background dust concentration will be utilized to evaluate whether Site activities are the source of the action level exceedance. Background concentrations will be based on measurements over a minimum of a 1-hour period at the upwind Site boundary. This upwind data will be used to calculate a time weighted average background dust concentration. The background dust concentration may need to be recalculated periodically during the work day, based on changed upwind conditions. Operations may be resumed once monitoring indicates that dust concentrations are below the action level.

As applicable, air monitoring will be conducted during development implementation activities in the immediate work zones and surrounding areas to assess levels of exposure to Site workers, establish that the work zone designations are valid, and verify that respiratory protection being worn by personnel, if needed, is adequate. Concurrent with the work zone air monitoring, perimeter air monitoring will also be performed to ensure contaminants are not migrating off-site. Perimeter monitoring will include monitoring along the perimeter of the Site, including both the downwind and upwind portions of the Site. The concentration measured in the downwind portion of the Site shall not exceed the concentration in the upwind portion. If exceedances attributable to Site conditions are identified downwind for more than five minutes, dust control measures and additional monitoring will be implemented. The dust suppression measures may include wetting or misting through the use of a hose connected to an available water supply or a water truck stationed at the Site.

Dust control measures will be implemented as described above to address dust generated as a result of construction activities conducted at the Site. However, based on the nature of the area and/or on-going activities surrounding the Site, it is possible that windblown particulates may come from surrounding areas. As discussed above, the dust concentration in the upwind portion of the Site will be considered when monitoring dust levels in the work zone. A pre-construction meeting will be held to discuss the potential of windblown particulates from other activities impacting the air monitoring required for this RADWP. Site contact information will be provided to address the possibility of upwind dust impacts. If dust is observed above the action level (3.0 mg/m³) and it is believed to originate from off-site (i.e., upwind) sources, this will immediately be reported to the MDE-VCP project team, as well as the MDE Air and Radiation Management Administration (ARMA).

5.2. WATER MANAGEMENT

This plan presents the protocols for handling any groundwater or surface water that needs to be removed to facilitate construction of the proposed Sub-Parcel B2-1 development. While it is not

anticipated that groundwater will be encountered during the proposed development, the following measures are provided as contingencies.

5.2.1. **Groundwater PAL Exceedances**

Aqueous PAL exceedances in groundwater in the vicinity of Sub-Parcel B2-1 included both inorganic and organic compounds, although none of the detections were significantly elevated. The complete analytical findings of the Area B Groundwater Investigation, including results obtained from shallow groundwater points in the vicinity of the Site (FM01-PZM003, SW08-PZM003, and SW-058-MWS) were presented to the agencies in the Area B Groundwater Phase II Investigation Report (Revision 0) dated September 30, 2016. While the concentrations of any PAL exceedances are not deemed to be a significant human health hazard since there is no on-site groundwater use, proper water management is required to prevent unacceptable discharges or risks to on-site workers.

5.2.2. **Dewatering**

Although dewatering is not anticipated to be necessary for this development project based on the limited scope of subsurface work, the following dewatering requirements are provided as contingencies. If dewatering is required, it shall be done in accordance with all local, state, and federal regulations.

Water that collects in excavations/trenches due to intrusion of groundwater, stormwater, and/or dust control waters will be pumped to the Humphrey Creek Waste Water Treatment Plant (HCWWTP). The water pumped to the HCWWTP will be treated and discharged in accordance with NPDES Permit No. 90-DP-0064A; I. Special Conditions; A.4; Effluent Limitations and Monitoring Requirements.

The EP will inspect the water that collects in the excavations/trenches. If the water exhibits indications of significant contamination (sheen, odor, discoloration, presence of product), or if the excavation/trench is within a known area of significant groundwater contamination (if groundwater is the source of the intrusive water) or a significant Phase II Investigation target, the water may be sampled and analyzed for some or all of the analyses listed below. The analyses run will be dependent on the suspected source of contamination and local site conditions.

The results of the analyses will be reviewed by the HCWWTP operator to determine if any wastewater treatment system adjustments are necessary. If the results of the analyses are above the threshold levels listed below, the water will be further evaluated to confirm acceptable treatment at the HCWWTP, or will be evaluated to design an appropriate pre-treatment option. Alternatively, the water may be disposed of at an appropriate off-site facility.

Analysis	Threshold Levels
Total metals by USEPA Method 6020A	1,000 ppm
PCBs by USEPA Method 8082	>Non-Detect
SVOCs by USEPA Method 8270C	1 ppm
VOCs by USEPA Method 8260B	1 ppm
Oil & Grease by USEPA Method 1664	200 ppm

Documentation of any water testing, as well as the selected disposal option, will be reported to the MDE in the Development Completion Report.

5.3. HEALTH AND SAFETY

A property-wide Health and Safety Plan (HASP provided as **Appendix E**) has been developed and is attached to this plan to present the minimum requirements for worker health and safety protection for the project. All contractors working on the Site must prepare their own HASP that provides a level of protection at least as much as that provided by the attached HASP. Alternately, on-site contactors may elect to adopt the HASP provided.

Prior to commencing work, the contractor must conduct an on-site safety meeting for all personnel. All personnel must be made aware of the HASP. Detailed safety information shall be provided to personnel who may be exposed to COPCs. Workers will be responsible for following safety procedures to prevent contact with potentially contaminated soil or groundwater.

5.4. INSTITUTIONAL CONTROLS (FUTURE LAND USE CONTROLS)

Long-term conditions related to future use of the Site will be placed on the RADWP approval, No Further Action Letter (NFA), and Certificate of Completion (COC). These conditions are anticipated to include the following:

- A restriction prohibiting the use of groundwater for any purpose at the Site and a requirement to characterize, containerize, and properly dispose of groundwater in the event of deep excavations encountering groundwater.
- Notice to MDE prior to any future soil disturbance activities at the Site. This written notice will be required at least 30 days prior to any planned excavation activities.
- Requirement for a HASP in the event of any future excavations at the Site.
- Complete appropriate characterization and disposal of any future material excavated at the Site in accordance with applicable local, state and federal requirements.

The responsible party will file the above deed restrictions as defined by the MDE-VCP in the NFA and COC. The entire property will be subject to the groundwater use restriction.

The Tenant will be required to sign onto the Environmental Covenant with restriction in the NFA. Tradepoint Atlantic will notify the Tenant of this requirement and will provide MDE with contact information for the Tenant prior to issuance of the NFA.

5.5. POST REMEDIATION REQUIREMENTS

Post remediation requirements will include compliance with the conditions specified in the NFA, COC, and the deed restrictions recorded for the Site. Deed restrictions will be recorded within 30 days after receipt of the final NFA. In addition, MDE will be provided with a written notice at least 30 days prior to any planned excavation activities at the Site. Written notice of planned excavation activities will include the proposed date(s) for the excavation, location of the excavation, health and safety protocols (as required), clean fill source (as required), and proposed characterization and disposal requirements.

5.6. CONSTRUCTION OVERSIGHT

Construction Oversight by an EP will ensure and document that the project is built as designed and appropriate environmental and safety protocols are followed. Upon completion, the EP will certify that the project is constructed in accordance with this RADWP. Records shall be provided to document:

- Daily observations of construction activities during site grading
- Compliance with soil screening requirements
- Proper water management, including documentation of any testing and water disposal

6.0 PERMITS, NOTIFICATIONS AND CONTINGENCIES

The participant and their contractors will comply with all local, state, and federal laws and regulations by obtaining any necessary approvals and permits to conduct the activities contained herein.

A grading permit is required if the proposed grading disturbs over 5,000 square feet of surface area or over 100 cubic yards of earth. A grading permit is required for any grading activities in any watercourse, floodplain, wetland area, buffers (stream and within 100 feet of tidal water), habitat protection areas or forest buffer areas (includes forest conservation areas). Erosion and Sediment Control Plans will be submitted to, and approved by, the Baltimore County Soil Conservation District prior to initiation of land disturbance for development.

There are no wetlands identified within the project area and no work will be performed beyond the shoreline so no permits are required from the MDE Water Resources Administration.

Contingency measures will include the following:

1. The MDE will be notified immediately of any previously undiscovered contamination, previously undiscovered storage tanks and other oil-related issues, and citations from regulatory entities related to health and safety practices.

2. Any significant change to the implementation schedule will be noted in the progress reports to MDE.

7.0 IMPLEMENTATION SCHEDULE

Progress reports will be submitted to the MDE on a quarterly basis. Each quarterly progress report will include, at a minimum, a discussion of the following information regarding tasks completed during the specified quarter:

- Development Progress
- Dust monitoring
- Water Management
- Soil Management (imported materials, screening, stockpiling)
- Soil Sampling and Disposal
- Notable Occurrences (if applicable)
- Additional Associated Work (if applicable)

The proposed implementation schedule is shown below:

Task	**Proposed Completion Date**
Anticipated Plan Approval	April 27, 2018
Intrusive Activities (Full Scope)	August 31, 2018
Ductbank Installation	October 31, 2018
Site Work	December 31, 2018
Foundations Installation	June 28, 2019
Breakers, Transformers, and Relay Equipment	September 30, 2019
Submittal of Completion Report/Notice of Readiness for Use*	February 2020
Request for a NFA from the MDE	March 2020
Recordation of institutional controls in the land records office of Baltimore County	Within 30 days of receiving the approval of NFA from the MDE

Submit proof of recordation with Baltimore County	Upon receipt from Baltimore County

*Notice of Readiness for Use shall be prepared by Professional Engineer registered in Maryland and submitted with the Development Completion Report to certify that the work is consistent with the requirements of this RADWP and the Site is suitable for occupancy and use.

FIGURES

Tradepoint Atlantic
Area A and Area B Parcels

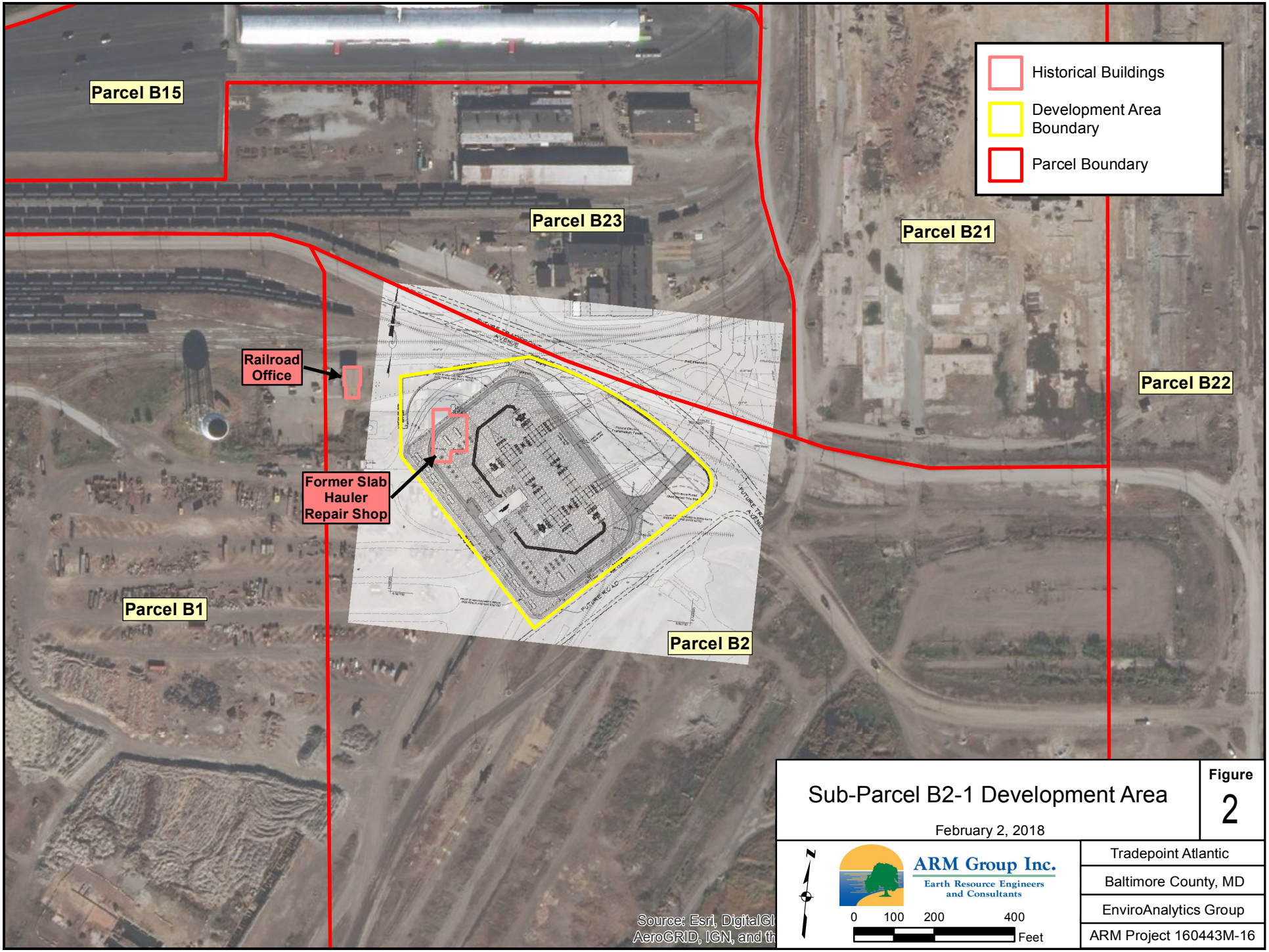
July 25, 2017

Figure 1

ARM Group Inc.
Earth Resource Engineers and Consultants

0 500 1,000 2,000 Feet

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
Area A: Project 150298M Area B: Project 150300M Development: Project 160443M



Sub-Parcel B2-1 Development Area

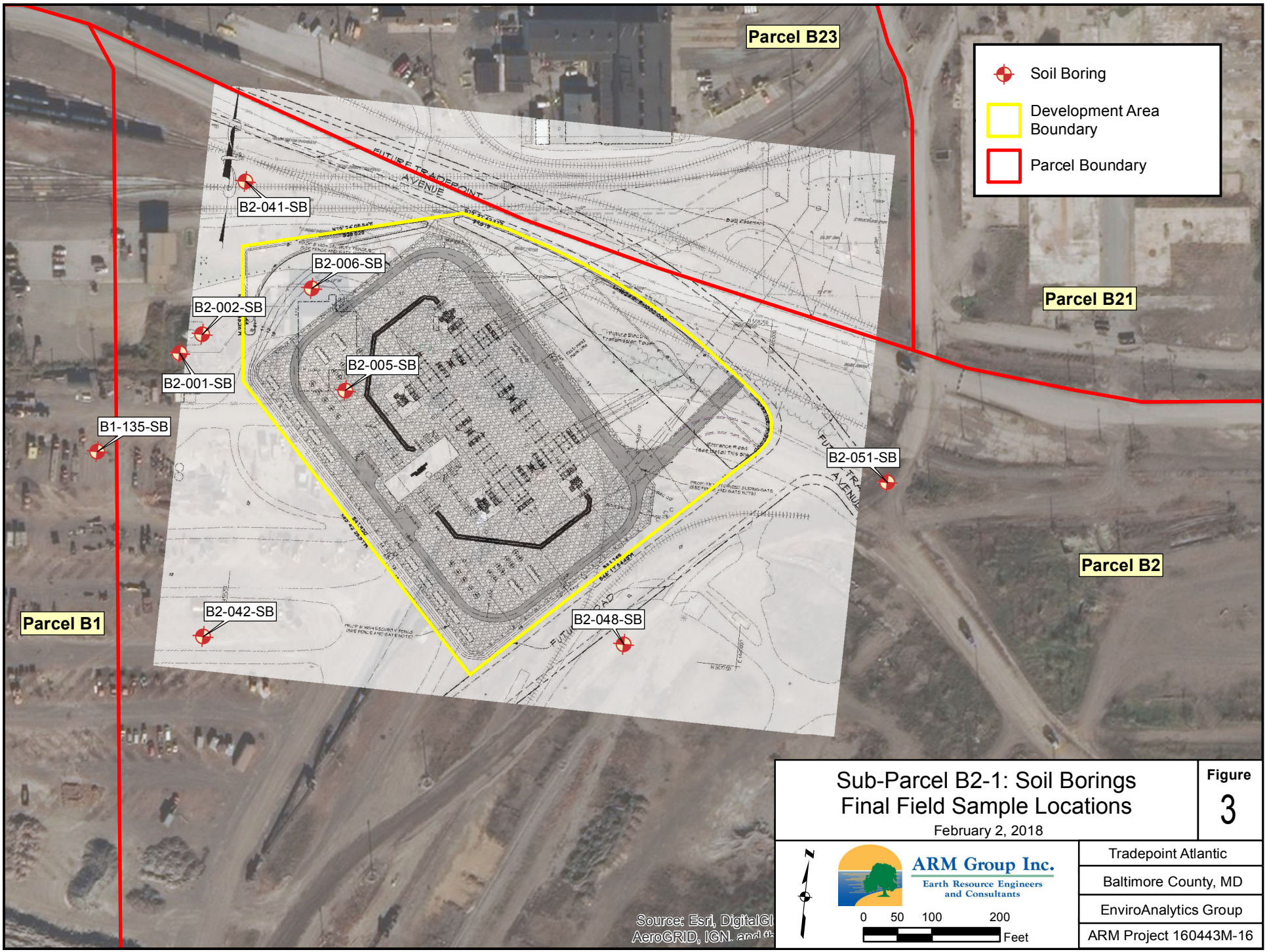
February 2, 2018

Figure 2

ARM Group Inc.
Earth Resource Engineers and Consultants

0 100 200 400 Feet

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-16



Sub-Parcel B2-1: Soil Borings Final Field Sample Locations

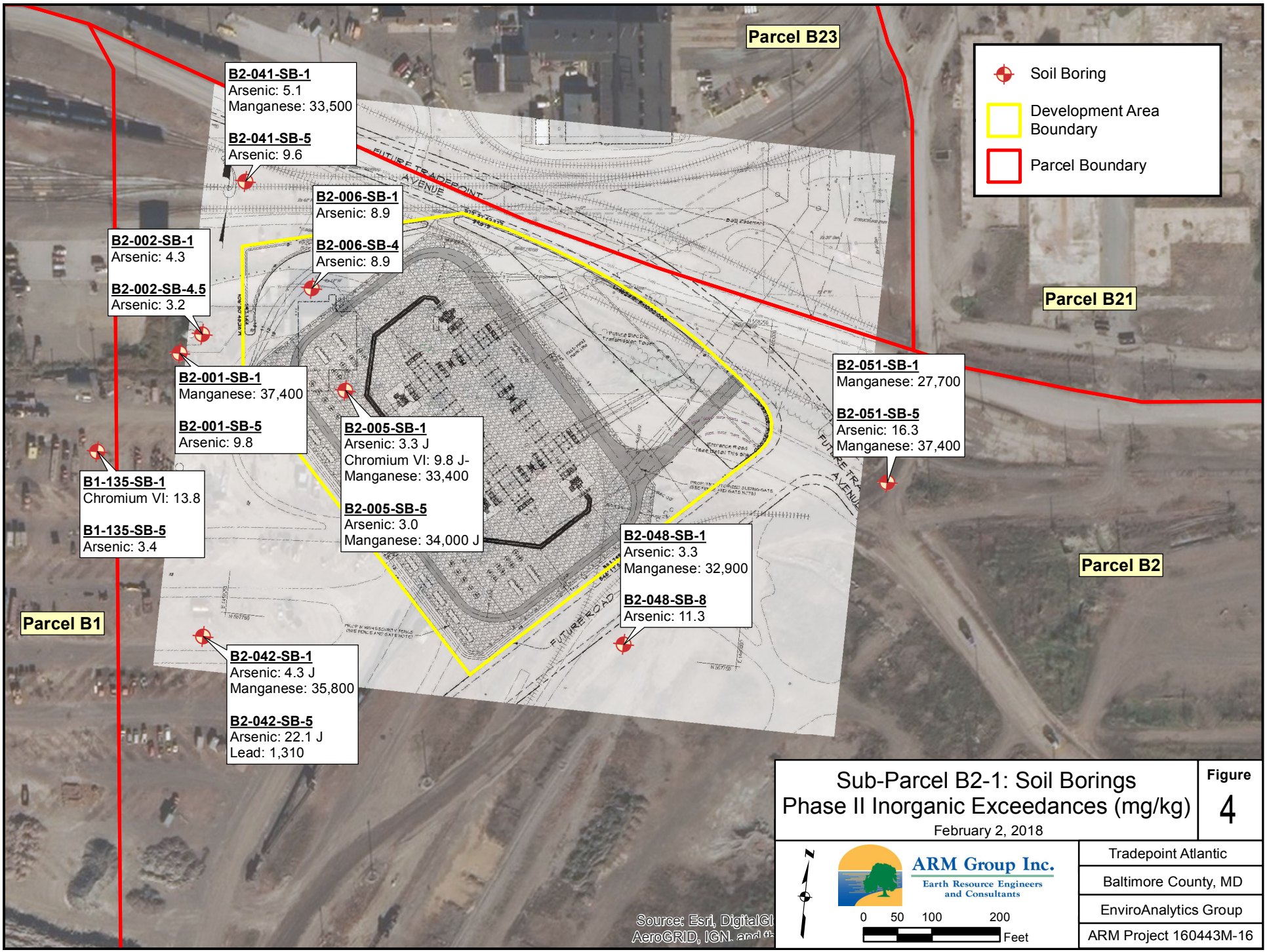
February 2, 2018

Figure 3

ARM Group Inc.
Earth Resource Engineers and Consultants

0 50 100 200 Feet

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-16



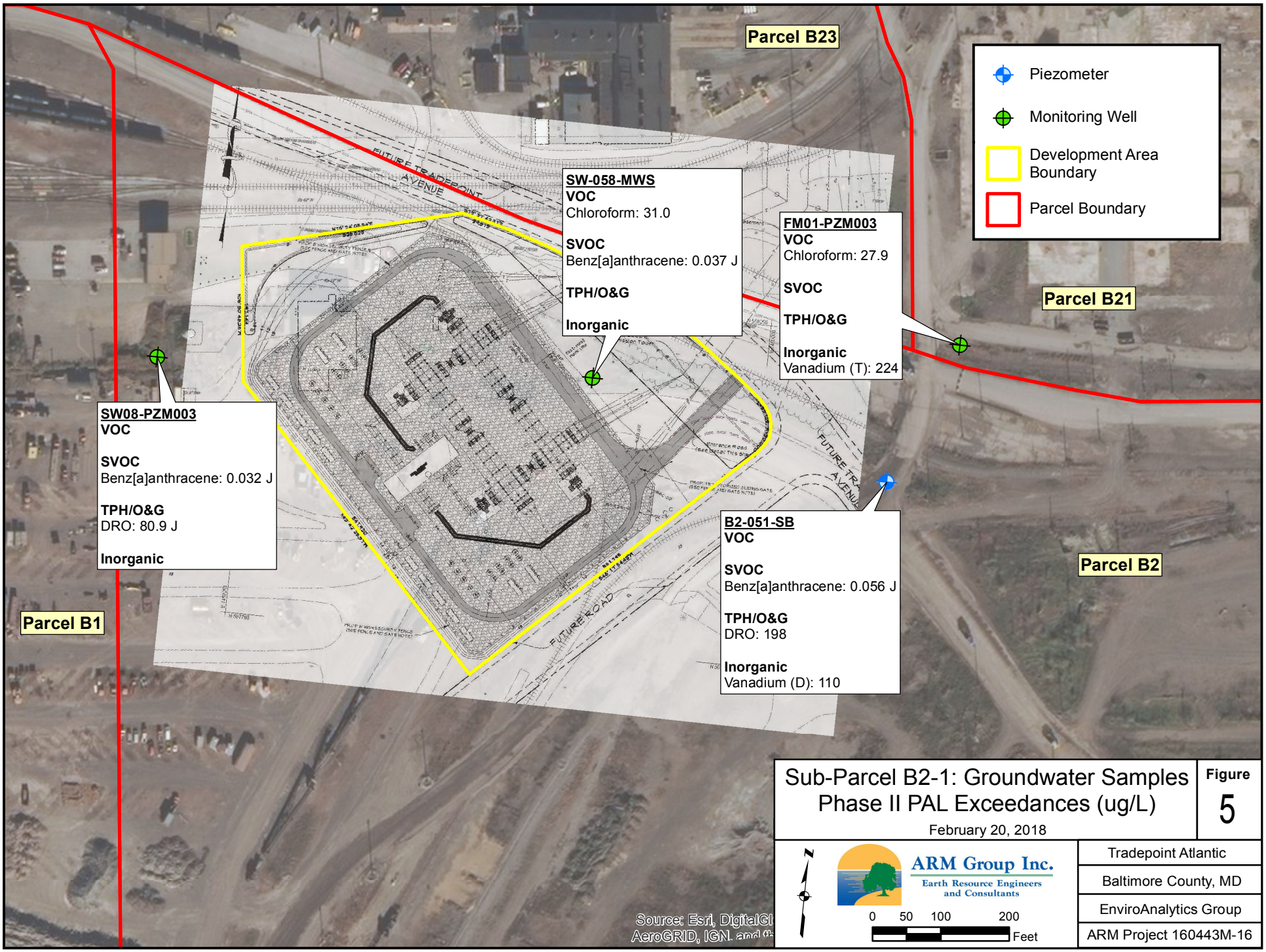
Sub-Parcel B2-1: Soil Borings
Phase II Inorganic Exceedances (mg/kg)

February 2, 2018

Figure 4

ARM Group Inc.
Earth Resource Engineers and Consultants

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-16



Sub-Parcel B2-1: Groundwater Samples Phase II PAL Exceedances (ug/L)

February 20, 2018

Figure 5

ARM Group Inc.
Earth Resource Engineers and Consultants

0 50 100 200 Feet

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-16

TABLES

Table 1
Summary of Organics Detected in Soil
Sub-Parcel B2-1
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	B1-135-SB-1*	B1-135-SB-5*	B2-001-SB-1	B2-001-SB-5	B2-002-SB-1	B2-002-SB-4.5	B2-005A-SB-1	B2-005-SB-1	B2-005-SB-5	B2-006-SB-1
Volatile Organic Compounds												
Acetone	mg/kg	670,000	**0.01**	**0.0084 J**	N/A	**0.019 J**	N/A	N/A	N/A	N/A	N/A	N/A
Semi-Volatile Organic Compounds^												
1,1-Biphenyl	mg/kg	200	0.075 U	0.072 U	0.076 U	0.073 U	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	**0.022 J**
1,2,4,5-Tetrachlorobenzene	mg/kg	350	0.075 U	0.072 U	0.076 U	0.073 U	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	0.073 U
2,4-Dimethylphenol	mg/kg	16,000	0.075 U	0.072 U	**0.035 J**	0.073 U	0.078 U	0.078 U	0.073 UJ	0.074 R	0.073 R	0.073 U
2-Methylnaphthalene	mg/kg	3,000	**0.0017 J**	**0.011**	**0.15**	**0.056 J**	**0.016 J**	**0.003 J**	**0.0064 J**	0.074 U	**0.0062 J**	**0.19**
2-Methylphenol	mg/kg	41,000	0.075 U	0.072 U	0.076 R	0.073 U	0.078 U	0.078 U	0.073 UJ	0.074 R	0.073 R	0.073 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	0.15 U	0.14 U	0.15 R	0.15 U	0.16 U	0.15 U	0.15 UJ	0.15 R	0.15 R	0.15 U
Acenaphthene	mg/kg	45,000	0.0016 B	0.003 B	**0.098**	**0.022 J**	**0.016 J**	**0.0006 J**	**0.0008 J**	0.074 UJ	0.0073 UJ	**0.058 J**
Acenaphthylene	mg/kg	45,000	0.0074 U	**0.0063 J**	**0.15**	**0.034 J**	0.078 UJ	**0.0041 J**	**0.0091**	0.074 UJ	0.0073 UJ	**0.17**
Acetophenone	mg/kg	120,000	0.075 U	0.072 U	**0.027 J**	**0.028 J**	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	**0.02 J**
Anthracene	mg/kg	230,000	0.0052 B	0.018 B	**0.087 J**	**0.053 J**	**0.009 J**	**0.0099**	**0.0058 J**	**0.0043 J**	**0.0036 J**	**0.33**
Benz[a]anthracene	mg/kg	21	**0.0051 J**	**0.077**	**0.0084**	**0.27**	**0.047 J**	**0.038**	**0.019**	**0.019 J**	**0.013**	**0.91**
Benzaldehyde	mg/kg	120,000	0.075 U	0.072 U	0.076 U	**0.023 J**	**0.053 J**	0.078 U	0.073 U	0.019 J	0.073 U	**0.025 J**
Benzo[a]pyrene	mg/kg	2.1	**0.0021 J**	**0.11**	**0.0029 J**	**0.29**	**0.071 J**	**0.028**	**0.013**	**0.012 J**	**0.0099**	**0.8**
Benzo[b]fluoranthene	mg/kg	21	**0.0072 J**	**0.25**	**0.013**	**0.41**	**0.14**	**0.06**	**0.033**	**0.057 J**	**0.027**	**1.5**
Benzo[g,h,i]perylene	mg/kg		**0.0013 J**	**0.061**	**0.0059 J**	**0.25**	**0.047 J**	**0.012**	**0.021**	**0.023 J**	**0.0062 J**	**0.41**
Benzo[k]fluoranthene	mg/kg	210	**0.0074 J**	**0.26**	**0.01**	**0.12**	**0.11**	**0.048**	**0.026**	**0.045 J**	**0.021**	**1.2**
bis(2-Ethylhexyl)phthalate	mg/kg	160	0.075 U	0.072 U	0.076 U	**0.67 J**	0.078 U	0.078 U	0.047 J	**0.033 J**	0.073 U	0.057 B
Caprolactam	mg/kg	400,000	0.19 U	0.18 U	**1.3**	**0.043 J**	0.2 U	0.19 U	0.18 U	0.19 U	0.18 U	**0.023 J**
Carbazole	mg/kg		0.075 U	0.072 U	0.076 U	0.073 U	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	**0.078 J**
Chrysene	mg/kg	2,100	**0.0041 J**	**0.099**	**0.026**	**0.32**	**0.043 J**	**0.032**	**0.022**	**0.065 J**	**0.014**	**0.82**
Dibenz[a,h]anthracene	mg/kg	2.1	0.0074 U	**0.022**	0.0075 U	**0.072 J**	0.078 U	**0.0043 J**	**0.0034 J**	0.074 U	**0.0016 J**	**0.15**
Diethylphthalate	mg/kg	660,000	0.075 U	0.072 U	0.076 U	0.073 U	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	0.073 U
Di-n-butylphthalate	mg/kg	82,000	0.075 U	0.072 U	0.054 B	0.062 B	0.078 U	0.078 U	0.12 B	0.074 U	0.073 U	0.05 B
Di-n-ocytlphthalate	mg/kg	8,200	0.075 U	0.072 U	0.076 U	0.073 UJ	0.078 UJ	0.078 UJ	0.073 UJ	0.074 UJ	0.073 U	0.073 UJ
Fluoranthene	mg/kg	30,000	0.01 B	**0.12**	**0.03 J**	**0.31**	**0.058 J**	**0.062**	**0.035**	**0.055 J**	**0.032**	**1.3**
Fluorene	mg/kg	30,000	0.0028 B	0.0021 B	**0.071**	**0.016 J**	0.078 UJ	**0.0013 J**	**0.0013 J**	0.074 UJ	0.0073 UJ	**0.094**
Hexachloroethane	mg/kg	8	0.075 U	0.072 U	**0.039 J**	**0.031 J**	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	0.073 U
Indeno[1,2,3-c,d]pyrene	mg/kg	21	**0.00096 J**	**0.054**	**0.0039 J**	**0.18**	**0.043 J**	**0.013**	**0.011**	0.074 U	**0.0058 J**	**0.49**
Isophorone	mg/kg	2,400	0.075 U	0.072 U	**0.1**	0.073 U	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	0.073 U
Naphthalene	mg/kg	17	0.0023 B	0.015 B	**0.042**	**0.044 J**	0.078 UJ	0.0079 UJ	0.0094	0.074 UJ	**0.0061 J**	**0.18**
N-Nitrosodiphenylamine	mg/kg	470	0.075 U	0.072 U	**0.88**	**0.035 J**	0.078 U	0.078 U	0.073 U	0.074 U	0.073 U	0.073 U
Phenanthrene	mg/kg		0.012 B	0.048 B	**0.87 J**	**0.14**	**0.043 J**	**0.024 J**	**0.016**	**0.022 J**	**0.02 J**	**1**
Phenol	mg/kg	250,000	0.075 U	0.072 U	0.076 R	0.073 U	0.078 U	0.078 U	0.073 UJ	0.074 R	0.073 R	0.073 U
Pyrene	mg/kg	23,000	0.01 B	**0.12**	**0.38 J**	**0.39**	**0.055 J**	**0.047**	**0.03**	**0.077**	**0.025**	**0.99**
PCBs												
Aroclor 1260	mg/kg	0.99	0.056 U	N/A	0.019 U	N/A	0.019 U	N/A	0.018 U	0.018 U	N/A	0.019 U
PCBs (total)	mg/kg	0.97	0.056 U	N/A	0.13 U	N/A	0.14 U	N/A	0.13 U	0.13 U	N/A	0.13 U
TPH/Oil and Grease												
Diesel Range Organics	mg/kg	6,200	**19.8**	**37.5**	**1,310 J**	**218 J**	**81.5 J**	5.4 B	113 J	**507 J**	**31.3 J**	**53.3 J**
Gasoline Range Organics	mg/kg	6,200	10.3 U	9.7 U	**20.4**	2.9 B	5.8 B	5.2 B	4.1 B	4.7 B	4.3 B	3.4 B
Oil and Grease	mg/kg	6,200	N/A	N/A	**1,240**	**3,230**	**4,700**	**248**	**436 J-**	**2,440**	**254**	**460**

Detection in bold
* indicates non-validated data
^ PAH compounds were analysed via SIM
N/A indicates that the parameter was not analyzed for this sample
Values in red indicate an exceedance of the Project Action Limit (PAL)

U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.
R: The result for this analyte is unreliable. Additional data is needed to confirm or disprove the presence of this compound/analyte in the sample.

Table 1
Summary of Organics Detected in Soil
Sub-Parcel B2-1
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	B2-006-SB-4	B2-041-SB-1*	B2-041-SB-5*	B2-042-SB-1	B2-042-SB-5	B2-048-SB-1	B2-048-SB-8	B2-051-SB-1	B2-051-SB-5
Volatile Organic Compounds											
Acetone	mg/kg	670,000	N/A	0.0092 U	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Semi-Volatile Organic Compounds^											
1,1-Biphenyl	mg/kg	200	**0.063 J**	0.069 U	**0.021 J**	0.073 U	0.071 U	0.074 U	0.082 U	**0.021 J**	0.07 U
1,2,4,5-Tetrachlorobenzene	mg/kg	350	**0.019 J**	0.069 U	0.078 U	0.073 U	0.071 U	0.074 U	0.082 U	0.071 U	0.07 U
2,4-Dimethylphenol	mg/kg	16,000	**0.059 J**	0.069 U	0.078 U	0.073 R	0.071 R	0.074 R	0.082 U	0.071 R	0.07 R
2-Methylnaphthalene	mg/kg	3,000	**0.6**	**0.03 J**	**0.21**	**0.00098 J**	**0.056 J**	**0.15**	**0.0019 J**	**0.12**	**0.11**
2-Methylphenol	mg/kg	41,000	**0.039 J**	0.069 U	0.078 U	0.073 R	0.071 R	0.074 R	0.082 U	0.071 R	0.07 R
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	**0.12 J**	0.14 U	0.16 U	0.14 R	0.14 R	0.15 R	0.16 U	0.14 R	0.14 R
Acenaphthene	mg/kg	45,000	**0.044 J**	**0.0051 J**	**0.0048 J**	**0.00057 J**	**0.019 J**	**0.0058 J**	0.0083 U	0.071 U	**0.0083 J**
Acenaphthylene	mg/kg	45,000	**0.12**	**0.031 J**	**0.015**	0.0074 U	**0.02 J**	**0.0054 J**	**0.0011 J**	0.071 U	**0.073**
Acetophenone	mg/kg	120,000	**0.045 J**	0.069 U	**0.024 J**	0.073 U	0.071 U	0.074 U	0.082 U	0.071 U	0.07 U
Anthracene	mg/kg	230,000	**0.22**	**0.043 J**	**0.027**	**0.0007 J**	**0.038 J**	**0.016 J**	**0.0018 J**	0.071 U	**0.1**
Benz[a]anthracene	mg/kg	21	**0.54**	**0.11**	**0.07**	**0.0052 J**	**0.085**	**0.072 J**	**0.008 J**	**0.04 J**	**0.49**
Benzaldehyde	mg/kg	120,000	**0.11 J**	0.069 U	0.078 U	0.073 U	0.071 U	**0.04 J**	0.082 U	0.071 R	0.07 R
Benzo[a]pyrene	mg/kg	2.1	**0.51**	**0.12**	**0.062**	**0.003 J**	**0.075**	**0.044 J**	**0.0071 J**	**0.016 J**	**0.37**
Benzo[b]fluoranthene	mg/kg	21	**1**	**0.26**	**0.15**	**0.0059 J**	**0.11**	**0.13**	**0.018**	**0.063 J**	**0.92**
Benzo[g,h,i]perylene	mg/kg		**0.53**	**0.17**	**0.047**	**0.0026 J**	**0.076**	**0.062 J**	**0.0024 J**	**0.047 J**	**0.11**
Benzo[k]fluoranthene	mg/kg	210	**0.85**	**0.12**	**0.11**	**0.0022 J**	**0.066 J**	**0.12**	**0.016**	**0.043 J**	**0.63**
bis(2-Ethylhexyl)phthalate	mg/kg	160	0.09 B	**0.026 J**	0.078 U	0.073 U	**0.028 J**	0.074 UJ	0.082 U	0.071 U	0.07 U
Caprolactam	mg/kg	400,000	**0.066 J**	0.17 U	**0.05 J**	0.18 U	0.18 U	0.19 U	0.2 U	0.18 U	0.18 U
Carbazole	mg/kg		**0.075 J**	0.069 U	0.078 U	0.073 U	0.071 U	0.074 U	0.082 U	0.071 U	**0.032 J**
Chrysene	mg/kg	2,100	**0.58**	**0.13**	**0.12**	**0.0039 J**	**0.077**	**0.16**	**0.011**	**0.12**	**0.32**
Dibenz[a,h]anthracene	mg/kg	2.1	**0.15**	**0.027 J**	**0.014**	0.0074 U	**0.031 J**	0.074 U	0.0083 U	0.071 U	**0.035 J**
Diethylphthalate	mg/kg	660,000	0.023 B	0.046 B	0.054 B	0.073 U	0.02 B	0.074 U	0.082 U	0.071 U	0.07 U
Di-n-butylphthalate	mg/kg	82,000	0.058 B	0.069 U	0.078 U	0.069 B	0.13 B	0.041 B	0.037 B	0.071 U	0.07 U
Di-n-ocytlphthalate	mg/kg	8,200	0.082 UJ	0.069 U	0.078 U	0.073 U	0.071 U	**0.16 J**	0.082 U	0.071 UJ	0.07 U
Fluoranthene	mg/kg	30,000	**0.9**	**0.19**	**0.1**	**0.0067 J**	**0.11**	**0.12**	**0.013**	**0.12**	**0.74**
Fluorene	mg/kg	30,000	**0.053 J**	0.069 U	**0.012**	0.0074 U	**0.018 J**	**0.0077 J**	0.0083 U	0.071 U	**0.0063 J**
Hexachloroethane	mg/kg	8	0.082 U	0.069 U	0.078 U	0.073 U	0.071 U	0.074 U	0.082 U	0.071 U	0.07 U
Indeno[1,2,3-c,d]pyrene	mg/kg	21	**0.41**	**0.14**	**0.037**	**0.0023 J**	**0.06 J**	**0.018 J**	**0.0025 J**	0.071 U	**0.12**
Isophorone	mg/kg	2,400	0.082 U	0.069 U	0.078 U	0.073 U	0.071 U	0.074 U	0.082 U	0.071 U	0.07 U
Naphthalene	mg/kg	17	**0.48**	0.069 U	**0.15**	0.0074 U	**0.078**	**0.092**	0.0083 U	0.071 UJ	0.071 UJ
N-Nitrosodiphenylamine	mg/kg	470	0.082 U	0.069 U	0.078 U	0.073 U	0.071 U	0.074 U	0.082 U	0.071 U	0.07 U
Phenanthrene	mg/kg		**1.2**	**0.096**	**0.25**	**0.0045 J**	**0.097**	**0.092**	**0.0046 J**	**0.33**	**0.29**
Phenol	mg/kg	250,000	**0.046 J**	0.069 U	0.078 U	0.073 R	0.071 R	0.074 R	0.082 U	0.071 R	0.07 R
Pyrene	mg/kg	23,000	**0.73**	**0.18**	**0.096**	**0.0058 J**	**0.1**	**0.18**	**0.011**	**0.16**	**0.61**
PCBs											
Aroclor 1260	mg/kg	0.99	N/A	0.017 U	N/A	0.018 U	N/A	**0.056**	N/A	0.018 U	N/A
PCBs (total)	mg/kg	0.97	N/A	0.12 U	N/A	0.13 U	N/A	**0.056 J**	N/A	0.13 U	N/A
TPH/Oil and Grease											
Diesel Range Organics	mg/kg	6,200	**90.5 J**	**46**	**71.1**	**10.6 J**	**47.2 J**	**446 J**	**9.6 J**	**235**	**29.3**
Gasoline Range Organics	mg/kg	6,200	3.5 B	**5.8 J**	**20.5**	4 B	3 B	2.7 B	2.3 B	**3 J**	**2.8 J**
Oil and Grease	mg/kg	6,200	**552**	**289**	**202**	**77.7 J-**	**288 J-**	**2,240 J-**	**393 J-**	**1,430**	**267**

Detection in bold
* indicates non-validated data
^ PAH compounds were analysed via SIM
N/A indicates that the parameter was not analyzed for this sample
Values in red indicate an exceedance of the Project Action Limit (PAL)

U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.
R: The result for this analyte is unreliable. Additional data is needed to confirm or disprove the presence of this compound/analyte in the sample.

Table 2
Summary of Inorganics Detected in Soil
Sub-Parcel B2-1
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	B1-135-SB-1*	B1-135-SB-5*	B2-001-SB-1	B2-001-SB-5	B2-002-SB-1	B2-002-SB-4.5	B2-005A-SB-1	B2-005-SB-1	B2-005-SB-5	B2-006-SB-1
Metals												
Aluminum	mg/kg	1,100,000	**13,300**	**12,400**	**20,900**	**23,300**	**7,880**	**12,900**	**12,800**	**14,000**	**10,400**	**18,800**
Arsenic	mg/kg	3	2.4 U	**3.4**	2.4 U	**9.8**	**4.3**	**3.2**	**3.3 J**	**2.9**	**3**	**8.9**
Barium	mg/kg	220,000	**232**	**120**	**34**	**260**	**77.6 J**	**53.6 J**	**59.7**	**98.5 J**	**39.3 J**	**174**
Beryllium	mg/kg	2,300	**0.54 J**	**1.8**	0.95 U	**3.1**	**0.62 J**	**0.75 J**	**0.35 B**	**0.88**	0.84 U	**2.8**
Cadmium	mg/kg	980	0.38 B	0.52 B	1.4 U	**1 J**	**0.42 J**	1.5 U	1.3 U	1.2 U	**0.5 J**	**1.7**
Chromium	mg/kg	120,000	**949**	**72.2**	**1,390**	**95.7**	**454**	**33.7**	**1,460**	**970**	**1,420**	**413**
Chromium VI	mg/kg	6.3	**13.8**	0.26 B	**5.6 J-**	0.6 B	0.64 B	1.1 B	4 J-	**9.8 J-**	**3.6 J-**	0.71 B
Cobalt	mg/kg	350	**1.7 J**	**3.3 J**	**0.65 J**	**9.7**	**5.5**	**5.5**	**0.79 J**	**1.7 J**	**1.6 J**	**13**
Copper	mg/kg	47,000	**34.1**	**30.5**	**13.9**	**125**	**42.5 J**	**16.4 J**	**21.8**	**28.2 J**	**28 J**	**92.1**
Iron	mg/kg	820,000	**166,000**	**58,100**	**169,000**	**141,000**	**141,000**	**24,900**	**189,000**	**150,000**	**216,000**	**156,000**
Lead	mg/kg	800	**7.2**	**18.5**	**2.5**	**124**	**69.3**	**18**	**7.3**	**8.5**	**6.4**	**152**
Manganese	mg/kg	26,000	**18,900**	**3,520**	**37,400**	**4,060**	**13,700 J**	**285 J**	**33,400**	**24,600 J**	**34,000 J**	**10,700**
Mercury	mg/kg	350	0.1 U	**0.008 J**	0.11 U	**0.049 J**	0.12 U	**0.019 J**	**0.013 J**	0.11 U	0.097 U	**0.061 J**
Nickel	mg/kg	22,000	**19.7**	**15.1**	**14.4 J**	**34.8 J**	**23.3**	**18.6**	**16.7 J**	**19.9**	**21.5**	**49.2 J**
Selenium	mg/kg	5,800	3.9 U	3.9 U	3.8 U	3.4 U	3.5 U	4 U	3.4 U	3.3 U	3.4 U	3.3 U
Silver	mg/kg	5,800	**1 J**	2.9 U	**29.1 J**	**9.3 J**	**28.3**	**1.4 J**	**25 J**	**24.6**	**27.5**	**18.4 J**
Vanadium	mg/kg	5,800	**535**	**74.3**	**662**	**97.9**	**1,180**	**29.9**	**865**	**660**	**755**	**707**
Zinc	mg/kg	350,000	**99.4**	**97.2**	**18**	**308**	**98.2**	**54.4**	**64.5**	**114**	**56.8**	**433**
Other												
Cyanide	mg/kg	150	**0.068 J**	**0.099 J**	**0.4 J**	**0.37 J**	**0.36 J+**	1 U	0.23 J	**0.29 J+**	**0.14 J+**	**1 J**

Detections in bold
Values in red indicates an exceedance of the Project Action Limit (PAL)
* indicates non-validated data
U: This analyte was not detected in the sample. The numeric value repesents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
J+: The positive result reported for this analyte is a quantitative estimate but may be biased high.
J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 2
Summary of Inorganics Detected in Soil
Sub-Parcel B2-1
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	B2-006-SB-4	B2-041-SB-1*	B2-041-SB-5*	B2-042-SB-1	B2-042-SB-5	B2-048-SB-1	B2-048-SB-8	B2-051-SB-1	B2-051-SB-5
Metals											
Aluminum	mg/kg	1,100,000	**11,100**	**9,640**	**34,100**	**9,530**	**6,660**	**18,000**	**17,500**	**18,300**	**14,900**
Arsenic	mg/kg	3	**8.9**	**5.1**	**9.6**	**4.3 J**	**22.1 J**	**3.3**	**11.3**	**2.5**	**16.3**
Barium	mg/kg	220,000	**125**	**80.9**	**334**	**36.5**	**74.5**	**74**	**67.8**	**127**	**90.2**
Beryllium	mg/kg	2,300	**1.7**	**0.14 J**	**1.8**	0.11 B	**0.96**	0.89 B	0.83 B	**1.8**	**0.18 J**
Cadmium	mg/kg	980	**0.77 J**	**0.52 J**	**1.1 J**	1.2 U	**15.8**	1.6 U	1.7 U	1.3 U	**0.55 J**
Chromium	mg/kg	120,000	**72.8**	**2,970**	**302**	**1,340**	**267**	**1,380**	**36.9**	**1,210 J**	**1,440 J**
Chromium VI	mg/kg	6.3	0.61 B	0.67 B	1.1 B	**5.4 J-**	0.47 B	**1.8 J-**	0.71 B	**1.7 J-**	**2.6 J-**
Cobalt	mg/kg	350	**11.3**	**2.3 J**	**22.7**	**1.3 J**	**14.6**	0.7 B	4.4 B	**0.55 J**	**1.9 J**
Copper	mg/kg	47,000	**66**	**25.4**	**167**	**15.1**	**213**	**21.1 J**	**16.8 J**	**13.2 J**	**30.8 J**
Iron	mg/kg	820,000	**97,500**	**178,000**	**41,900**	**197,000**	**318,000**	**207,000**	**29,000**	**151,000 J**	**184,000 J**
Lead	mg/kg	800	**84.5**	**11.1**	**167**	**1.6 J**	**1,310**	**1.5 J**	**14**	2.1 UJ	**36.9 J**
Manganese	mg/kg	26,000	**1,730**	**33,500**	**1,710**	**35,800**	**5,230**	**32,900**	**519**	**27,700**	**37,400**
Mercury	mg/kg	350	**0.21**	**0.048 J**	**0.048 J**	0.099 U	**0.059 J**	0.012 B	0.021 B	0.097 U	0.089 U
Nickel	mg/kg	22,000	**30.8 J**	**17.1**	**167**	**17.7 J**	**77.8 J**	**18 J**	**12 J**	**12.3 J**	**25.7 J**
Selenium	mg/kg	5,800	3.9 U	3.4 U	**2 J**	3.2 U	3.3 U	4.3 U	4.6 U	3.3 U	3.5 U
Silver	mg/kg	5,800	**6 J**	**20.6**	**11.2**	**26.7 J**	**13.2 J**	**25.3 J**	**2 J**	**25.3**	**29.3**
Vanadium	mg/kg	5,800	**88.2**	**576**	**86.5**	**623**	**244**	**905**	**42.5**	**778**	**837**
Zinc	mg/kg	350,000	**224**	**70**	**507**	**19.1**	**13,300**	**31.7 J**	**41.3 J**	**37.5 J**	**95 J**
Other											
Cyanide	mg/kg	150	**0.86 J**	**0.66 J**	**1.1**	1 U	**0.51 J**	**0.55 J+**	**0.42 J+**	**0.22 J-**	**0.33 J-**

Detections in bold
Values in red indicates an exceedance of the Project Action Limit (PAL)
* indicates non-validated data
U: This analyte was not detected in the sample. The numeric value repesents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
J+: The positive result reported for this analyte is a quantitative estimate but may be biased high.
J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 3
Summary of Organics and Inorganics Detected in Groundwater
Sub-Parcel B2-1
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	FM01-PZM003	SW-058-MWS	SW08-PZM003	B2-051-PZ*
Volatile Organic Compounds						
Chloroform	µg/L	0.22	**27.9**	**31**	1 U	1 U
Toluene	µg/L	1,000	1 U	1 U	1 U	**0.84 J**
Semi-Volatile Organic Compounds^						
1,4-Dioxane	µg/L	0.46	0.1 U	0.1 U	**0.16**	**0.025 J**
2,4-Dimethylphenol	µg/L	360	1 U	1 U	1 U	**0.52 J**
2-Methylnaphthalene	µg/L	36	0.1 U	0.1 U	0.1 U	**0.55**
2-Methylphenol	µg/L	930	1 U	1 U	1 U	**0.31 J**
3&4-Methylphenol(m&p Cresol)	µg/L	930	2.1 U	2 U	2 U	**0.85 J**
Acenaphthene	µg/L	530	0.1 U	0.1 U	**0.033 J**	**0.49**
Acenaphthylene	µg/L	530	0.1 U	0.1 U	0.1 U	**0.42**
Anthracene	µg/L	1,800	**0.014 J**	0.1 U	**0.023 J**	**0.27**
Benz[a]anthracene	µg/L	0.03	**0.022 J**	**0.037 J**	**0.032 J**	**0.056 J**
Benzo[a]pyrene	µg/L	0.2	**0.014 J**	**0.021 J**	**0.029 J**	0.1 U
Benzo[b]fluoranthene	µg/L	0.25	0.1 U	**0.095 J**	**0.11 J**	0.1 U
Benzo[g,h,i]perylene	µg/L		0.1 U	**0.025 J**	0.1 UJ	0.1 U
Benzo[k]fluoranthene	µg/L	2.5	0.1 U	**0.075 J**	0.083 B	0.1 U
Carbazole	µg/L		1 U	1 U	1 U	**1.6**
Chrysene	µg/L	25	**0.012 J**	**0.046 J**	0.028 B	0.1 U
Fluoranthene	µg/L	800	**0.059 J**	**0.039 J**	**0.014 J**	**0.45**
Fluorene	µg/L	290	0.1 U	0.1 U	**0.019 J**	**0.99**
Phenanthrene	µg/L		**0.056 J**	0.1 U	**0.018 J**	**1.8**
Pyrene	µg/L	120	**0.05 J**	**0.042 J**	0.1 U	**0.28**
TPH/Oil & Grease						
Diesel Range Organics	µg/L	47	47.9 B	105 UJ	**80.9 J**	**198**

Table 3
Summary of Organics and Inorganics Detected in Groundwater
Sub-Parcel B2-1
Tradepoint Atlantic
Sparrows Point, Maryland

Parameter	Units	PAL	FM01-PZM003	SW-058-MWS	SW08-PZM003	B2-051-PZ*
Total Metals						
Aluminum	µg/L	20,000	**118**	**295**	**236**	N/A
Arsenic	µg/L	10	5 U	5 U	**3.7 J**	N/A
Barium	µg/L	2,000	**25.8**	**27.4**	**20.3**	N/A
Chromium	µg/L	100	1.6 B	**8.6**	**1.5 J**	N/A
Iron	µg/L	14,000	50 B	**451**	**532**	N/A
Manganese	µg/L	430	**7.6**	**17.2**	**296**	N/A
Nickel	µg/L	390	**0.71 J**	10 U	2.7 B	N/A
Vanadium	µg/L	86	**224**	**21.4**	1.4 B	N/A
Zinc	µg/L	6,000	10 U	**8.2 J**	**11.2**	N/A
Dissolved Metals						
Aluminum, Dissolved	µg/L	20,000	**102**	**51.4**	50 U	**1,130**
Arsenic, Dissolved	µg/L	10	5 U	5 U	3.3 B	**5.1**
Barium, Dissolved	µg/L	2,000	**25.7**	**22.4**	**18.9**	**100**
Chromium, Dissolved	µg/L	100	1.3 B	**8.1**	**0.86 J**	**1 J**
Iron, Dissolved	µg/L	14,000	**23.9 J**	19.4 B	**69.5 J**	**121**
Manganese, Dissolved	µg/L	430	**5.8 J**	2.9 B	**278**	**5.6**
Vanadium, Dissolved	µg/L	86	**233**	**17.7**	0.63 B	**110**
Other						
Cyanide	µg/L	200	10 U	10 U	10 U	**0.016**

Detections in bold **Values in red indicate an exceedance of the Project Action Limit (PAL)**
^PAH compounds were analyzed via SIM
* indicates non-validated data
N/A indicates that the parameter was not analyzed for this sample

U: This analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.
UJ: This analyte was not detected in the sample. The actual quantitation/detection limit may be higher than reported.
J: The positive result reported for this analyte is a quantitative estimate.
B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

Table 4 - Sub-Parcel B2-1
COPC Screen Analysis

Parameter	CAS#	Location of Max Result	Max Detection (mg/kg)	Final Flag	Min Detection (mg/kg)	Average Detection (mg/kg)	Total Samples	Frequency of Detection (%)	Cancer TR=1E-06 (mg/kg)	Non-Cancer HQ=0.1 (mg/kg)	COPC?
1,1-Biphenyl	92-52-4	B2-006-SB-4	0.063	J	0.021	0.03	19	21.05	410	20	no
1,2,4,5-Tetrachlorobenzene	95-94-3	B2-006-SB-4	0.019	J	0.019	0.02	19	5.26		35	no
2,4-Dimethylphenol	105-67-9	B2-006-SB-4	0.059	J	0.035	0.05	12	16.67		1,600	no
2-Methylnaphthalene	91-57-6	B2-006-SB-4	0.6		0.00098	0.10	19	94.74		300	no
2-Methylphenol	95-48-7	B2-006-SB-4	0.039	J	0.039	0.04	11	9.09		4,100	no
Acenaphthene	83-32-9	B2-001-SB-1	0.098		0.00057	0.02	19	68.42		4,500	no
Acenaphthylene	208-96-8	B2-006-SB-1	0.17		0.0011	0.05	19	68.42			no
Acetone	67-64-1	B2-001-SB-5	0.019	J	0.0084	0.01	4	75.00		67,000	no
Acetophenone	98-86-2	B2-006-SB-4	0.045	J	0.02	0.03	19	26.32		12,000	no
Aluminum	7429-90-5	B2-041-SB-5	34,100		6,660	15,074	19	100.00		110,000	no
Anthracene	120-12-7	B2-006-SB-1	0.33		0.0007	0.06	19	84.21		23,000	no
Aroclor 1260	11096-82-5	B2-048-SB-1	0.056		0.056	0.06	10	10.00	0.99		no
Arsenic	7440-38-2	B2-042-SB-5	22.1	J	2.5	7.19	19	89.47	3	48	YES (C)
Barium	7440-39-3	B2-041-SB-5	334		34	114	19	100.00		22,000	no
Benz[a]anthracene	56-55-3	B2-006-SB-1	0.91		0.0051	0.15	19	100.00	21		no
Benzaldehyde	100-52-7	B2-006-SB-4	0.11	J	0.019	0.05	17	35.29	820	12,000	no
Benzo[a]pyrene	50-32-8	B2-006-SB-1	0.8		0.0021	0.13	19	100.00	2.1	22	no
Benzo[b]fluoranthene	205-99-2	B2-006-SB-1	1.5		0.0059	0.27	19	100.00	21		no
Benzo[g,h,i]perylene	191-24-2	B2-006-SB-4	0.53		0.0013	0.10	19	100.00			no
Benzo[k]fluoranthene	207-08-9	B2-006-SB-1	1.2		0.0022	0.20	19	100.00	210		no
Beryllium	7440-41-7	B2-001-SB-5	3.1		0.14	1.31	19	68.42	6,900	230	no
bis(2-Ethylhexyl)phthalate	117-81-7	B2-001-SB-5	0.67	J	0.026	0.16	19	26.32	160	1,600	no
Cadmium	7440-43-9	B2-042-SB-5	15.8		0.42	2.48	19	47.37	9,300	98	no
Caprolactam	105-60-2	B2-001-SB-1	1.3		0.023	0.30	19	26.32		40,000	no
Carbazole	86-74-8	B2-006-SB-1	0.078	J	0.032	0.06	19	15.79			no
Chromium	7440-47-3	B2-041-SB-1	2,970		33.7	857	19	100.00		180,000	no
Chromium VI	18540-29-9	B1-135-SB-1	13.8		1.7	5.37	19	47.37	6.3	350	YES (C)
Chrysene	218-01-9	B2-006-SB-1	0.82		0.0039	0.16	19	100.00	2,100		no
Cobalt	7440-48-4	B2-041-SB-5	22.7		0.55	5.77	19	89.47	1,900	35	no
Copper	7440-50-8	B2-042-SB-5	213		13.2	52.7	19	100.00		4,700	no
Cyanide	57-12-5	B2-041-SB-5	1.1		0.068	0.45	19	89.47		120	no
Dibenz[a,h]anthracene	53-70-3	B2-006-SB-1 & B2-006-SB-4	0.15		0.0016	0.05	19	57.89	2.1		no

Table 4 - Sub-Parcel B2-1
COPC Screen Analysis

Parameter	CAS#	Location of Max Result	Max Detection (mg/kg)	Final Flag	Min Detection (mg/kg)	Average Detection (mg/kg)	Total Samples	Frequency of Detection (%)	Cancer TR=1E-06 (mg/kg)	Non-Cancer HQ=0.1 (mg/kg)	COPC?
Di-n-ocytlphthalate	117-84-0	B2-048-SB-1	0.16	J	0.16	0.16	19	5.26		820	no
Fluoranthene	206-44-0	B2-006-SB-1	1.3		0.0067	0.24	19	94.74		3,000	no
Fluorene	86-73-7	B2-006-SB-1	0.094		0.0013	0.03	19	52.63		3,000	no
Hexachloroethane	67-72-1	B2-001-SB-1	0.039	J	0.031	0.04	19	10.53	8	46	no
Indeno[1,2,3-c,d]pyrene	193-39-5	B2-006-SB-1	0.49		0.00096	0.09	19	89.47	21		no
Iron	7439-89-6	B2-042-SB-5	318,000		24,900	148,126	19	100.00		82,000	YES (NC)
Isophorone	78-59-1	B2-001-SB-1	0.1		0.1	0.10	19	5.26	2,400	16,000	no
Lead^	7439-92-1	B2-042-SB-5	1,310		1.5	113	19	94.74		800	YES (NC)
Manganese	7439-96-5	B2-001-SB-1 & B2-051-SB-5	37,400		285	18,792	19	100.00		2,600	YES (NC)
Mercury	7439-97-6	B2-006-SB-4	0.21		0.008	0.06	19	47.37		35	no
Naphthalene	91-20-3	B2-006-SB-4	0.48		0.0061	0.12	19	47.37	17	59	no
Nickel	7440-02-0	B2-041-SB-5	167		12	32.2	19	100.00	64,000	2,200	no
N-Nitrosodiphenylamine	86-30-6	B2-001-SB-1	0.88		0.035	0.46	19	10.53	470		no
PCBs (total)*	1336-36-3	B2-048-SB-1	0.056	J	0.056	0.06	10	10.00	0.94		no
Phenanthrene	85-01-8	B2-006-SB-4	1.2		0.0045	0.26	19	89.47			no
Phenol	108-95-2	B2-006-SB-4	0.046	J	0.046	0.05	11	9.09		25,000	no
Pyrene	129-00-0	B2-006-SB-1	0.99		0.0058	0.23	19	94.74		2,300	no
Selenium	7782-49-2	B2-041-SB-5	2	J	2	2.00	19	5.26		580	no
Silver	7440-22-4	B2-051-SB-5	29.3		1	18.0	19	94.74		580	no
Vanadium	7440-62-2	B2-002-SB-1	1,180		29.9	513	19	100.00		580	YES (NC)
Zinc	7440-66-6	B2-042-SB-5	13,300		18	825	19	100.00		35,000	no

J: The positive result reported for this analyte is a quantitative estimate.

COPC = Constituent of Potential Concern
TR = Target Risk
HQ = Hazard Quotient
C = Compound was identified as a cancer COPC
NC = Compound was identified as a non-cancer COPC

*PCBs (total) include the sum of all detected aroclor mixtures, including those without regional screening levels (e.g. Aroclor 1262, Aroclor 1268) which are not displayed.
^The COPC screening level for lead was not adjusted to the HQ=0.1 because lead is not assessed in the SLRA. The 800 mg/kg PAL is relevant to the Adult Lead Model procedure.

Table 5 - Sub-Parcel B2-1
Assessment of Lead

Exposure Unit	Surface/Sub-Surface	Arithmetic Mean (mg/kg)
Site-Wide (7.2 ac.)	Surface	26.3
	Sub-Surface	198
	Pooled	107

Adult Lead Model (ALM) Risk Levels	
Soil Concentration (mg/kg)	Probability of Blood Concentration of 10 ug/dL
2,518 mg/kg	5%
3,216 mg/kg	10%

Table 6 - Sub-Parcel B2-1
Composite Worker Risk Ratios
Maximum Values - 9 Locations

		Composite Worker - 7.2 acres				
		Pooled Soil (Max Values)				
			RSLs		Risk Estimates	
Parameter	Target Organ	Max mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	22.1	3.00	480	7.4E-06	0.05
Chromium VI	Respiratory	13.8	6.30	3,500	2.2E-06	0.004
Iron	Gastrointestinal	318,000		820,000		0.4
Manganese	Nervous	37,400		26,000		1
Vanadium	Dermal	1,180		5,800		0.2
					1E-05	↓

RSLs were obtained from the EPA Regional Screening Levels at https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

Total HI	Dermal	0
	Cardiovascular	0
	Respiratory	0
	Nervous	1
	Gastrointestinal	0

Table 7 - Sub-Parcel B2-1
Construction Worker Risk Ratios
Maximum Values - 9 Locations

35-Day Exposure		Construction Worker - 7.2 acres				
		Pooled Soil (Max Values)				
			SSLs		Risk Estimates	
Parameter	Target Organ	Max mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	**Cardiovascular; Dermal**	22.1	108	681	2.0E-07	0.03
Chromium VI	**Respiratory**	13.8	148	5,696	9.3E-08	0.002
Iron	**Gastrointestinal**	318,000		1,718,152		0.2
Manganese	**Nervous**	37,400		26,294		1
Vanadium	**Dermal**	1,180		11,137		0.1
					3E-07	↓

SSLs calculated using equations in the EPA Supplemental Guidance dated 2002.

Guidance Equation Input Assumptions:

5 cars/day (2 tons/car)
5 trucks/day (20 tons/truck)
3 meter source depth thickness

Total HI	Dermal	0
	Cardiovascular	0
	Respiratory	0
	Nervous	1
	Gastrointestinal	0

APPENDIX A

TRADEPOINT
ATLANTIC
1600 Sparrows Point Boulevard
Baltimore, Maryland 21219

January 22, 2018

Maryland Department of Environment
1800 Washington Boulevard
Baltimore MD, 21230

Attention: Ms. Barbara Brown

Subject: Request to Enter Temporary CHS Review
Tradepoint Atlantic Parcel B2-1 – Fitzell Substation

Dear Ms. Brown:

The conduct of any environmental assessment and cleanup activity on the Tradepoint Atlantic property, as well as any associated development, is subject to the requirements outlined in the following agreements:

- Administrative Consent Order (ACO) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the Maryland Department of the Environment (effective September 12, 2014); and
- Settlement Agreement and Covenant Not to Sue (SA) between Tradepoint Atlantic (formerly Sparrows Point Terminal, LLC) and the United States Environmental Protection Agency (effective November 25, 2014).

On September 11, 2014, Tradepoint Atlantic submitted an application to the Maryland Department of the Environment's (Department) Voluntary Cleanup Program (VCP).

In consultation with the Department, Tradepoint Atlantic affirms that it desires to accelerate the assessment, remediation and redevelopment of certain sub-parcels within the larger site due to current market conditions. To that end, the Department and Tradepoint Atlantic agree that the Controlled Hazardous Substance (CHS) Act (Section 7-222 of the Environment Article) and the CHS Response Plan (COMAR 26.14.02) shall serve as the governing statutory and regulatory authority for completing the development activities on Parcel B2-1 and complement the statutory requirements of the Voluntary Cleanup Program (Section 7-501 of the Environment Article). Upon submission of a Site Response and Development Work Plan and completion of the remedial activities for the sub-parcel, the Department shall issue a "No Further Action" letter upon a recordation of an environmental covenant describing any necessary land use controls for the specific sub-parcel. At such time that all the sub-parcels within the larger parcel have completed remedial activities, Tradepoint Atlantic shall submit to the Department a request for issuing a Certificate of Completion (COC) as well as all pertinent information concerning completion of remedial activities conducted on the parcel. Once the VCP has completed its review of

TRADEPOINT
ATLANTIC
1600 Sparrows Point Boulevard
Baltimore, Maryland 21219

the submitted information it shall issue a COC for the entire parcel described in Tradepoint Atlantic's VCP application.

Alternatively, Tradepoint Atlantic or other entity may elect to submit an application for a specific sub-parcel and submit it to the VCP for review and acceptance. If the application is received after the cleanup and redevelopment activities described in this work plan are implemented and a No Further Action letter is issued by the Department pursuant to the CHS Act, the VCP shall prepare a No Further Requirements Determination for the sub-parcel.

If Tradepoint Atlantic or other entity has not carried out cleanup and redevelopment activities described in the work plan, the cleanup and redevelopment activities may be conducted under the oversight authority of either the VCP or the CHS Act, so long as those activities comport with this work plan.

Engineering and institutional controls approved as part of this Site Response and Development Work Plan shall be described in documentation submitted to the Department demonstrating that the exposure pathways on the sub-parcel are addressed in a manner that protects public health and the environment. This information shall support Tradepoint Atlantic's request for the issuance of a COC for the larger parcel.

Please do not hesitate to contact Tradepoint Atlantic for further information.

Thank you,

Peter Haid

Environmental Director
TRADEPOINT ATLANTIC
1600 Sparrows Point Boulevard
Baltimore, Maryland 21219
T 443.649.5055 C 732.841.7935
phaid@tradepointatlantic.com

APPENDIX B

Fitzell Substation Excavations

Excavation type	*Duration of Excavation **
Crew A	
Transformer Foundations and Containment	
Transformer 110-1 (TA), 110-2 (TB), 110-3 (TC), 110-4 (TD)	<28 days
Crew A Total	<28 days
Crew B	
Circuit Breaker Foundations	
B13, B14, B23, B24	<14 days
13.8 kV Reactors	
FDR 6024, 6025, 6026, 6027	<7 days
13.8 kV Cap	
FDR 6029	<7 days
Crew B Total	<28 days
Crew C	
Ductbank	
TC to SWGR, TB to SWGR	<7 days
Switchgear Enclosure	
Enclosure	<7 days
34.5 kV Reactors	
FDR 34090 - 34096	<7 days
34.5 kV Capacitors	
FDR 34090 to 34095	<7 days
Crew C Total	<28 days

*** No crew will exceed 35 days ground intrusive work.**

Schedule provided by Tradepoint Atlantic on February 16, 2018

APPENDIX C

Construction Worker Soil Screening Levels
35 Work Day Exposure
Calculation Spreadsheet - Sub-Parcel B2-1

Description	Variable	Value
Days worked per week	DW	5
Exposure duration (yr)	ED	1
Hours worked per day	ET	8
A/constant (unitless) - particulate emission factor	Aconst	12.9351
B/constant (unitless) - particulate emission factor	Bconst	5.7383
C/constant (unitless) - particulate emission factor	Cconst	71.7711
Dispersion correction factor (unitless)	FD	0.185
Days per year with at least .01" precipitation	P	130
Target hazard quotient (unitless)	THQ	1
Body weight (kg)	BW	80
Averaging time - noncancer (yr)	ATnc	1
Soil ingestion rate (mg/d)	IR	330
Skin-soil adherence factor (mg/cm2)	AF	0.3
Skin surface exposed (cm2)	SA	3300
Event frequency (ev/day)	EV	1
Target cancer risk (unitless)	TR	01E-06
Averaging time - cancer (yr)	ATc	70
A/constant (unitless) - volatilization	Aconstv	2.4538
B/constant (unitless) - volatilization	Bconstv	17.566
C/constant (unitless) - volatilization	Cconstv	189.0426
Dry soil bulk density (kg/L)	Pb	1.5
Average source depth (m)	ds	3
Soil particle density (g/cm3)	Ps	2.65
Total soil porosity	Lpore/Lsoil	0.43
Air-filled soil porosity	Lair/Lsoil	0.28

Construction Worker Soil Screening Levels
35 Work Day Exposure
Calculation Spreadsheet - Sub-Parcel B2-1

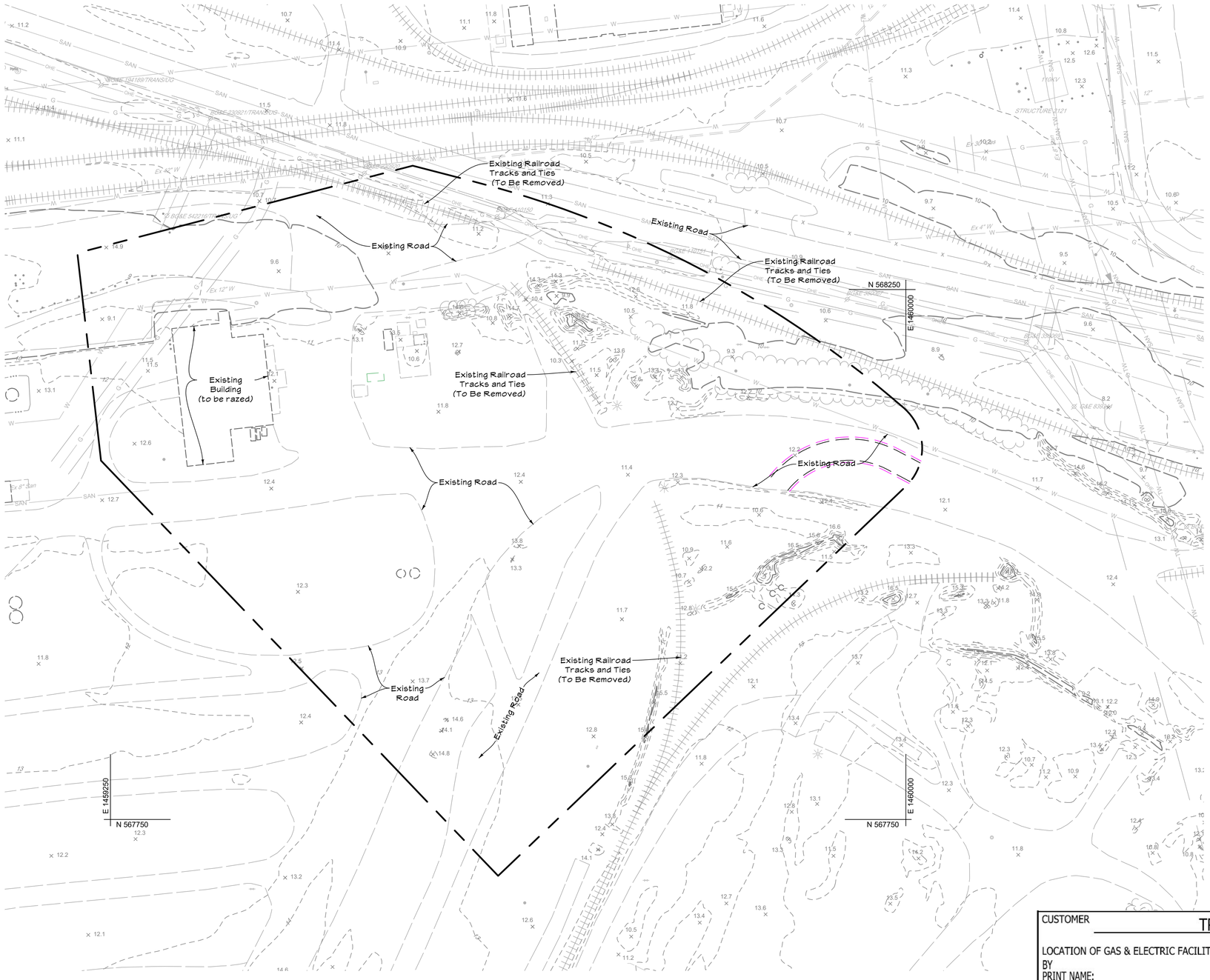
Area of site (ac)	Ac	7.2
Overall duration of construction (wk/yr)	EW	7
Exposure frequency (day/yr)	EF	**35**
Cars per day	Ca	5
Tons per car	CaT	2
Trucks per day	Tru	5
Tons per truck	TrT	20
Mean vehicle weight (tons)	w	**11**
Derivation of dispersion factor - particulate emission factor (g/m2-s per kg/m3)	Q/Csr	**15.8**
Overall duration of construction (hr)	tc	**1,176**
Overall duration of traffic (s)	Tt	**1,008,000**
Surface area (m2)	AR	**29,137**
Length (m)	LR	**171**
Distance traveled (km)	ΣVKT	**60**
Particulate emission factor (m3/kg)	PEFsc	**69,566,110**
Derivation of dispersion factor - volatilization (g/m2-s per kg/m3)	Q/Csa	**8.88**
Total time of construction (s)	Tcv	**1,008,000**

Input
Calculation

Chemical	RfD & RfC Sources	^Ingestion SF $(mg/kg\text{-}day)^{-1}$	^Inhalation Unit Risk $(ug/m^3)^{-1}$	^Subchronic RfD (mg/kg-day)	^Subchronic RfC (mg/m^3)	^GIABS	Dermally Adjusted RfD (mg/kg-day)	^ABS	^RBA	*Dia	*Diw	*Henry's Law Constant (unitless)	*Kd	*Koc	DA	Volatilization Factor - Unlimited Reservoir (m^3/kg)	Carcinogenic Ingestion/ Dermal SL (SLing/der)	Carcinogenic Inhalation SL (SLinh)	Carcinogenic SL (mg/kg)	Non-Carcinogenic Ingestion/ Dermal SL (SLing/der)	Non-Carcinogenic Inhalation SL (SLinh)	Non-Carcinogenic SL (mg/kg)
Arsenic, Inorganic	I/C	1.50E+00	4.30E-03	3.00E-04	1.50E-05	1	3.00E-04	0.03	0.6			-	2.90E+01				108	35,430	108	696	32,646	681
Chromium(VI)	A/N/I	5.00E-01	8.40E-02	5.00E-03	3.00E-04	0.025	1.25E-04	**0.01**	1			-	1.90E+01				161	1,814	148	5,746	652,928	5,696
Iron	P	-	-	7.00E-01	-	1	7.00E-01	**0.01**	1			-	2.50E+01							1,718,152		1,718,152
Manganese (Non-diet)	I	-	-	2.40E-02	5.00E-05	0.04	9.60E-04	**0.01**	1			-	6.50E+01							34,672	108,821	26,294
Vanadium and Compounds	A	-	-	1.00E-02	1.00E-04	0.026	2.60E-04	**0.01**	1			-	1.00E+03							11,738	217,643	11,137

*chemical specific parameters found in Chemical Specific Parameters Spreadsheet at https://www.epa.gov/risk/regional-screening-levels-rsls
^chemical specific parameters found in Unpaved Road Traffic calculator at https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search
I: chemical specific parameters found in the IRIS at https://www.epa.gov/iris
C: chemical specific parameters found in Cal EPA at https://www.dtsc.ca.gov/AssessingRisk
A: chemical specific parameters found in Agency for Toxic Substances and Disease Registry Minimal Risk Levels (MRLs) at https://www.atsdr.cdc.gov/mrls/pdfs/atsdr_mrls.pdf
P: chemical specific parameters found in the Database of EPA PPRTVs at https://hhpprtv.ornl.gov/quickview/pprtv.php
N: chemical specific parameters found in NJDEP

APPENDIX D



PLAN
SCALE: 1"=50'

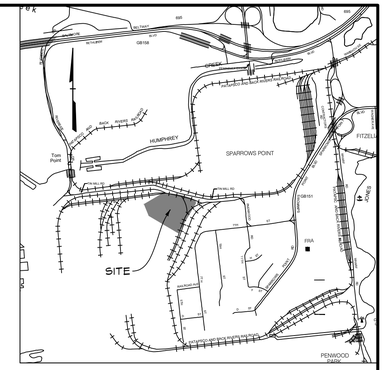
0 50' 100'

NOTE: THE ENTIRE SITE LIES WITHIN SOIL CLASSIFICATION UuB, HYDROLOGIC SOIL GROUP 'D'

MARYLAND COORDINATE SYSTEM
NAD 83 - NAVD 88/2011

LEGEND

- Existing Minor Contour
- Existing Major Contour
- Existing Edge of Road
- EX. 15"-D. SD — Existing Storm Drain
- E — Existing Underground Electric
- TW — TW — Existing Overhead Transmission Electric
- EX. 15" W. W — Existing Water Line
- EX. 12" G. G — Existing Gas Line
- EX. 8" S. SAN — Existing Sanitary Sewer Line
- OHE — Existing Overhead Distribution Electric line
- Existing Railroad Tracks
- Existing Utility Pole
- Existing Electric Structures
- Existing Curb and Gutter
- Existing Tree Line
- Existing Drive/Paving
- Existing Building
- Substation Easement Area



VICINITY MAP
SCALE: 1"=2000'

DATA REFERENCES:

1. Existing topography shown hereon is from field run survey by Century Engineering Inc, dated Nov 2016
2. Utilities shown hereon are from digital files provided by Tradepoint Atlantic LLC (TPA).
3. Coordinates and bearings shown hereon are referred to the Maryland Coordinate System, NAD 83(1991),elevations shown hereon referred to the North American Vertical Datum 1988 (NAVD 88) and referenced to the following Baltimore County control stations

Designation	Northing	Easting	Elevation	
863	578534.26	1453796.03	28.30	A railroad spike in the pavement at the northwest corner of the intersection of Peninsula Expressway and Chesterwood Rd
GIS-2	565182.41	1464480.70	9.95	Brass Disk in grass approximately 110ft north of BGE pole No260604 and 44ft off centerline of Wharf Rd. Access is through Trade Point Atlantic Property at gate B off of Wharf Rd.
GIS-52	574839.60	1467447.91	15.79	Brass Disk in the grass at the northwest corner of North Point Road and Veterans of Foreign Wars Post 2678 Entrance.

CUSTOMER TRADEPOINT ATLANTIC

LOCATION OF GAS & ELECTRIC FACILITIES APPROVED BY
PRINT NAME: SIGNATURE:
PHONE DATE

MCS

LIMIT OF DISTURBANCE: 314068 SF = 7.21 Ac.±

PROJECT ID#3020 SERV DATE: 12/1/19

UPDATE YOUR PRINT TO REFLECT 'AS BUILT' STATE & RETURN A COPY TO THE APPLICABLE DESIGN UNIT

11

CENTURY ENGINEERING PROJECT NO: 161294.00

CENTURY ENGINEERING
CONSULTING ENGINEERS - PLANNERS
10710 Gilroy Road, Hunt Valley, MD 21031
Phone: 443.589.2400 Fax: 443.589.2401

ENGINEER'S CERTIFICATION

"I CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 24814, EXPIRATION DATE: Feb 28, 2018."

STATE OF MARYLAND — ROBERT LEE ALFORD — No. 24814 — PROFESSIONAL ENGINEER

REV.	DATE	ACCOUNT NO.	DESCRIPTION	APPROVED

AUTOCAD

ENGINEERING
CIVIL CENTURY ENG. INC.
ELEC. ____
PROJ. ENG. ____
PROJ. MGR. Al Alford
PRIN. ENG. ____
SUPV. ENG. ____

DESIGN GROUP
DESIGNED RAL
DRAWN RAL
CHECKED RGB
APPROVED ____
DATE 15 Nov. 2016

Existing Conditions & Demolition Plan

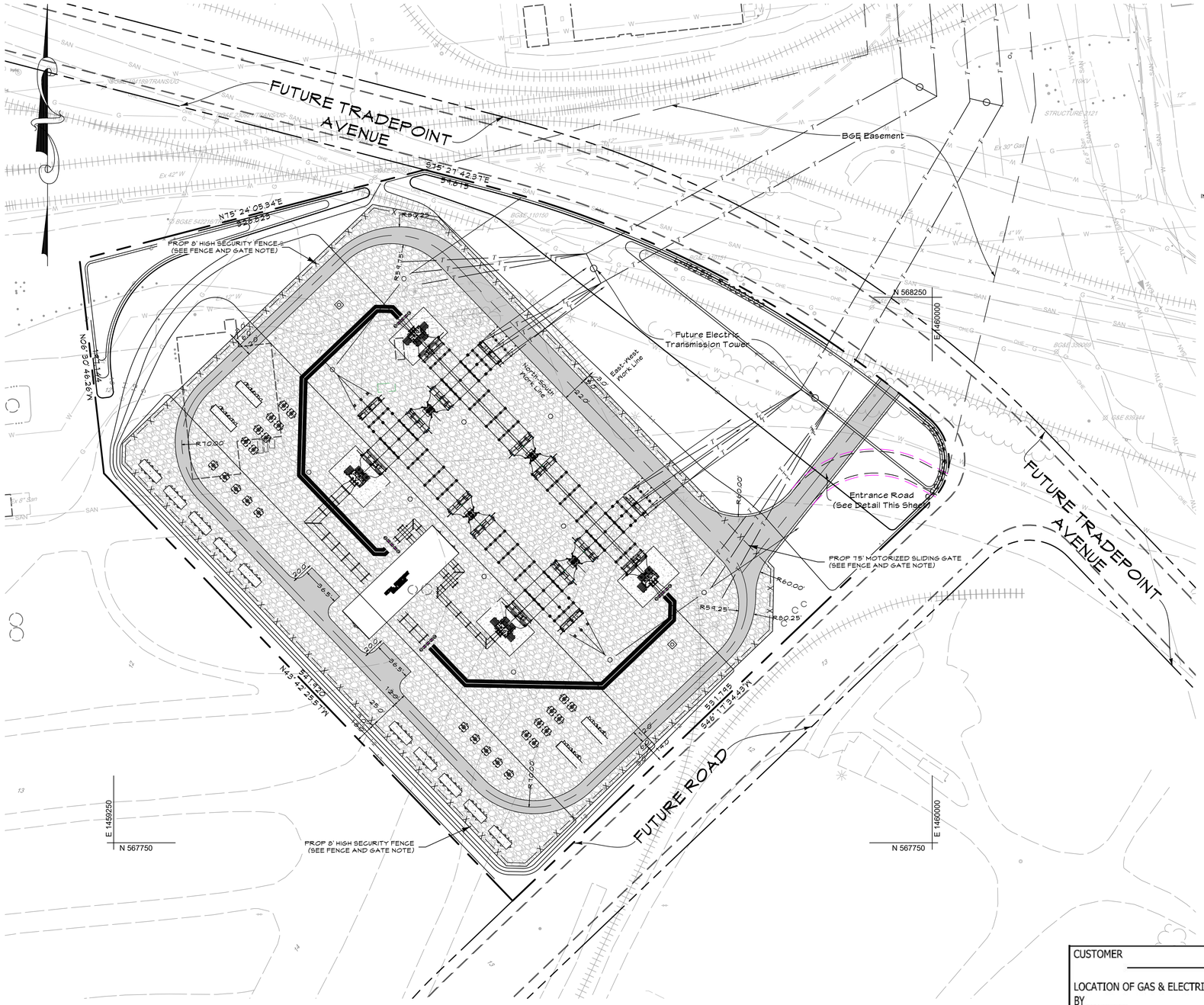
115-34.5 & 115-13kV SUBSTATION

FITZELL SUBSTATION

SUBSTATION & SYSTEM PROTECTION

BGE | SCALE 1" = 1000' | REV
DWG NO. C-2 | D

Drawing File: T:\2016\Facilities\161294.00 BGE Sparrows Point Fitzell and Peninsula\Civil\CADD\Drawings\Fitzell Plans\161294.00 (C-2) EX Conditions & Demo Plan.dwg



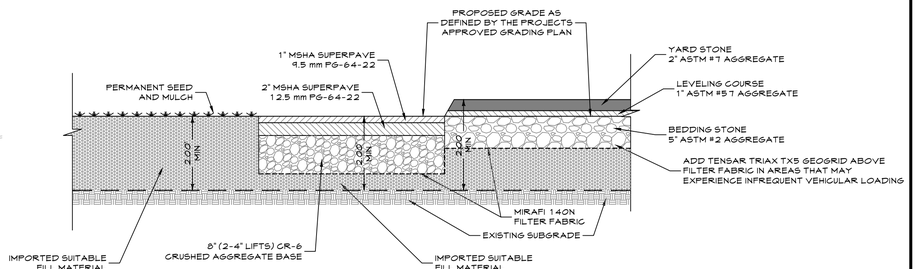
SITE AND LAYOUT PLAN

SCALE: 1" = 50'

0 50' 100'

FENCE AND GATE NOTE:

FENCE FABRIC SHALL BE HIGH SECURITY FENCING FABRIC AS MANUFACTURED BY BETAFENCE USA WITH THE FOLLOWING FEATURES: SECURITY MESH TO BE GALVANIZED EXPANDED METAL INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS CONTRACTOR SHALL TO REFER TO BGE EFB-11124 FOR ALL OTHER FENCES AND GATES REQUIREMENTS



PERVIOUS AREA, ACCESS ROAD AND YARD STONE SECTION DETAIL

NOT TO SCALE

NOTES:

1. A "LEVELING COURSE" CONSISTING OF ASTM SIZE #57 AGGREGATE SHOULD BE BETWEEN THE YARD STONE AND THE BEDDING STONE. THE LEVELING COURSE SHOULD BE PLACED TO THE MINIMAL THICKNESS REQUIRED TO FILL VOIDS OF THE LARGER AGGREGATE BEDDING STONE (APPROXIMATELY 1" THICKNESS).
2. THE BEDDING STONE SHOULD CONSIST OF ASTM SIZE #2 AGGREGATE. THE BEDDING STONE SHOULD HAVE A MINIMUM THICKNESS OF 5 INCHES.
3. EARTHWORK: THE SUBGRADE SHOULD BE COMPACTED AND PROOF ROLLED. IF SOFT SUBGRADE AREAS ARE ENCOUNTERED, SUCH AREAS SHOULD EITHER BE RECOMPACTED OR UNDERCUT AND BACKFILLED AS REQUIRED. THE BACKFILL SHOULD BE PLACED IN 8INCH LIFTS AND BE COMPACTED TO AT LEAST 95 PERCENT OF MODIFIED PROCTOR (AASHTO T-180) MAXIMUM DRY DENSITY.
4. IMPORTED SUITABLE FILL MATERIAL: SHALL BE IMPORTED VCP CLEAN (EARTHEN) FILL MATERIAL MEETING THE PROJECT SPECIFICATION FOR SATISFACTORY SOILS.

LEGEND

- Existing Edge of Road
- EX. 15" D — SD — Existing Storm Drain
- E — Existing Underground Electric
- TW — TW — Existing Overhead Transmission Electric
- EX. 15" W. — W — Existing Water Line
- EX. 12" G. — G — Existing Gas Line
- EX. 8" S. — SAN — Existing Sanitary Sewer Line
- OHE — Existing Overhead Distribution Electric line
- Existing Railroad Tracks
- Existing Utility Pole
- Existing Electric Structures
- Future Curb and Gutter
- Existing Tree Line
- Existing Drive/Paving
- Existing Building
- Substation Easement Area
- Future Right-of-Way
- Proposed Yard Stone
- Proposed Paving
- X — X — X — X — Proposed Security Fence
- T — T — Future Overhead Transmission Electric

DATA REFERENCES:

1. Existing topography shown hereon is from field run survey by Century Engineering Inc, dated Nov 2016

2. Coordinates and bearings shown hereon are referred to the Maryland Coordinate System, NAD 83(1991),elevations shown hereon referred to the North American Vertical Datum 1988 (NAVD 88) and referenced to the following Baltimore County control stations

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863	578534.26	1453796.03	28.30

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Brass Disk in grass approximately 110ft north of BGE pole No260604 and 44ft off centerline of Wharf Rd. Access is through Trade Point Atlantic Property at gate B off of Wharf Rd.

GIS-52	574839.60	1467447.91	15.79

Brass Disk in the grass at the northwest corner of North Point Road and Veterans of Foreign Wars Post 2678 Entrance.

MCS

CUSTOMER: TRADEPOINT ATLANTIC

LOCATION OF GAS & ELECTRIC FACILITIES APPROVED BY

PRINT NAME: SIGNATURE:

PHONE DATE

LIMIT OF DISTURBANCE: 314068 SF = 7.21 Ac.±

PROJECT ID#3020 SERV DATE: 12/1/19

UPDATE YOUR PRINT TO REFLECT 'AS BUILT' STATE & RETURN A COPY TO THE APPLICABLE DESIGN UNIT

11

CENTURY ENGINEERING PROJECT NO: 161234.00

CENTURY ENGINEERING
CONSULTING ENGINEERS - PLANNERS
10710 Gilroy Road, Hunt Valley, MD 21031
Phone: 443.589.2400 Fax: 443.589.2401

ENGINEER'S CERTIFICATION

"I CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 24814, EXPIRATION DATE: Feb 28, 2018."

STATE OF MARYLAND — RUSSELL ALAN LIMBERT — No. 24814 — PROFESSIONAL ENGINEER

REV.	DATE	ACCOUNT NO.	DESCRIPTION	APPROVED

AUTOCAD

ENGINEERING

CIVIL CENTURY ENG, INC.
ELEC. BLACK & VEATCH
PROJ. ENG.
PROJ. MGR. Al Alford
PRIN. ENG.
SUPV. ENG.

DESIGN GROUP

DESIGNED RAL
DRAWN RAL
CHECKED RGB
APPROVED
DATE 15 Nov. 2016

Site and Layout Plan

115-34.5 & 115-13kV SUBSTATION

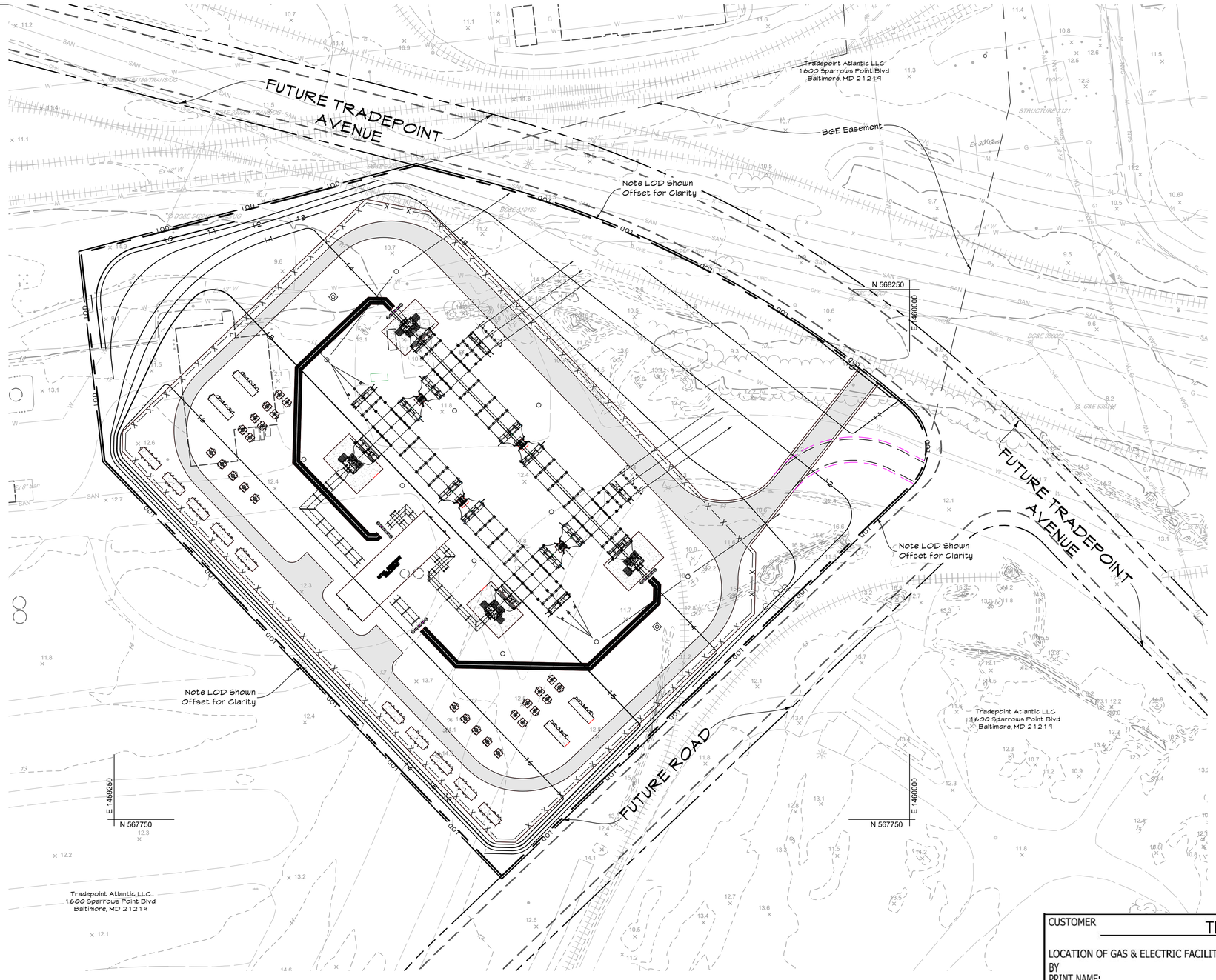
FITZELL SUBSTATION

SUBSTATION & SYSTEM PROTECTION

BGE SCALE 1" = 1000' REV

DWG NO. C-3 D

Drawing File: T:\2016\Facilities\161234.00 BGE Sparrows Point Fitzell and Peninsula\CIVIL\CADD\Drawings\Fitzell Plans\161234.00(C-1) Site and Layout Plan.dwg



LEGEND

- Existing Minor Contour
- Existing Major Contour
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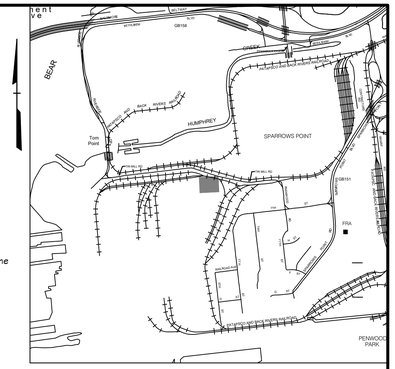
- Existing Utility Pole
- Existing Electric Structures
- Future Curb and Gutter
- Existing Tree Line
- Existing Drive/Paving
- Existing Building
- Substation Easement Area
- Proposed Major Contour
- Proposed Minor Contour
- Proposed Security Fence
- Limit of Disturbance



VICINITY MAP

SCALE: Custom

DATA REFERENCES:

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GIS-52	574834.60	1467447.91	15.79	Brass Disk in the grass at the northwest corner of North Point Road and Veterans of Foreign Wars Post 2678 Entrance.

OWNER'S/DEVELOPER'S CERTIFICATION - GRADING

"I/we certify that all grading on this site will be done in accordance with the current grading requirements as set forth by the Baltimore County Department of Environmental Protection and Sustainability and with the requirements specified in Article 33, Title 5 of the Baltimore County Code."

Signature Owner/Developer — Date

Jim Burkman — Print Name

Sr. Environmental Scientist — Title

BALTIMORE COUNTY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
AND SUSTAINABILITY
APPROVED FOR GRADING

DATE:

STORMWATER MANAGEMENT NOT REQUIRED

MCS

LIMIT OF DISTURBANCE: 314068 SF = 7.21 Ac.±

PROJECT ID#3020 SERV DATE: 12/1/19

UPDATE YOUR PRINT TO REFLECT 'AS BUILT' STATE & RETURN A COPY TO THE APPLICABLE DESIGN UNIT

CUSTOMER TRADEPOINT ATLANTIC

LOCATION OF GAS & ELECTRIC FACILITIES APPROVED BY

PRINT NAME: SIGNATURE:

PHONE DATE

GRADING PLAN NOTES

1. The proposed grading shown on this plan meets the requirements set forth by Baltimore County Department of Environmental Protection and Sustainability and complies with Article 33, Title 5 of the Baltimore County Code. However, due to building types and layout, some field adjustments may be required. All changes must comply with the above mentioned requirements.
2. All swales have been designed by the engineer to convey runoff according to Baltimore County Department of Public Works design standards.
3. There shall be no clearing, grading, construction or disturbance of vegetation in the Critical Area Buffer, Forest Buffer Easement or other forest retention areas, except as permitted by the Baltimore County Department of Environmental Protection and Sustainability.
4. Stormwater management has been addressed though impervious area reduction.

GRADING PLAN

SCALE: 1" = 50'

0 50' 100'

NOTES

1. Property Owner: Trade Point Atlantic LLC
   1600 Sparrows Point Blvd
   Baltimore, MD 21219
2. There are no streams, wetlands, forest buffers or tree conservation areas within the easement area.
3. This site is not located in a known floodplain.
4. This site is not located in the Chesapeake Bay Critical Area Limits.

CENTURY ENGINEERING PROJECT NO: 161294.00

CENTURY ENGINEERING
CONSULTING ENGINEERS - PLANNERS
10710 Gilroy Road, Hunt Valley, MD 21031
Phone: 443.589.2400 Fax: 443.589.2401

ENGINEER'S CERTIFICATION

"I CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 24814, EXPIRATION DATE: Feb 28, 2018."

STATE OF MARYLAND — ROBERT GERARD ALLEN — No. 24814 — PROFESSIONAL ENGINEER

REV.	DATE	ACCOUNT NO.	DESCRIPTION	APPROVED

AUTOCAD

ENGINEERING
CIVIL CENTURY ENG. INC.
ELEC. ____
PROJ. ENG. ____
PROJ. MGR. Al Alford
PRIN. ENG. ____
SUPV. ENG. ____

DESIGN GROUP
DESIGNED RAL
DRAWN RAL
CHECKED RGB
APPROVED ____
DATE 15 Nov. 2016

Grading Plan

115-34.5 & 115-13kV SUBSTATION

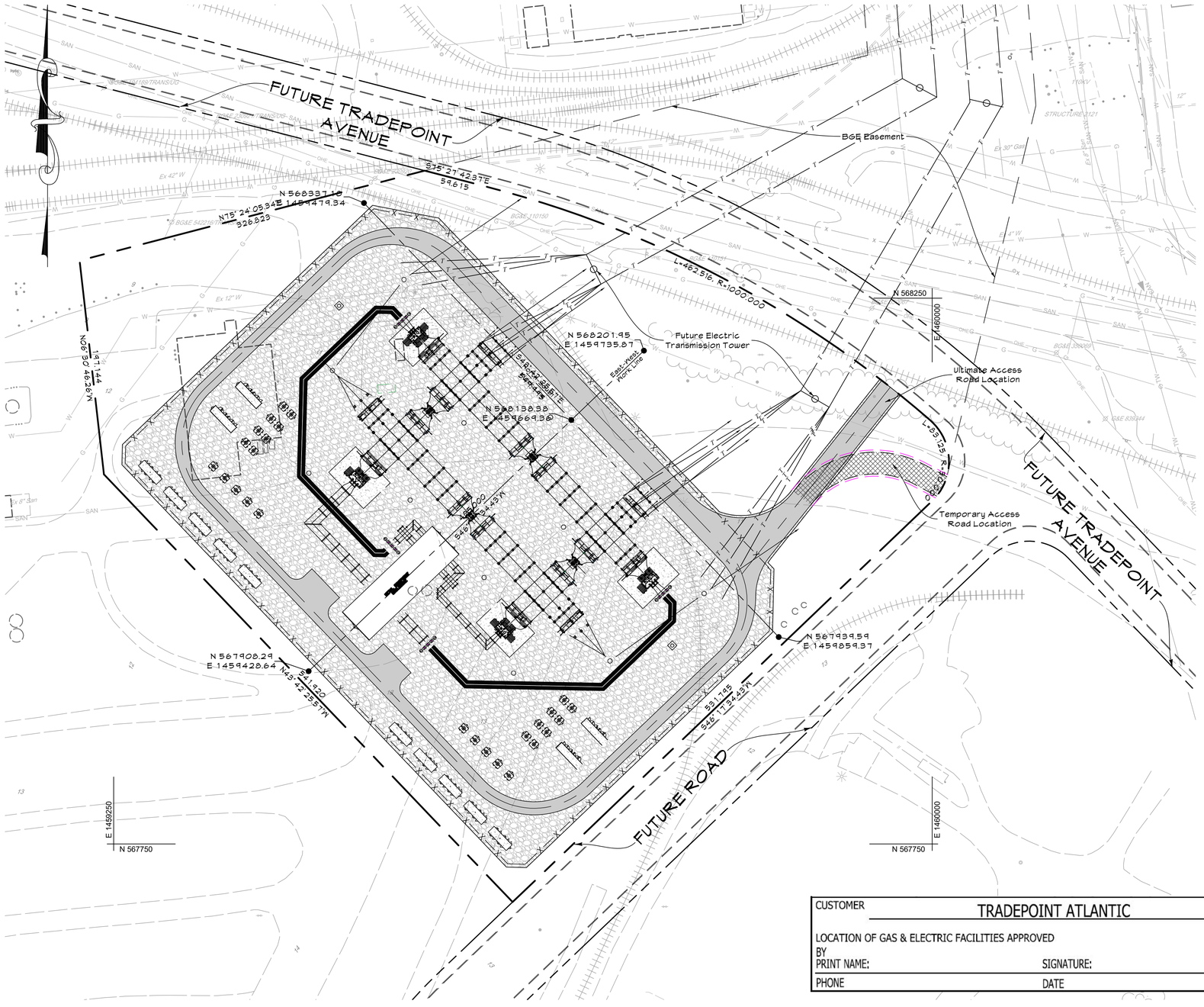
FITZELL SUBSTATION

SUBSTATION & SYSTEM PROTECTION

BGE — SCALE 1" = 1000' — DWG NO. C-4 — D — REV

11

Drawing File: T:\2016\Facilities\161294.00 BGE Sparrows Point Fitzell and Peninsula\CIVIL\CADD\Drawings\Fitzell Plans\161294.00 (C-4) Grading Plan.dwg



"AS-BUILT" CERTIFICATION

I hereby certify that the facility shown on this plan was constructed as shown on the "as-built" plans and meets the approved plans and specifications.

Signed _____ P.E._____

Print _____ Date_____

Certify means to state or declare a professional opinion based upon on-site inspections and materials tests which are conducted during construction. The on-site inspections and material tests are those inspections and tests deemed sufficient and appropriate by commonly accepted engineering standards. Certify does not mean or imply a guarantee by the engineer nor does an engineer's certification relieve any other party from meeting requirements imposed by contract, employment, or other means, including meeting commonly accepted practices.

CONTRACTOR'S "AS-BUILT" NOTE

As-built plans and certification are required for this stormwater management facility. These must be prepared and sealed by a registered professional engineer. Baltimore County will not perform the inspection or prepare the as-built plans or certification. the stormwater management permit security will not be released until the as-built plans and certification are approved by Baltimore County.

In order to prepare the required as-built plans and certification, this stormwater management facility must be inspected by the engineer at specific stages during construction as required by the current Baltimore County Stormwater Management Policy and Design Manual. The contractor shall notify the engineer at least five (5) working days prior to starting any work shown on these plans.

MISS UTILITY

Call "Miss Utility" at 1-800-257-7777 48 hours prior to the start of work. The excavator must notify all public utility companies with underground facilities in the area of proposed excavation and have those facilities located by the utility companies prior to commencing excavation.

ENGINEER'S CERTIFICATION

I hereby certify that this plan has been prepared by me or under my supervision and meets the minimum standards of the Baltimore County Department of Environmental Protection and Resource Management and the Baltimore County Soil Conservation District.

Signature _____ P.E. No. _____

Print Name _____ Date _____

DEVELOPERS CERTIFICATION

I/we hereby certify that all proposed work shown on these construction drawing(s) and on the approved sediment control drawings(s) will be accomplished pursuant to these plans. I/we also understand that it is my/our responsibility to have the construction supervised and certified, including the submittal of "as-built" plans within thirty (30) days of completion, by a registered professional engineer.

Signed _____

Date _____

STORMWATER MANAGEMENT GENERAL NOTES

1. Unless otherwise noted, all construction shall be in accordance with:
   a. Baltimore County Department of Public Works Standard Specifications and Details for Construction 2007, errata and addenda.
   b. Maryland Soil Conservation District Service Standards and Specifications Pond Code 378, January 2000.
   c. Maryland Department of Transportation, State Highway Administration, July, 2008 Standard Specifications for Construction and Materials.
2. This site lies within the Jones Falls watershed.
3. All facilities are private and shall be maintained by the owner.
4. All construction must be certified by a licensed professional engineer.
5. A state permit is not required for this project.
6. Storm water management approved under Bill No. 25-10

LEGEND

- Existing Edge of Road
- EX. 15" R. SD — Existing Storm Drain
- E — Existing Underground Electric
- TW — TW — Existing Overhead Transmission Electric
- EX. 15" W. W — Existing Water Line
- EX. 12" G. G — Existing Gas Line
- EX. 8" S. SAN — Existing Sanitary Sewer Line
- OHE — Existing Overhead Distribution Electric line
- Existing Railroad Tracks
- Existing Utility Pole
- Existing Electric Structures
- Future Curb and Gutter
- Existing Tree Line
- Existing Drive/Paving
- Existing Building
- Substation Easement Area
- Future Right-of-Way
- Proposed Alternative Surface (Yard Stone)
- Proposed Ultimate Paving
- Temporary Paving
- X — X — X — X — Proposed Security Fence
- T — T — Future Overhead Transmission Electric

DATA REFERENCES:

1. Existing topography shown hereon is from field run survey by Century Engineering Inc. dated Nov 2016

2. Coordinates and bearings shown hereon are referred to the Maryland Coordinate System, NAD 83(1991),elevations shown hereon referred to the North American Vertical Datum 1988 (NAVD 88) and referenced to the following Baltimore County control stations

Designation	Northing	Easting	Elevation
863	578534.26	1453796.03	28.30

A railroad spike in the pavement at the northwest corner of the intersection of Peninsula Expressway and Chesterwood Rd

GIS-2	565182.41	1464480.70	9.95

Brass Disk in grass approximately 110ft north of BGE pole No260604 and 44ft off centerline of Wharf Rd. Access is through Trade Point Atlantic Property at gate B off of Wharf Rd.

GIS-52	574839.60	1467447.91	15.79

Brass Disk in the grass at the northwest corner of North Point Road and Veterans of Foreign Wars Post 2678 Entrance.

MCS

CUSTOMER	TRADEPOINT ATLANTIC
LOCATION OF GAS & ELECTRIC FACILITIES APPROVED BY	
PRINT NAME:	SIGNATURE:
PHONE	DATE

LIMIT OF DISTURBANCE: 314068 SF = 7.21 Ac.±

STORMWATER MANAGEMENT PLAN 3 OF 3

PROJECT ID#3020 SERV DATE: 12/1/19

UPDATE YOUR PRINT TO REFLECT 'AS BUILT' STATE & RETURN A COPY TO THE APPLICABLE DESIGN UNIT

11

AS-BUILT DATA FOR ALTERNATIVE SURFACE (YARD STONE) * TO BE COMPLETED BY THE CERTIFYING ENGINEER		
	DESIGN	* AS-BUILT
ALTERNATIVE SURFACE AREA	151,942 sqft	
ASTM #7 AGGREGATE DEPTH	2.0 in	
ASTM #57 AGGREGATE DEPTH	1.0 in	
ASTM #2 AGGREGATE DEPTH	5.0 in	
GEOGRID INSTALLED	✓	

STORMWATER MANAGEMENT PLAN

SCALE: 1" = 50'

0 50' 100'

CENTURY ENGINEERING PROJECT NO: 161294.00

CENTURY ENGINEERING
CONSULTING ENGINEERS - PLANNERS
10710 Gilroy Road, Hunt Valley, MD 21031
Phone: 443.589.2400 Fax: 443.589.2401

ENGINEER'S CERTIFICATION

"I CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 24814, EXPIRATION DATE: Feb 28, 2018."

STATE OF MARYLAND — ROBERT ALAN LEWIS — No. 24814 — PROFESSIONAL ENGINEER

REV.	DATE	ACCOUNT NO.	DESCRIPTION	APPROVED

AUTOCAD

ENGINEERING
CIVIL CENTURY ENG. INC.
ELEC. _____
PROJ. ENG. _____
PROJ. MGR. Al Alford
PRIN. ENG. _____
SUPV. ENG. _____

DESIGN GROUP
DESIGNED RAL
DRAWN RAL
CHECKED RGB
APPROVED _____
DATE 15 Nov. 2016

SWM Plan

115-34.5 & 115-13kV SUBSTATION

FITZELL SUBSTATION

SUBSTATION & SYSTEM PROTECTION

BGE

SCALE 1" = 1000'

DWG NO. C-10 D

REV

Drawing File: T:\2016\Facilities\161294.00 BGE Sparrows Point Fitzell and Peninsula\CIVIL\CADD\Drawings\Fitzell Plans\161294.00 (SWM-3) SWM Planding

APPENDIX E

HEALTH AND SAFETY PLAN

SPARROWS POINT TERMINAL
SPARROWS POINT, MARYLAND

Prepared by:

EnviroAnalytics Group

Environmental Engineers

January 2015

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

1.1 Background

The Sparrows Point Terminal site has historically been a steel making facility. It is located in Baltimore County, Maryland in the southeast corner of the Baltimore metropolitan area (approximately 9 miles from the downtown area), on the Sparrows Point Peninsula in the Chesapeake Bay watershed. The facility occupies the entire peninsula and is bounded to the west by Bear Creek; to the south by Patapsco River; and to the east by Jones Creek, Old Road Bay and residential areas of the City of Edgemere. The facility is bounded to the north by the Sparrows Point Country Club. The site is approximately 3,100 acres in size.

Pennsylvania Steel built the furnace at Sparrows Point in 1887 and the first iron was cast in 1889. Bethlehem Steel Corporation (BSC) purchased the facility in 1916 and enlarged it by building additional and plating facilities. BSC filed for bankruptcy in 2001. A series of entities has owned the site between then and now: the International Steel Group (ISG), Mittal Steel, ISG Sparrows Point, LLC, Severstal Sparrows Holding LLC, which was renamed to Severstal Sparrows Point, LLC, RG Steel Sparrows Point, LLC, and then a joint venture to Sparrows Point LLC (SP) and HRE Sparrows Point LLC. Most recently, in 2014, the property and assets were sold to Sparrows Point Terminal LLC (SPT). Environmental liability was retained by SP and work is currently being conducted by EnviroAnalytics Group, LLC (EAG) on behalf of SP.

- In addition to the current environmental investigation and remediation being conducted onsite by EAG and their consultants, there are other entities conducting work on the facility. Demolition of the remaining structures is currently ongoing at the site, and those contractors are being managed by SPT.
- The purpose of this document is to provide an overall health and safety plan (HASP) for EAG personnel and EAG directed contractors who are engaging in environmental investigation and remediation activities onsite. EAG directed contractors will also be expected to have their own Health and Safety Program, and they may opt to draft their own site specific HASP, provided it meets the requirements in this HASP.

1.2 Historic Operations

Steel manufacturing involves handling vast amounts of raw material including coke, iron ore, limestone and scrap steel, as well as recovering byproducts and managing waste materials. The operations listed below either were or are currently performed at the Sparrows Point Facility.

- Iron and steel production
- Coal chemical recovery system
- Other byproducts recovery systems
- Wastewater treatment systems
- Solid waste management
- Air pollution control

A number of site-specific environmental and hydrogeologic investigations have been prepared for the Sparrows Point facility. For the purposes of this HASP, information was obtained from the "Special Study Area Release Site Characterization" completed in 2001 by CH2MHill, as well as additional documents submitted since that time. There are five separate Special Study Areas as put forth in the Consent Decree:

- Humphrey Impoundment,
- Tin Mill Canal/Finishing Mills Areas,
- Coke Oven Area,
- Coke Point Landfill, and
- Greys Landfill.

Contaminated soils and groundwater may be present at the site. This plan was prepared based on an assessment of hazards expected to be present and a review of data from the previous site investigations and groundwater sampling events.

During the current investigations and remedial efforts, all related work will be performed in accordance with the requirements of this HASP and Occupational Safety and Health Administration (OSHA) regulations as defined in 29 Code of Federal Regulations (CFR) 1910.120 and 1926.65.

2.0 PURPOSE, SCOPE AND ORGANIZATION

This section describes the purpose, scope and organization of this HASP and the health and safety responsibilities of EAG, their employees, and their subcontractors involved in the field investigation and remediation activities at the Sparrows Point facility.

2.1 Scope

Field investigation and remediation activities for this project may include, but are not limited to:

- Groundwater sampling and monitoring,
- Groundwater and remediation well installation,
- Groundwater and remediation well repairs,
- Groundwater and remediation well closure and abandonment,
- Surface water sampling,
- Sediment sampling,
- Soil boring and subsurface soil sampling,
- Soil excavations for remedial purposes,
- Installation and operation of remediation systems for soil, soil vapor, and groundwater,
- Decommissioning and closure of remediation systems,
- Soil excavations for remedial purposes,
- Insitu soil mixing/soil stabilization,
- Exsitu soil mixing/soil stabilization,
- Dredging operations along Tin Mill Canal,
- Insitu chemical and/or biological injections, and
- Recovery of non-aqueous phase liquids (NAPL)

When EAG personnel are providing oversight of subcontractors, they will attend the safety and health briefings held by the contractor. EAG personnel will follow the requirements of this HASP, as well as any potentially more stringent requirements of the contractor's health and safety plan.

When EAG personnel are conducting tasks on their own, with or without subcontractors, they will follow the requirements of this HASP. EAG contractors, such as drillers, will also be required to follow the requirements of this HASP, as well as any more stringent requirements of the contractor's health and safety plan.

All EAG field personnel, including subcontractors to EAG, will be required to read and understand this HASP and agree to implement its provisions. All site personnel will sign the Acknowledgement Form included in **Attachment A** stating that they have read, understood, and agree to abide by the guidelines and requirements set forth in this plan.

2.2 Organization of Document

This HASP includes health and safety procedures for all generally anticipated project field activities. This plan also meets the OSHA requirements contained in the CFR, specifically 29 CFR 1910.120 and 29 CFR 1926, by including the following items:

- A description of staff organization, qualifications and responsibilities (Section 2.3),
- Hazard analysis (Section 3.0),
- Health hazard information (Section 4.0),
- Personal protective equipment (PPE), including available first aid, emergency, and safety equipment (Section 5.0),
- Employee and subcontractor training and standard safety procedures (section 6.0),
- Exposure monitoring plan (Section 7.0),
- Medical surveillance (Section 8.0),
- Site control measures and decontamination procedures for personnel and equipment (Section 9.0),
- Emergency response and contingency procedures (section 10.0), and
- Material Safety Data Sheets (MSDSs) for chemicals used on-site (**Attachment B**).

2.3 EAG Health and Safety Personnel

Personnel responsible for implementing this HASP include:

EAG Contacts for Sparrows Point Project Work	
VP Remediation, Russ Becker	(314) 686-5611
Senior Project Manager, James Calenda	(314) 620-3056
Senior Project Engineer, Elizabeth Schlaeger	(314) 307-1732
Josh Burke – Field Operations Manager	(314) 686-5623
Project Field Team Members, Jeff Wilson and Bill Trentzsch	(314) 620-3135, (314) 686-5598

3.0 HAZARD ANALYSIS

This section outlines the potential hazards related to the field activities listed in Section 2.1.

3.1 Hazard Analysis

The field activities planned for this project pose potential health and safety hazards for field team members. This section describes the hazards associated with the above-listed field activities. Detailed chemical, physical, and biological hazards information is provided in Section 4.0 (Health Hazard Information).

Hazards to which employees and subcontractors may be exposed to as a result of the above-listed activities include potential chemical exposures, lacerations, excessive noise, thermal stress, lifting of excessive weight or bulk, hand tools and heavy equipment, drilling and slips, trips and falls.

3.1.1 Chemical Hazards

Potential exposures to chemicals in the soil or groundwater include the possibility of dermal exposure (contact and/or absorption), inhalation of chemical contamination that may be encountered during sampling or during equipment decontamination activities, or ingestion of contaminants if good personal hygiene practices are not followed.

Benzene, naphthalene, and various metals are the major contaminants that have been identified in groundwater during previous investigations at the site In addition, light NAPL (LNAPL – benzene, in particular) and dense NAPL (DNAPL – naphthalene, in particular) have also been identified or are heavily suspected in various locations in the Coke Oven Area. Dissolved metals the chemicals of concern primarily located in the area of Tin Mill Canal and the Rod and Wire Mill Area. Treatment chemicals, such as sulfuric acid, are currently being used in remediation systems. All appropriate MSDS sheets will be reviewed that apply to the investigation or remedial tasks being conducted. MSDS sheets are located in **Attachment B**. It should be noted that this is a dynamic document: should any additional chemicals be introduced or discovered, the MSDS sheets will be added to **Attachment B**, as necessary.

3.1.2 Physical Hazards

The potential physical hazards associated with field activities include:

- Excessive lifting
- Slips, trips, and falls
- Working at heights
- Exposure to extreme outside temperatures and weather
- Equipment hazards
- Drilling Hazards
- Noise
- Dust and fumes
- Injury from tools, equipment, rotating parts
- Electrical hazards
- Buried and overhead hazards
- Work over water
- Driving to, from, and around the site (including working in trafficked areas)

Additional hazards may be encountered based on the various task at hand. It will be the responsibility of the site manager, with the help of field staff, to identify and address any additional hazards on a "per task or job" basis. A Job Safety Analyses (JSA) may need to be conducted prior to the start of various tasks. Safety meetings will be conducted with all staff in attendance, before the start of any new task or when any significant personnel or other changes (such as a swift change in weather, for example) occur. Updated information relating to physical hazards will be presented during these meetings in an effort to familiarize the crew with potential hazards, discuss new situations, and determine how the associated risks can be reduced. Further, good housekeeping practices will be enforced to preclude other risks resulting from clutter and inattention to detail. In addition, internal field audits will be randomly conducted to ensure adherence to all procedures are being followed.

3.1.3 Biological Hazards

Biological hazards that may be encountered when conducting field activities include the following:

- Poisonous snakes and spiders
- Ticks and tick-borne diseases
- Stinging insects such as chiggers, bees, wasps, etc.
- Various viruses and diseases spread via animal to human contact such as West Nile virus or rabies
- Various viruses and diseases spread via human to human contact such as colds or the flu
- Dermal contact with poison ivy, oak, and/or sumac
- Bloodborne pathogens when administering first aid

First aid kits will be available on-site. It is crucial to note that any site personnel who has significant allergies should communicate that information to the field team they are working with, along with the location of their auto-injector pen (such as an Epi-Pen) for use in case of going into anaphylactic shock from something that would cause such a reaction (like a bee sting, for example). Personnel who suffer from such allergies are responsible for providing their own auto-injector devices as those are typically prescription based as well as specific to their particular allergy.

4.0 HEALTH HAZARD INFORMATION

This section provides chemical hazard information for those potentially hazardous materials expected to be present at the facility. Potential physical and biological hazards are also discussed in this section.

4.1 Chemical Hazards

Exposure to chemicals through inhalation, ingestion, or skin contact may result in health hazards to field workers. Hazards associated with exposure will be evaluated using OSHA Permissible Exposure Limits (PELs) and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs). Each of these values are 8-hour, time-weighted averaged (TWAs) above which an employee cannot be exposed. EAG may also use the National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs) where applicable. Although the OSHA PELs are the only exposure limits enforceable by law, the most stringent of exposure limits will be used as the EAG-enforced exposure criteria during field activities.

The following is a summary of the potential hazards created by the compounds that may be encountered during field activities. Data from sampling of groundwater wells was reviewed to identify potential contaminants at the site. Contaminants of concern may include benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), phenols, metals and water treatment chemicals. Table 4-1 contains chemical information and exposure limits for various chemicals that may be expected to be present in the investigation and remediation efforts. During the recovery of NAPL, the major contaminants of concern are benzene and naphthalene. It is possible that carbon monoxide may also be encountered from the use of various internal combustion engines (vehicular or otherwise); however, it is anticipated that since any such engine will be used outdoors, it is not expected that concentrations of concern will accumulate. With the use of any such engine, the engine should be positioned such that site personnel are upwind of the engine exhaust.

If any chemicals are brought on-site, MSDS must be made available and added to **Attachment B**. Personnel must be trained in the hazards and use of chemicals.

Table 4-1
Chemical Contaminants of Potential Concern

Chemical Name Synonyms (trade name)	Exposure Limits	Characteristics	Route of Exposure	Symptoms of Exposure
Benzene	PEL: 1PPM REL: 0.1 CA TLV: 0.5PPM STEL: 1PPM (NIOSH) Skin: YES	Colorless to light-yellow liquid with aromatic odor. LEL: 1.2% UEL: 7.8% VP: 75mm FI.P: 12°F	INH ABS ING CON	Irritation of eyes, skin, nose, respiratory system, giddiness, headache, nausea, fatigue, anorexia, dermatitis, bone marrow depression
Ethylbenzene	PEL: 100PPM REL: 100PPM TLV: 100PPM STEL: 125PPM IDLH: 800PPM Skin: NO	Colorless liquid with an aromatic odor. LEL: 0.85 UEL: 6.7% IP: 8.76EV VP: 7mm FI.P: 55°F	INH ING CON	Irritation of eyes, skin, mucous membranes; headache; dermatitis
1,1 dichloroethane	PEL: 100PPM REL: 100PPM TLV: 100PPM STEL: NA IDLH: 3000PPM Skin: NO	Colorless, oily liquid with a chloroform-like odor. LEL: 6.2% UEL: 16% IP: 11.05EV Vp: 64mm FI.P: 56°F	INH ING CON	Irritation of eyes, CNS depression, liver, kidney, lung damage
Phenol	PEL: 5PPM REL: 5PPM, 15.6PPM (C) TLV: 5PPM STEL: NA IDLH 250PPM Skin: YES	Colorless to light pink crystalline solid with a sweet, acrid odor. LEL: 1.8% UEL: 5.9% IP: 8.12EV Vp: 0.08mm FI.P: 175°F	INH ING CON ABS	Irritated eyes, nose, throat, anorexia, weakness, muscular ache, pain, dark urine, cyanosis, liver, kidney damage, skin burns, dermatitis, tremor, convulsions, twitch
Naphthalene	PEL: 10PPM REL: 10PPM TLV: 10PPM STEL: 15PPM IDLH: 250PPM Skin: YES	Colorless to brown solid with an odor of mothballs LEL: 0.9% UEL: 5.9% IP: 8.12EV Vp: 0.08mm FI.P: 174°F	INH ABS ING CON	Irritation of eyes, headache, confusion, excitement, malaise, nausea, vomiting, abdominal pain, irritated bladder, profuse sweating, jaundice, hematuria, renal shutdown, dermatitis, optical neuritis, corneal damage
Toluene	PEL: 200PPM, 300PPM (C) REL: 100PPM TLV: 20PPM STEL: 150PPM IDLH: 500PPM Skin: YES	Colorless liquid with a sweet, pungent benzene-like odor. LEL: 1.1% UEL: 7.1% IP: 8.82EV VP: 21MM FI.P: 40°F	INH ABS ING CON	Irritation of eyes, nose, fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, lacrimation, nervousness, muscle fatigue, insomnia, dermatitis, liver, kidney damage
Xylenes	PEL: 100PPM REL: 100PPM TLV: 100PPM STEL: 150PPM IDLH: 900PPM Skin: NO	Colorless liquid with an aromatic odor. LEL: 0.9% UEL: 6.7% IP: 8.40EV VP: 5MM FI.P: 88°F	INH ABS ING CON	Irritated eyes, nose, respiratory system, headache, fatigue, dizziness, confusion, malaise, drowsiness, incoherence, staggering gait, corneal vacuolization, anorexia, nausea, vomiting, abdominal pain, dermatitis

Chemical Name Synonyms (trade name)	Exposure Limits	Characteristics	Route of Exposure	Symptoms of Exposure
Styrene	PEL: 100PPM, 200PPM (C) REL: 50PPM TLV: 20PPM STEL: 40PPM IDLH: 700PPM Skin: NO	Colorless to yellow, oily liquid with a sweet, floral odor. LEL: 0.9% UEL: 6.8% IP: 8.40eV VP: 5MM FI.P: 88°F	INH ABS ING CON	Irritated eyes, nose, respiratory system, headache, fatigue, dizziness, confusion, malaise, drowsiness, weakness, narcosis, dermatitis
Chlorodiphenyl (54% chlorine) (11097-69-1)	PEL: 0.5mg/m³ REL: 0.001mg/m³ TLV: 0.5mg/m³ STEL: N/A IDLH: 5mg/m³(CA) Skin: YES	Colorless to pale yellow viscous liquid with a mild hydrocarbon odor. LEL: NA UEL: NA IP: UNKNOWN VP: 0.00006MM FI.P: NA	INH ABS ING CON	Irritated eyes, chloracne, liver damage, reproductive effects (carcinogen)
Polynuclear aromatic hydrocarbons (PAHs) (coal tar pitch volatiles) (65996-93-2)	PEL: 0.2mg/m³ REL: 0.1mg/m³ TLV: 0.2 mg/m³ STEL: N/A IDLH: 80mg/m³(CA) Skin: NO	The pitch of coal tar is black or dark brown amorphous residue that remains after the redistillation process. LEL: N/A UEL: N/A IP: VARIES VP: VARIES FI.P: VARIES	INH CON	Direct contact or exposure to vapors may be irritating to the eyes. Direct contact can be highly irritating to the skin and produce dermatitis. Exposure to vapors may cause nausea and vomiting. A potential human carcinogen.
Arsenic (inorganic)	PEL: 0.01mg/m³ REL: NONE TLV: 0.5 mg/m³ STEL: N/A IDLH: 5mg/m³ (CA) Skin: NO	Silver-gray or tin-white brittle odorless solid. Air odor threshold: N/D.	INH ABS CON ING	Symptoms include ulceration of nasal septum, gastrointestinal disturbances, respiratory irritation and peripheral neuropathy. Potential occupational carcinogen.
Barium	PEL: 0.5mg/m³ REL: 0.5mg/m³ TLV: 0.5mg/m³ STEL: N/A IDLH: 50mg/m³ Skin: NO	White, odorless solid. Air odor threshold: N/D.	INH ING CON	Irritated eyes, skin, upper respiratory system, skin burns, gastroenteritis, muscle spasm, slow pulse, cardiac arrhythmia
Cadmium (elemental)	PEL: 0.005mg/m³ REL: CA TLV: 0.01mg/m³ STEL: N/A IDLH: 9mg/m³ (CA) Skin: NO	Silver-white, blue-tinged lustrous, odorless solid. Air odor threshold: N/D.	INH ING	Symptoms include pulmonary edema, cough, tight chest, head pain, chills, muscle aches, vomiting and diarrhea. Potential occupational carcinogen.
Chromium (Metal)	PEL: 1.0mg/m³ REL: 0.5mg/m³ TLV: 0.5mg/m³ STEL: N/A IDLH: 250mg/m³ Skin: NO	Blue-white to steel-gray lustrous, brittle, hard odorless solid. Air odor threshold: N/D.	INH ING CON	Symptoms may include irritated eyes and skin, lung fibrosis.
Chromium (Chromium III inorganic compounds)	PEL: 0.5mg/m³ REL: 0.5mg/m³ TLV: 0.5mg/m³ STEL: N/A IDLH: 25mg/m³ Skin: NO	Varies depending on specific compound.	INH ING CON	Irritation of eyes, sensitivity dermatitis

Chemical Name Synonyms (trade name)	Exposure Limits	Characteristics	Route of Exposure	Symptoms of Exposure
Copper	PEL: 1mg/m³ REL: 1mg/m³ TLV: 1mg/m³ STEL: N/A IDLH: 100mg/m³ Skin: NO	Reddish, lustrous, malleable, odorless solid	INH ING CON	Irritation of eyes, nose, pharynx, nasal septum perforations, metallic taste, dermatitis
Lead (Elemental & Inorganic as Pb)	PEL: 0.05mg/m³ REL0.1mg/m³ TLV: 0.05mg/m³ STEL: N/A IDLH: 100mg/m³ Skin: NO	A heavy, ductile soft gray solid. Air odor threshold: N/D.	INH ING CON	Accumulative poison may cause weakness, insomnia, facial pallor, anorexia, malnutrition, constipation, abdominal pain, anemia, gingival lead line, paralysis of wrists and ankles, hypertension and kidney disease.
Nickel	PEL: 1mg/m³ REL: 0.015mg/m³ (Ca) TLV: 0.1mg/m³ STEL: N/A IDLH: 10mg/m³ Skin: NO	Lustrous, silvery, odorless solid. Air odor threshold: N/A VP: 0mm	INH CON ING	Sensitivity dermatitis, allergic asthma, pneumonitis
Vanadium pentoxide dust	PEL: 0.5mg/m³ (C) REL: 0.05mg/m³ (C) TLV: 0.05mg/m³ STEL: N/A IDLH: 35mg/m³ Skin: NO	Yellow-orange powder or dark gray, odorless flakes dispersed in air. VP: 0mm	INH ING CON	Irritated eyes, skin, throat, green tongue, metallic taste, eczema, cough, fine rales, wheezing, bronchitis
Zinc oxide	PEL: 5mg/m³ REL: 5mg/m³ TLV: 2mg/m³ STEL: 10mg/m³ IDLH: 500mg/m³ Skin: NO	White, lustrous solid	INH	Metal fume fever, chills, muscular ache, nausea, fever, dry throat, cough, weakness, metallic taste, headache, blurred vision, low back pain, vomiting, fatigue, malaise
Sulfuric Acid (water treatment chemical)	PEL: 1mg/m³ TLV: 0.2mg/m³ Skin: YES	Oily, colorless to slightly yellow, clear to turbid liquid	IHN ABS ING CON	Can cause irritation or corrosive burns to the upper respiratory system, lung irritation, pulmonary edema, burns to mouth throat and stomach, erode teeth, skin lesions
Antiscale (water treatment chemical)	PEL: 1mg/m³ TLV: 0.2mg/m³ Skin: YES	Liquid, colorless, clear	IHN ABS ING CON	May cause severe skin burns and eye damage, can cause cancer, fatal if inhaled, may damage organs through prolonged exposure
Antifoam (water treatment chemical)	N/E	Liquid emulsion, white, opaque	IHN ABS ING CON	May be harmful to skin, if inhaled and if swallowed
Gases				
Carbon Monoxide	PEL: 50PPM REL: 35PPM TLV: 25PPM STEL: 200PPM (C) IDLH: 1200PPM Skin: NO	Colorless, odorless gas LEL: 12.5% UEL: 74% IP: 14.01eV VP: >35atm FI.P: N/A	INH	Headache, rapid breathing, nausea, tiredness, dizziness, confusion

NOTES:

OSHA PEL	Occupational Safety and Health administration Final Rule Limits, Permissible Exposure Limit for an eight=hour, time-weighted average
ACGIH TLV	American Conference of Governmental Industrial Hygienists, Threshold Limit Value for eight-hour, time-weighted average
STEL	Short-term Exposure Limit for a 15-minute, time-weighted average
NIOSH IDLH	National Institute for Occupational Safety and Health, Immediately Dangerous to Life or Health concentration
PPM	Part of vapor or gas per millions parts of air by volume at 25°Celsius and 760mm Hg mg/m³ (milligram of substance per cubic meter of air)
CA	NIOSH has identified numerous chemicals that it recommends to be treated as potential or confirmed human carcinogens.
(C)	The (ceiling) concentration that should not be exceed during any part of the working exposure.
Skin	Refers to the potential contribution to the overall exposure by the cutaneous (absorption) route, including mucous membranes and eye, either by airborne or more particularly by direct contact with the substance.
UEL	Upper Explosive Limit – the highest concentration of a material in air that produces an explosion in fire or ignites when it contacts an ignition source.
LEL	Lower Explosive Limit – the lowest concentration of the material in air that can be detonated by spark, shock, fire, etc.
INH	Inhalation
ABS	Skin absorption
ING	Ingestion
CON	Skin and/or eye contact

4.2 Physical Hazards

Field employees and subcontractors may be exposed to a number of physical hazards during this project. Physical hazards that may be encountered include the following:

- Heat and cold stress
- Lifting hazards
- Slips, trips and falls
- Working around heavy equipment
- Drilling hazards
- Noise
- Use of hand and power tools
- Buried hazards
- Electrical hazards
- Underground and overhead utilities
- Working over water
- Travel to and from site

4.2.1 Heat Stress

Local weather conditions may produce an environment that will require restricted work schedules in order to protect employees from heat stress. The Project Manager or the Field Lead Team Member will observe workers for any potential symptoms of heat stress. Adaptation of work schedules and training on recognition of heat stress conditions should help prevent heat-related illnesses from occurring. Heat stress controls will be stated at 70°F for personnel in protective clothing and at 90°F for personnel in regular work clothing. Heat stress prevention controls include:

- Allow workers to become acclimatized to heat (three to six days)
- Provide rest breaks in a shaded or air-conditioned break area
- Provide sun screen to prevent sun burn
- Provide drinking water and electrolyte-replenishing fluids
- Keep ice readily available to rapidly cool field team members

The following Heat Stress Index should be used as a guide to evaluate heat stress situations. If the Heat Stress exceeds 105 degrees Fahrenheit, contact the project manager prior to conducting work for detailed guidance.

Heat Stress Index

Temp. °F	Relative Humidity								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
105	98	104	110	120	132				
102	97	101	108	117	125				
100	95	99	105	110	120	132			
98	93	97	101	106	110	125			
96	91	95	98	104	108	120	128		
94	89	93	95	100	105	111	122		
92	87	90	92	96	100	106	114	122	
90	85	88	90	92	96	100	106	114	122
88	82	86	87	89	93	95	100	106	115
86	80	84	85	87	90	92	96	100	109
84	78	81	83	85	86	89	91	95	99
82	77	79	80	81	84	86	89	91	95
80	75	77	78	79	81	83	85	86	89
78	72	75	77	78	79	80	81	83	85
76	70	72	75	76	77	77	77	78	79
74	68	70	73	74	75	75	75	76	77

NOTES: Add 10° F when protective clothing is being used; Add 10° F when in direct sunlight

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HSI Temp	Category	Injury Threat
Above 130° F	Extreme Danger	No work unless emergency exists. Contact Cardno ATC RSC and Corporate Risk Management Department prior to proceeding. Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
105° to 130° F	Danger	Contact RSC prior to proceeding. Requires strict adherence to ACGIH Heat Stress Guidelines, including use of on-site WBGT equipment. Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
90° to 105° F	Extreme Caution	Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
80° to 90° F	Caution	Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity.
Below 80° F	Normal Range	Typical conditions for time of year. Little or no danger under normal circumstances. As always, anticipate problems and work safely.

4.2.2 Cold Stress

Frostbite and hypothermia are two types of cold injury that personnel must be protected against during the performance of field duties. The objective is to prevent the deep body temperature from falling below 96.8° F and to prevent cold injury to body extremities. Two factors influence the development of a cold injury the ambient temperature, and wind velocity. Reduced body temperature will very likely result in reduced mental alertness, reduction in rational decision making, and/or loss of consciousness with the threat of death.

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Use appropriate cold weather clothing when temperatures are at or below 40° F as exposed skin surfaces must be protected. These protective items can include facemask, hand wear, and foot wear. Workers handling evaporative solvents during cold stress conditions will take special precautions to avoid soaking gloves and clothing because of the added danger of prolonged skin contact and evaporative cooling. Personnel will wear protective clothing appropriate for the level of cold and planned physical activity. The objective is to protect all parts of the body, with emphasis on the hands and feet. Eye protection against glare and ultraviolet light should be worn in snowy and icy conditions.

The work rate should not be so great as to cause heavy sweating that could result in wet clothing. If heavy work must be done, opportunities for rest breaks will be provided where workers have the opportunity to change into dry clothing. Conversely, plan work activities to minimize time spent sitting or standing still. Rest breaks should be taken in a warm, dry area. Windbreaks can also be used to shield the work area from the cooling effects of wind.

If extreme cold-related weather conditions occur, EAG field personnel and subcontractors will take the following precautions:

- Wear adequate insulated clothing when the air temperature drops below 40°F
- Reduce work periods in extreme conditions to allow adequate rest periods in a warm area
- Change clothes when work clothes become wet
- Avoid caffeine (which has diuretic and circulatory effects)

4.2.3 Lifting Hazards

Field personnel may be exposed to injury caused by lifting heavy objects and various pieces large or unwieldy pieces of equipment. All field team members will be trained in the proper methods for lifting heavy and/or large equipment and are cautioned against lifting objects that are too heavy or too big for one person. Proper lifting techniques include the following:

- Keep feet approximately shoulder width apart
- Bend at the knees
- Tighten abdominal muscles
- Lift with the legs
- Keep the load close to the body
- Keep the back upright
- Use the buddy system for larger or heavy pieces of equipment

All drums will be staged using an approved drum dolly or other appropriate equipment. Proper care will be taken in the use of this equipment. Healthy employees with no medical restrictions may lift and carry a maximum of 50 pounds using proper lifting and carrying techniques. This recommended weight limit may be reduced depending on physical and workplace factors.

4.2.4 Slips, Trips and Falls

The most common hazards that will be encountered during field activities will be slips, trips and falls. Field team members are trained to use common sense to avoid these hazards such as using work boots/safety shoes with nonskid soles. When working on slippery surfaces, tasks will be planned to decrease the risk of slipping via avoiding the slippery areas, if possible, or utilizing engineering controls. Engineering controls may involve the placement of supplemental material such as boards, gravel, or ice melt should be utilized to mitigate slippery conditions. Other engineering controls may involve the use of footgear traction control devices. Employees and subcontractors will avoid slippery surfaces, use engineering controls as appropriate, not hurry, and maintain good housekeeping.

4.2.5 Buried Hazards

Whenever the ground is penetrated, the potential for contacting buried hazards exists. During the planning/mobilization phase, prior to drilling or other excavation activities, EAG personnel and/or their contractors will establish the location of underground utility lines (gas, electrical, telephone, fiber optic cable, etc.) and/or substructures or other potential buried hazardous items. This may be conducted by review of historic utility and substructure maps, private utility locates, ground penetrating radar, or other technologies. If there is any evidence of utilities or subsurface objects/structures, drilling or excavation activities may be offset. If activities cannot be offset, measures will be taken to remove, disconnect, and/or protect the utilities and/or subsurface structures and/or objects. Every reasonable effort will be made to clear the area of intrusive work prior to fieldwork being started.

4.2.6 Electrical Hazards

It may be possible that overhead power lines will be in proximate locations during drilling or excavation activities. At least a 20 foot clearance must be maintained from overhead power lines. No equipment such as drill rigs or dump trucks can be moved while masts or buckets are in the upright position. Field personnel and subcontractors performing electrical work are required to be appropriately trained to work on the electrical systems in question prior to start of work. Authorization from project management personnel is required prior to any electrical work or work near overhead power lines. . When using extension cords, all field workers will ensure that they are in good working condition, are correctly rated for use, and do not contain abrasions such that bare wires could be exposed to the environment. Extension cords will not be used in wet areas without plugging the extension cord into a ground fault circuit interrupter (GFCI). GFCIs will detect a short circuit and cut power.

4.2.7 Heavy Equipment Operations

Heavy equipment must be operated in a safe manner and be properly maintained such that operators and ground personnel are protected.

Requirements for Operators

- Only qualified, trained, and authorized operators are allowed to operate equipment
- Seat belts will be used at all times in all equipment and trucks
- Operators will stop work whenever ground personnel or other equipment enter their work area; work will resume only when the area has been cleared
- No personnel may ride on equipment other than the Authorized Operator
- No personnel may be carried or lifted in the buckets or working "arms" of the equipment
- Spotters will be used when ground personnel are in the vicinity of heavy equipment work areas and/or when an operator is backing equipment near other structures or congested area

Requirements for Ground Personnel

- All ground personnel must wear orange protective vests in work areas with any operating heavy equipment
- Ground personnel will stay outside of the swing zone or work area of any operating equipment
- Ground personnel may only enter the swing or work area of any operating equipment when:
  -They have attracted the operators attention and made eye contact
  -The operator has idled the equipment down and grounded all extensions
  -The operator gives the ground personnel permission to approach
- Ground personnel shall never walk or position themselves between any fixed object and running equipment or between two running pieces of equipment

Equipment

- Maintain operations manuals at the site for each piece of equipment that is present and in use
- Ensure operators are familiar with the manual for the equipment and operate the equipment within the parameters of the manual
- Ensure all equipment is provided with roll-over protection systems
- Verify that seatbelts are present and functional in all equipment
- Prohibit the use of equipment that has cab glass which is broken or missing
- Ensure that backup alarms are functional on all trucks and equipment
- Require all extensions such as buckets, blades, forks, etc. to be grounded when not in use
- Require brakes to be set and wheels chocked (when applicable) when not in use

Daily inspections of equipment are required using a Daily Heavy Equipment Safety Checklist. Equipment deemed to be unsafe as a result of daily inspection will not be used until required repairs or maintenance occurs. During maintenance/repair, ensure that motors are turned off, all extensions are grounded or securely blocked, controls are in a neutral position, and the brakes are set.

4.2.8 Drilling and Excavation Safety

Prior to any intrusive work, as previously mentioned, the location of underground utilities, such as sewer, telephone, gas, water and electric lines must be determined and plainly staked. Necessary arrangements must be made with the utility company or owner for the protection, removal or relocation of the underground utilities. In such circumstances, excavation will be done in a manner that

does not endanger the field personnel engaged in the work or the underground utility. Utilities left in place will be protected by barricading, shoring, suspension or other measures, as necessary.

The use of unsafe or defective equipment is not permitted. Equipment must be inspected regularly. If found to be defective, equipment must be immediately removed from use and either repaired or replaced prior to resuming work with that equipment. Field personnel will be familiar with the location of first-aid kits and fire extinguishers. Telephone numbers for emergency assistance must be prominently posted and kept current.

Good housekeeping conditions will be observed in and around the work areas. Suitable storage places will be provided for all materials and supplies. Pipe, drill rods, etc. must be securely stacked on solid, level sills. Work surfaces, platforms, stairways, walkways, scaffolding, and access ways will be kept free of obstructions. All debris will be collected and stored in piles or containers for removal and disposal.

The area of the site to undergo intrusive activity must be walked over with the drillers and/or heavy equipment operators to identify all work locations, as well as making sure all marked utilities are seen by those doing the intrusive work.

Drilling Specific Concerns:

In areas where utilities have been identified or may be suspected, pre-drilling clearance such hand-augering, hand excavation (with shovels or post-hole diggers), or air-knifing to a depth of at least 5' below ground surface (BGS) may be required. The Project Manager will provide guidance in those instances on what has been determined as an acceptable means of clearing drilling locations. It should be noted that if the soil lithology changes to gravel within those 5 feet, that may be an indication of a utility trench and extreme caution should be taken OR the drilling location should be offset 5 horizontal feet from the original location. Should 3 consecutive attempts be made without success to offset a particular drilling location, the field personnel should stop and contact the Project Manager for further instruction.

Special precaution must be taken when using a drill rig on a site within the vicinity of electrical power lines and other overhead utilities. Electricity can shock, burn and cause death. When overhead electrical power lines exist at or near a drilling site, all wires will be considered dangerous.

A check will be made for sagging power lines before a site is entered. Power lines will not be lifted to gain entrance. The appropriate utility company will be contacted and a request will be made that it lift or raise cut off power to the lines.

The area around the drill rig will be inspected before the drill rig mast (derrick) is raised at a site in the vicinity of power lines. The minimum distance from any point on the drill rig to the nearest power line will be determined when the mast is raised or is being raised. The mast will not be raised and the drill rig will not be operated if this distance is less than 20 feet, because hoist lines and overhead power lines can be moved toward each other by the wind.

Before the mast is raised, personnel will be cleared from the immediate area, with the exception of the operator and a helper, when necessary. A check will be made to ensure safe clearance from energized power lines or equipment (minimum 20-foot clearance). Unsecured equipment must be removed from the mast and cables, mud lines and catline ropes must be adequately secured to the mast before raising. After it is raised, the mast must be secured to the rig in an upright position with steel pins.

Excavation Specific Concerns:

For excavation work, entry into an excavated area or trench will only be allowed when:

- Shoring, sloping, and spoil pile placement is in conformance with 29 CFR 1926 Subpart P, and
- Personal protection and monitoring, as detailed in this HASP, has been implemented.

All excavation contractors are required to provide an OSHA trained and certified Competent Person. Daily inspections of excavations, the adjacent areas, and protective systems shall be made by the Competent Person for evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the Competent Person prior to the start of work and as needed throughout each shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. All inspections made by the Competent Person should be recorded in the field log book. No personnel shall perform work in a trench or excavation that contains accumulated water (any accumulated water will need to be either pumped out until the trench/excavation is dry, or the accumulated water is allowed to disperse naturally). Each employee in an excavation shall be protected from cave-ins by an adequate protective system except when excavations are made entirely in stable rock or the excavation is less than 5 feet in depth and examination by the Competent Person provides no indication of a potential cave-in. Protective systems consist of sloping or benching, use of trench boxes or other shielding mechanisms, or the use of a shoring system in accordance with the regulations.

When mobile equipment is operated adjacent to an excavation and the operators/drivers do not have a clear and direct view of the edge of the excavation, a warning system such as barricades, hand or mechanical signals, or spotters are required.

Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard to personnel in the excavation. All temporary spoil piles shall be kept at least 2 feet away from the edge of the excavation. Spoil piles should be placed to channel rainwater or other run-off water away from the excavation.

All excavations deeper than 4 feet deep and which have the potential to have a hazardous atmosphere or oxygen deficient atmospheres (less than 19.5% oxygen) must be tested to ensure safe working conditions, prior to entry.

4.2.9 Use of Hand Tools and Portable Power Tools

Hand tools will be kept in good repair and used only for their designed purposes. Proper protective eyewear will be worn when using hand tools and portable power tools. Unguarded sharp-edged or

pointed tools will not be carried in field personnel's pockets. The use of tools with mushroomed heads, split or defective handles, worn parts, or other defects will not be permitted. Inspect all tools prior to start-up or use to identify any defects. Tools that have become unsafe will be reconditioned before reissue or they will be discarded and replaced. Throwing or dropping of tools from one level to another will not be permitted; rather, containers and hand lines will be used for transporting tools from one level to another if working at heights.

Non-sparking tools will be used in atmospheres where sources of ignition may cause fire or explosion. Electric-powered shop and hand tools will be of the double-insulated, shockproof type, or they will be effectively grounded. Power tools will be operated only by designated personnel who are familiar and trained with their use. When not in use, tools will not be left on scaffolds, ladders or overhead working surfaces.

4.2.10 Noise

Exposure to high levels of noise may occur when working near drill rigs or other heavy equipment. Also, depending upon where the work is being performed, local equipment (e.g., airports, factory machines, etc.) may produce high levels of noise. A good indication of the need for hearing protection is when verbal communication is difficult at a distance of 2-3 feet. Personnel will be provided with ear plugs and/or earmuffs when exposed to noise levels in excess of the 8-hour Permissible Exposure Limit (PEL) of 90 decibels.

4.2.11 Work Zone Traffic Control

Personnel will exercise caution when working near areas of vehicular traffic. Work zones will be identified by the use of delineators (traffic cones, flags, vehicles, DOT approved devices, temporary or permanent fencing, and/or safety barrier tape). Personnel will wear reflective vests when working in these areas. Depending on frequency, proximity, and nature of traffic, a flag person may also be utilized.

4.2.12 Work Over Water

If personnel will be working near, above or immediately adjacent to or within 6 feet of water that is 3 feet or more deep or where water presents a drowning hazard (e.g., fast-moving stream, water body with a soft bottom), employees are required to a U.S. Coast Guard (USCG) approved personal flotation device (PFD). All PFDs must have reflective tape on them to facilitate visibility. Employees must inspect PFDs daily before use for defects. Do no use defective PFDs.

4.2.13 Vehicle Use

Personnel must use caution when driving to, from, and across the site, paying special attention to other site traffic, as well as weather and road conditions. Heavy equipment should be transported during non-rush hour traffic.

4.3 Biological Hazards

Site activities on this Site may expose workers to other hazards such as poisonous plants, insects, animals, and indigenous pathogens. Protective clothing and respiratory protection equipment, and being capable of identifying poisonous plants, animals, and insects, can greatly reduce the chances of exposure. Thoroughly washing any exposed body parts, clothing, and equipment will also protect against infections. Avoiding contact with biological hazards is the best way to prevent potential adverse health effects. Recognition of potential hazards is essential. When avoidance is impractical or impossible, PPE, personal hygiene, good general health and awareness must be used to prevent adverse effects. If working in wooded/grassy areas, use appropriate insect repellants (containing DEET and/or Permethrin) and apply them per the manufacturers' directions. The following is a list of biological hazards that may be encountered while performing field activities at the project site and surrounding areas:

BIOLOGICAL HAZARD and LOCATION	CONTROL MEASURES
Snakes typically are found in underbrush and tall grassy areas.	If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. **DO NOT** apply ice, cut the wound or apply a tourniquet. Carry the victim or have him/her walk slowly if the victim must be moved. Try to identify the snake: note color, size, patterns and markings.
Poison ivy, poison oak and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas.	Become familiar with the identity of these plants. Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.
Exposure to **bloodborne pathogens** may occur when rendering first aid or CPR, or when coming into contact with medical or other potentially infectious material or when coming into contact with landfill waste or waste streams containing such infectious material.	Training is required before a task involving potential exposure is performed. Exposure controls and personal protective equipment (PPE) area required. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.
Bees, spiders and other stinging insects may be encountered almost anywhere and may present a serious hazard particularly to people who are allergic.	Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past and inform the Project Manager and/or the buddy. If a stinger is present, remove it carefully with tweezers. Watch for allergic reaction; seek medical attention if a reaction develops.
Ticks typically are in wooded areas, bushes, tall grass and brush. Ticks are black, black and red or brown and can be up to one-quarter inch in size.	Avoid tick areas. Wear tightly woven, light-colored clothing with pants tucked into boots or socks. Spray outside of clothing with insect repellent containing permethrin. Check yourself for ticks often. If bitten, carefully remove tick with tweezers. Report the bit to the Project Manager. Look for symptoms of Lyme

	disease that include a rash that looks like a bulls eye and chills, fever, headache, fatigue, stiff neck or bone pain. If symptoms appear, seek medical attention.

5.0 PERSONAL PROTECTIVE EQUIPMENT

PPE ensembles are used to protect employees and subcontractors from potential contamination hazards while conducting project field activities. Level D is expected to be used for most activities at the site. The following subsections describe the PPE requirements for the field activities.

5.1 Level D Protection

When the atmosphere contains no known hazards and work functions preclude splashes, immersions or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals, Level D protection may be used. Level D does not provide respiratory protection and only provides minimal dermal protection. The Level D ensemble consists of the following:

- Work clothes that may consist of a short or long-sleeved cotton shirt and cotton pants, cotton overalls, or disposal overalls such as Tyvek™
- Steel-toe/steel-shank work boots
- Safety glasses with side shields
- Hearing protection, as necessary
- Hand protection, as appropriate
- Hard hat when working around overhead equipment such as a drilling rig
- Reflective vests when working around heavy equipment or near roadways
- Body harness and life vests when working on or within 6 feet of bulkheads, at heights, or in 3 feet or more of standing water (such as in Tin Mill Canal)

5.2 Modified Level D Protection

This is the level of protection that may be needed for material handling, sampling operations, and operation of remediation equipment when splash hazards are present. Modified Level D protection consists of the following:

- Disposable overalls such as polyethylene-coated Tyvek™
- Latex, vinyl, or nitrite inner gloves when handling liquids/fluids
- Nitrile outer gloves (taped to outer suit)
- Chemical-protective over-boots (taped to outer suit)
- Steel-toe/steel-shank, high-ankle work boots
- Hard hat with face shield
- Safety glasses with side shields or goggles
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- Hearing protection, as necessary

5.3 Level C Protection

Level C protection will be used when site action levels are exceeded and respiratory protection is required. The Level C ensemble consists of Modified Level D with the following modifications:

- Half or full-face air-purifying respirator (APR) equipped with appropriate cartridges/filters
- Chemical resistant clothing such as poly-coated Tyvek™
- Inner and outer nitrile gloves
- Chemical-resistant safety boots or boot covers to go over safety boots

Upgrading or downgrading the level of protection used by EAG employees and subcontractors is a decision made by EAG based on the air monitoring protocols presented in Section 7.0 for respiratory protection, the potential for inhalation exposure to toxic chemicals, and the need for dermal protection during the activity.

5.4 First Aid, Emergency and Safety Equipment

The following first aid, emergency and safety equipment will be maintained onsite at the work area:

- A portable eye wash
- Appropriate ABC-type fire extinguishers (minimum of 10 pounds; remediation systems to house individual 20 pound extinguishers) carried in every vehicle used during field operations
- Industrial first-aid kit (one 16-unit that complies with American National Standards Institute (ANSI) Z308A for every 25 persons or less)
- Bloodborne pathogen precaution kit with CPR mouth shield
- Instant cold packs
- Soap or waterless hand cleaner and towels
- American Red Cross First Aid and CPR Instruction Manuals

6.0 PERSONNEL TRAINING AND STANDARD SAFETY PROCEDURES

Employees must have received, at the time of project assignment, a minimum of 40 hours of initial OSHA health and safety training for hazardous waste site operations. Personnel who have not met the requirements for the initial training will not be allowed in the Exclusion Zone (EZ) or Contamination Reduction Zone (CRZ) of any active work area. A copy of each subcontractor site worker's 40-hour training certificate must be sent to the Project Manager for review prior to the start of the site work.

The 8-hour refresher training course must be taken at a minimum of once per year. At the time of the job assignment, all site workers must have received 8 hours of refresher training within the past year. This course is required of all field personnel to maintain their qualifications for hazardous waste site work. A copy of each subcontractor site worker's most recent 8-hour refresher training certificate must be sent to the Project Manager for review prior to the start of the site work.

A site-specific safety orientation will be conducted by EAG for all EAG employees and subcontractors engaged in fieldwork.

6.1 Onsite Safety, Health and Emergency Response Training

The OSHA 1910.120 standard requires that site safety and health training be provided by a trained, experienced supervisor. "Trained" is defined to mean an individual that has satisfactorily completed the OSHA 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) course and 8-hour site supervisor training. Training will be offered at the time of the initial task assignment and/or whenever new chemicals are introduced into the workplace. Training will include all applicable regulatory requirements, location of the program, inventory and MSDSs, chemicals used and their hazards (chemical, physical, and health), how to detect the presence or release of chemicals, safe work practices and methods employees can take to protect themselves from hazards, how to read MSDSs and site or project specific information on hazard warnings and labels in use at that location. All training will be documented and training certificates will be kept in the employee's permanent training file. All applicable training will also require annual refreshers.

EAG qualified personnel must also provide safety meetings.

6.2 Standard Safety Procedures

This section describes the standard safety procedures that EAG requires all onsite personnel to follow during site activities.

6.2.1 General Safety Work Practices

All onsite employees and subcontractors will observe the following general safety work practices:

- Health and safety tailgate briefings will occur to introduce new activities, any new safety issues, and emergency egress routes for work areas; any significant change (added personnel, change in scope, or change in field conditions) will trigger a second (or more) tailgate meeting to address whatever change occurred
- No food, drink, or tobacco products will be allowed in the Exclusion and Contamination Reduction Zones
- Loose clothing, hair, and/or jewelry will not be permitted around moving or rotating equipment
- The "buddy system" will be implemented as necessary whereby a pair of co-workers watches out for each other while in proximity of potential physical work hazards
- Good housekeeping of all work areas will be maintained on an ongoing basis

6.2.2 Hand Safety

This standard is intended to protect employees from activities that may expose them to injury. This standard provides information on recognizing those conditions that require personal protective equipment (PPE) or specific work practices to reduce the risk of hand injury.

Appropriate gloves must be worn when persons work with materials or equipment that presents the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc.

<u>Guidelines for Working With and Around Equipment (Hand Tools, Portable Powered Equipment)</u>:

- Employees should be trained in the use of all tools.
- Keep hand and power tools in good repair and use them only for the task for which they were designed.

- Inspect tools before use and remove damaged or defective tools from service.
- Operate tools in accordance with manufacturer's instructions.
- Do not remove or bypass a guarding device for any reason.
- Keep surfaces and handles clean and free of excess oil to prevent slipping.
- Wear proper PPE, including gloves, as necessary.
- Do not carry sharp tools in pockets.
- Clean tools and return to the toolbox or storage area upon completion of a job.
- Before applying pressure, ensure that wrenches have a good bite.
- Brace yourself by placing your body in the proper position so you will not fall if the tool slips.
- Make sure hands and fingers have sufficient clearance in the event the tool slips.
- Always pull on a wrench, never push.
- When working with tools overhead, place tools in a holding receptacle when not in use.
- Do not throw tools from place to place or from person to person, or drop tools from heights.
- Inspect all tools prior to start-up or use to identify any defects.
- Powered hand tools should not be capable of being locked in the ON position.
- Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
- Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.
- Do not use cheater pipes.
- Make provisions to prevent machines from restarting through proper lockout/tagout.

<u>Guidelines for using Cutting Tools:</u>

- Always use the specific tool for the task. Tubing cutters, snips, self- retracting knives, concealed blade cutters, and related tools are task specific and minimize the risk of hand injury. For more information about cutting tools, see Supplemental Information A.
- Fixed open-blade knives (FOBK) are prohibited from use. Examples of fixed open-blade knives include pocket knives, multitools, hunting knives, and standard utility knives.
- When utilizing cutting tools, personnel will observe the following precautions to the fullest extent possible:
- Use the correct tool and correct size tool for the job.
- Cut in a direction away from yourself and not toward other workers in the area.
- Maintain the noncutting hand and arm toward the body and out of the direction of the cutting tool if it were to slip out of the material being cut.
- Ensure that the tool is sharp and clean; dirty and dull tools typically cause poor cuts and more hazard than a sharp, clean cutting tool.
- Store these tools correctly with covers in place or blades retracted, as provided by the manufacturer.
- On tasks where cutting may be very frequent or last all day (e.g., liner samples), consider Kevlar® gloves in the PPE evaluation for the project.
- Do not remove guards on paper cutters.

6.2.3 Respiratory Protection

Based on air monitoring, an upgrade to Level C protection may be indicated. Half or full-face APRs will be utilized for protection against organic vapors and particulates. All employees required to wear respirators will be need to be medically cleared, in writing to do so by a qualified Occupational Physician.

All respirator users must be trained before they are assigned a respirator, annually thereafter, whenever a new hazard or job is introduces and whenever employees fail to demonstrate proper use or knowledge. Training will include, at a minimum:

- Why the respirator is necessary and what conditions can make the respirator ineffective.
- What limitation and capabilities of the respirators area.
- How to inspect, put on and remove and check the seals of the respirator.
- What respirator maintenance and storage procedures are.
- How to recognize medicals signs and symptoms that may limit or prevent effective use of the respirator.
- The engineering and administrative controls being used and the need for respirators.
- The hazards and consequences of improper respirator use.
- How to recognize and handle emergency situations.

Training will be documented and training certificated will be kept in the employee's permanent training file.

6.2.4 Personal Hygiene Practices

The field team must pay strict attention to sanitation and personal hygiene requirements to avoid personal contamination. The following instructions will be discussed and must be followed:

- During field activities, never put anything in the mouth, including fingers
- All employees must wash their hands, forearms, face, and neck before eating drinking, smoking or using the restroom
- Smoking is prohibited except in designated areas outside the work zone
- At the end of the day, all employees will shower upon returning home or to their hotel

6.2.5 Electrical Safety

All extension cords used onsite must be heavy-duty variety and must be properly grounded. All temporary circuitry must incorporate the use of GFCI devices. Refer to electrical safety in Section 4.2.6, Electrical Hazards.

6.2.6 Fire Safety

All flammable liquids will be used only for their intended purpose and stored and handled only in approved containers. Portable containers must be the approved red safety containers equipped with flame arresters and self-closing lids. All transfers of flammable liquids must be made with the containers grounded or bonded. Also, gasoline containers will be clearly labeled and storage areas (if

applicable) will be posted with "No Smoking" signs. Fire extinguishers will be stalled in all areas that contain flammable liquids.

6.2.7 Illumination

All work is planned for daylight hours. No special requirements are anticipated. However, should any work take place outdoors after daylight hours, suitable lighting will be required. In addition, suitable lighting is to be provided in each remediation system building or enclosure.

6.2.8 Sanitation

Potable water and toilet facilities will be provided in compliance with the OSHA 1926.51 standard. Any container used to distribute drinking water shall be clearly marked and not used for any other purpose. Single drinking cups will be supplied, both a sanitary container for the unused cups and a receptacle for disposed of the used cups will also be provided. Port-a-johns will be provided since there are no sanitary sewers on the job site.

7.0 EXPOSURE MONITORING PLAN

This section describes air and personnel monitoring protocols, sampling methods, and instrumentation to be used, as well as the methods and frequency of sampling instrument calibration and action levels for potential work site hazards. When engaged in air monitoring, EAG personnel and subcontractors must use the forms to record air monitoring data and air monitoring instrument calibration records. All monitoring records/forms are to be maintained in the project file by the EAG Project Manager.

7.1 Air Monitoring

The surveillance program is established to detect changes in the ambient air at the work site and to ensure the continuing safety of the work zones and adequacy of the level of worker protection. During field activities, the designated field team member will monitor the work site for combustible gas concentrations and organic vapors. Calibration of all monitoring equipment will be performed in accordance with the manufacturers' procedures by trained EAG employees and subcontractors. The Project Manager, Project Field Team Leader or representative will be notified immediately of any contaminant levels that could trigger an upgrade in PPE or cause a suspension of site activities.

- One or more of the following direct-reading instruments may be used to aid in this determination. Photoionization Detectors (PID) and Flame Ionization Detectors (FID) will measure non-specific organic gases and vapors. Combustible Gas Indicators (CGI) will detect explosive atmospheres. Oxygen (O2) meters will detect fluctuations in oxygen concentrations. These instruments should be calibrated or bump tested daily and whenever the readings may be erratic. All readings should be recorded in the field log books.

Air monitoring results obtained from the breathing zone during field activities will be recorded in field log books. All such records will also include the location, date/time, weather conditions, person monitored, background concentration, and identification of specific contaminant whenever possible. Air monitoring information will be utilized to evaluate personnel exposure and assess the appropriateness of PPE for Site conditions.

7.1.1 Combustible Gas and Oxygen Deficiency/Excess Monitoring

Explosive gas concentrations are not expected to exceed 10% of the lower explosive level (LEL). Should the need be indicated for monitoring, action guidance for the CGI/O2 meter responses is contained in **Table 7-1**.

Table 7-1

CGI/Oxygen Meter Action Levels	
Meter Response	**Action**
CGI response 0%-10% LEL	Continue normal operations
CGI initial response >10% and <20% LEL	Eliminate all sources of ignition from the work area; temporarily retreat from work area for 15-30 minutes and then monitor area again
CGI response after 15-30 minute retreat >10% and <20% LEL	Retreat from work area; notify Project Manager
CGI response >20%	Discontinue operations; retreat from work area
Oxygen level <19.5%	Retreat from work area; notify Project Manager
Oxygen level >23.5%	Retreat from work area; notify Project Manager

7.1.2 Organic Vapor Concentrations

Real-time monitoring for organic vapor concentrations in the breathing zone and down hole will be conducted during field operations (installation of groundwater monitoring and groundwater sampling by EAG and EAG subcontractor personnel) with a PID equipped with a 10.2- or 11.7-electron volt (eV) probe. The PID will be taken into the field and operated during site activities where contaminated soil and/or groundwater may be present. Air monitoring will be conducted during well installation and when a well is opened for groundwater measurements. Measurements will be made at the well head and personnel breathing zones where activities are being performed. The instrument will be calibrated using ultra-high purity air and isobutylene vapor of known concentration before and after use each day. Air calibration measurements will be documented in writing and kept in the project file. Action guidance for PID responses is contained in **Table 7-2**.

Table 7-2

Action Levels for General Site Work	
Meter Response in Breathing Zone (minimum of 3 minutes)	**Action Required**
<5ppm above background	Use Level D PPE
>5ppm above background	Level C PPE, including half or full-face APR with organic vapor cartridges/P100 filters
>50ppm above background	Stop work
Action Levels for Handling NAPL	
Meter Response in Breathing Zone (minimum of 3 minutes)	**Action Required**
<1ppm above background	Use Modified Level D PPE
>1ppm to <10ppm	Level C PPE, including half or full-face APR with organic vapor cartridges
>10ppm above background	Immediately withdraw; monitoring will continue until action levels will allow safe re-entry

If air concentrations of organic vapors are greater than 5 ppm above background in the breathing zone for a 3-minute period, personnel will stop work, retreat from site, and allow time (at least 15 minutes) for vapors to dissipate. If monitoring indicates that concentrations still exceed 5 ppm, workers will upgrade to Level C PPE. If monitoring indicates that concentrations exceed 50 ppm, work will be stopped until site conditions can be re-evaluated.

These action levels are based on the assumption that the major component of free product being recovered will be benzene or naphthalene.

Work involving NAPL recovery from monitoring wells will be conducted in Level C PPE. This level may be downgraded based on air monitoring data and actual field conditions. Downgrading of PPE must be approved by the PM and HSE staff. If ventilation is conducted, additional air monitoring will be performed to the resumption of work to determine the level of PPE required.

7.2 Physical Conditions Monitoring

Site workers will be monitored by the Project Manager for signs of weather-related symptoms from exposure to excessive heat or cold.

Whenever the air temperature exceeds 70°F for personnel wearing chemical protective clothing or 90°F for personnel wearing regular work clothes, the Project Manager will assess conditions that may cause heat stress in site workers.

8.0 MEDICAL SURVEILLANCE

This section discusses the medical surveillance program, how the results are reviewed by a physician and how participation is documented.

8.1 Medical Surveillance Program

All personnel who will be performing any task where potential exposure to hazardous material exists will undergo medical surveillance as outlined in OSHA 29 CFR 1910.120(f). All personnel performing tasks in the Exclusion Zone or Contamination Reduction Zone will be required to have passed the EAG medical surveillance examination (or equivalent), performed by a licensed Occupational Physician. The Project Manager will verify that all EAG and subcontractor personnel meet applicable OSHA medical surveillance requirements.

Applicable field employees will undergo an annual comprehensive medical examination, including a comprehensive health history, blood chemistry with complete blood count and differential, urinalysis, medical history, required chest x-rays, audiogram, pulmonary function testing, testing for heavy metals (as needed), and a physician's interpretation of each employee's medical surveillance examination, including the ability of the employee to wear a respirator. A comprehensive medical examination will be performed if an employee develops signs or symptoms indicating possible overexposure to hazardous substances and/or heat or cold stress.

8.2 Physician Review

All medical surveillance and examination results are reviewed by a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine. EAG employee participation in the medical surveillance program is a part of their permanent medical record maintained in the employee's home office. A copy of the current medical clearance signed by the occupational health physician for all EAG employees must be maintained at the home office.

9.0 SITE CONTROL MEASURES AND DECONTAMINATION

To provide for the protection of public health and safety and minimize the possibility of transferring hazardous substances from the site, contamination control procedures are required. These procedures consist of site control measures (which entail the delineation of work zones, communications, and site security) and decontamination procedures (which are necessary for both personnel and equipment). Contaminants that may be uncovered during sampling operations must not be transferred outside the work zone unless properly containerized, and must be removed from clothing, personnel, and equipment prior to relocation from that zone. This section discusses site control measures and decontamination procedures to be used during the collection of samples, the installation of soil borings and/or groundwater monitoring/remediation wells, excavations, and other intrusive work where contact with impacted soils and groundwater could occur by EAG and/or EAG subcontractor personnel.

9.1 Site Control Measures

Site control can be achieved by effectively delineating the work zone, providing appropriate communication, and establishing site security.

9.1.1 Work Zone Delineation

To minimize the transfer of hazardous substances from the site and to ensure proper protection of employees and subcontractors, work zones will be established by the Field Project Team Leader. Applicable site work and the associated requirement for work zones will be determined by the Project Manager. The work area will be divided into an Exclusion Zone (EZ), a Contamination Reduction Zone (CRZ), and a Support Zone (SZ). A typical work zone delineation setup is shown as **Figure 9-1**, below.

Exclusion Zone (EZ)

Contamination does or could exist in this zone. Only properly authorized and trained individuals (refer to Section 6.0) wearing appropriate PPE will be allowed to enter and work in this zone. All people entering the EZ must wear, at a minimum, Level D protection. An entry and exit point for personnel and equipment will be established at the periphery of the EZ (between the EZ and the CRZ) to regulate the flow of personnel and equipment.

Contamination Reduction Zone (CRZ)

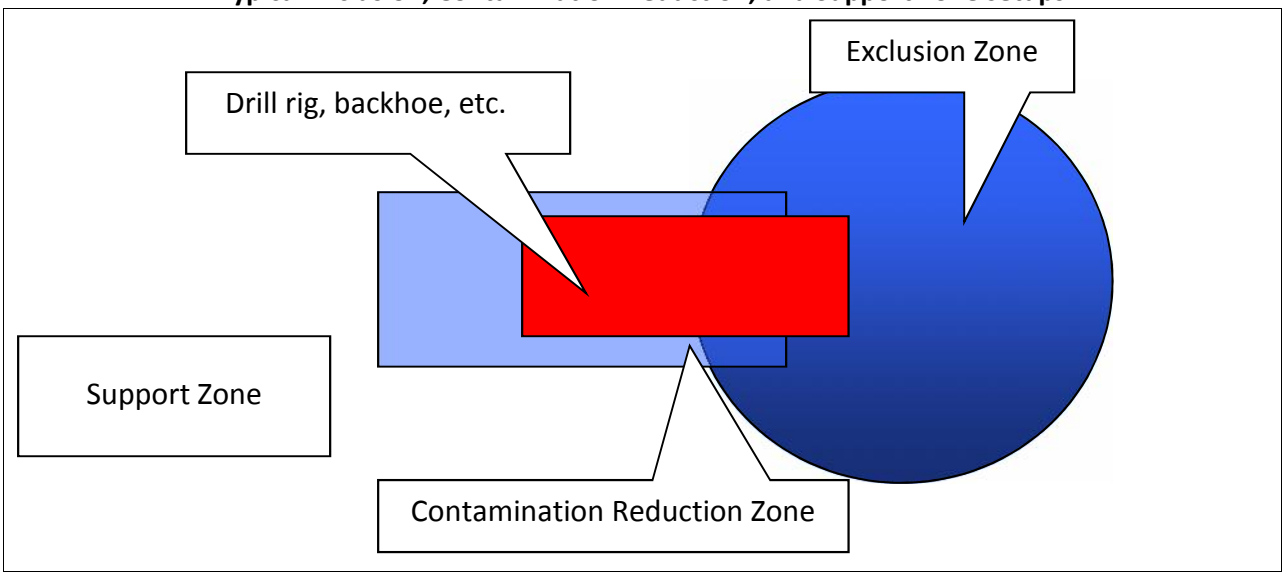
Between the EZ and the SZ will be the CRZ, which will provide a transition between the potentially contaminated EZ and the clean SZ. The CRZ (located upwind of the EZ, if possible) will be a corridor leading from the EZ and will serve as a buffer to further reduce the probability of the SZ becoming contaminated. Exit from the EZ will only be allowed through this CRZ. The CRZ will provide additional assurance that the physical transfer of contaminating substances on people, equipment, and/or in the air will be limited through a combination of decontamination and zone restrictions. Within this zone, employees and subcontractors may perform personal decontamination (e.g., face and hand washing), and certain PPE and small equipment decontamination. Buckets or wash basins for boot

washing and equipment decontamination will be stationed on a sheet of plastic (a minimum of 8 feet by 8 feet), the boundaries of which will constitute the CRZ.

Support Zone (SZ)

The Support Zone will be considered a non-contaminated area. The location of support facilities in the SZ will be upwind of the EZ (where possible) and readily accessible to the nearest road. The field office/support facilities, equipment vehicles, a first aid station and a visitors/personnel entry and exit log for the work site will be located in this zone. Potentially contaminated personal clothing, equipment and samples are not permitted in this zone unless properly containerized.

Figure 9-1
Typical Exclusion, Contamination Reduction, and Support Zone setups



9.1.2 Communications

A loud and clear form of communication should be made available for Site personnel entering the work zones. Site communication may be in the form of hand signals, voice, or other communication devices. All forms of communication should be understood by all workers on the Site prior to starting work. Offsite communications may be conducted with mobile phones or walkie-talkies only if the atmosphere has been deemed non-explosive, and the person using the mobile device is in the SZ while placing the call, or inside the cab of a stationary vehicle.

9.1.3 Site Security

The Sparrows Point facility is not open to the public, and there is a strictly monitored main entrance with a security guard on duty at all times who only allows authorized personnel onto the Site. This limited access to the facility should eliminate the need for many requirements for specific site security except those needed to maintain work zone integrity, such as visible barriers around open excavations or EZs and CRZs. No site visitors will be allowed to travel unescorted by EAG or subcontractor personnel around the facility.

Once site visitors arrive at their intended work zone, they must check in with the Field Team Lead. If visitors are authorized to enter the CRZ and/or the EZ, they must have completed OSHA 1910.120 medical surveillance and training requirements (refer to Section 8.0 and Section 6.0). Visitors must wear

appropriate PPE before they will be allowed to enter the CRZ and/or the EZ. They must also be taken through this HASP during a brief tail-gate meeting and sign the Acknowledgement page in the back prior to engaging in any activities inside the CRZ or the EZ. All site visitors must follow the same site control measures and decontamination procedures as EAG personnel and subcontractors. The Project Manager must also be informed of each visitor's name, purpose for their visit, time of entry (and exit), location of tasks they wish to perform, whether they completed their intended task(s), and any other relevant information pertaining to their visit.

9.2 Decontamination Procedures

Decontamination of employees, subcontractors, and equipment leaving the EZ will be performed to minimize human exposure to hazardous substances and to minimize the spread of contamination to surrounding areas. The purpose of the CRZ is to provide a location to perform limited personnel decontamination and certain PPE and small equipment decontamination.

9.2.1 Personnel Decontamination

Persons leaving the EZ must pass through the CRZ and follow decontamination procedures before entering the SZ. Hand tools and other sampling equipment used in the EZ and reusable PPE (boots, safety glasses, etc.) will be appropriately cleaned prior to removal from the site each day. The step-by-step sequence for personnel decontamination is as follows:

- Remove boot covers (if used) at the boot washing station and place them in the disposal container provided
- Wash outer gloves and chemical resistant boots (if used) at the boot washing station
- Remove wrist tape (if used) and outer gloves and place them in the disposal container provided
- Remove ankle tape (if used) and disposable coveralls (if used) and place them in the disposal container provided
- Remove respirators (if used) and place each in designated locations in the CRZ
- Remove inner gloves and discard in the disposal container provided
- Wash hands and face and proceed to the SZ

Respirators must be fully decontaminated after each use by the personnel who previously wore them. All project employees and subcontractors are required to take a thorough soap and water shower in their home or motel room at the end of each workday. If monitoring or a general exposure assessment indicates that an employee has become contaminated, the employee or subcontractor will notify the EAG Project Manager and the Field Team Lead as soon as the contaminated state has been discovered.

9.2.2 Equipment Decontamination

All equipment leaving the EZ must be decontaminated either within the CRZ or at the central decontamination area. Small equipment, such as hand tools, will be thoroughly decontaminated within the CRZ before being placed in the SZ. The field tools may be scrubbed visually clean using a detergent solution (Alconox/Liquinox) with water and a stiff, long-bristled scrub brush. Following the solution scrubbing, the tools may be rinsed with distilled water or isopropyl alcohol. Any vehicle working in an EZ will be decontaminated before leaving the site. The vehicle will be cleaned by sweeping excess soil and debris off the wheels. A high-pressure sprayer will then be used to wash the wheels, if necessary.

Each piece of equipment will be inspected after cleaning for any soil remaining on the tires or elsewhere. All vehicles will be cleaned to the satisfaction of the Field Team Lead or a designated assistant prior to entering the SZ or leaving the site. Employees or subcontractors performing decontamination shall wear the appropriate level of PPE (refer to Section 5.0).

9.2.3 Waste Management

The Project Manager and the Field Team Leads will be responsible for overseeing the containerization and disposal of any field derived wastes. Contaminated or suspected contaminated field derived wastes shall be disposed of in accordance with all local, state, and/or federal regulations. Field derived wastes include decontamination rinse waters and other related decontamination generated wastes.

Soils and groundwater expected to be encountered during any sampling or intrusive work not to be contaminated, based on existing data, may be discharged to the ground surface in the immediate vicinity of the monitoring well. However, any known or suspected to be contaminated soil (in small quantities) or groundwater will be containerized for future removal, likely in 55-gallon drums or other approved storage vessels. Depending on the suspected contaminants, the recovered groundwater may be sent through one of the onsite groundwater treatment units. However, the treatment unit must be designed to address the contaminants of concern in the groundwater being treated. Otherwise, the liquid must be staged onsite for eventual offsite disposal at an approved facility.

Impacted soil, if in drums, will be staged in an area designated by the Project Manager or Field Team Lead for eventual disposal. For large excavations, where excavated soil is stockpiled, it may be necessary to place soils on plastic and cover with plastic to prevent any potential leachable runoff. The Project Manager and/or Field Team Lead will provide the proper guidance necessary for handling bulk soil piles.

Any NAPL recovered via remediation systems or manual recovery efforts will be properly containerized and either disposed of offsite as a recyclable material, if possible, or as a hazardous waste. The receiving facility must be an approved facility.

10.0 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

The objective of emergency response and contingency procedures is to ensure that effective actions are implemented in a timely manner to minimize or control the effects of adverse events (e.g., potential chemical exposures, personal injuries, fires/explosions, and spills/releases). The following subsections describe the basic emergency responses required should an emergency take place during field investigation or remedial effort activities.

10.1 Emergency Phone Numbers

Emergency telephone numbers are listed in **Table 10-1**.

Table 10-1
Emergency Telephone Numbers and Agencies

Agency	Telephone Number
Security (Sparrows Point facility)	(410) 388-7761
Ambulance	911
Fire	911
Occupational Health Clinic	(410) 633-3600
Hospital	(410) 550-0100 (general) (410) 550-0350 (emergency)
National Response Center	(800) 424-8802
Poison Control Center - Maryland	(800) 222-1222
EAG Main Contact	
VP Remediation, Russ Becker	(314) 686-5611
Project Manager, James Calenda	(314) 620-3056

10.2 Injury/Illness Treatment

In the event of illness or injury, the following steps will be taken:

- Evaluate the extent of injuries or seriousness of illness.
- When employees require urgent medical attention, call for emergency assistance. First aid should be administered while awaiting an ambulance or paramedics. All emergency medical treatment, other than first aid, will be administered by the local paramedics. **Table 10-1** lists site emergency telephone numbers. In all cases, critical injuries must be immediately referred for professional medical attention.
- For a non-critical injury/illness, first aid will be administered by onsite personnel. Anyone sustaining a non-critical injury/illness who continues to work will be monitored by the Field Team Lead for any signs of worsening condition, if it is deemed that the person can return to work by the Team Lead and Project Manager. Injured personnel who later suffer any worsening change in status are to immediately notify the Team Lead or the Project Manager.

10.3 Occupational Health Clinic and Hospital Information

Occupational Health Clinic

The Concentra Medical Center, located at 1833 Portal Street, Baltimore, MD, is the closest occupational health clinic, just over 6 miles away. A map to the clinic in included as **Figure 10-1**. The clinic should be used for non-emergency injuries and illnesses.

Directions:
From Sparrow's Point Road, turn left onto Wharf Road;
Turn left onto MD-158 W/Bethlehem Blvd. (0.4 mile);
Turn right onto MD-157 N/Peninsula Expy. (2.7 miles);
Turn slight left onto Merritt Ave. (0.1 mile);
Merritt Ave. becomes Sollers Point Rd. (0.3 mile);
Turn left to stay on Sollers Point Rd (0.6 mile);
Turn left onto Williams Ave. (0.2 mile);
Turn right onto Dundalk Ave. (<0.1 miles);
Turn left onto Chandlery St. (0.1 mile);
Turn left onto Portal St.

Figure 10-1: Health Clinic (Non-Emergency) Map

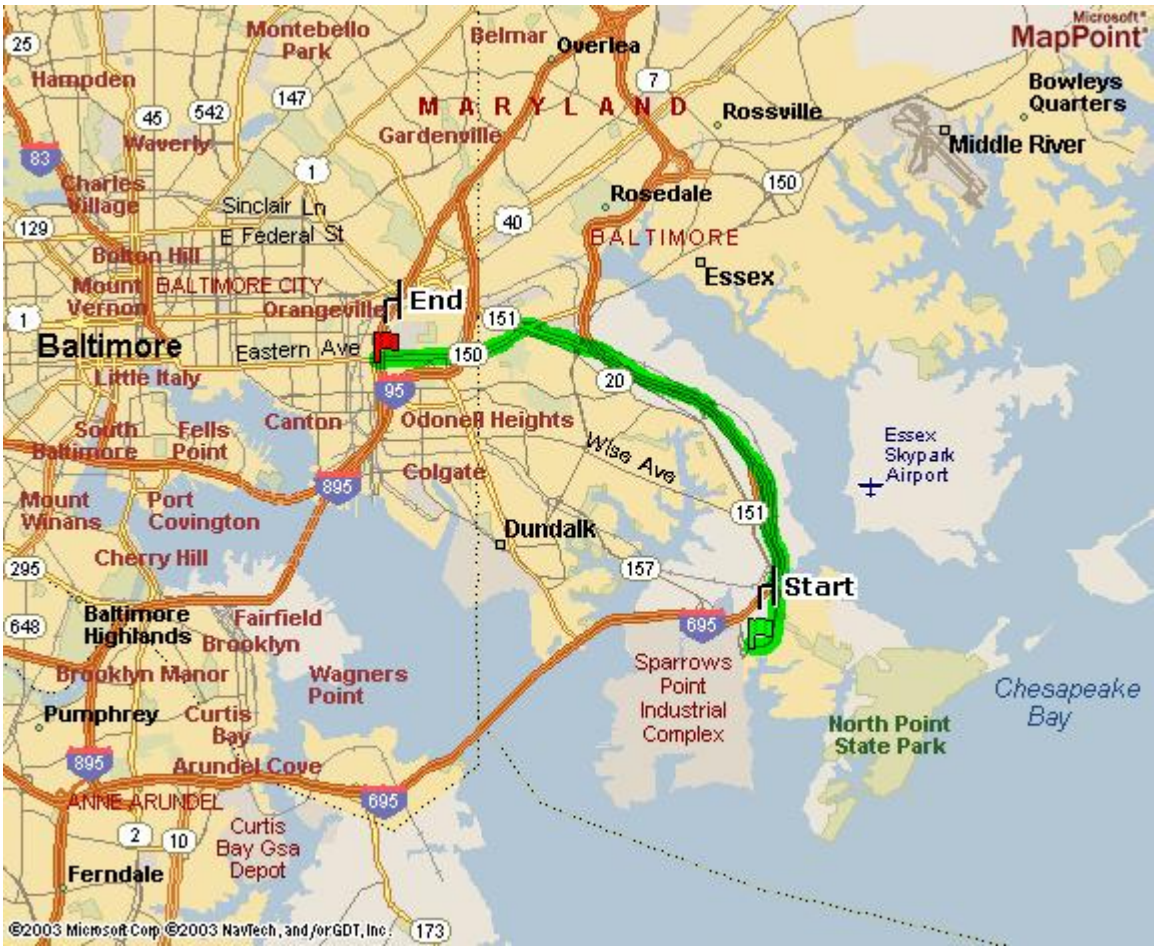
Hospital

The Johns Hopkins Bayview Hospital is the closest emergency facility, just over 9 miles away. The hospital is located at 4940 Eastern Avenue in Baltimore, MD. **Figure 10-2** is a map to this hospital. Maps are also included in **Attachment E**.

Directions:

From the Sparrows Point Industrial Complex, go north on Route 151 for approximately one mile.
Take ramp (right) onto I-695 towards I-695/Essex.
At exit 40, take ramp (right) onto Route 151/North Point Boulevard North/MD 150;
Take ramp (right) onto Route 150 (Eastern Avenue).
Continue on Eastern Avenue to hospital on right.

Figure 10-2: Hospital Map



Prior to the start of field activities, the Project Field Team Leader will call to verify the telephone numbers and directions for the clinic and hospital, and then distribute location maps and the emergency telephone list to workers and vehicles.

10.4 Accident and Emergency Medical Response

All field team members will be aware of the location of a first aid kit kept onsite. All vehicles used to transport injured persons to an offsite medical facility will be provided with directions and a map to the medical facility.

If treatment beyond first aid is required, emergency response personnel will be contacted for assistance and transport. Before beginning site activities, the Project Field Team Leader will ensure that each field team member knows where the nearest emergency medical facilities are and how to get there. The closest hospital will be used in cases of life-threatening emergencies at the direction of the Project Field Team Leader. The telephone numbers of the local emergency services will be available in the SZ, and the Project Field Team Leader will brief the field team on the procedures for calling for help in an emergency.

Site personnel will inform the Project Manager of any medications, allergies, or other medical information that may be applicable for their medical treatment. The Project Manager will supply this information to emergency response personnel, and will accompany the victim to the hospital, if possible.

10.4.1 Chemical Exposure

In case of accidental overexposure to a hazardous material (groundwater, soil, and/or off-gas materials), guidelines shown in **Table 10-2** will be used.

Table 10-2
Chemical Exposure Guidelines

Type of Overexposure	First Aid Guidelines
Skin Contact	Skin: Wash/rinse the affected area thoroughly with copious amounts of soap and water.
	Eyes: Eyes should be rinsed for at least 15 minutes following chemical contamination.
	Contact emergency response personnel if required, or transport victim to the hospital.
Inhalation	Move the victim to fresh air.
	Contact emergency response personnel if required, or transport victim to the hospital.
Ingestion	Contact Poison Control Center.
	Contact emergency response personnel, or transport victim to the hospital.

10.4.2 Decontamination During a Medical Emergency

For minor medical problems or injuries, regular decontamination procedures will be followed. If emergency, life-saving first aid and/or medical treatment are required, regular decontamination procedures may need to be abbreviated or omitted:

- Do not attempt to wash or rinse an unresponsive victim unless the victim has been contaminated with an extremely toxic or corrosive chemical that may cause injury or loss of life to emergency response personnel.
- Outer garments can be removed if it does not cause a delay, interfere with treatment, or aggravate the problem.

- PPE can be cut away and respiratory protective equipment must always be removed.
- If contaminated clothing cannot be safely removed, then the victim should be wrapped in a blanket or plastic sheeting to prevent contamination to the inside of the ambulance and/or emergency response personnel.

The Project Manager or Field Team Lead will advise the medical staff as to the type of contamination possibly involved.

10.4.3 Small or Incipient Fire

A small fire is defined as a fire that can be extinguished with an available 20 pound type ABC fire extinguisher. An incipient fire is a fire that is small because it has just started. In the event of a small or incipient fire, the following minimum actions will be taken:

- Evacuate nearby personnel from the area, if possible, to an upwind location or to an area not affected by smoke or hazardous decomposition products if an upwind location is not feasible.
- Attempt to extinguish fire using portable fire extinguisher or by smothering.
- Contact emergency response personnel, as needed, for any injuries or exposures to hazardous decomposition products, or if fire cannot be put out.
- After the fire has been extinguished, or emergency response personnel have been contacted, notify the following project personnel:
  The Project Manager

10.4.4 Large Fire or Explosion

An explosion, large fire or a small fire which cannot be extinguished is beyond the first line capabilities of EAG personnel. Professional emergency response personnel would be needed to provide emergency assistance for these types of incidents. In the event of a large fire, explosion or a small fire that cannot be extinguished, the following minimum actions will be taken:

- Evacuate all personnel from the site, if possible, to an upwind location, or to an area not affected by smoke or hazardous decomposition products if an upwind location is not feasible
- Perform a quick role call to account for all site personnel
- Contact the fire department
- Contact emergency response personnel, as needed, for any injuries or exposures to hazardous decomposition products
- After emergency response personnel have been contacted, notify the following project personnel:
  The Project Manager

10.4.5 Adverse Weather Conditions

In the event of adverse weather conditions, the Project Manager will determine if work can continue without sacrificing the health and safety of site personnel. Threatening weather conditions will be monitored by the Project Manager and possibly the Team Lead via radio, television, internet, and/ or calls to the National Weather Service. Some of the conditions to be considered include:

- Potential for heat or cold stress
- Limited visibility

- Electrical storms
- Treacherous weather-related working conditions (i.e., heavy rainfall, icy conditions causing slippery footing hazards, etc.).

10.4.6 First Aid for Heat Stress/Cold Stress

First aid treatment for **heat cramps** includes shade, rest and fluid replacement. If available, the individual should drink electrolyte replacement fluids (e.g., Gatorade, Squincher or 10-K). The individual should recover within half an hour.

First aid treatment for **heat exhaustion** includes cooling the victim, elevating the feet and fluid replacement. If the individual has not recovered within half an hour, then transport the victim to the hospital for medical attention.

Heat stroke is a medical emergency, requiring the immediate cooling of the victim and transport to the hospital for medical treatment immediately.

First aid treatment for **frost nip** and **frostbite** includes covering the affected area with warmth and retreating to a warm area. If the individual has not recovered within half an hour, then transport the victim to the hospital for medical attention.

Frozen tissue is a medical emergency and the victim must receive medical attention immediately. Contact emergency response personnel immediately or transport the victim to the hospital.

First aid treatment of **mild hypothermia** includes using heat to raise the individual's body temperature. Heat may be applied to the victim in the form of heat packs, hot water bottles and blankets. If the individual has not recovered within half an hour, then transport the victim to the hospital for medical attention.

Severe hypothermia is a medical emergency and the victim must be transported to the hospital immediately. First aid treatment for severe hypothermia includes handling the victim very gently; rough handling may set off of an irregular heartbeat. ***DO NOT*** attempt to re-warm the severely hypothermic victim; re-warming may cause the development of an irregular heartbeat.

10.4.7 Snake Bites

If bitten, lower the extremity below the heart to reduce the poison's dissemination through the body. Remain calm, try to keep the heart rate reduced and seek medical attention immediately. Do not cut the wound or attempt to suck out the venom. Note any physical features (e.g., shape of head and color or pattern on body) of the snake.

10.4.8 Animal Bites

All bites should be treated as contaminated soft tissue injuries. Bites should be washed immediately with large amounts of soap and water. If soap is not available, flush the wound with water. The severity and onset of any infection is dependent upon the number of organisms (viruses or bacteria) introduced into the wound. Washing saliva out of the wound immediately will reduce the number of bacteria or viruses that can enter the tissue. Medical attention must be sought if rabies is suspected or the individual has not had a recent tetanus booster.

10.4.9 Insect Bites and Stings

Emergency care for insect bites and stings depends on the individual's reaction. To treat a sting that results in a minor reaction, remove the stinger by gently scraping it off the skin. Do not try to grasp the sac or stinger, because this forces the remaining venom into the skin. Once the stinger has been removed, clean the wound and surrounding area. Apply cold packs to slow the absorption of the venom and reduce pain and swelling. The treatment for a severe reaction to insect stings includes the following:

- Confirm with the victim whether they are highly allergic to the insect that stung them
    - If victim has gone into anaphylactic shock, retrieve their epi pen or other auto-injector and administer per the directions as hastily as possible
- Assuming the victim remains conscious, ask them to refrain from moving around, and to lie down
- Immobilize the injured area immediately
- If an extremity is involved, remove any rings or watch
- Keep the affected part low, below the level of the heart
- Apply cold compresses to the affected area
- If possible, try to identify the type of insect that inflicted the sting
- Transport the victim to a medical facility immediately, continuing supportive measures en route.

All employees and subcontractors must report severe reactions to insect stings prior to the beginning of work to both the Project Manager and Field Team Lead.

10.4.10 Poisonous Plants

Decontamination: Wash the skin immediately after contact with the plant. Proper washing may not be practical in the middle of the woods, but a product such as Technu or a small wash-up kit with prepackaged, alcohol-based cleansing tissues can be effective. Employees and subcontractors should not forget to wash contaminated clothing and clean up contaminated equipment prior to re-use.

Treatment: Options are as follows:

- Home treatment: Calamine lotion and an oatmeal bath (one cup to a tub full of water) can help relieve itching. To prevent secondary skin infection, scratching is not helpful and the fingernails should be cut to avoid damage to the skin. Over-the-counter hydrocortisone cream can decrease inflammation and itching; however, the label should be read and the cream used according to directions.
- When to see the doctor: Severe cases may require further treatment. A physician should be seen if the rash appears infected, is on the face or other sensitive body areas, or is too extensive to be easily treated at home.

10.4.11 Ticks

To remove an attached tick:

- Use fine-tipped tweezers or a "tick tool" to grasp the tick at the surface of the skin
- If tweezers are not available, use a tissue to protect the fingers (exposure to the tick's body fluid may lead to transmission of disease)
- With a steady motion, pull the tick straight out

Disinfect the bite site and the tweezers. Wash your hands thoroughly with soap and water. Save the tick if you can by placing it in a Ziploc bag in the freezer; this may help with diagnosis in the future.

If flu-like symptoms such as fatigue, headache, neck-stiffness or jaw discomfort begin following a tick bite, seek medical attention.

APPENDICES

EnviroAnalytics Group

Environmental Engineers

ATTACHMENT A

COMPLIANCE AGREEMENT

EAG HEALTH AND SAFETY PLAN

ACKNOWLEDGEMENT FORM

I, _____, have read (or had read to me), EAG's health and safety plan.
(Print Name)

I understand my responsibilities as they are defined in this plan and will abide by these rules and procedures, as well as any regulations or otherwise governing safety. When in doubt concerning safe job performance, I will speak to my immediate supervisor and/or Project Manager.

I understand EAG reserves the right to change or amend the HASP at any time.

I understand any violation to the plan policies or procedures will be cause for disciplinary action up to and including termination.

_____ _____

Employee Signature Date

_____ _____

EAG Supervisor/Project Manager Signature Date

ATTACHMENT B

Material Safety Data Sheets (MSDSs)

APPENDIX F

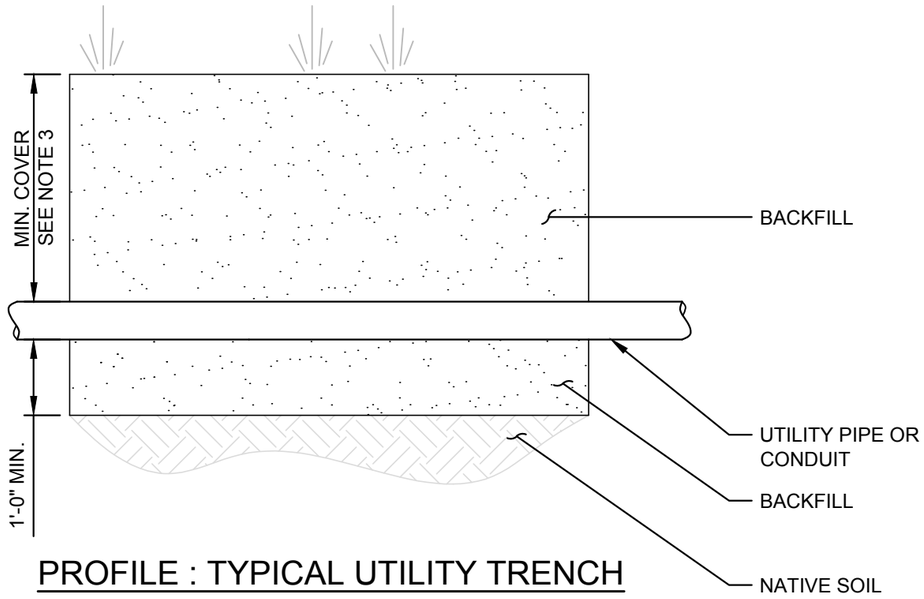
GENERAL NOTES:

1. ALL PIPES OR CONDUIT SHALL BE LEAK-PROOF AND WATERTIGHT. ALL JOINTS SHALL BE SEALED OR GASKETED.

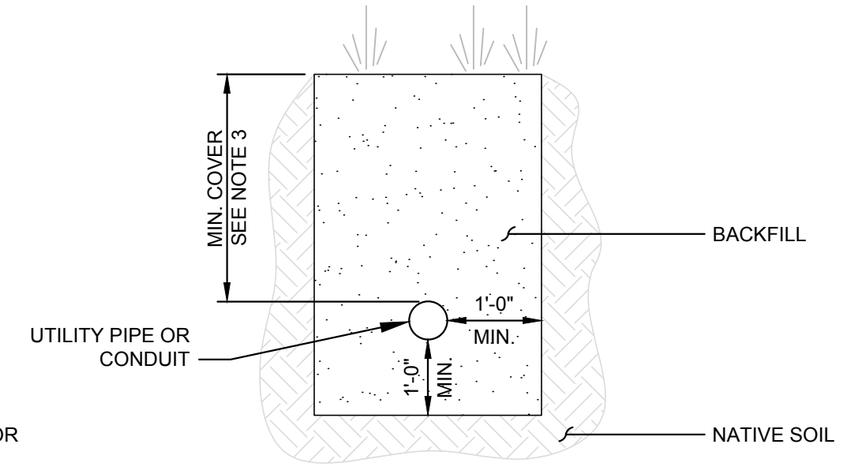
2. ALL PIPES SHALL BE PROPERLY PLACED AND BEDDED TO PREVENT MISALIGNMENT OR LEAKAGE. PIPE BEDDING SHALL BE INSTALLED IN SUCH A MANNER AS TO MINIMIZE THE POTENTIAL FOR ACCUMULATION OF WATER AND CONCENTRATED INFILTRATION.

3. MINIMUM COVER ABOVE UTILITY SHALL BE BASED ON SPECIFIC UTILITY REQUIREMENTS.

4. TRENCHES SHALL BE BACKFILLED WITH BEDDING AND MATERIALS APPROVED BY MDE FOR INDUSTRIAL USE.



PROFILE : TYPICAL UTILITY TRENCH



SECTION : TYPICAL UTILITY

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TYPICAL UTILITY CROSS SECTIONS
Sparrows Point Site
EnviroAnalytics Group, LLC

January 2018
1/2" = 1'-0"
160443M

Figure 1

APPENDIX G

Utility Excavation NAPL Contingency Plan

Revision 4 – June 19, 2017

Introduction:

Proposed underground utilities and excavations necessary for the redevelopment of the Tradepoint Atlantic property may encounter areas of petroleum and/or Oil & Grease contamination in soil. The assessment of total petroleum hydrocarbons (TPH) diesel range organics (DRO), gasoline range organics (GRO), Oil & Grease, and/or non-aqueous phase liquid (NAPL) completed as part of each Phase II Investigation includes the following:

- Each soil boring with evidence of NAPL (i.e., containing a sheen or free oil in the soil core), whether located near utilities or not, is investigated via the installation of a piezometer to assess mobility to groundwater. If measureable NAPL is present in the initial piezometer, additional soil borings and shallow temporary piezometers are installed surrounding the initial detection to delineate the impacts. Each piezometer installed to delineate the presence or absence of NAPL is checked with an oil-water interface probe immediately after installation, 48 hours after installation, and at least 30 days after installation.
- TPH-DRO/GRO and Oil & Grease data, once received, are assessed in their magnitude and location respective to subsurface utilities, stormwater conveyances, and surface waters.
- Locations that exhibit elevated detections of TPH/Oil & Grease or evidence of NAPL, that are within reasonable proximity (i.e. 25 feet) to subsurface utilities or stormwater conveyances and/or within reasonable proximity (i.e. 100 feet) to surface waters, are identified for further delineation and selective removal (if warranted).

Any NAPL identified in soil borings or piezometers during the Phase II Investigation would be noted on relevant logs and identified in Response and Development Work Plans for construction planning purposes. Despite these planning efforts, unidentified pockets of contamination (including NAPL) may still be encountered during construction. This contingency plan provides the procedures to be utilized during construction work to properly address response and construction techniques if any materials impacted with NAPL are encountered.

Objectives:

The purpose of this plan is to describe procedures to be followed in the event that NAPL is encountered in utility trenches or other excavations during development of the Tradepoint Atlantic property. The specific objectives of this plan and the procedures outlined herein are:

1. To ensure identification and proper management of Oil & Grease and petroleum-contaminated soils.
2. To ensure proper worker protection for working in areas of Oil & Grease and petroleum contamination.
3. To ensure that the installation of new utilities does not create new preferential flow paths for the migration of free-phase hydrocarbons (Oil & Grease, TPH-DRO/GRO, etc.) or soil vapors.

Identification of Oil & Grease and Petroleum Contaminated Soil:

An Environmental Professional (EP) will be on-site to determine if soils show evidence of the presence of Oil & Grease or TPH present as NAPL during installation of utility trenches or other excavation activities completed during development. Oil & Grease or petroleum-contaminated soils can be identified by the presence of free oil, oil staining, a petroleum odor, or any combination of these conditions. Free oil (NAPL) is liquid oil which could potentially be drained or otherwise extracted from the soil, and is the focus of this contingency plan, although severe staining accompanied by odors should be addressed via the same contingency measures provided herein (based on the judgement of the EP). The appearance of oil staining is not always consistent, but varies depending on the nature of the oil, the soil type, and the age of the release. Staining associated with old petroleum contamination often has a greenish hue, but may also be brown or black. The olfactory sense is the most sensitive instrument for identifying petroleum contamination in the field. Therefore, a petroleum odor may be noted although there is no visible sign of oil or staining. In some instances, decaying organic matter can produce an odor similar to petroleum, but this is rare.

If NAPL is encountered during construction, the extent of impacts shall be delineated by excavating trenches or installing four soil borings (two in each direction) perpendicular to the utility alignment or excavation to examine the soil for physical evidence of NAPL. Perpendicular transects will be investigated every 50 feet along the section of the utility trench or excavation where there is physical evidence of NAPL. Each transect will extend to a distance of 10 feet from the edge of the utility trench or excavation. This represents the maximum distance which would require mandatory excavation to mitigate potential migration risks (see below).

NAPL delineation will be guided primarily by screening observations from the perpendicular borings or trenches, and samples will be collected to test for extractable Oil & Grease or petroleum-contaminated soil using the Oil Sticks™ test kit. This test kit provides a determination of whether hydrocarbons are present in soil and extractable (i.e. could mobilize as a NAPL). Oil Sticks™ change from a pale blue to a deep blue color when they come in contact with free product. This instantaneous change in color occurs even when miniscule amounts of product come in contact with the strip. The sensitivity of Oil Sticks™ to determine the presence/absence of oil is reported by the manufacturer to be about 1,000 to 2,000 mg/kg. The

field test is performed by placing approximately 3 tablespoons of soil in a clean sample cup and adding enough water to cover the sample. After stirring the sample and waiting ~1 minute, the Oil Sticks™ test strip should be swished through the water, making sure to touch the strip to the sides of the cup where product may collect at the interface (meniscus) between the cup, water, and air. If the strip turns deep blue, or deep blue spots appear, oil or hydrocarbon is present. However, the MDE has observed that the Oil Sticks™ method may produce inconsistent results. Therefore, documentation of all screening methods is necessary during boring/trenching work. This documentation shall include an accurate record of visual and olfactory screening, along with a narrative with photographs. Field screening will be aided by photoionization detector (PID) results, and Oil Sticks™ samples should be biased to target elevated PID readings, if any. The agencies have requested that all soil samples prepared for the Oil Sticks™ field test be photographed for evidence of sheen/residue on the cup sides. Detailed records are required to be submitted with the project-specific Completion Report.

If petroleum or Oil & Grease impacts are identified in Site soils based on use of the Oil Sticks™ test kit or other field screening methods, disposal requirements will be determined using the quantitative PetroFLAG™ hydrocarbon analysis system or fixed laboratory analysis (see following section). The PetroFLAG™ hydrocarbon analysis system is a broad spectrum field test kit suitable for TPH contamination regardless of the source or state of degradation (Dexsil Corporation). PetroFLAG™ field test kits do not distinguish between aromatic and aliphatic hydrocarbons, but quantify all fuels, oils, and greases as TPH. Dilutions can be used to determine concentrations of TPH/Oil & Grease above the normal calibration range. Dexsil notes that positive results for TPH may occur if naturally occurring waxes and oils, such as vegetable oils, are present in the sample. Additional detail regarding the procedure for the PetroFLAG™ kit is given in **Attachment 1**.

Soil Excavation, Staging, Sampling and Disposal:

The EP will monitor all utility trenching and excavation activities for signs of potential contamination. In particular, soils will be monitored with a hand-held PID for potential VOCs, and will also be visually inspected for the presence of staining, petroleum waste materials, or other indications of NAPL contamination that may be different than what was already characterized. Excavated material that is visibly stained or that exhibits a sustained PID reading of greater than 10 ppm will be segregated and containerized or placed in a stockpile on polyethylene or impervious surface until the material can be analyzed using the PetroFLAG™ test kit to characterize the material for appropriate disposal. If a PetroFLAG™ test kit is not available to the contractor, or if the contractor prefers to use fixed laboratory analysis, samples may be characterized via submittal to a laboratory for TPH/Oil & Grease analysis. However, any excavated material containing NAPL (i.e., containing free oil) cannot be characterized for waste disposal using the PetroFLAG™ test kit and must instead be characterized via fixed laboratory analysis, as described in the final paragraph of this section. In addition, any hydrocarbon contaminated soil discovered during construction activities that was not previously

characterized must also be analyzed for PCBs prior to removal and transport to an appropriate disposal facility. If excavated and stockpiled, such materials will be covered with a plastic tarp so that the entire stockpile is encapsulated, and anchored to prevent the elements from affecting the integrity of the containment. The MDE will be notified if such materials are encountered during utility work.

Soil exhibiting physical evidence of NAPL contamination or elevated TPH/Oil & Grease with detections in the low percentage range, which is located within 10 feet of a proposed new utility or subsurface structure (i.e., foundation, sump, electrical vault, underground tank, etc.), will be excavated and segregated for disposal at the on-site nonhazardous landfill (Greys Landfill) or an off-site facility pending the completion of any required PCB analytical testing. Impacted soil which is located greater than 10 feet away from the proposed utility or subsurface structure may be left in place and undisturbed. The extent of the excavation will be determined in the field following visual/olfactory screening supplemented by the PID and Oil Sticks™ test kit, but soil disposal requirements will be determined with the PetroFLAG™ test kit (since the Oil Sticks™ method is not quantitative) or via fixed laboratory analysis for TPH/Oil & Grease (if preferred by the contractor or if the PetroFLAG™ test kit is unavailable to the contractor).

Any recovered NAPL will be collected for off-site disposal. As required by the appropriate and MDE approved facility, samples impacted by NAPL (i.e., containing free oil) will be collected for profiling/waste characterization and submitted to a fixed laboratory, as mentioned above, for the following analyses: metals, VOCs, TPH-DRO/GRO, and/or additional analysis required by the selected disposal facility. Upon receipt of any additional characterization analytical results, the MDE will be notified of the proposed disposal facility. Non-impacted material with no evidence of NAPL (i.e. soils that may contain measureable concentrations of TPH/Oil & Grease but below percentage levels) may be placed on the Site in areas to be paved or capped as long as all other requirements specified in the Response and Development Work Plan (or similar governing document) are met.

Initial Reporting:

If evidence of NAPL in soil or groundwater is encountered during excavation, it will be reported to the MDE within two hours. Information regarding the location and characteristics of any NAPL contaminated soil will be documented as follows:

- Location (exact stationing);
- Extent of contamination (horizontally and vertically – prepare a sketch including dimensions);
- Relative degree of contamination (i.e. free oil with strong odor vs. staining); and
- Visual documentation (take photographs and complete a photograph log)

Utility Installations in Impacted Areas:

Underground piping or conduits installed through areas of Oil & Grease or petroleum contamination shall be leak proof and water tight. All joints will be adequately sealed or gasketed, and pipes or conduits will be properly bedded and placed to prevent leakage. All trench backfill will meet the MDE definition of clean fill, or otherwise be approved by the MDE. Pipe bedding will be installed to minimize the potential for accumulation of water and concentrated infiltration. This can be achieved by using a relatively small amount of low-permeability pipe bedding; open-graded stone will be avoided or only used in thicknesses of 6 inches or less. Bedding must be properly placed and compacted below the haunches of the pipe. Clay, flowable fill, or concrete plugs will be placed every 100 feet across any permeable bedding to minimize the preferential flow and concentration of water along the bedding of such utilities.

If required, each trench plug will be constructed with a 2-foot-thick clay plug or 1-foot-thick flowable fill or concrete plug, perpendicular to the pipe, which extends at least 1 foot in all directions beyond the permeable pipe bedding. The plug acts as an anti-seep collar, and will extend above the top of the pipe. Installation of each trench plug will follow the completion of the trench excavation, installation of granular pipe bedding (because dense-graded aggregate or soil or other pipe bedding is difficult to properly compact below the haunches of the pipe), and seating of the pipe. The trench plug will then be installed by digging out a 1-foot trench below and around the pipe corridor, and placing clay, flowable fill, or concrete to construct the plug. A specification drawing for installation of the trench plug has been provided as **Figure 1**.

Attachment 1 - PetroFLAG™ Procedure

PetroFLAG™ field test kits use a proprietary turbidimetric reaction to determine the TPH concentration of solvent extracted samples (USEPA). Calibration standards provided with the unit are used to perform a two-point calibration for the PetroFLAG™. A blank and a 1,000 ppm standard are run by the analyzer unit to create an internal calibration curve.

Analysis of a soil sample is performed using three simple steps: extraction, filtration, and analysis. The PetroFLAG™ analysis is performed as follows:

- Place a 10 gram soil sample in a test tube.
- Add extraction solvent to the tube.
- Shake the tube intermittently for four minutes.
- Filter the extract into a vial that contains development solution
- Allow the solution to react for 10 minutes.

The filtration step is important because the PetroFLAG™ analyzer measures the turbidity or "optical density" of the final solution. Approximately 25 samples can be analyzed per hour. The vial of developed solution is placed in the meter, and the instrument produces a quantitative reading that reveals the concentration of hydrocarbons in the soil sample. The PetroFLAG™ method quantifies all fuels, oils, and greases as TPH between 15 and 2000 ppm (Dexsil Corporation). A 10x dilution of the filtered extraction solvent will be completed to allow for quantification of soil concentrations in excess of 10,000 ppm. The specially designed PetroFLAG™ analyzer allows the user to select, in the field, the response factor that is appropriate for the suspected contaminant at each site. Vegetable-based oils have been shown to exhibit a response factor of 18% (EPA Method 9074). Using the selected response factor, the analyzer compensates for the relative response of each analyte and displays the correct concentration in parts per million (ppm).

References:

U.S. Environmental Protection Agency (EPA). Contaminated Site Clean-up Information (Clu-IN): Test Kits. Office of Superfund Remediation and Technology Innovation. http://www.clu-in.net/characterization/technologies/color.cfm

Dexsil Corporation. 2016. PetroFLAG Analyzer System (PF-MTR-01). http://www.dexsil.com/products/detail.php?product_id=23

EPA SW-846 Method Number 9074 - Turbidimetric Screening Procedure for Total Recoverable Hydrocarbons in Soil

GENERAL NOTES:

1. ALL PIPES OR CONDUIT PASSING THROUGH AREAS OF PETROLEUM CONTAMINATION SHALL BE LEAK-PROOF AND WATERTIGHT. ALL JOINTS SHALL BE SEALED OR GASKETED.
2. ALL PIPES SHALL BE PROPERLY PLACED AND BEDDED TO PREVENT MISALIGNMENT OR LEAKAGE. PIPE BEDDING SHALL BE INSTALLED IN SUCH A MANNER AS TO MINIMIZE THE POTENTIAL FOR ACCUMULATION OF WATER AND CONCENTRATED INFILTRATION.
3. TRENCH PLUGS SHALL EXTEND A MINIMUM OF ONE (1) FOOT BEYOND PERMEABLE BEDDING OR BACKFILL IN ALL DIRECTIONS.
4. ANTI-SEEP COLLARS FROM THE PIPE MANUFACTURER, THAT ARE PRODUCED SPECIFICALLY FOR THE PURPOSE OF PREVENTING SEEPAGE AROUND THE PIPE, ARE ACCEPTABLE IF INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, AND ONLY WITH PRIOR APPROVAL BY EAG.
5. MINIMUM COVER ABOVE UTILITY SHALL BE BASED ON SPECIFIC UTILITY REQUIREMENTS.
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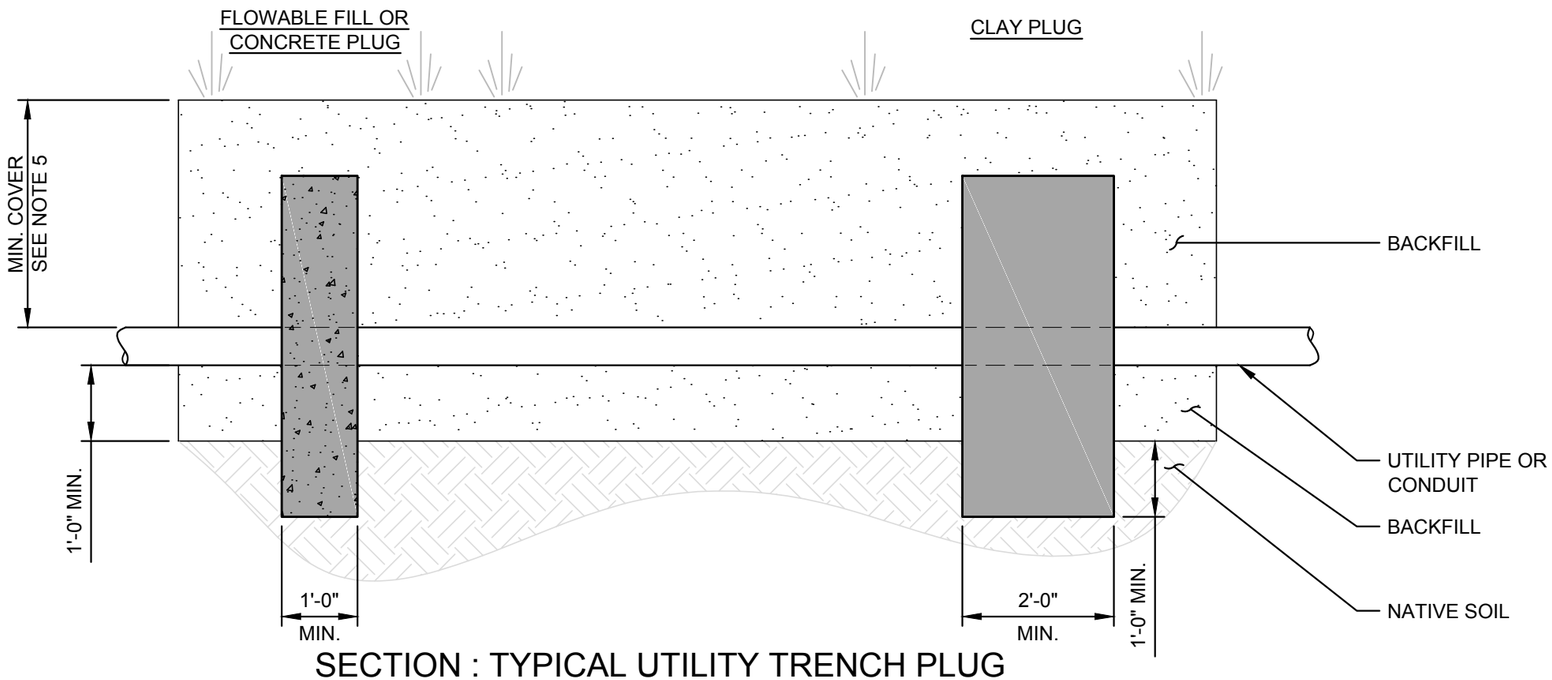
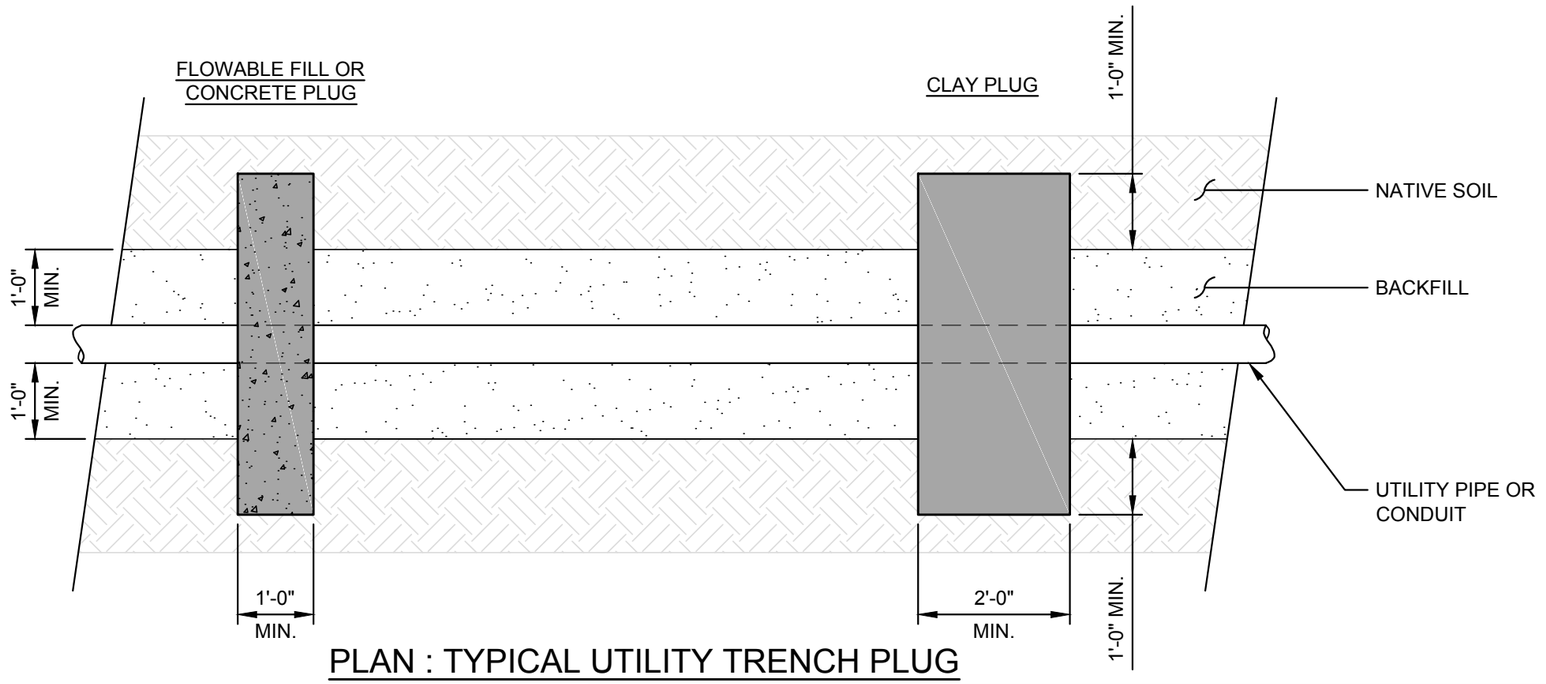


SECTION : TYPICAL UTILITY TRENCH PLUG



PLAN : TYPICAL UTILITY TRENCH PLUG

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UTILITY TRENCH PLUG
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Figure 1