RESPONSE AND DEVELOPMENT WORK PLAN

AREA B: SUB-PARCEL B6-2
TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

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TABLE OF CONTENTS

TABLE OF CONTENTS
(CONT.)

FIGURES

TABLES

TABLE OF CONTENTS
(CONT.)

APPENDICES

ELECTRONIC ATTACHMENTS

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 for development as Area B: Sub-Parcel B6-2 (the Site). Tradepoint Atlantic submitted a letter (**Appendix A**) requesting an expedited plan review to achieve construction deadlines for the proposed development on this Site. Parcel B6 is comprised of approximately 148.5 acres of the approximately 3,100-acre former plant property located as shown on **Figure 1**.

The Sub-Parcel B6-2 Development Area consists of approximately 50.5 acres within the northern portion of Parcel B6. The TMC (also designated as Parcel B16) flows through the proposed development area, roughly splitting the proposed development of Sub-Parcel B6-2 into northern and southern sections. Response work associated with the TMC is covered by several other documents submitted under separate covers.

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.

An application to enter the Tradepoint Atlantic property into the Maryland Department of the Environment Voluntary Cleanup Program (MDE-VCP) was submitted to the MDE on September 10, 2014. Plans for the property include demolition and redevelopment over the next several years. The property's current use is Tier 3 (Industrial), and the majority of the property is reasonably anticipated to continue with this use in the future. However, certain sub-parcels, including the proposed Sub-Parcel B6-2 Development Area, are proposed to be developed for Tier 2 (Commercial) use as defined by the VCP. The proposed development area is also part of the acreage that remains subject to the requirements of 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.

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 Site 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 this 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 Site consists of 50.5 acres currently slated for development into a future retail area. The 50.5 acres represents the potential exposure area for a Construction Worker performing major grading and utility installations required at the Site during initial preparatory construction. The same area has been evaluated for potential Composite Worker (and child/youth visitor) exposures following retail development. The proposed major grading and utility installation plans covered by this RADWP are shown in relation to the existing parcel boundaries in the attached **Figure 2a/2b**. Future retail development lots will be subject to individual development updates. The purpose of this RADWP is to provide an estimate of the potential Construction Worker risk during grading work and utility installations, as well as estimates of overall Composite Worker and child/youth visitor risks for the final retail area. The Composite Worker and child/youth visitor risks evaluated herein will be referenced in the future as development plans for individual retail lots are proposed.

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 subsequent Phase II Investigations including work associated with the

Parcel B6 Phase II Investigation and Finishing Mill Groundwater Investigation; a human health Screening Level Risk Assessment (SLRA) conducted for the identified conditions; and engineering and institutional controls which have been designed to facilitate the planned Sub-Parcel B6-2 development and address the impacts and potential human health exposures. The engineering and institutional controls include work practices and applicable protocols that are submitted for approval to support the development and use of the Site. Engineering and institutional controls approved and installed as part of this Site RADWP shall be described in closure certification documentation submitted to the MDE demonstrating that the exposure pathways on Sub-Parcel B6-2 are addressed in a manner that protects public health and the environment. The remaining acreage of Parcel B6 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 unacceptable risks associated with future land use.

2.0 SITE DESCRIPTION AND HISTORY

2.1. SITE DESCRIPTION

The Site consists of 50.5 acres in the northern portion of Parcel B6. A narrow section of the TMC also passes through the proposed grading area. Response work associated with the TMC is covered by several other documents submitted under separate covers. The proposed major grading and utility installation plans for the Site are indicated in **Figure 2a/2b**. The Site is currently zoned Manufacturing Heavy-Industrial Major (MH-IM), and is not occupied. The development area covered by this RADWP is located to the north of the former Hot Strip Mill Area. All former buildings have been demolished. There is no groundwater use on-site or within the surrounding Tradepoint Atlantic property.

The Site is at an average elevation of approximately 10 feet above mean sea level (amsl). Existing elevations in the parcel are relatively consistent and range from roughly 7 feet amsl to 14 feet amsl across the Site. Elevations decrease rapidly at the edges of the TMC down to the waterline. Stormwater from Sub-Parcel B6-2 does not have a clear surface runoff direction, but much of the surface water ultimately discharges to the TMC. 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 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 former facilities and processes in the Hot Strip Mill Area (located to the south of the Site) generally included heating and rolling hot bands of metal, and cooling and coiling of the finished products. Several railways which supported the Hot Strip Mill and larger Finishing Mills Area passed through the Site. Minor structures formerly located at the Site included service buildings, access gates, and parking lots.

A small petroleum recovery facility was previously located near the western end of the Site. The oil recovery facility was identified within Weaver Boos' Phase I ESA (dated May 19, 2014) based on historical aerial imagery as being located adjacent to the waterway formerly known as Humphrey Creek. The former recovery facility included a small rectangular surface

impoundment which was diked to separate it from the Humphrey Creek. An additional former impoundment may also have been historically present to the east of the access gate ("G" Gate) located centrally at the Site. This impoundment was identified within Weaver Boos' Phase I ESA from historical aerial imagery as an irregularly shaped image adjacent to the former Humphrey Creek. The area with the "G" Gate impoundment has since been converted into a vehicle parking lot. Both the petroleum recovery facility and the former G" Gate impoundment were classified as Recognized Environmental Conditions (RECs) within Weaver Boos' Phase I ESA. These former RECs are further described below in Section 3.1. More information regarding historical activities can also be found in the Phase II Investigation Work Plan for Parcel B6 (Revision 2 dated May 12, 2016; supplemented by a comment response letter dated November 28, 2016), as well as in the Parcel B6 Phase II Investigation Report (Revision 1 dated May 9, 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 Resource Conservation and Recovery Act (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 Environmental 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 following two RECs were identified within the Site boundary as defined in the Phase I ESA:

Apparent Historical Surface Impoundment ("G" Gate) (REC 22, Finding 273):
According to the Phase I ESA, a small irregular shaped image which may have been a pond was visible on aerial photography, in the area just north of the TMC. The pond was located just east of the "G" Gate along the south side of Route 158, in an area converted to a vehicle parking lot. The pond appeared to discharge a dark plume to the surface waters of the remnant Humphrey Creek (now filled and replaced with the TMC). It is unclear what materials may have been present in the discharge.

TMC Oil Recovery Plant and Impoundment (REC 26, Finding 278):
According to the Phase I ESA, aerial photography indicated that a small oil recovery plant was located just north of the TMC, with a small rectangular surface impoundment located just to the southwest. The impoundment appeared to be diked to separate it from the adjoining surface waters of the Humphrey Creek (now filled and replaced with the TMC). The area may have contained petroleum products and/or potentially hazardous substances.

Relevant SWMUs and AOCs were also identified as located in Figure 3-1 from the DCC Report. This figure generally shows the SWMUs, AOCs, and main facility areas within the property boundaries. There were no SWMUs or AOCs identified within the Sub-Parcel B6-2 boundaries based on this review.

3.2. PHASE II INVESTIGATION RESULTS (SOIL)

A Phase II Investigation of soil conditions was performed for Parcel B6 (encompassing the entire development area) in accordance with the requirements outlined in the ACO as further described in the Phase II Investigation Work Plan – Area B: Parcel B6 (Revision 2) dated May 12, 2016 (supplemented by a comment response letter dated November 28, 2016). The Work Plan was approved by the agencies on February 16, 2017. Findings from the Parcel B6 Phase II Investigation are presented in the Phase II Investigation Report – Area B: Parcel B6 (Revision 1) dated May 9, 2017, and summarized in this document.

The Phase II Investigation Work Plan was developed to target the specific features which represented a potential release of hazardous substances and/or petroleum products to the environment, including the RECs 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 parcel. A total of 198 soil samples (from 93 boring locations) were collected and analyzed to assess the presence or absence of contamination in Parcel B6. A total of 52 of these samples (from 26 boring locations) were included for the assessment of Sub-Parcel B6-2, as indicated in **Figure 3**. A few select locations (e.g., B6-063-SB, B6-066-SB, and B6-082-SB) are located outside of the development boundary but are within reasonable proximity such that the data from these borings can be considered to be representative of the sub-parcel.

Soil samples were analyzed for the USEPA Target Compound List (TCL) Volatile Organic Compounds (VOCs), TCL Semi-Volatile Organic Compounds (SVOCs), Total Petroleum Hydrocarbons (TPH) Diesel Range Organics (DRO) and Gasoline Range Organics (GRO), USEPA Target Analyte List (TAL) Metals, hexavalent chromium, and cyanide based on the parcel-specific sampling plan for Parcel B6. During the implementation of the Parcel B6 Work Plan, TPH-DRO/GRO analysis was required at every location, but Oil & Grease analysis was not required or completed (except at a few specific locations which are not relevant for this RADWP). Shallow soil samples (0 to 1 foot) 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) are included as electronic attachments. The laboratory and data validation reports contain qualifier keys for the flags assigned to individual results in the attached summary tables.

Soil sample results relevant for the Site were screened against the Project Action Limits (PALs) established in the site-wide Quality Assurance Project Plan (QAPP) dated April 5, 2016, or based

on other direct agency guidance (e.g., TPH-DRO/GRO). **Table 1** and **Table 2** provide a summary of the detected organic compounds and inorganics in the soil samples submitted for laboratory analysis. The PALs for relevant polynuclear aromatic hydrocarbons (PAHs) have been adjusted upward based on revised toxicity data for PAHs published in the USEPA Regional Screening Level (RSL) Composite Worker Soil Table dated June 2017. PAL exceedances in soil relevant to the proposed development area consisted of five inorganics (arsenic, manganese, thallium, vanadium, and lead), one SVOC (benzo[a]pyrene), total PCBs, and DRO. **Figure S-1** through **Figure S-3** present summaries of the soil sample results that exceeded the PALs for inorganics, SVOCs, and DRO, respectively. A PCB exceedance figure was determined to be unnecessary since there was only one exceedance of the applicable PALs (sample B6-056-SB-1 with a result of 1.212 mg/kg for total PCBs).

In addition, there were two boring locations within the proposed development boundary (or directly adjacent) where evidence of possible non-aqueous phase liquid (NAPL) was noted in the soil cores. These locations (B6-056-SB and B6-066-SB) along with the two exceedances of the DRO PAL (B6-054-SB and B6-066-SB) are highlighted on **Figure S-3** and are further described and evaluated in the following section. There were no locations where concentrations of lead exceeded the threshold of 10,000 mg/kg at which delineation would be required. Likewise, none of the PCB detections exceeded the mandatory excavation criterion of 50 mg/kg.

3.3. NON-AQUEOUS PHASE LIQUID IN SOIL BORINGS

There were two samples (from two individual borings) where DRO was detected above the PAL of 6,200 mg/kg: B6-054-SB-4 at 6,840 mg/kg and B6-066-SB-5 at 11,000 mg/kg. Elevated TPH-DRO/GRO concentrations could be indicative of the potential presence of NAPL which could be mobilized during construction associated with utility installations. Soil cores were screened for evidence of possible NAPL contamination during the completion of each soil boring. The field observations were noted on the boring logs (submitted with the Parcel B6 Phase II Investigation Report), and several sample locations had visible sheens or NAPL noted in the soil cores. Two boring locations relevant for the proposed development had physical evidence of possible product in the cores: B6-056-SB and B6-066-SB.

Temporary piezometers were installed at both of the soil boring locations with potential evidence of NAPL noted in the soil cores (B6-056-SB and B6-066-SB). One of the piezometer installation locations (B6-066-SB) also exhibited an elevated detection of DRO above the soil PAL as documented above. The purpose of the delineation piezometers was to assess the potential presence in and/or mobility of NAPL to groundwater. An oil-water interface probe was used to check both piezometers (B6-056-PZ and B6-066-PZ) for the presence of NAPL immediately after installation, 48 hours after installation, and again after at least 30 days.

NAPL was not detected in B6-056-PZ during these checks, and no delineation activities were warranted. As no measureable product was identified, no mobile product is apparent. The

piezometer B6-056-PZ has not been abandoned at this time, but it will be abandoned prior to development in this area. The piezometer will be gauged a final time on the abandonment date to confirm that NAPL has not accumulated in the casing. Measureable NAPL was recorded in the piezometer installed at B6-066-PZ, and the NAPL was subsequently delineated via the installation of additional temporary piezometers in the surrounding area. Delineation has been deemed to be complete, and response actions to address the NAPL impacts which have been documented in this area will be coordinated with the MDE under a Work Plan to be submitted for approval in the future. Manual product removal or additional active remediation to remove the NAPL mass in the vicinity B6-066-SB may be required depending on future development needs. No utilities are currently proposed in the vicinity of this NAPL delineation area.

No physical evidence of product was noted in the soil core of boring B6-054-SB; however, moderate odors and elevated photoionization detector (PID) readings were noted at a depth of 4 feet below ground surface (bgs). This interval was sampled, and subsequently returned a result of 6,840 mg/kg, slightly above the PAL of 6,200 mg/kg. While no physical evidence of product was noted during the Phase II Investigation, it should be acknowledged that the depth of equipment refusal (4 feet bgs) coupled with the elevated detection of DRO indicates that the possible presence of product at this location cannot be ruled out for lower soil depths.

The proximity of DRO-impacted borings (and NAPL delineation piezometers) to proposed utilities is required to be evaluated for development planning. Appropriate protocols are documented in Section 5.1.1 to prevent the mobilization of any product if future utilities are proposed in the vicinity of these impacts. The three borings with possible NAPL and/or elevated DRO are provided on **Figure 4** in relation to the proposed utility alignments. Location B6-066-SB is not located within the limit of disturbance (LOD), but the most severe NAPL contamination has been identified in the vicinity of this boring. A close-up view of this boring location in relation to the currently proposed utility plan, with all delineation piezometers, is provided on **Figure 5**. This figure indicates that the NAPL has been delineated, and there are no concerns related to the alignments of currently proposed utilities. Although free-phase product (i.e., NAPL) has not been identified in the areas of B6-056-SB and B6-054-SB, workers must also use caution if any trenching or excavation is required in the vicinity of these borings.

3.4. PHASE II INVESTIGATION RESULTS (GROUNDWATER)

Groundwater within Parcel B6 was investigated in accordance with the separate Finishing Mills Groundwater Investigation Work Plan (Revision 1) dated July 7, 2016. The Work Plan was pre-approved by the agencies via email on June 28, 2016 following review of a comment response letter on an initial draft (Revision 0). The sampling and analysis plan defined in the Finishing Mills Groundwater Investigation Work Plan was designed to provide a focused investigation of groundwater, with groundwater sample points distributed regularly throughout and along the perimeter of the Finishing Mills Area. Data from the Finishing Mills Groundwater Investigation

pertinent to this RADWP has been evaluated with respect to potential concerns associated with construction activities, with the findings discussed herein.

The overall Finishing Mills Groundwater Investigation has been completed with findings reported in the Finishing Mills Groundwater Phase II Investigation Report (Revision 0) dated November 30, 2016. A total of 13 groundwater samples were collected from temporary groundwater sample collection points (commonly referred to as piezometers) and permanent monitoring wells within Sub-Parcel B6-2: FM-010-PZS, FM-011-PZS, FM-011-PZI, SW-077-MWS, SW-077-MWI, SW-078-MWS, SW-078-MWI, TM10-PZM007, TM12-PZM006, TM14-PZM005, TM16-PZM007, TM17-PZM005, and TM18-PZM005. Of these 13 groundwater sample points, 10 samples were collected from the shallow hydrogeologic zone. Since excavation and trenching activities proposed at the Site will not extend into the intermediate or lower hydrogeologic zones, the discussion of analytical data presented herein is limited to the shallow hydrogeologic zone. The locations of the 10 relevant shallow groundwater sample points are shown on **Figure 6**. Several additional wells (not pictured) were sampled nearby, but are not relevant for this RADWP because they are positioned across the TMC from the development area. Thus, these wells are not representative of groundwater conditions below the portions of the Site where intrusive work will be performed.

These 10 shallow groundwater samples were analyzed for TCL-VOCs, TCL-SVOCs, TAL-Dissolved Metals, TPH-DRO/GRO, hexavalent chromium, cyanide and/or PCBs, based on the project-specific sampling plan. The permanent groundwater wells were additionally analyzed for TAL-Metals (total). The laboratory Certificates of Analysis (including Chains of Custody) and relevant Data Validation Reports (50% validated groundwater data) from the Finishing Mills Groundwater Investigation are included as electronic attachments. The laboratory and data validation reports contain qualifier keys for the flags assigned to individual results in the attached summary tables.

Each groundwater sample collection point was inspected for evidence of NAPL using an oil-water interface probe prior to sampling. None of the piezometers or permanent wells relevant for the Site showed evidence of NAPL during these checks (excluding the delineation piezometers described in the preceding section). **Table 3** and **Table 4** present a summary of the organic compounds and inorganic compounds detected in the shallow hydrogeologic groundwater samples, and **Figure GW-1** through **Figure GW-3** present all groundwater sample results that exceeded the PALs. For simplicity, the summary **Figure GW-1** does not include duplicate exceedances of total and dissolved metals at relevant Finishing Mills Groundwater sample locations. If both total and dissolved concentrations exceeded the PAL for a specific compound, the value for total metals is displayed on the figure for each sample. The groundwater PALs for certain PAHs have been adjusted upward from the values presented in the QAPP based on revised toxicity data for PAHs published in the USEPA RSL Resident Tapwater Table dated June 2017.

Groundwater PAL exceedances in the vicinity of the Site consisted of nine inorganic compounds (arsenic, chromium, cobalt, iron, lead, manganese, nickel, thallium, and vanadium), three SVOCs (benz[a]anthracene, naphthalene, and pentachlorophenol), and DRO. While the concentrations of these PAL exceedances on-site do not present a human health hazard since there is no groundwater use, proper water management is required to prevent unacceptable discharges or risks to on-site workers.

3.5. HUMAN HEALTH SCREENING LEVEL RISK ASSESSMENT (SLRA)

A human health Screening Level Risk Assessment (SLRA) was performed for soils relevant for Sub-Parcel B6-2 to determine potential risks to Construction Workers performing the major grading and utility installation activities proposed at the Site, as well as future Composite Workers and potential child/youth visitors to the retail area. The grading and utility installation activities comprise the majority of intrusive work for the Site, and represent the scope of work covered by this RADWP. In the future, retail development lots (subject to individual development updates) will be established at the Site and occupied; child and youth visitors may also be present at the future retail facilities. The purpose of this RADWP is to provide an evaluation of the potential Construction Worker exposures during major grading work and utility installations, as well as evaluation of potential risks to the future Composite Worker and child/youth visitor for the proposed retail use. The Composite Worker and child/youth visitor risks evaluated herein will be referenced in the future as plans for the development of individual retail lots are proposed.

There is no potential for human exposures to groundwater for a Composite Worker or child/youth visitor 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 procedures shall be followed to mitigate risk.

3.5.1. Analysis Process

The SLRA has been conducted for soils to further evaluate the Site conditions in support of the design of necessary response measures. The most recent SLRA evaluation process for the Construction Worker and Composite Worker scenarios is described in the Phase II Investigation Report – Area B: Parcel B6 (Revision 1) dated May 9, 2017. Phase II Investigation soil boring locations relevant for the proposed development are shown on **Figure 7a/7b** in relation to the proposed grading and utility plans. A few select locations (e.g., B6-063-SB, B6-066-SB, and B6-082-SB) are located outside of the development boundary but are within reasonable proximity such that the data from these borings can be considered to be representative of the sub-parcel. Generally, the child and youth visitors were evaluated using the same process as the Composite Worker evaluation, except the screening levels used to determine overall cumulative cariogenic and non-carcinogenic risks were updated as appropriate (described below).

The Sub-Parcel B6-2 Development Area was evaluated for the Construction Worker and Composite Worker scenarios as a shared exposure unit (EU). The child/youth visitor scenarios were also evaluated using the same EU. This shared EU has been designated throughout the remainder of this RADWP as the "Construction Worker LOD" or the "Composite Worker Area", depending on the exposure scenario being discussed. The USEPA and MDE have approved the use of a single EU to evaluate each of these exposure scenarios, as documented in correspondence received from the USEPA on October 19, 2017. The sample locations indicated in **Figure 7a/7b** are within the EU or in close proximity such that they can be considered to be representative of the soils in the EU for risk assessment purposes.

Compounds that are present at concentrations at or above the USEPA Composite Worker RSLs set at a target cancer risk of 1E-6 or target non-cancer Hazard Quotient (HQ) of 0.1 were identified as Constituents of Potential Concern (COPCs) to be included in the SLRA. The COPC screening analysis results for the Sub-Parcel B6-2 Development Area are included in **Table 5** to identify compounds above the relevant screening levels within the site-wide dataset.

3.5.2. Sub-Parcel B6-2 SLRA Results and Risk Characterization

Soil data were divided into three datasets (surface, subsurface, and pooled) for the Sub-Parcel B6-2 Construction Worker and Composite Worker (and child/youth visitor) EU to evaluate potential current and future exposure scenarios. The Construction Worker may be exposed only to surface soils, but subsurface soils would be encountered during construction activities that involve soil disturbances such as excavations or other intrusive earth-moving activities. The pooled data may be applicable for construction work that involves disturbances through the surface soil, since workers would likely not be exposed solely to the subsurface soil. The current Composite Worker or child/youth visitor 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 or child/youth visitor could be exposed to a mixture of surface and subsurface soils.

If the detection frequency of a COPC analyte is less than 5% in a dataset with a minimum of 20 samples, the COPC can be eliminated from the risk analysis assuming the detections are not extremely high (based on agency discretion). A single detection that is extremely high could require delineation rather than elimination. No analyte designated as a COPC in the site-wide dataset had a detection frequency less than 5%, thus no COPCs were removed due to low detection frequencies.

Exposure point concentrations (EPCs) were calculated for each COPC soil dataset (i.e., surface, subsurface, and pooled surface/subsurface) in the site-wide EU using the ProUCL software (version 5.0) developed by the USEPA. ProUCL input tables and output tables derived from the data for each COPC in soils are provided as electronic attachments, with computations presented

and EPCs calculated for COPCs within each of the three datasets (surface, subsurface, and pooled) for the site-wide EU.

The EPCs for lead are the average (i.e., arithmetic mean) values for each dataset. A lead evaluation spreadsheet, providing the computations to determine lead averages for each dataset in the site-wide EU, is also included as an electronic attachment. The average lead concentrations are presented in **Table 6**, which indicates that neither surface, subsurface, nor pooled soils in the EU exceeded an average lead value of 400 mg/kg. The screening criterion for lead was set at an arithmetic mean of 400 mg/kg based on the Integrated Exposure Uptake Biokinetic (IEUBK) model-generated residential screening level, with a secondary limit of 800 mg/kg based on the RSL, and a tertiary limit of 2,518 mg/kg based on the May 2017 updated Adult Lead Model 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.

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 the following main tasks:

- Stormwater Installation – 18 days;
- Pumping Station/Sewer Installation – 36 days; and
- Water Installation – 21 days

Each of the listed intrusive tasks will be performed by a separate work crew. A table with approximate working dates is provided as **Appendix C** to display the main construction activities covered by this RADWP. This preliminary schedule was provided by the development contractor, and states that no crew performing ground intrusive work will exceed an exposure duration of 36 days (equivalent to the longest individual task listed above). Although the provided schedule in **Appendix C** illustrates a February 2018 through May 2018 work period, the actual start date may be modified; however, the duration of intrusive activities will not change if the start date is adjusted.

The Construction Worker exposure scenario is realistically modeled with the use of a single EU for the proposed construction work, because intrusive work will be conducted throughout the development LOD. The calculated EPCs for the surface and subsurface exposure scenarios for the site-wide Construction Worker are shown in **Table 7**. The supplemental EPCs generated from the pooled surface and subsurface soils are also included in the EPC table. The EPCs generated from the site-wide LOD were evaluated using site-specific Construction Worker Soil Screening Levels (SSLs), which were calculated based on the anticipated maximum exposure duration of 36 intrusive work days.

Risk ratios for the estimates of potential EPCs for the Construction Worker scenario with the selected exposure duration (36 work days) are shown in **Table 8** (surface), **Table 9** (subsurface), and **Table 10** (pooled surface and subsurface soils). The variables entered for calculation of site-specific Construction Worker SSLs (LOD area, input assumptions, and exposure frequency) are indicated as notes on the tables. The spreadsheet used for computation of the site-specific 36-day Construction Worker SSLs is included in **Appendix B**. The SLRA results for the site-wide 36-day exposure scenario are summarized as follows:

Worker Scenario	Exposure Unit	Medium	Hazard Index (>1)	Total Cancer Risk
Construction Worker (36 days)	LOD (50.5 acres)	Surface Soil	none	6E-8
		Subsurface Soil	none	1E-7
		Pooled Soil	none	1E-7

Using the 36-day site-wide exposure scenario, the carcinogenic risks for surface, subsurface, and pooled soils were all computed to be less than 1E-5, the acceptable carcinogenic risk level for no further action. In addition, none of the non-carcinogens caused a cumulative HI to exceed 1 for any target organ system for surface, subsurface, or pooled soils using the 36-day exposure duration for the site-wide LOD. This assessment indicates that site-specific health and safety protocols or further action would not be required for the proposed construction if intrusive activities do not exceed 36 work days. Additional worker protective measures beyond standard level D protection are not necessary for the intrusive construction work planned for the Site during this initial phase of development based on the anticipated schedule provided by the contractor (**Appendix C**). If the total duration of site-wide intrusive work would exceed the specified limit of 36 days, the work would need to be completed by a separate crew, or additional health and safety protections would be required. Alternatively, an additional risk assessment would need to be provided to the agencies as an addendum to this RADWP demonstrating that the proposed schedule increase would be acceptable.

General health and safety controls used by Construction Workers (level D protection) are adequate to mitigate risk to Construction Workers for the proposed work according to the provided contractor schedule. Institutional controls will be required to be established for the protection of future Construction Workers in the event of any future 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.

Composite Worker (and Visitor) Assessment:

The calculated EPCs for the surface and subsurface exposure scenarios for the Composite Worker Area (also used for the child/youth visitor scenarios) are shown in **Table 11**. The supplemental EPCs generated from the pooled surface and subsurface soils are also included in the EPC table. Risk ratios for the estimates of potential EPCs for the Composite Worker scenario are shown in **Table 12** (surface), **Table 13** (subsurface), and **Table 14** (pooled soils). Risk ratios for the estimates of potential EPCs for the child visitor scenario are shown in **Table 15** (surface), **Table 16** (subsurface), and **Table 17** (pooled soils), and risk ratios for the estimates of potential EPCs for the youth visitor scenario are shown in **Table 18** (surface), **Table 19** (subsurface), and **Table 20** (pooled soils). The RSLs used for the child/youth visitor scenarios were adjusted from the default Composite Worker RSL values using the USEPA's online RSL Calculator. **Table 15** through **Table 20** display the variables entered for calculation of the adjusted child/youth visitor scenario RSLs (body weight, exposure duration, etc.). The results are summarized as follows:

Worker Scenario	Exposure Unit	Medium	Hazard Index (>1)	Total Cancer Risk
Composite Worker	Composite Worker Area (50.5 acres)	Surface Soil	Dermal = 2	2E-6
		Subsurface Soil	Nervous = 2 Dermal = 2	5E-6
		Pooled Soil	Dermal = 2	4E-6
Child Visitor		Surface Soil	Nervous = 6 Dermal = 10	3E-6
		Subsurface Soil	Nervous = 9 Dermal = 12	7E-6
		Pooled Soil	Nervous = 6 Dermal = 9	4E-6
Youth Visitor		Surface Soil	Dermal = 2	1E-6
		Subsurface Soil	Nervous = 2 Dermal = 2	3E-6
		Pooled Soil	Dermal = 2	2E-6

The current Composite Worker will be exposed only to surface soils. The risk ratios indicated that the cumulative cancer risk for the Composite Worker exposure to surface soil was below the acceptable limit for no further action (1E-5). When the non-cancer risks were segregated and summed by target organ for cumulative Hazard Index (HI), the dermal system exceeded a cumulative HI of 1 in surface soils (HI=2) due to elevated metals. 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 indicated that the

cumulative cancer risks for the future Composite Worker scenario were also below the no further action limit when subsurface and pooled soils were evaluated. When the non-cancer risks were segregated and summed by target organ for cumulative HI, the nervous system (HI=2) and the dermal system (HI=2) exceeded a cumulative HI of 1 due to elevated metals. The evaluation of pooled data indicated similar cancer risks and non-cancer hazards as those which were presented in the isolated surface and subsurface evaluations.

The child and youth visitor scenarios were evaluated using the same EU as the Composite Worker (50.5 acres). The calculated EPCs for each parameter identified as a COPC were identical to the values used in the Composite Worker evaluation, but adjusted RSLs were calculated using the USEPA's online RSL Calculator. None of the estimated cumulative carcinogenic risks for any scenario (child and youth visitors evaluated using the surface, subsurface, and pooled soil datasets) exceeded the acceptable level for no further action (1E-5). However, several exposure scenarios for the child/youth visitors exceeded a cumulative HI of 1 when the non-cancer hazard results were summed by target organ. The dermal system and nervous system both exceeded the HI of 1 for several exposure scenarios due to elevated metals detected in the surface and subsurface. Potential hazards caused by elevated metals can be appropriately mitigated via the installation of a physical barrier (i.e., a VCP cap).

Based on these SLRA evaluations for the Composite Worker and child/youth visitor scenarios, the retail area covered by this RADWP requires mitigation of the estimated risks associated with existing soil via a VCP capping remedy. The capping remedy would also include standard institutional controls and long term maintenance requirements. A capping remedy will be implemented for the entire Composite Worker Area indicated in **Figure 7a/7b**. Although the locations of the final retail lots have not yet been established and are subject to individual development updates, each of the retail lots will be required to be completed with a VCP cap, the minimum requirements of which are described in the trailing sections of this RADWP. If a specific area is not ultimately proposed to be completed as a retail lot, this area will also be required to be capped separately to ensure that the entire Composite Worker Area is subject to the capping remedy.

Phased Implementation of Capping Remedy – Schedule Considerations:

The final capping remedy for the Sub-Parcel B6-2 Development Area is proposed to be installed using a phased approach as individual retail lots are designed and completed. Interim measures will be installed to restrict access to uncapped portions of the Composite Worker Area, which is also applicable for the child/youth visitor scenarios, during the interim period to temporarily prevent potential exposures until the required capping remedy is fully implemented. With the temporary restrictions, the Composite Worker and child/youth visitors will not be exposed to potentially impacted soils while commercial activities are being conducted on (completed) paved or otherwise capped

portions of the Site. The proposed temporary restrictions for the uncapped portions of the Site will adequately mitigate potential risks to the Composite Worker and child/youth visitors during the phased implementation of the capping remedy.

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

Results from the SLRA indicate that a remedy of capping with institutional controls (and general health and safety protocols) will be acceptable to mitigate potential current and future Composite Worker and Construction Worker risks. The discussion of the Composite Worker in this section includes the implications for potential child/youth visitor exposure scenarios within the retail area. The proposed interim measures in the Composite Worker Area will provide adequate temporary protection for the Composite Worker while the phased capping remedy is being implemented. The proposed VCP capping remedy for the Composite Worker Area was evaluated for consistency with the CERCLA Threshold Criteria and the Balancing Criteria. The Threshold Criteria assess the overall protection of human health and the environment, as well as achievement of media cleanup objectives and 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 remedy, as a whole, protects and maintains protection of human health and the environment. This criterion is satisfied when response actions are complete. The purpose of this remedy is to provide a protective barrier between human site users and impacted materials, and to protect the environment by preventing surface water from contacting impacted materials in place. The capping and institutional control remedy would eliminate risk to current and future Composite Workers by preventing exposure to areas of the Site where the cumulative estimated risk to the Composite Worker could potentially exceed a cancer risk of 1E-5 or a HI of 1. Groundwater does not present a human health hazard since there is no groundwater use. Implementation of the proposed use restrictions 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/groundwater COPCs by human receptors.

Achieve Media Cleanup Objective: The assessment against this criterion describes how the remedy 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 future 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 remedy will attain soil and groundwater objectives. The activity use restrictions will eliminate current and future unacceptable exposures to both soil and groundwater. The groundwater impacts at the Site have been addressed within the Finishing Mills Groundwater Phase II Investigation Report (and will be further discussed in a future comprehensive groundwater study).

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 proposed remedy 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 and groundwater conditions observed at the Site, with the possible exception of NAPL at two boring locations (B6-056-SB and B6-066-SB). The potential groundwater impacts at the Site have been addressed within the Finishing Mills Groundwater Phase II Investigation Report (and will be further discussed in a future comprehensive groundwater study). The proposed capping remedy will prevent contact with soil COPCs, reducing potential risks to within acceptable levels for future industrial workers. The control measures included in the proposed remedy, 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 intrusive activities.

Balancing Criteria:

Long-Term Reliability and Effectiveness: The assessment against this criterion evaluates the long-term effectiveness of the remedy in maintaining protection of human health and the environment after the response objectives have been met. 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 capping remedy for the Composite Worker Area will permanently contain the contaminated media in place. In order for the cap to effectively act as a barrier, regular inspections will be required to determine if erosion or cracks have formed that could expose workers (or child/youth visitors) to contaminated soils.

Institutional controls (deed restrictions) will be implemented to protect future Composite and Construction Workers against inadvertent 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 proposed remedy will maintain protection of human health and the environment over time by controlling exposure to the hazardous constituents potentially remaining in soils and groundwater. The long term effectiveness is high, as use restrictions are readily implementable and easily maintained. Given the historical, heavily industrial uses of the Site and the surrounding area, including the presence of landfills, land and 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. The capping remedy for the Composite Worker Area will prevent the spread of contaminants in wind-blown dust or stormwater and will prevent infiltration through the impacted unsaturated zone from carrying contaminants to the groundwater. Thus the mobility of contaminants will be reduced by the capping remedy for the Composite Worker Area. The proposed capping remedy will also avoid the short term risks associated with excavating and transporting large quantities of soil which might otherwise be removed for risk mitigation.

Short-term Effectiveness: The assessment against this criterion examines how well the proposed remedy protects human health and the environment during the construction and implementation until response objectives have been met. 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 capping remedy for the Composite Worker Area will be implemented using a phased approach as individual retail lots are completed. The risks to the Composite Worker during implementation will be mitigated by temporary mechanisms which will limit exposures to uncapped portions of the Site, and risks to the Construction Worker during remedy implementation are mitigated by limiting workers to less than 36 days of intrusive work. The short-term risk to site workers following general health and safety measures during implementation of the remedy will be low, leading to a high level of short-term effectiveness for protection of future site users and the environment. 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.

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. The proposed capping remedy for the Composite Worker Area uses readily available capping techniques including concrete/paving technology.

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 capping remedy for the Composite Worker Area remedial costs would be incurred as part of the proposed site development, regardless of the presence of impacted soil.

State/Agency Support and Acceptance: MDE has been involved throughout the Site investigation process. The proposed use restrictions included in the proposed remedy 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.

A capping remedy with institutional controls would satisfy the CERCLA Threshold Criteria and the Balancing Criteria and would do so in a manner that ensures reliable implementation and effectiveness. The remedy is cost-effective and consistent with the proposed development plan, although the capped areas may need to be expanded to ensure that the requirements are satisfied.

4.0 PROPOSED SITE DEVELOPMENT PLAN

Tradepoint Atlantic is proposing to perform grading and installation of major utilities at the Site, in preparation of developing the Site for future retail use. This proposed work will require construction activities on roughly 50.5 acres of Sub-Parcel B6-2. The proposed future use of the Site is Tier 2B – Restricted Commercial. The remainder of Parcel B6 will be addressed in additional separate development plans in accordance with the requirements of the ACO that will include RADWPs, if necessary.

Certain compounds (organics and 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. Current and future adult workers could potentially contact surface or subsurface soil. Construction Workers may contact impacted surface and subsurface soil during earth movement activities associated with future construction activities. Potential risks to future adult workers and child/youth visitors associated with impacts to soil and groundwater exceeding the PALs will be addressed through a remedy consisting of engineering controls (capping of the Composite Worker Area) and institutional controls (deed restrictions). The proposed site development plan provides for a containment remedy and institutional controls that will mitigate future adult workers or child/youth visitors from contacting potentially impacted soil at the Site.

While the concentrations of COPCs in groundwater on-site are not deemed to be a human health hazard since there is no groundwater use, proper water management is required to prevent unacceptable discharges or risks to Construction Workers. Work practices and health and safety procedures governing groundwater encountered during excavation activities will provide protection for Construction Workers associated with excavations or trenching at the Site. Additionally, 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.

General health and safety controls (level D protection) outlined in the site-specific Health and Safety Plan (HASP provided in **Appendix D**) 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 estimates of Construction Worker cancer risk for the site-specific 36-day exposure frequency were all 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 36-day exposure frequency. If the schedule of site-wide intrusive activities exceeds 36 days, additional site-specific health and safety requirements or additional risk assessment will be warranted.

Drawings for the proposed development in the sub-parcel (grading and utility installations), are provided in **Appendix E**. Clean fill used at the surface as a component of a capping remedy must meet the VCP requirements for commercial land use. Some material previously approved by the MDE for industrial use may require additional sampling to demonstrate that it meets the requirements for commercial use. Processed slag aggregate sourced from the Tradepoint Atlantic property or other materials approved by the MDE for industrial use may be used as structural fill material under areas to be capped. Future Composite Workers (and visitors) will not be exposed to structural backfill or utility trench backfill which is placed at the Site to be covered by a VCP cap.

The exact layout of the retail area has not yet been finalized. Ultimately, the entire Composite Worker Area, which was also evaluated for the child/youth visitor scenarios, will need to be capped in accordance with the VCP capping requirements established in several previous RADWPs. The minimum requirements for the various capping sections are provided below. Once plans for each retail lot are finalized, the MDE and USEPA will be provided with a brief RADWP Addendum detailing the site plan for the retail lot, along with an indication of the proposed final capping remedy, and a discussion of any concerns related to the intrusive work schedule (if any) associated with the construction of the applicable retail lot. Multiple retail lots may be combined into the same addendum if the sequencing of development is conducive to a single submission. The SLRA presented herein will serve as the primary reference document for any future development associated with Sub-Parcel B6-2, and addenda will be prepared and submitted to the agencies as necessary.

The development protocols outlined in the remainder of this document are applicable to the major grading and utility installations at the Site, as well as any supplemental construction activities to be completed after this preparatory work.

The process of completing the proposed construction activities at the Site involves the tasks listed below. As-built and regulatory documentation for the outlined tasks and procedures related to site grading and major utility installations will be provided in a Sub-Parcel B6-2 Interim Completion Report. Development Completion Report(s) will be necessary following the construction of each retail lot embedded within Sub-Parcel B6-2, to ensure that the required capping remedy has been installed in each area.

- **Response Phase**

1. Groundwater network abandonment plan.

Temporary groundwater sample collection points installed during the Finishing Mills Groundwater Investigation have already been properly abandoned in accordance with COMAR 26.04.04.34 through 36. The NAPL screening piezometer B6-056-PZ has not been abandoned at this time, but it will be abandoned prior to development in this area. The

piezometer will be gauged a final time on the abandonment date to confirm that NAPL has not accumulated in the casing. The existing permanent monitoring wells SW-077-MWS, SW-077-MWI, SW-078-MWS, SW-078-MWI, TM10-PZM007, TM12-PZM006, TM14-PZM005, TM16-PZM007, TM17-PZM005, and TM18-PZM005 sampled during the Finishing Mills Groundwater Investigation are also proposed for abandonment under this RADWP. These abandonments should be completed prior to development activities in the vicinity of the wells to ensure that the above-ground casings are not damaged and the wells can be properly abandoned. If the permanent wells cannot be abandoned prior to the start of development, temporary protective measures (flagging, barriers, etc.) may also be installed as necessary to protect the integrity of these wells during grading.

Abandonment Rationale:

Each of the monitoring wells listed above was sampled during the Finishing Mills Groundwater Investigation, with the results presented in the Finishing Mills Groundwater Phase II Investigation Report (Revision 0) dated November 30, 2016. The shallow groundwater results are restated in **Table 3** and **Table 4** of this RADWP. The Finishing Mills Groundwater Investigation also included numerous permanent wells and temporary groundwater sample collection points throughout the Finishing Mills Area which are not relevant to this particular RADWP. As described in the Phase II Investigation Report, these wells provided analytical data to help characterize potential exposure risks to future occupants of the parcel based on the vapor intrusion to indoor air pathway, as well as the potential for surface water quality impacts as indicated by comparison to the USEPA National Recommended Water Quality Criteria (NRWQC) (USEPA 2009) for ecological risk (Saltwater Aquatic Life Continuous Criterion Concentration) and human health risk (Consumption of Organism Only). In some cases, appropriate replacement criteria were used in lieu of the NRWQC if no NRWQC screening level was available for a specific compound (e.g., naphthalene).

The results of the vapor intrusion screening for the Finishing Mills Groundwater Investigation were presented in *Table 11* and *Table 12* of the Phase II Investigation Report which are included in **Appendix F-1**. These results were also presented graphically in *Figure GW-10* of the Phase II Investigation Report, which is reproduced in **Appendix F-1** of this RADWP. These resources showed that the only potential risks from the vapor intrusion to indoor air pathway were due to elevated total cyanide. As stated in the Phase II Investigation Report, the vapor intrusion risks were conservatively screened using total cyanide rather than free cyanide or cyanide amenable to chlorination, and therefore may not be representative of actual vapor intrusion potential. The vapor intrusion screening level for available cyanide is 3.5 mg/L. The Phase II Investigation Report recommended that additional sampling should be completed to determine the

extent to which cyanide in the groundwater is present as free cyanide that could contribute to potential vapor intrusion risks.

Subsequently, a total of 13 representative locations were selected for additional sample collection for available cyanide. Several of these locations were present within the Finishing Mills Area, although none of the 10 permanent wells covered by this RADWP were sampled. The results of the supplemental sampling were discussed in the Site-Wide Groundwater Study Report (Revision 0) dated August 11, 2017, and were presented in *Table 2* and *Figure 13* of this separate report. The table and figure are both reproduced in **Appendix F-2** of this RADWP. The Site-Wide Groundwater Study Report concluded that only a very small fraction of the total cyanide present in groundwater exists as available cyanide. As a result, cyanide does not appear to be a significant COPC when evaluating indoor air vapor intrusion concerns, particularly since the maximum detection of total cyanide in groundwater below Sub-Parcel B6-2 was only 28.8 ug/L, which is a lower concentration than any of the locations selected for supplemental sampling.

As stated above, the NRWQC (or appropriate replacement criteria) were also evaluated to determine potential concerns with respect to ecological risk (Saltwater Aquatic Life Continuous Criterion Concentration) and human health risk (Consumption of Organism Only). Shallow groundwater in most of the Finishing Mills Area appears to discharge to the TMC, which ultimately discharges through the NPDES Outfall 014 after being pumped through the HCWWTP for treatment. The TMC is the focus of future response actions with the ultimate goal of eliminating the need to use the HCWWTP for stormwater runoff management after demolition and redevelopment are complete at the Tradepoint Atlantic property. The canal would still serve to convey runoff from commercial and industrial areas prior to discharge. The groundwater screening results should not be considered an indication of effluent quality at the point of discharge to Bear Creek following treatment in the HCWWTP (or in any stormwater management facility that may be constructed in place of the HCWWTP), or of the surface water quality in Bear Creek following discharge.

Results from the well and piezometer locations adjacent to the TMC were averaged to develop arithmetic mean concentrations for the groundwater discharging to the canal. These average values (for each of the individual compounds which exceeded the NRWQC or alternative criteria) were used for screening purposes since they would be more representative of potential surface water discharges due to mixing. The canal also conveys stormwater from demolition and redevelopment areas. The canal was historically used to convey treated effluent from the City of Baltimore Back River Wastewater Treatment Plant (BRWWTP), and although the canal is no longer used as the primary conveyance system for this effluent it is still used for overflow discharges under certain conditions (due to maintenance activities or pump station power losses). Based on these downstream considerations, the evaluation of groundwater samples against the

surface water standards is a highly conservative assessment of the potential for groundwater impacts at the discharge point to Bear Creek. The results of the surface water screening were presented in *Table 13* of the Finishing Mills Groundwater Phase II Investigation Report. This table has also been reproduced in **Appendix F-1**. These results were also presented graphically in *Figure GW-11* of the Phase II Investigation Report, which is reproduced in **Appendix F-1**. This screening identified parameters that may present a concern with respect to discharges of groundwater to surface water.

The NRWQC Aquatic Life screening level for available cyanide is 1 mg/L, as shown in *Table 13* included in **Appendix F-1**. The screening level for naphthalene (1.4 ug/L) was obtained from the Surface Water Benchmarks developed by the USEPA Biological Technical Assistance Group (BTAG). This screening level was selected because it was used in the Phase I Offshore Investigation Report for the Sparrows Point Site, which was prepared by EA Engineering, Science, and Technology, Inc., PBC (EA) in March 2016. Cyanide (conservatively screened using the reported total cyanide data as discussed above) and naphthalene were identified in the Finishing Mills Groundwater Phase II Investigation Report as the only analytes in shallow groundwater that exceeded the water quality criteria by a factor of more than 10 using the averaged data. As demonstrated above, the fraction of cyanide which exists as available cyanide is expected to be significantly lower than the reported concentrations of total cyanide. Furthermore, the average concentration of total cyanide (121.5 ug/L) used for screening against the NRWQC was primarily influenced by one groundwater point located outside of the development area (SW-081-MWS) with a concentration of 1,350 ug/L. The average naphthalene concentration used for screening against the BTAG criterion exceeded this screening level by less than a factor of 11. Therefore, naphthalene is not considered to be a major concern for potential discharges to Bear Creek. In addition, the maximum concentration of naphthalene reported at the Site covered by this RADWP (12.9 ug/L) was less than the average concentration for shallow groundwater discharges used for screening (14.9 ug/L).

There is no potential for direct human exposure to groundwater for a future 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 work associated with development leads to a potential Construction Worker direct exposure to groundwater, health and safety plans and procedures shall be followed to limit exposure risk. Since the risks associated with vapor intrusion and surface water discharges have been shown to be negligible, the abandonment of the permanent wells in the groundwater monitoring network at the Site is appropriate. The abandonment of these wells will also support the remedial response work associated with the TMC (covered by other documents) by ensuring that the wells are properly abandoned before excavation activities occur along

the canal. It is understood that the agencies may require the installation of additional permanent wells in the future for additional monitoring following site development.

Figure 8 shows the permanent wells and temporary groundwater sample collection points relevant for Sub-Parcel B6-2, and indicates the wells that are proposed to be abandoned. The NAPL screening piezometer B6-056-PZ will also be abandoned (and gauged a final time on the abandonment date). As stated above, the temporary groundwater sample collection points in the Finishing Mills Area have already been abandoned.

- **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). Any soils replaced at the Site will be capped in the future in accordance with this RADWP.

2. Grading and site preparation.

As indicated on the grading plan in **Appendix E**, grading will include cut and fill which will ultimately raise the elevation at the Site. The current and final (proposed) ground surface elevations are indicated on the grading plan. The Site will be raised with net fill. Since the Site will require imported fill material, there is not expected to be a significant amount of excavated material (if any) which will need to be disposed of off-site. According to the design engineer, on-site grading will involve the excavation (cut) of approximately 47,200 cubic yards of material and the placement (fill) of approximately 321,140 cubic yards of material. (These estimates include a possible expansion of the retail area to the south of the TMC and west of the Composite Worker Area, which is not covered under this RADWP; therefore, the exact quantifies of cut and fill material will differ from these estimates.) Cut and fill grading activities will be performed by Construction Workers inside enclosed vehicle cabs and will not include manual digging. Therefore, cut and fill grading activities will not include any intrusive exposure days since activities performed within vehicle cabs do not represent an exposure risk. As noted in the SLRA, due to the division of labor, no individual crew is scheduled to perform intrusive work for more than 36 work days.

Any material that is not suitable for compaction will be excavated and replaced with subbase material, although it is not anticipated that poor soils will be encountered. Borrow materials will be obtained from MDE-approved sources. Clean fill used at the surface as a component of a capping remedy must meet the VCP requirements for commercial land use. Some

material previously approved by the MDE for industrial use may require additional sampling to demonstrate that it meets the requirements for commercial use. Processed slag aggregate sourced from the Tradepoint Atlantic property or other materials approved by the MDE for industrial use may be used as structural fill material under areas to be capped. Fill 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 MDE.

3. Installation of underground utilities.

Underground utilities will be installed at the approximate locations shown on the plans provided in **Appendix E**. Soil removed from the utility trenches may be replaced on-site and compacted. Any soils replaced at the Site will be capped in the future in accordance with this RADWP. Soil removed from utility trenches cannot be used as fill within the utility trenches unless such material have been approved for such 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.

Stormwater will be conveyed by new piping and inlet connections to stormwater management facilities on the Tradepoint Atlantic property. 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.

Minimum stormwater pond section details are indicated in the general capping sections provided in **Appendix G**. An impervious PVC or equivalent liner covered by clean fill (meeting VCP requirements for commercial land use) will be placed in the stormwater pond areas. As an alternative, 2-feet of clay material meeting the VCP clean fill requirements can be used in lieu of an impervious liner, but placement of the clay material must be performed in such a manner as to ensure that the final permeability of the liner system is demonstrated

to be similar to, or better than, the impermeable liner system. If clay material is used, documentation must be provided to the MDE in the Development Completion Report(s) to demonstrate that the permeability of the clay liner is satisfactory. Since a capping remedy is required for the Composite Worker Area, the minimum stormwater pond section thicknesses are applicable to the entire retail area.

5. Floor slabs and paving (future development protocols).

Much of the Site will be covered with floor slabs or paving as the future retail lots are designed and completed. The paved areas will receive a layer of subbase material which will consist of compacted aggregate base. The required minimum thicknesses of all site-wide pavement sections to be placed over the existing soils are indicated in the general capping sections provided in **Appendix G**. All paved areas will be installed with a minimum of 4 inches of compacted aggregate based and a minimum of 4 inches of overlying pavement (asphalt or concrete) surface. Since a capping remedy is required for the Composite Worker Area, the minimum paving section thicknesses are applicable to the entire retail area.

6. Landscaping (future development protocols).

Some areas of the Site may be completed with landscaped caps as the future retail lots are designed and completed. Minimum landscaping section details are indicated in the general capping sections provided in **Appendix G**. Landscaped areas will consist of a minimum of 2 feet of clean fill (meeting VCP requirements for commercial land use) prior to being planted. Trees will be installed with a minimum of 2 feet of clean fill (meeting VCP requirements for commercial land use) around the root ball. A geotextile marker fabric will be placed between the clean backfill and underlying soils. Since a capping remedy is required for the Composite Worker Area, the minimum landscaped section thicknesses are applicable to the entire retail area.

5.0 DEVELOPMENT IMPLEMENTATION PROTOCOLS

5.1. DEVELOPMENT PHASE

This plan specifically discusses protocols for the handling of soils and fill materials in association with grading and major utility installations for the planned Sub-Parcel B6-2 development. The development protocols outlined in the remainder of this document are also appropriate for any supplemental construction activities to be completed after this preparatory work, such as final cap construction (which would need to be separately approved by the agencies prior to implementation). 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. No soils contaminated with total PCBs in excess of 50 mg/kg have been identified in Sub-Parcel B6-2. There were no samples where detections of lead were identified in excess of 10,000 mg/kg. There were three locations within, or adjacent to, the proposed development area with soil exceedances of the DRO PAL (6,200 mg/kg) and/or potential indications of NAPL in the soil core (B6-054-SB, B6-056-SB, and B6-066-SB). These borings are pictured with the current utility plan in **Figure 4** and **Figure 5**, and should be considered with respect to the utility alignments and inverts prior to trenching in these areas.

Following completion of the SLRA, the screening level estimates of Construction Worker cancer risk for the site-specific 36-day exposure frequency were all less than 1E-5 (the acceptable level for no further action). 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 36 days in the site-wide LOD. According to the risk assessment performed for the proposed maximum exposure duration of 36 days (equivalent to the longest individual task listed in the construction schedule; **Appendix C**), general worker protective controls (Level D) and health and safety measures will be sufficient for the proposed development, with no additional site-specific requirements.

The screening level estimates of risk for future Composite Workers and child/youth visitors identified several elevated non-cancer hazards for both surface and subsurface soils in the Composite Worker Area. Non-cancer HI values were identified above the no further action limit of 1 for the nervous system and the dermal system due to elevated metals. The proposed capping remedy for the Site is appropriate to mitigate potential hazards related to metals present in the existing soils. The capping remedy will be implemented using a phased approach as individual

retail lots are designed and completed. This remedy will mitigate any potential risks to Composite Workers and child/youth visitors at the Site. As individual retail lots are completed, interim measures will be used to prevent exposures to uncapped areas of the Composite Worker Area while development is ongoing.

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 and/or utility work. During the pre-excavation meeting, all workers shall review the proposed excavation and trenching locations and associated utility inverts in conjunction with existing boring locations to identify areas of potentially elevated petroleum concentrations that may be mobilized by the utility installation. These areas will include screening piezometers impacted with measureable NAPL located to the west of the proposed development (B6-066-PZ and delineation piezometers) and borings which had evidence of free-phase NAPL in the soil cores and/or elevated analytical detections of DRO above the PAL (B6-054-SB, B6-056-SB, and B6-066-SB). **Figure 4** presents the proposed utility plan for the Sub-Parcel B6-2 Development Area, along with the three listed boring locations which may be indicative of areas with potential NAPL contamination. A close-up view of boring location B6-066-SB (with all delineation piezometers) is provided on **Figure 5**. The site-specific HASP for the project shall also be reviewed and discussed during the meeting.

Key soil excavation and backfill activities will be monitored through daily inspections by the environmental professional (EP). Soil excavation and removal activities will occur during utility trenching 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. Clean fill used at the surface as a component of a capping remedy must meet the VCP

requirements for commercial land use. Some material previously approved by the MDE for industrial use may require additional sampling to demonstrate that it meets the requirements for commercial use if it is to be placed at or near the surface. Processed slag aggregate sourced from the Tradepoint Atlantic property or other materials approved by the MDE for industrial use may be used as utility backfill under areas to be capped. A general utility detail drawing is provided as **Appendix H**. 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 I**) 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. All stockpiled soil may be considered for use as fill at this Site or on other areas of the Tradepoint Atlantic property depending on the analytical results. A sampling work plan including a description of the material, estimated volume, and sampling parameters will be submitted to the MDE for approval. 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 risks are less than 1E-4, and the non-cancer hazards (evaluated in terms of the magnitude of the exceedances and other factors such as bioavailability of COPCs) are acceptable, the stockpiled soil will be suitable for use as fill at the Tradepoint Atlantic property under areas to be capped. Otherwise, the materials will be sampled to determine if they are classified as hazardous waste.

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 unsuitable materials that require disposal either off-site or at the on-site landfill, if any, will be recorded and identified in the Interim Completion Report (and any subsequent Development Completion Report(s), as applicable).

5.1.3. **Fill**

Processed slag aggregate can be used as structural fill under areas to be capped without any additional required testing or approvals. Other materials approved by the MDE for industrial use may also be used as structural fill under areas to be capped. Material used at the surface as a component of a capping remedy must meet the VCP clean fill requirements for commercial land use. Some material previously approved by the MDE for industrial use may require additional sampling to demonstrate that it meets the requirements for commercial use if it is to be used as a component of the cap. All over-excavated utility trenches will be backfilled with bedding and backfill approved by the MDE. As with structural fill, processed slag aggregate and other materials approved for industrial use can be used as backfill in utility trenches if the area will be covered by a VCP cap. Any utility backfill which will extend into the cap (i.e., top 2 feet of backfill in landscaped areas) must meet the VCP clean fill requirements for commercial land use, and a geotextile marker fabric will be placed between the VCP clean fill and any underlying material. A general utility detail drawing is provided as **Appendix H**. Material imported to the Site will be screened according to MDE guidance for suitability.

As described in the SLRA, the risk ratios for COPCs in the Sub-Parcel B6-2 Development Area indicated that soil contaminant concentrations do not exceed acceptable cancer risks and/or non-cancer hazards for future Composite Workers (or child/youth visitors) in capped areas of the Site. Soil excavated on the sub-parcel has been deemed to be suitable for re-use as fill at the Site since the entire Composite Worker Area is to be capped.

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 for containment below capped areas.

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. In the future, cap installation and final development construction will be performed. 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 response plan. 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 B6-2 Development Area. 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**

A total of 10 shallow groundwater samples (FM-010-PZS, FM-011-PZS, SW-077-MWS, SW-078-MWS, TM10-PZM007, TM12-PZM006, TM14-PZM005, TM16-PZM007, TM17-PZM005, and TM18-PZM005) were collected from temporary groundwater sample collection points and permanent monitoring wells within and surrounding the Site. None of the temporary groundwater sample collection points or permanent wells utilized for groundwater sampling showed evidence of NAPL during mandatory checks with an oil-water interface probe. The delineation piezometers installed in the vicinity of B6-066-PZ to the west of the development area did exhibit detections of measurable NAPL, as described in Section 3.3.

PAL exceedances in groundwater in the vicinity of Sub-Parcel B6-2 consisted of nine inorganic compounds (arsenic, chromium, cobalt, iron, lead, manganese, nickel, thallium, and vanadium), three SVOCs (benz[a]anthracene, naphthalene, and pentachlorophenol), and DRO. While the concentrations of these PAL exceedances are not deemed to be a 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**

Dewatering during construction may be necessary for underground utility work (trenches/excavations) and stormwater pond installation. 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 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 Interim Completion Report (and any subsequent Development Completion Report(s), as applicable).

5.3. HEALTH AND SAFETY

A property-wide Health and Safety Plan (HASP provided as **Appendix D**) 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.
- Restriction for non-residential land use only.
- 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.
- Implementation of inspection procedures and maintenance of the containment remedies as outlined the following section.

Ultimately, the responsible party will file any required deed restrictions as defined by the MDE VCP in the NFA and COC. The VCP capping sections to be installed in the Composite Worker Area will be subject to long-term maintenance requirements for the containment remedy, as outlined in the following section. The entire Site 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.

Maintenance requirements will include maintenance of the capped areas in the Composite Worker Area to minimize degradation of the cap which could lead to exposures to the underlying soil. An Operations and Maintenance Plan (O&M Plan) for the capped areas in the Composite Worker Area is included in **Appendix J**. The O&M Plan will be applied to both exterior pavements (parking lots and roads) and interior pavements (building slabs), as well as any landscaped areas. The O&M Plan includes the inspection protocols for paved and landscaped areas, and specifies that annual inspections will be completed to evaluate the condition of the capping remedies. Inspection forms are provided in the O&M Plan for paved areas (both interior and exterior) and landscaped areas. Since the proposed capping remedy will be phased as individual retail lots are designed and completed, the capped areas will become subject to the requirements of the O&M Plan as they are completed.

The responsible party will perform cap maintenance inspections, perform maintenance of the cap, and retain cap inspection records. Areas of the pavement cap in the Composite Worker Area that have degraded to a Pavement Condition Index (PCI) of 4.0 will be repaired within 30 days of discovery. The MDE shall be notified within 10 business days of any repairs that are the result of a PCI of 4.0 or greater. The notification will include documentation of the conditions being repaired and the location of the repair.

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. TEMPORARY ACCESS RESTRICTIONS FOR COMPOSITE WORKERS AND VISITORS

As stated above in the SLRA, the capping remedy for the Composite Worker Area is proposed to be installed using a phased approach as the individual retail lots are designed and completed. This capping remedy will be protective of potential exposures for both the Composite Worker and child/youth visitors. The retail lots will not cover the entire area of the Composite Worker Area. Paving, landscaping, and/or stormwater management areas will ultimately cap the ground surface in the areas between the retail buildings.

Depending on occupancy opportunities prior to the completion of all retail development phases, access restrictions or other mechanisms will be used to prevent potential exposures to uncapped portions of the Composite Worker Area during the interim period to temporarily prevent potential exposures until the required capping remedy is fully implemented. With these temporary restrictions, the Composite Worker and child/youth visitors will not be exposed to potentially impacted soils while commercial activities are being conducted on (completed) capped portions of the Site. If occupancy of the Site is proposed prior to full implementation of the capping remedy for the Composite Worker Area, a detailed RADWP Addendum must be submitted to the agencies and approved prior to use. The RADWP Addendum would need to include details of the proposed interim measures including locations and protocols for the installation and maintenance of the proposed remedy. The interim measures could include temporary access restrictions (e.g., fencing) and/or temporary capping mechanisms (e.g., crushed concrete), among other possible responses.

5.7. CONSTRUCTION OVERSIGHT

Construction Oversight by an EP will ensure and document that the project is completed as designed and appropriate environmental and safety protocols are followed. Upon completion, the EP will certify that the project grading and utility installations were completed 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

As stated previously, the MDE and USEPA will be provided with a brief RADWP Addendum detailing the site plan for each retail lot once the design has been finalized for construction. Each

addendum will include an indication of the proposed final capping remedy, and a discussion of any concerns related to the intrusive work schedule (if any) associated with the final construction of the applicable retail lot. In addition to the required records listed above, the EP will also certify that the capping remedy for each retail lot has been properly constructed with the required minimum thicknesses (given in **Appendix G**).

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	February 9, 2018
Response Phase	**Proposed Completion Date**
Groundwater Well Abandonment	March 1, 2018
Development Phase	**Proposed Completion Date**
Erosion and Sediment Control Installation	March 1, 2018
Slag (or Alternative Fill) Delivery and Placement	April 30, 2018
Stormwater Installation	June 15, 2018
Pumping Station/Sewer Installation	August 1, 2018
Water Installation	July 15, 2018
VCP Cap Construction and Associated Retail Lot Construction	Varies by Individual Retail Lot
Submittal of Completion Report/Notice of Readiness for Use*	Varies by Individual Retail Lot

Request for a NFA from the MDE	After Final Capping is Complete
Recordation of institutional controls in the land records office of Baltimore County	Within thirty 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 addenda) and the Site is suitable for occupancy/use.

FIGURES

Tradepoint Atlantic
Area A and Area B Parcels

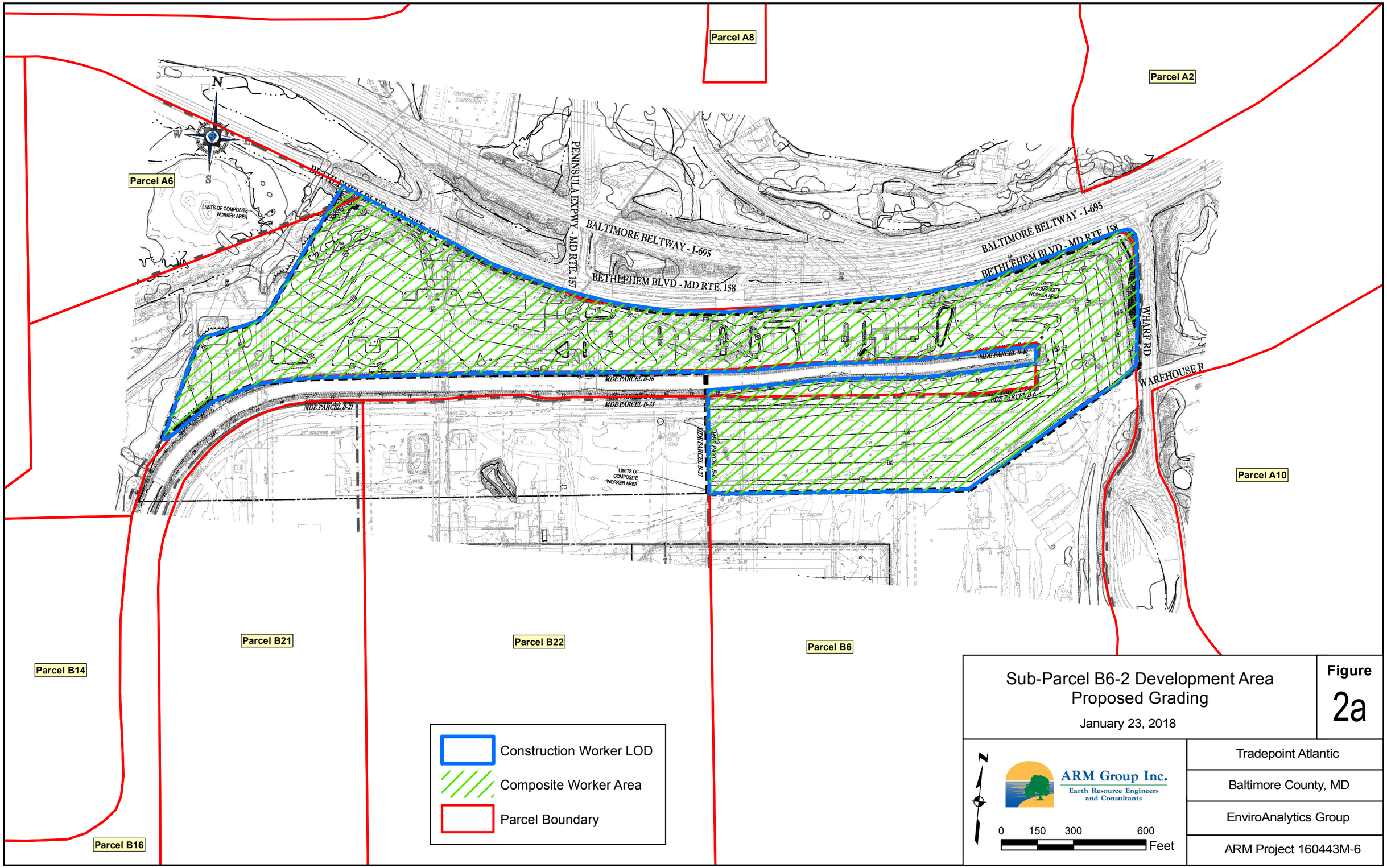
July 25, 2017

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 B6-2 Development Area
Proposed Grading

January 23, 2018

Figure 2a

ARM Group Inc.
Earth Resource Engineers and Consultants

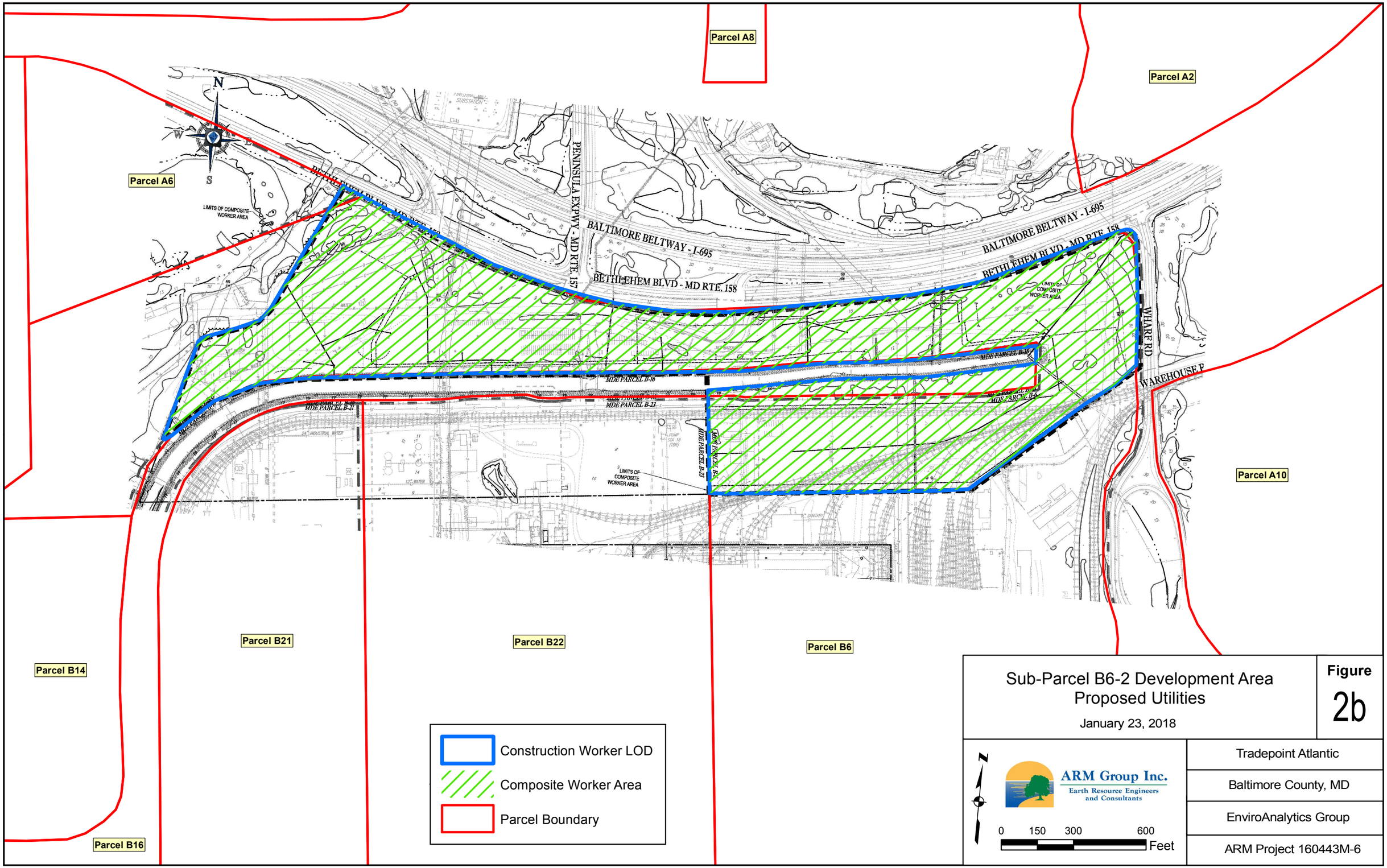
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Development Area Proposed Utilities

January 23, 2018

Figure 2b

ARM Group Inc.
Earth Resource Engineers and Consultants

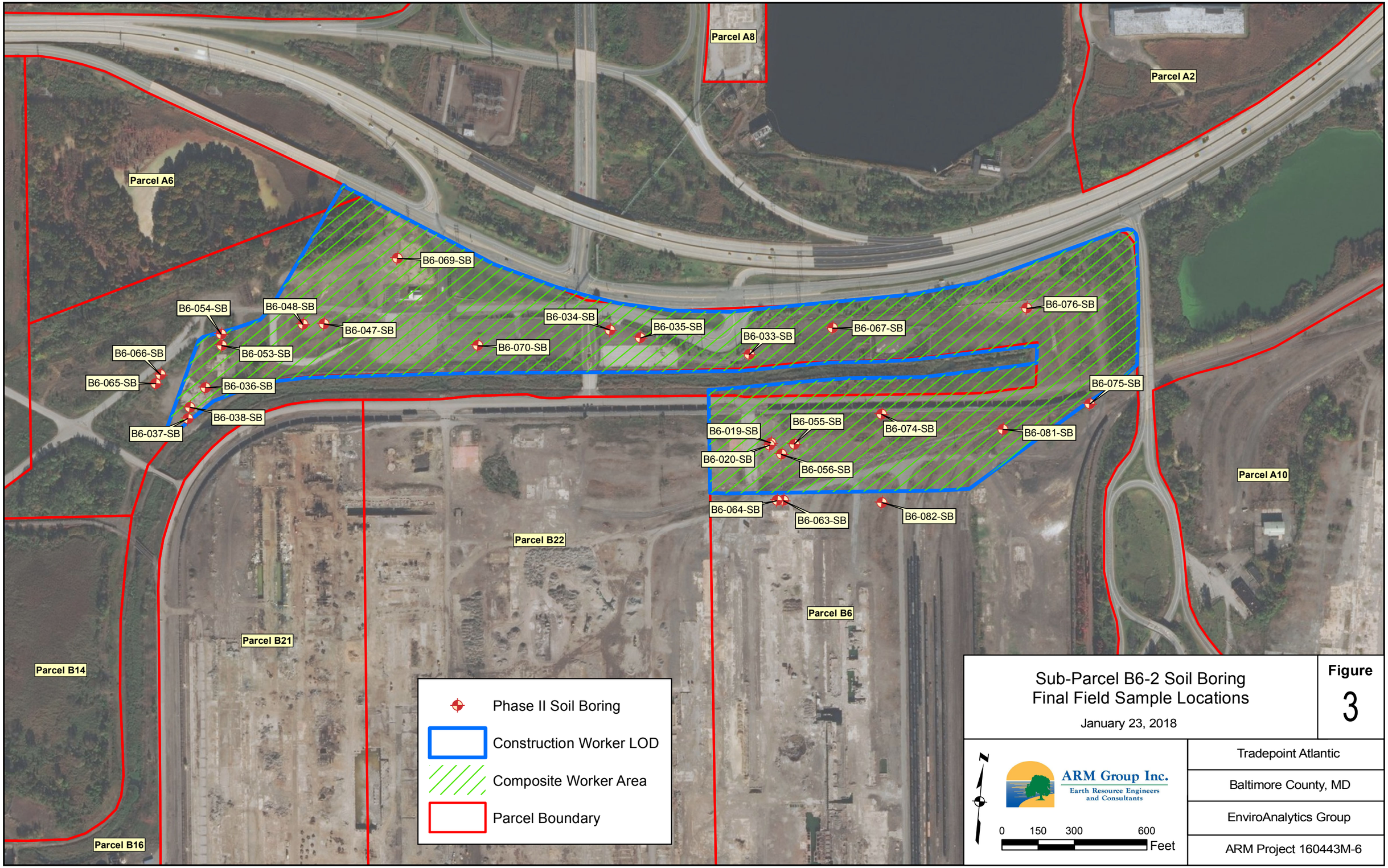
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Soil Boring Final Field Sample Locations

January 23, 2018

Figure 3

ARM Group Inc.
Earth Resource Engineers and Consultants

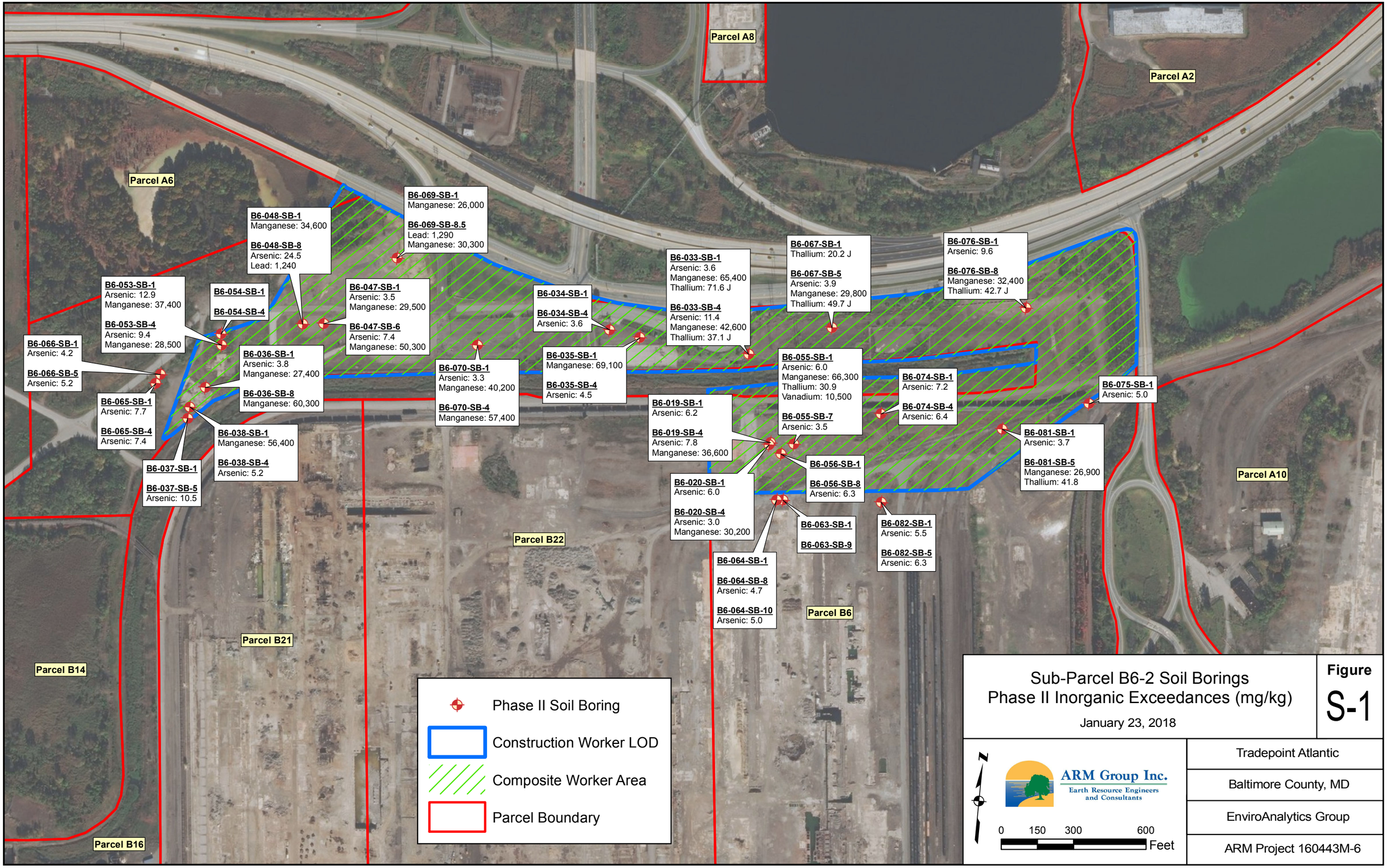
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Soil Borings
Phase II Inorganic Exceedances (mg/kg)

January 23, 2018

Figure
S-1

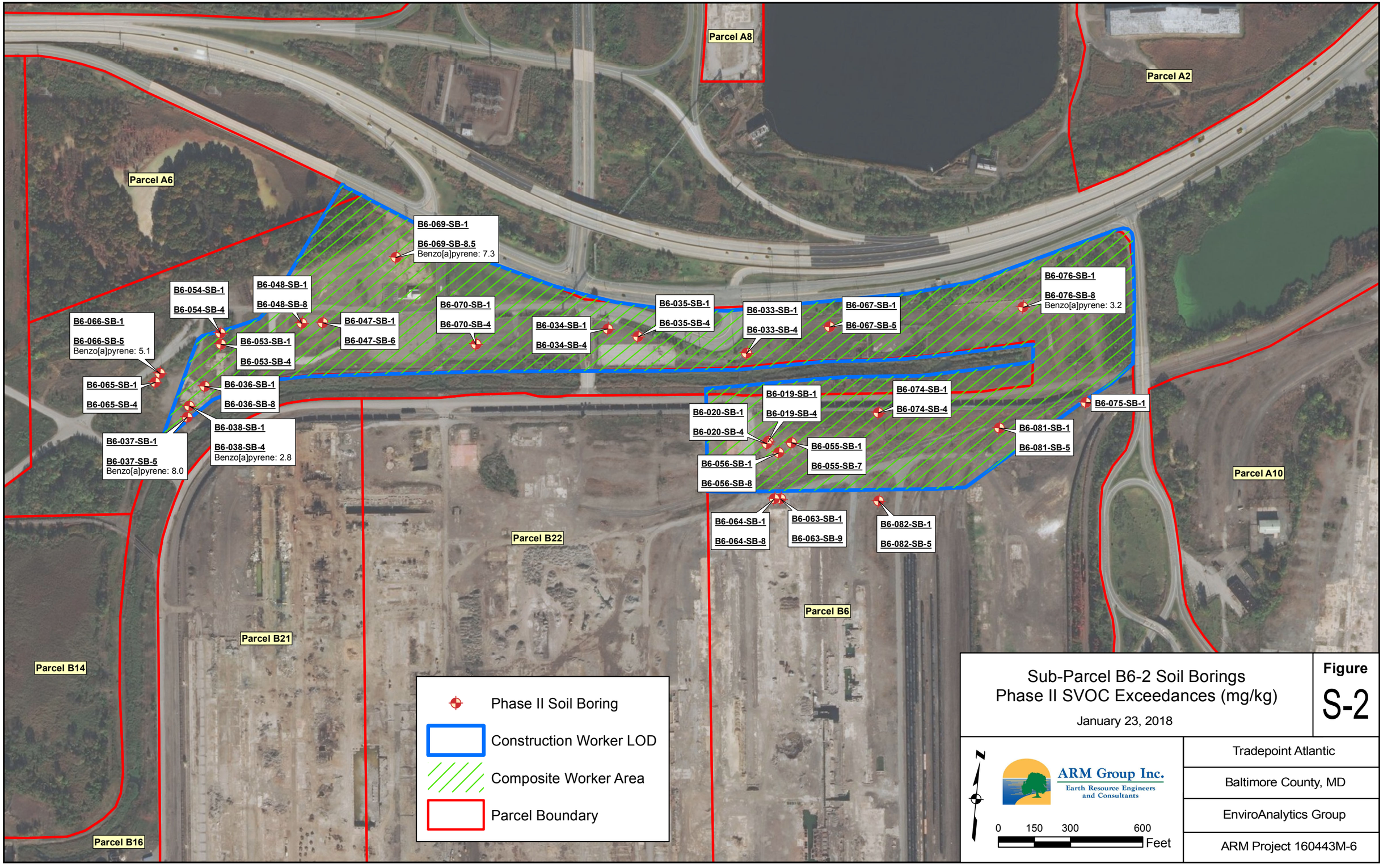
ARM Group Inc.
Earth Resource Engineers and Consultants

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Soil Borings
Phase II SVOC Exceedances (mg/kg)

January 23, 2018

Figure
S-2

ARM Group Inc.
Earth Resource Engineers and Consultants

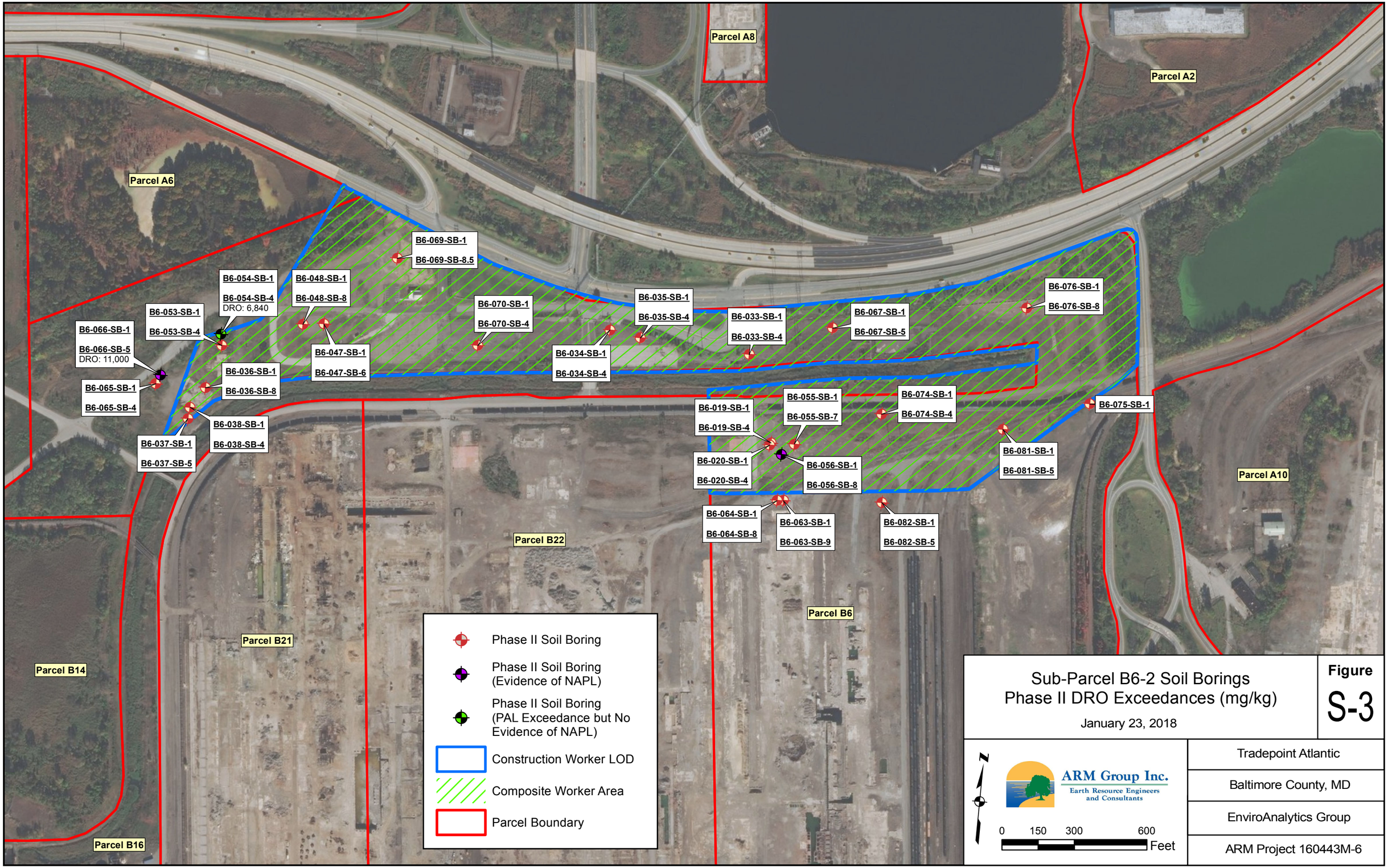
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Soil Borings
Phase II DRO Exceedances (mg/kg)

January 23, 2018

Figure
S-3

ARM Group Inc.
Earth Resource Engineers and Consultants

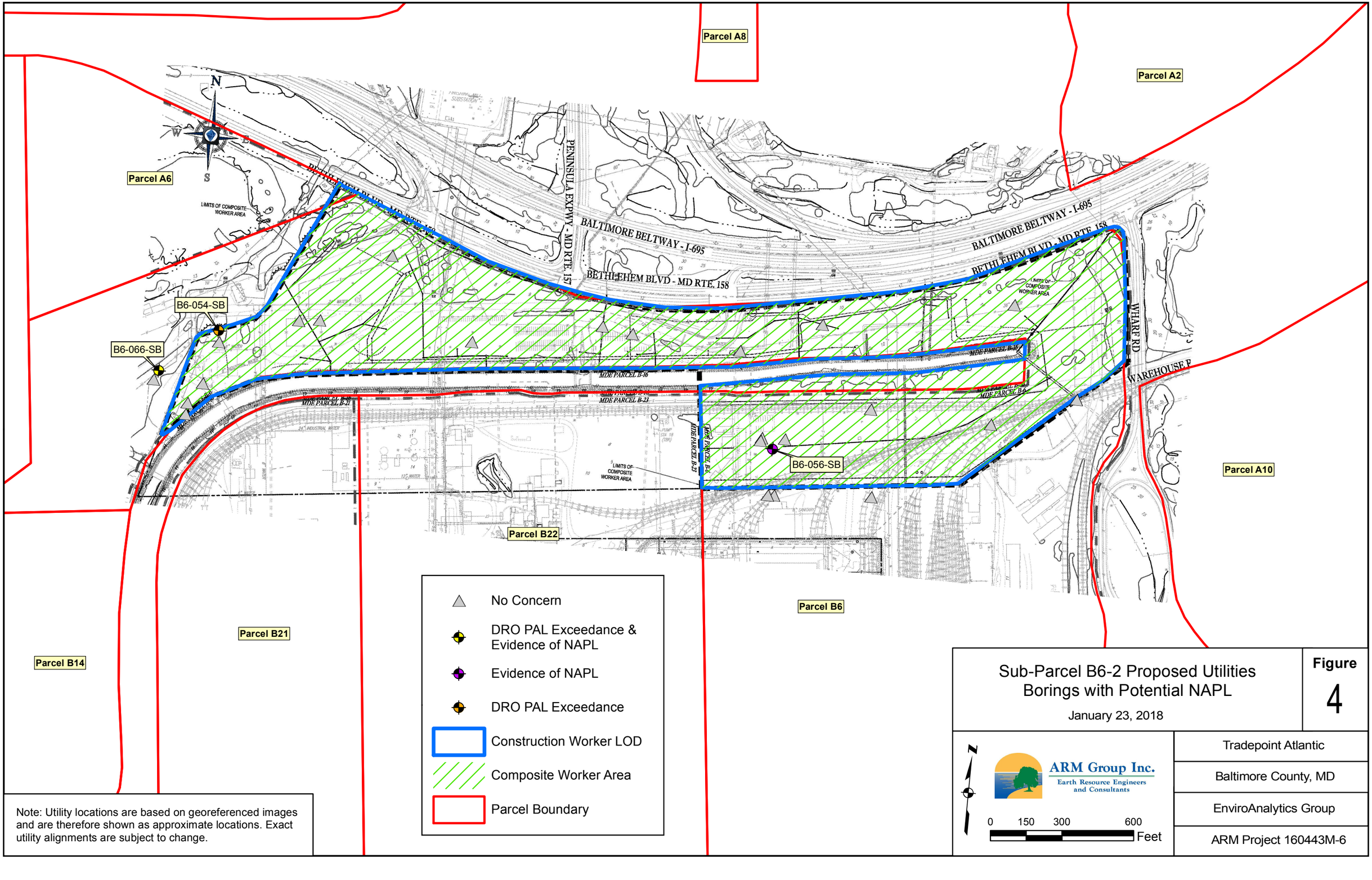
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Note: Utility locations are based on georeferenced images and are therefore shown as approximate locations. Exact utility alignments are subject to change.

Sub-Parcel B6-2 Proposed Utilities Borings with Potential NAPL

January 23, 2018

Figure 4

ARM Group Inc.
Earth Resource Engineers and Consultants

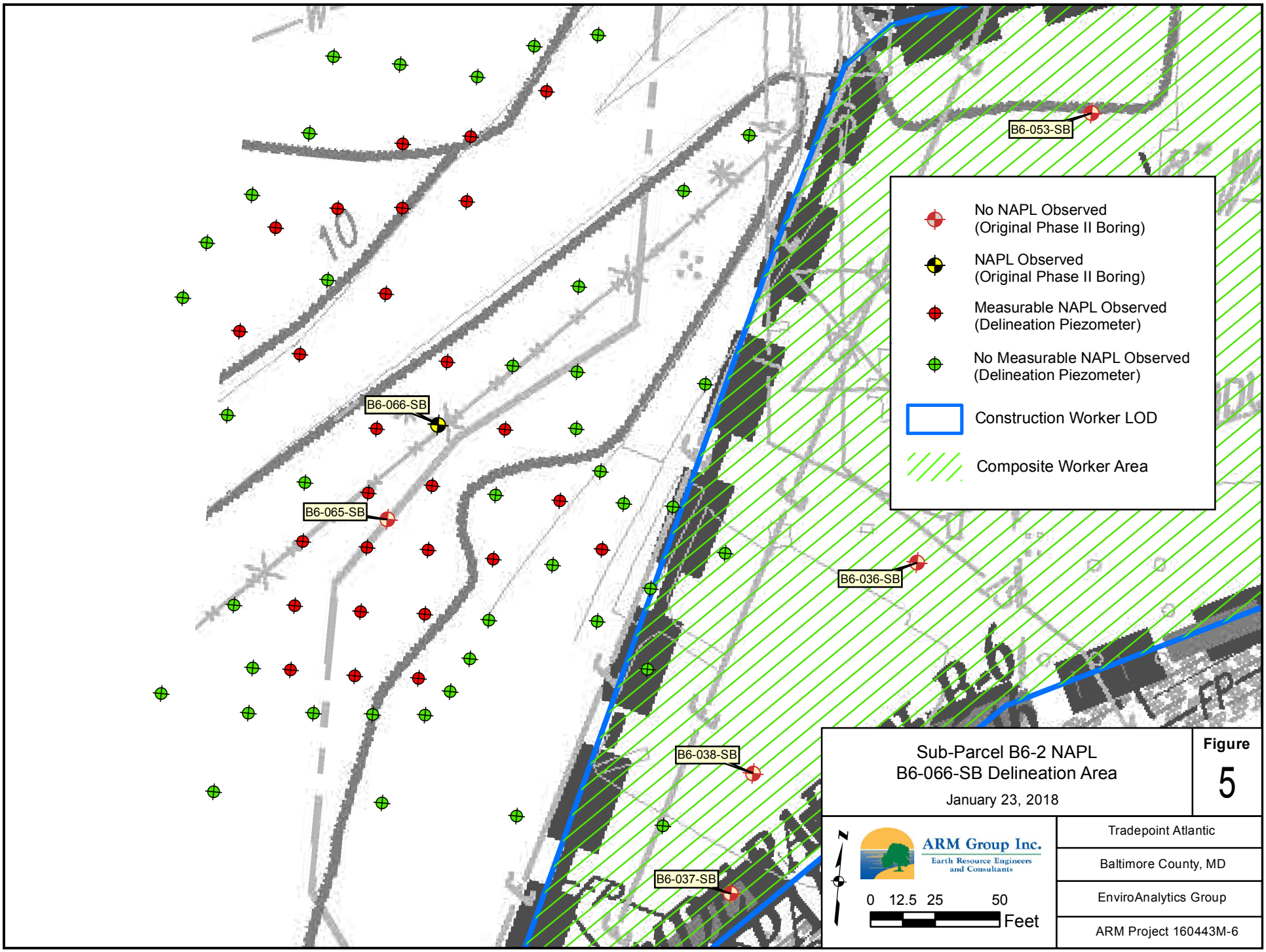
0 150 300 600 Feet

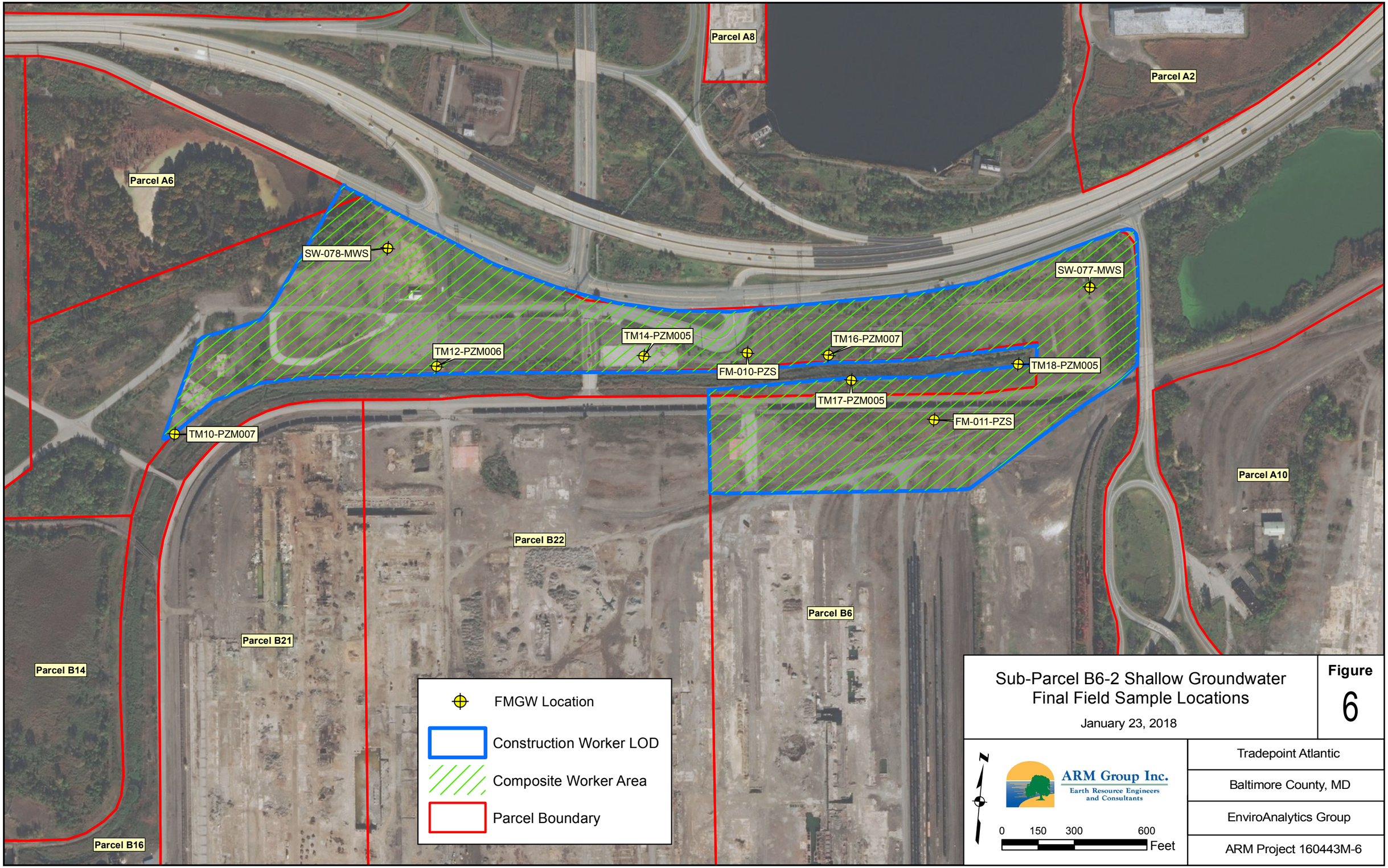
Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6


B6-053-SB
B6-066-SB
B6-065-SB
B6-036-SB
B6-038-SB
B6-037-SB
No NAPL Observed
(Original Phase II Boring)
NAPL Observed
(Original Phase II Boring)
Measurable NAPL Observed
(Delineation Piezometer)
No Measurable NAPL Observed
(Delineation Piezometer)
Construction Worker LOD
Composite Worker Area
Sub-Parcel B6-2 NAPL
B6-066-SB Delineation Area
January 23, 2018
Figure
5
ARM Group Inc.
Earth Resource Engineers and Consultants
0 12.5 25 50
Feet
Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-6



Sub-Parcel B6-2 Shallow Groundwater
Final Field Sample Locations

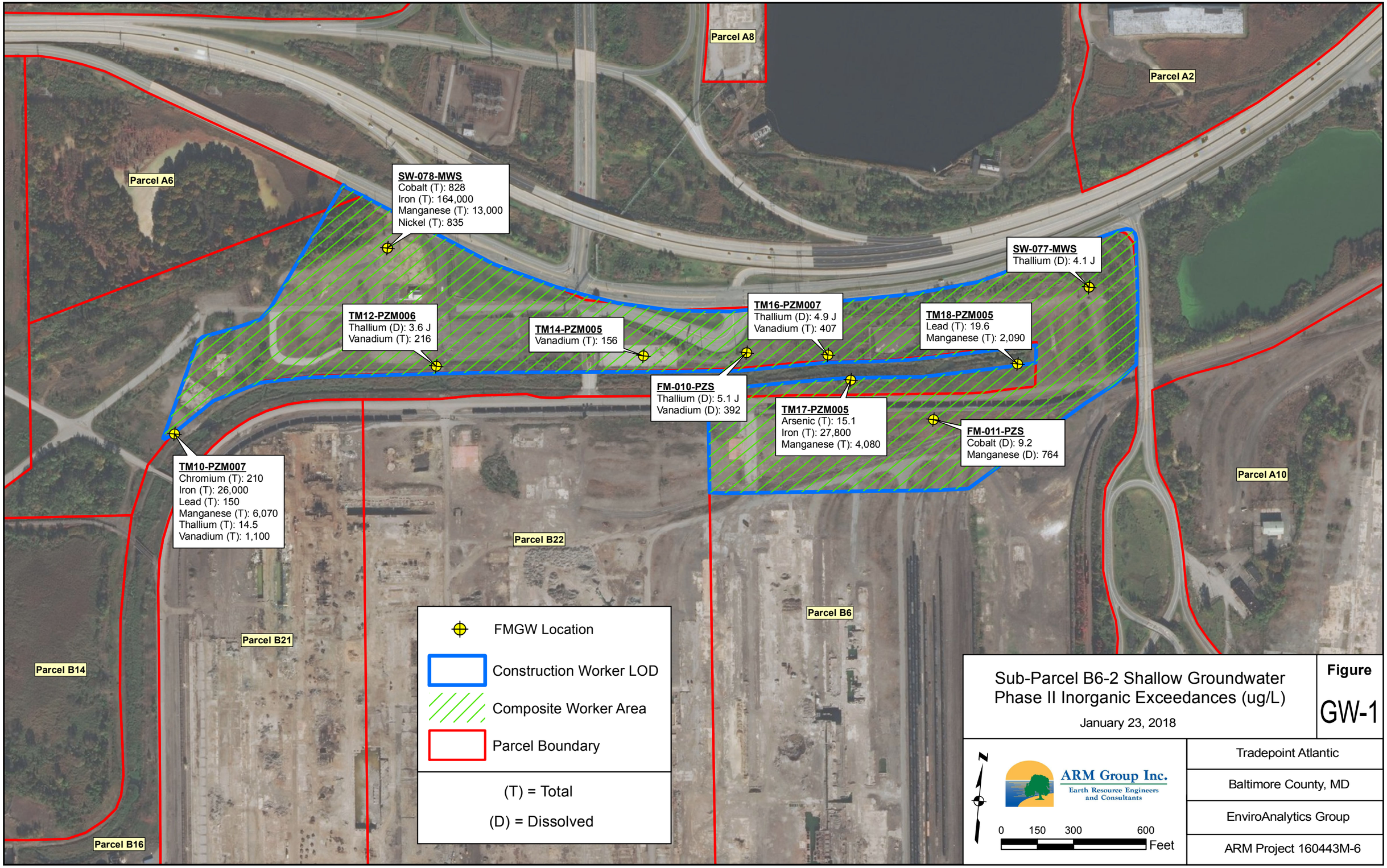
January 23, 2018

Figure
6

ARM Group Inc.
Earth Resource Engineers and Consultants

0 150 300 600 Feet

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-6



Sub-Parcel B6-2 Shallow Groundwater
Phase II Inorganic Exceedances (ug/L)

January 23, 2018

Figure

GW-1

ARM Group Inc.
Earth Resource Engineers and Consultants

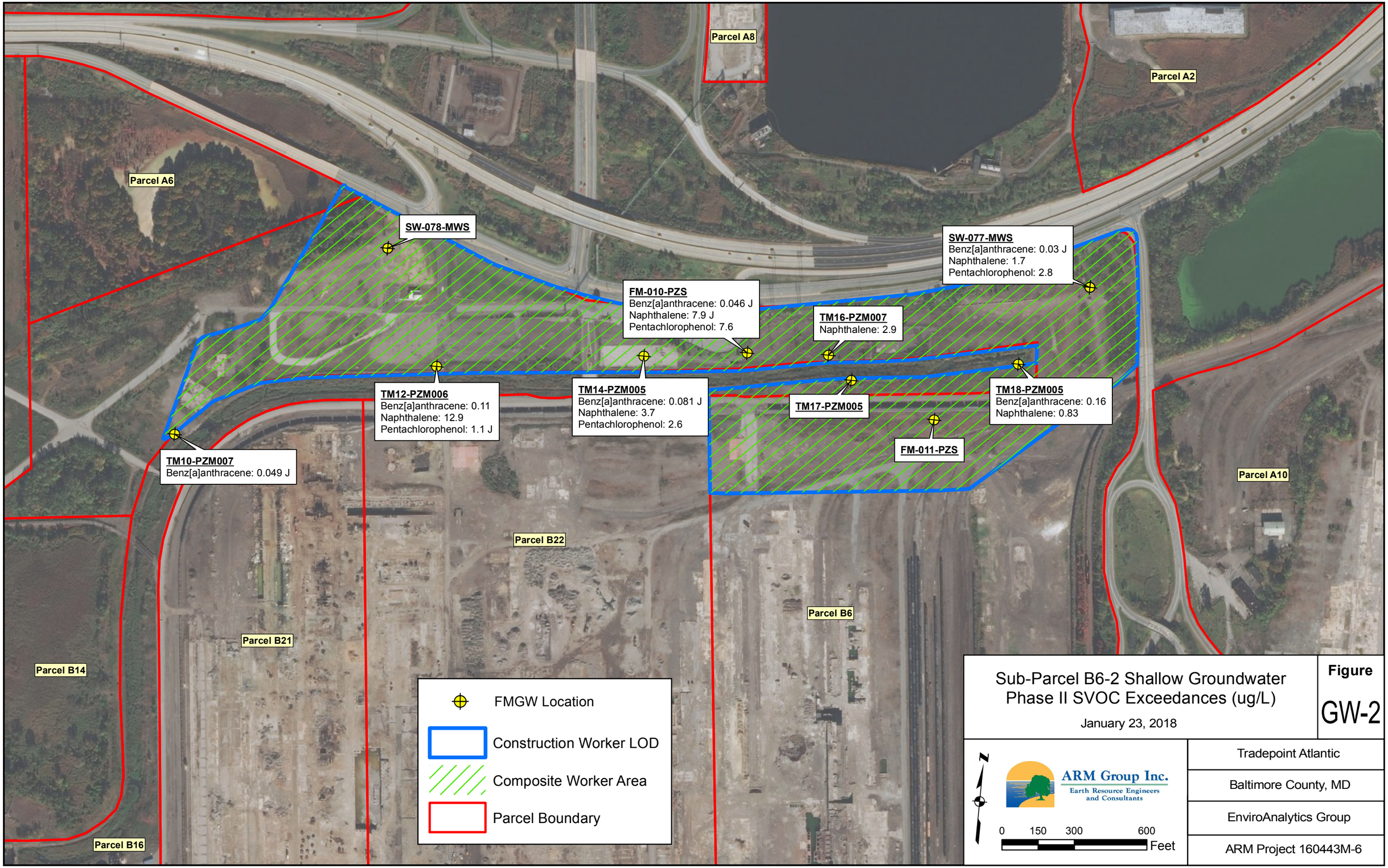
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Shallow Groundwater
Phase II SVOC Exceedances (ug/L)

January 23, 2018

Figure

GW-2

ARM Group Inc.
Earth Resource Engineers and Consultants

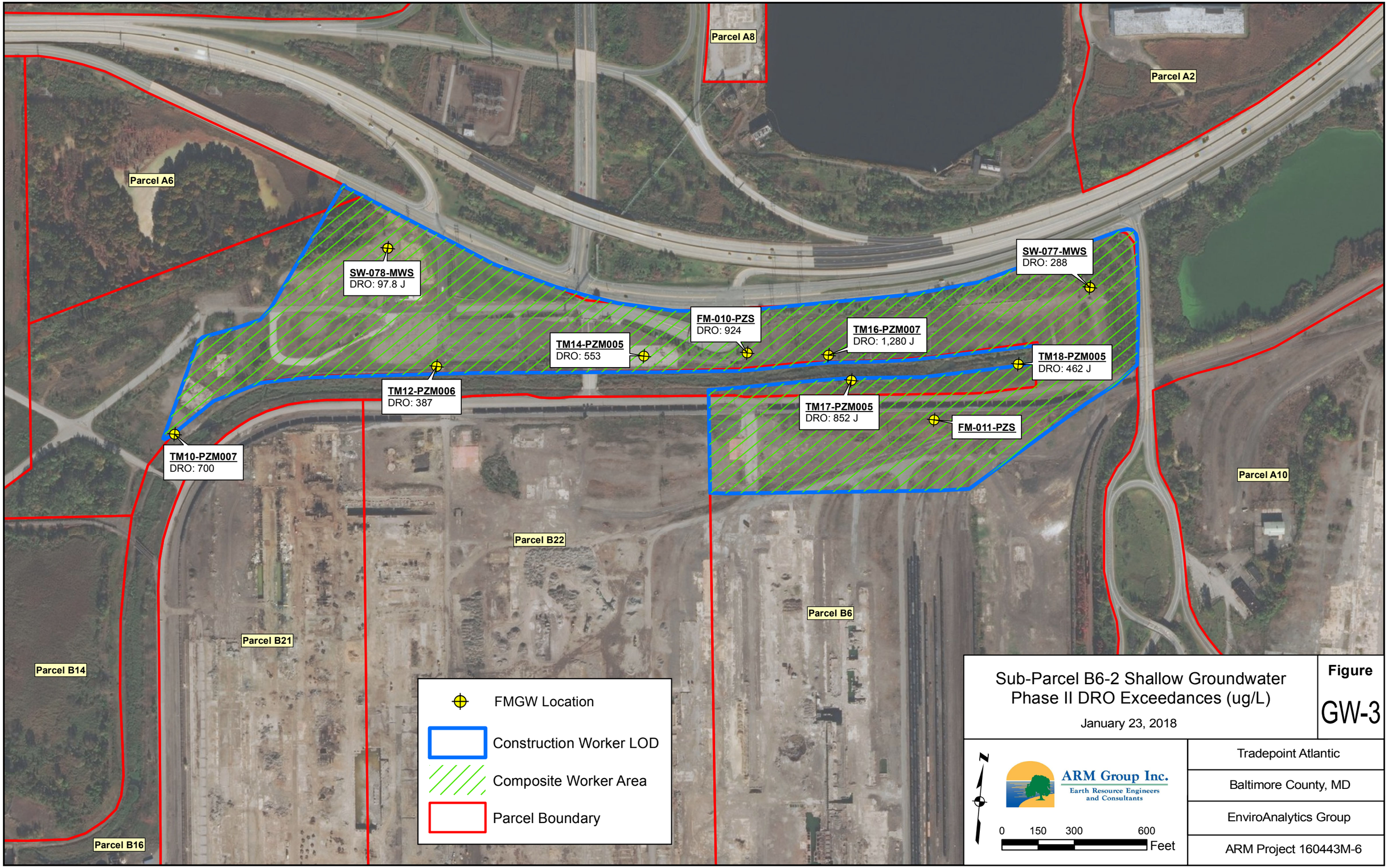
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Shallow Groundwater
Phase II DRO Exceedances (ug/L)

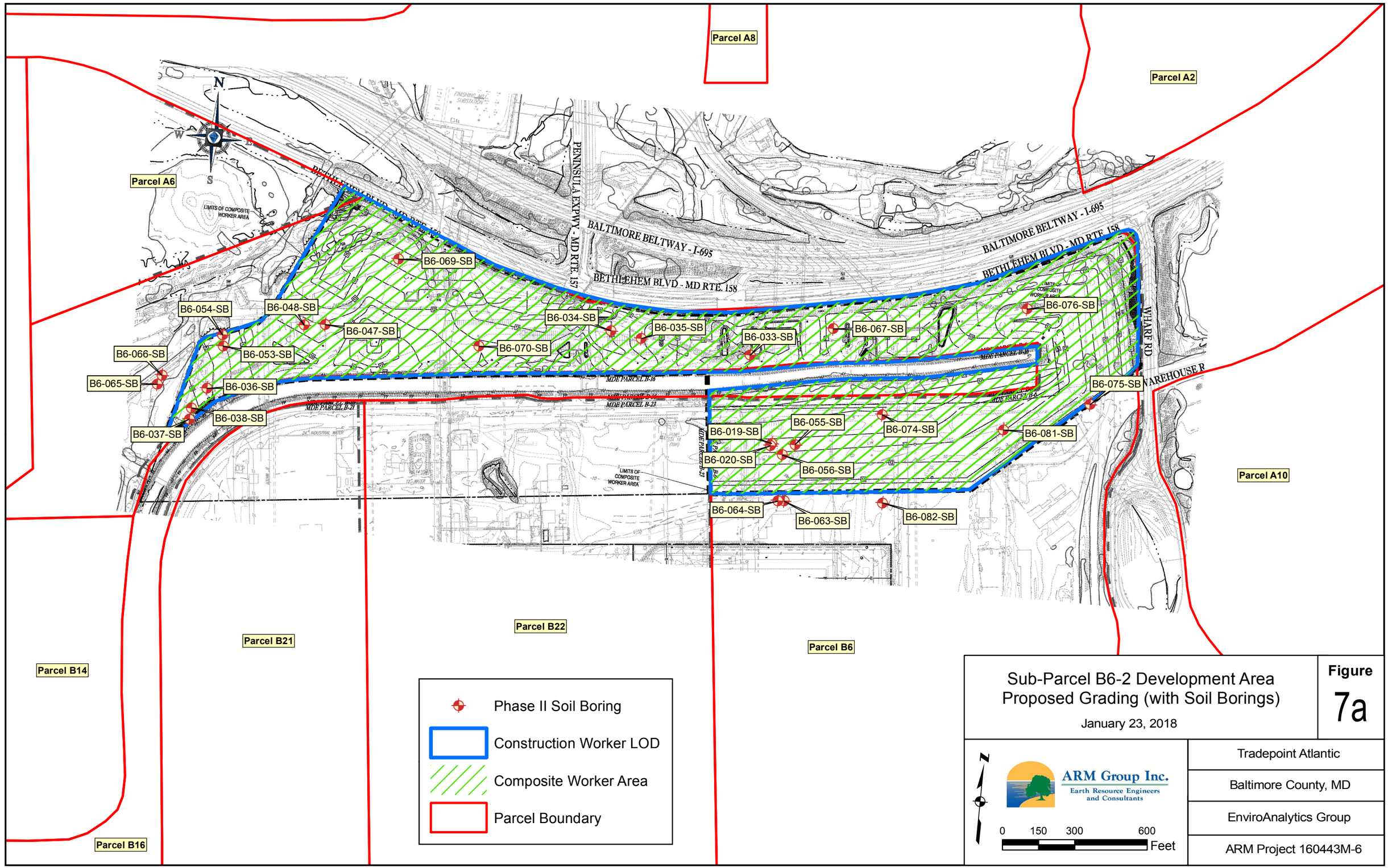
January 23, 2018

Figure

GW-3

ARM Group Inc.
Earth Resource Engineers and Consultants

Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-6



Sub-Parcel B6-2 Development Area
Proposed Grading (with Soil Borings)

January 23, 2018

Figure
7a

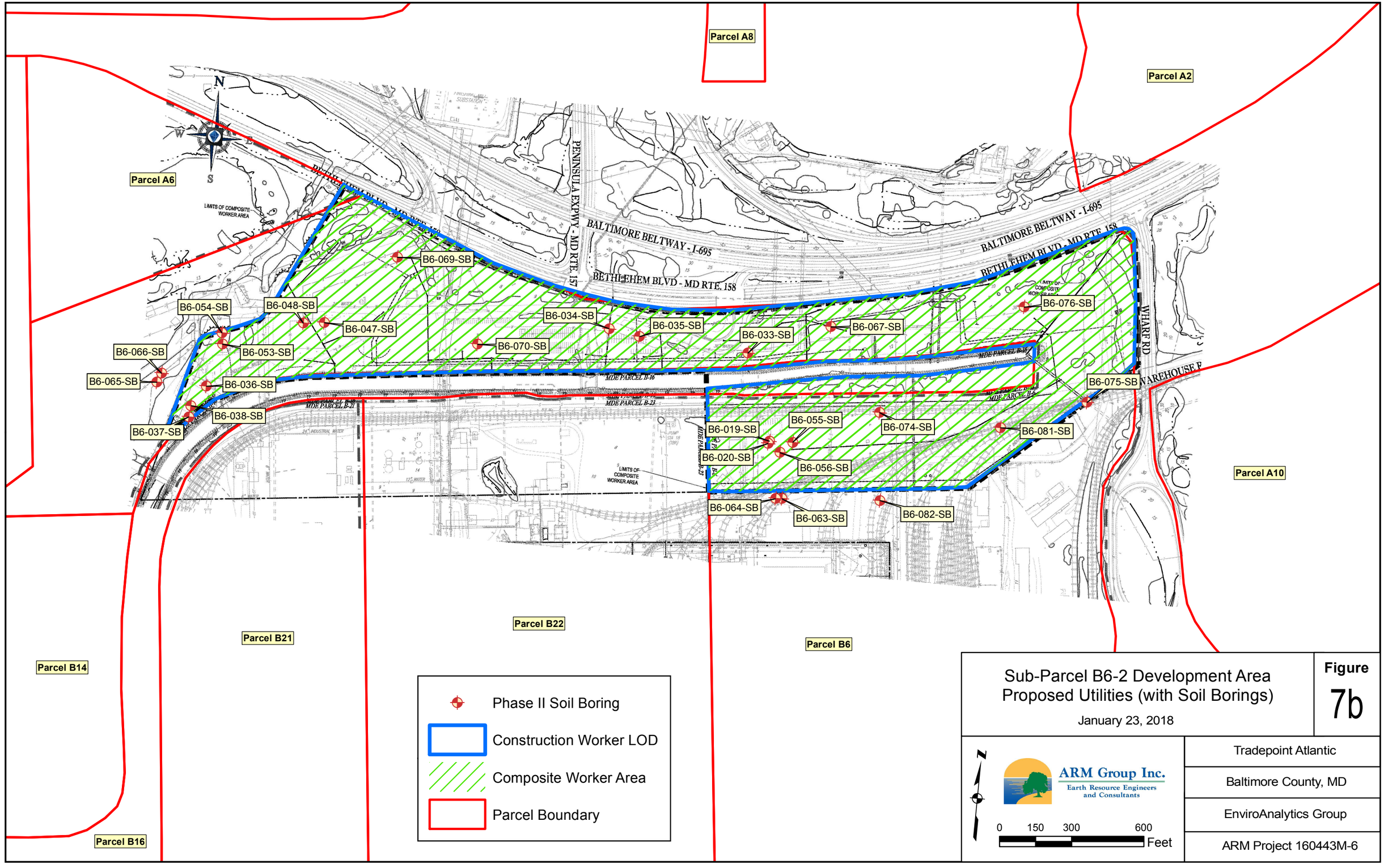
ARM Group Inc.
Earth Resource Engineers and Consultants

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2 Development Area
Proposed Utilities (with Soil Borings)

January 23, 2018

Figure 7b

ARM Group Inc.
Earth Resource Engineers and Consultants

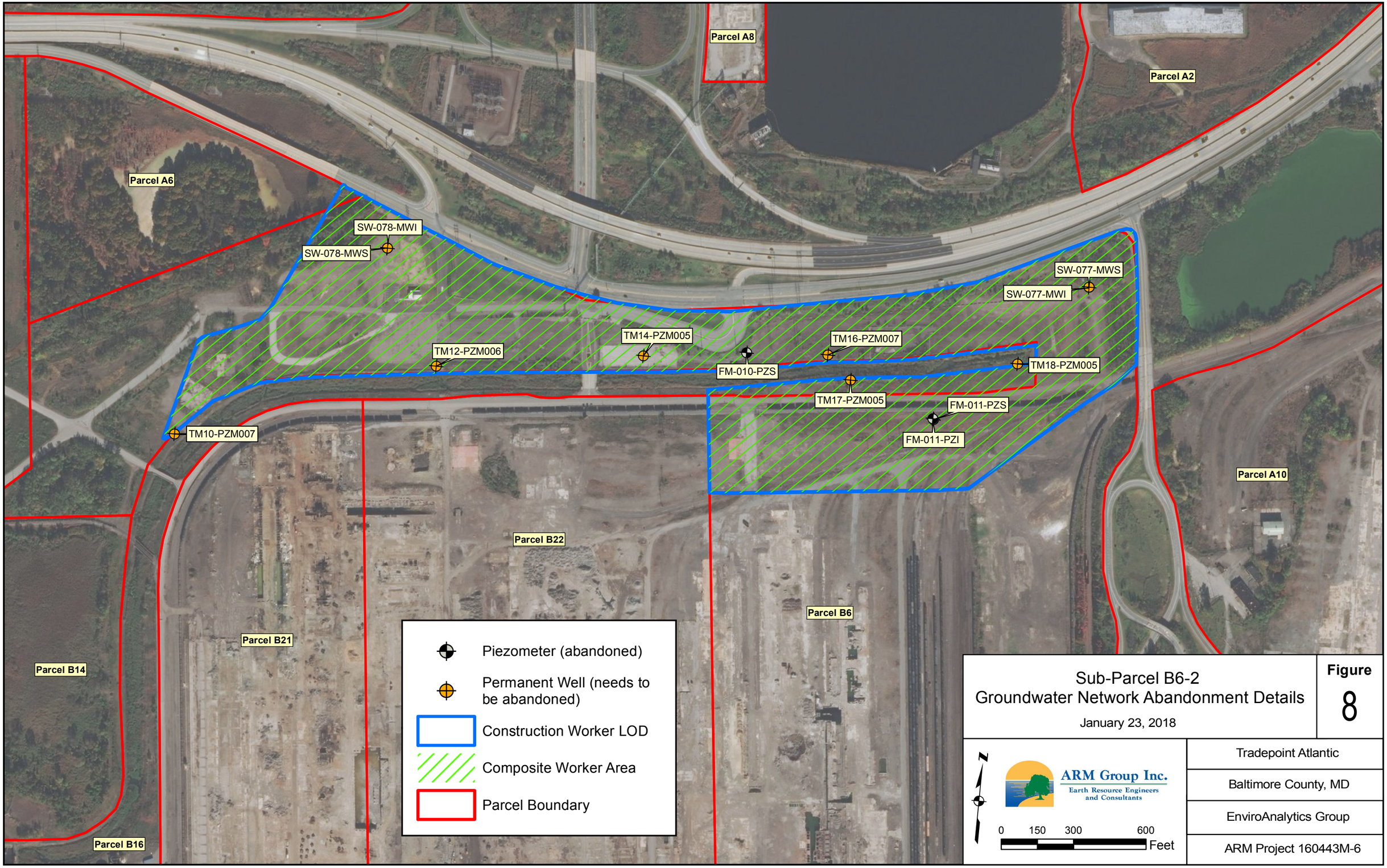
0 150 300 600 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6



Sub-Parcel B6-2
Groundwater Network Abandonment Details

January 23, 2018

Figure
8

ARM Group Inc.
Earth Resource Engineers and Consultants

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-6

TABLES

Table 1 - Sub-Parcel B6-2
Summary of Organics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-019-SB-1*	B6-019-SB-4*	B6-020-SB-1*	B6-020-SB-4*	B6-033-SB-1	B6-033-SB-4	B6-034-SB-1*	B6-034-SB-4*	B6-035-SB-1*	B6-035-SB-4*	B6-036-SB-1*	B6-036-SB-8*	B6-037-SB-1*
Volatile Organic Compounds															
1,2,3-Trichlorobenzene	mg/kg	930	0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
1,2-Dichlorobenzene	mg/kg	9,300	0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	**0.004 J**	0.0049 U	0.0055 U
1,2-Dichloroethene (Total)	mg/kg	2,300	0.0092 U	0.011 U	0.0095 U	0.0096 U	0.012 U	0.011 U	0.012 U	0.01 U	0.011 U	0.01 U	0.011 U	0.0098 U	0.011 U
1,3-Dichlorobenzene	mg/kg		0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
1,4-Dichlorobenzene	mg/kg	11	0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
2-Butanone (MEK)	mg/kg	190,000	**0.0077 J**	**0.003 J**	0.0095 U	**0.0041 J**	0.012 UJ	0.011 UJ	0.012 U	0.01 U	0.011 U	0.01 U	**0.0024 J**	0.0098 U	0.011 U
Acetone	mg/kg	670,000	**0.039**	0.011 U	0.0095 U	**0.011**	0.012 UJ	0.011 UJ	0.012 U	0.011 B	0.011 U	0.0072 B	**0.016**	0.007 B	**0.019**
Benzene	mg/kg	5.1	0.0046 U	**0.0021 J**	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
cis-1,2-Dichloroethene	mg/kg	2,300	0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
Cyclohexane	mg/kg	27,000	0.0092 U	0.011 U	0.0095 U	0.0096 U	0.012 U	0.011 U	0.012 U	0.01 U	0.011 U	0.01 U	0.011 U	0.0098 U	0.011 U
Ethylbenzene	mg/kg	25	**0.00094 J**	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
Isopropylbenzene	mg/kg	9,900	0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
Methyl Acetate	mg/kg	1,200,000	0.046 U	0.053 U	0.047 U	0.048 U	0.061 R	0.054 R	0.061 U	0.051 U	0.056 U	0.052 U	0.055 U	0.049 U	0.055 U
Tetrachloroethene	mg/kg	100	0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	**0.0058**	**0.0041 J**	0.0055 U
Toluene	mg/kg	47,000	0.0046 U	**0.0017 J**	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
Trichloroethene	mg/kg	6	0.0046 U	0.0053 U	0.0047 U	0.0048 U	0.0061 U	0.0054 U	0.0061 U	0.0051 U	0.0056 U	0.0052 U	0.0055 U	0.0049 U	0.0055 U
Xylenes	mg/kg	2,800	**0.0037 J**	0.016 U	0.014 U	0.014 U	0.018 U	0.016 U	0.018 U	0.015 U	0.017 U	0.016 U	0.016 U	0.015 U	0.017 U
Semi-Volatile Organic Compounds^															
1,1-Biphenyl	mg/kg	200	0.071 U	0.071 U	**0.024 J**	0.07 U	0.085 U	**0.031 J**	0.075 U	0.09 U	0.071 U	**0.031 J**	**0.066 J**	0.073 U	0.072 U
2,4-Dimethylphenol	mg/kg	16,000	0.071 U	0.071 U	0.071 U	0.07 U	0.085 U	0.078 U	0.075 U	0.09 U	0.071 U	0.077 U	0.076 U	0.073 U	0.072 U
2-Methylnaphthalene	mg/kg	3,000	0.071 U	**0.018**	**0.052 J**	0.071 U	**0.028**	**0.098**	0.074 U	0.009 U	**0.02 J**	**0.24**	**0.19**	**0.015**	**0.071 J**
2-Methylphenol	mg/kg	41,000	0.071 U	0.071 U	0.071 U	0.07 U	0.085 U	0.078 U	0.075 U	0.09 U	0.071 U	0.077 U	0.076 U	0.073 U	0.072 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	0.14 U	0.14 U	0.14 U	0.14 U	0.17 U	0.16 U	0.15 U	0.18 U	0.14 U	0.15 U	0.15 U	0.15 U	0.14 U
Acenaphthene	mg/kg	45,000	**0.0046 J**	**0.025**	**0.018 J**	**0.039 J**	**0.022**	**0.062**	**0.0068 J**	0.009 U	**0.0062 J**	**0.065 J**	**0.022 J**	**0.0023 J**	**0.011 J**
Acenaphthylene	mg/kg	45,000	0.071 U	**0.012**	**0.035 J**	**0.0066 J**	**0.0033 J**	**0.031**	**0.0063 J**	0.009 U	**0.0065 J**	**0.11**	**0.16**	**0.0046 J**	**0.014 J**
Acetophenone	mg/kg	120,000	0.071 U	0.071 U	0.071 U	0.07 U	0.085 U	0.078 U	0.075 U	0.09 U	0.071 U	**0.023 J**	0.076 U	0.073 U	0.072 U
Anthracene	mg/kg	230,000	**0.024 J**	**0.14**	**0.12**	**0.22**	**0.045**	**0.22**	**0.015 J**	0.009 U	**0.015 J**	**0.31**	**0.12**	**0.011**	**0.048 J**
Benz[a]anthracene	mg/kg	21	**0.093**	**0.71**	**0.31**	**0.76**	**0.19**	**1.1**	**0.025 J**	0.009 U	**0.035 J**	**1**	**0.29**	**0.045**	**0.14**
Benzaldehyde	mg/kg	120,000	0.071 U	0.071 U	**0.019 J**	0.07 U	0.085 UJ	0.078 UJ	0.075 U	0.09 U	0.071 U	**0.02 J**	**0.018 J**	0.073 U	0.072 U
Benzo[a]pyrene	mg/kg	2.1	**0.09**	**0.69**	**0.29**	**0.62**	**0.11**	**0.79**	**0.019 J**	0.009 U	**0.019 J**	**0.97**	**0.36**	**0.054**	**0.14**
Benzo[b]fluoranthene	mg/kg	21	**0.19**	**1**	**0.59**	**1.3**	**0.21**	**1.4**	**0.057 J**	0.009 U	**0.03 J**	**1.4**	**0.58**	**0.086**	**0.27**
Benzo[g,h,i]perylene	mg/kg		**0.082**	**0.39**	**0.2**	**0.29**	**0.035**	**0.28**	**0.015 J**	0.009 U	**0.011 J**	**0.25**	**0.25**	**0.034**	**0.081**
Benzo[k]fluoranthene	mg/kg	210	**0.17**	**0.38**	**0.52**	**1.1**	**0.082**	**0.53**	**0.014 J**	0.009 U	**0.016 J**	**0.46**	**0.27**	**0.04**	**0.27**
bis(2-Ethylhexyl)phthalate	mg/kg	160	**0.12**	0.071 U	0.071 U	**0.41**	0.085 U	0.078 U	0.075 U	0.09 U	**0.026 J**	0.077 U	**0.041 J**	0.073 U	**0.015 J**
Carbazole	mg/kg		0.071 U	**0.062 J**	**0.066 J**	**0.035 J**	**0.4**	**0.092**	0.075 U	0.09 U	0.071 U	**0.16**	**0.041 J**	0.073 U	0.072 U
Chrysene	mg/kg	2,100	**0.11**	**0.63**	**0.27**	**0.7**	**0.21**	**1.1**	**0.063 J**	0.009 U	**0.021 J**	**0.81**	**0.32**	**0.057**	**0.17**
Dibenz[a,h]anthracene	mg/kg	2.1	**0.035 J**	**0.14**	**0.058 J**	**0.099**	**0.014**	**0.12**	0.074 U	0.009 U	0.072 U	**0.11**	**0.077 J**	**0.012**	**0.022 J**
Diethylphthalate	mg/kg	660,000	**0.18**	0.071 U	**2.5**	0.07 U	0.085 U	0.078 U	0.075 U	0.09 U	0.071 U	0.077 U	0.076 U	0.073 U	0.072 U
Di-n-butylphthalate	mg/kg	82,000	0.071 U	0.071 U	0.071 U	0.07 U	0.085 U	0.078 U	0.075 U	0.09 U	0.071 U	0.077 U	0.076 U	0.073 U	0.072 U
Fluoranthene	mg/kg	30,000	**0.13**	**1.3**	**0.6**	**1.3**	**0.74**	**2.9**	**0.02 J**	**0.00078 J**	**0.031 J**	**1.6**	**0.49**	**0.076**	**0.31**
Fluorene	mg/kg	30,000	0.071 U	**0.02**	**0.035 J**	**0.03 J**	**0.011**	**0.08**	**0.013 J**	0.009 U	**0.012 J**	**0.059 J**	**0.019 J**	**0.0017 J**	**0.019 J**
Hexachloroethane	mg/kg	8	0.071 U	0.071 U	0.071 U	0.07 U	0.085 U	0.078 U	0.075 U	0.09 U	0.071 U	0.077 U	0.076 U	0.073 U	0.072 U
Indeno[1,2,3-c,d]pyrene	mg/kg	21	**0.056 J**	**0.37**	**0.17**	**0.26**	**0.038**	**0.29**	0.074 U	0.009 U	**0.012 J**	**0.29**	**0.23**	**0.032**	**0.074**
Naphthalene	mg/kg	17	0.071 U	**0.029**	**0.095**	**0.021 J**	**0.057**	**0.83**	0.074 U	0.009 U	0.072 U	**0.33**	**0.88**	**0.048**	**0.067 J**
Phenanthrene	mg/kg		**0.05 J**	**0.47**	**0.46**	**0.61**	**0.34**	**0.85**	**0.034 J**	**0.0008 J**	**0.03 J**	**0.78**	**0.43**	**0.054**	**0.19**
Phenol	mg/kg	250,000	0.071 U	0.071 U	0.071 U	0.07 U	0.085 U	0.078 U	0.075 U	0.09 U	0.071 U	0.077 U	**0.14**	0.073 U	0.072 U
Pyrene	mg/kg	23,000	**0.12**	**1.1**	**0.46**	**1**	**0.58**	**2.6**	**0.04 J**	0.009 U	**0.029 J**	**1.3**	**0.42**	**0.062**	**0.31**
PCBs															
Aroclor 1242	mg/kg	0.97	0.0547 U	N/A	0.0532 U	N/A	0.0591 U	N/A	0.0553 U	N/A	0.0542 U	N/A	**0.054 J**	N/A	0.0578 U
Aroclor 1254	mg/kg	0.97	**0.0756**	N/A	0.0532 U	N/A	0.0591 U	N/A	0.0553 U	N/A	0.0542 U	N/A	0.056 U	N/A	0.0578 U
Aroclor 1260	mg/kg	0.99	0.0547 U	N/A	0.0532 U	N/A	0.0591 U	N/A	0.0553 U	N/A	0.0542 U	N/A	**0.0842**	N/A	0.0578 U
Aroclor 1262	mg/kg		**0.0559**	N/A	**0.0453 J**	N/A	0.0591 U	N/A	0.0553 U	N/A	0.0542 U	N/A	0.056 U	N/A	0.0578 U
Aroclor 1268	mg/kg		0.0547 U	N/A	0.0532 U	N/A	0.0591 U	N/A	0.0553 U	N/A	0.0542 U	N/A	0.056 U	N/A	0.0578 U
PCBs (total)	mg/kg	0.97	**0.1315**	N/A	**0.0453 J**	N/A	0.0591 U	N/A	0.0553 U	N/A	0.0542 U	N/A	**0.1382**	N/A	0.0578 U
TPH															
Diesel Range Organics	mg/kg	6,200	**67**	**50.6**	**96.2**	**367**	**28 J**	**313 J**	**227**	8.9 U	**80.8**	**231**	**200**	**35.4**	**65.3**
Gasoline Range Organics	mg/kg	6,200	9.8 U	11.1 U	10.5 U	10.4 U	15.6 U	14.2 U	12.1 U	10.8 U	10.8 U	11.7 U	11 U	9 U	9.8 U

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

J: The positive result reported for this analyte is a quantitative estimate.
B: The compound/analyte was not detected substantially above the level of the associated method blank/preparation or field blank.
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.
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 - Sub-Parcel B6-2
Summary of Organics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-037-SB-5*	B6-038-SB-1*	B6-038-SB-4*	B6-047-SB-1*	B6-047-SB-6*	B6-048-SB-1*	B6-048-SB-8*	B6-053-SB-1*	B6-053-SB-4*	B6-054-SB-1*	B6-054-SB-4*	B6-055-SB-1*	B6-055-SB-7*
Volatile Organic Compounds															
1,2,3-Trichlorobenzene	mg/kg	930	0.0056 U	0.0068 U	0.0049 U	0.0047 U	0.0059 U	0.0052 U	**0.0031 J**	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
1,2-Dichlorobenzene	mg/kg	9,300	0.0056 U	**0.013**	**0.0029 J**	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
1,2-Dichloroethene (Total)	mg/kg	2,300	0.011 U	0.014 U	**0.005 J**	0.0095 U	0.012 U	0.01 U	0.013 U	0.01 U	0.011 U	0.012 U	0.77 U	0.0092 U	0.01 U
1,3-Dichlorobenzene	mg/kg		0.0056 U	0.0068 U	0.0049 U	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
1,4-Dichlorobenzene	mg/kg	11	0.0056 U	0.0068 U	0.0049 U	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
2-Butanone (MEK)	mg/kg	190,000	**0.0043 J**	0.014 U	0.0099 U	0.0095 U	0.012 U	0.01 U	**0.0068 J**	0.01 U	0.011 U	0.012 U	0.77 U	0.0092 U	0.01 U
Acetone	mg/kg	670,000	**0.026**	**0.017**	0.0056 B	0.0084 B	0.0097 B	0.0078 B	**0.032**	0.01 U	**0.0068 J**	**0.0066 J**	0.77 U	0.0092 U	0.01 U
Benzene	mg/kg	5.1	**0.0072**	0.0068 U	0.0049 U	0.0047 U	**0.0016 J**	**0.0025 J**	0.0066 U	0.0051 U	**0.0056**	0.0062 U	0.38 U	0.0046 U	**0.0015 J**
cis-1,2-Dichloroethene	mg/kg	2,300	0.0056 U	0.0068 U	**0.0045 J**	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
Cyclohexane	mg/kg	27,000	0.011 U	0.014 U	0.0099 U	0.0095 U	0.012 U	0.01 U	0.013 U	0.01 U	0.011 U	0.012 U	0.77 U	0.0092 U	0.01 U
Ethylbenzene	mg/kg	25	0.0056 U	0.0068 U	0.0049 U	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
Isopropylbenzene	mg/kg	9,900	0.0056 U	0.0068 U	0.0049 U	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
Methyl Acetate	mg/kg	1,200,000	0.056 U	0.068 U	0.049 U	0.047 U	0.059 U	0.052 U	0.066 U	0.051 U	0.056 U	0.062 U	**0.46 J**	0.046 U	0.052 U
Tetrachloroethene	mg/kg	100	0.0056 U	**0.011**	**0.0074**	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
Toluene	mg/kg	47,000	**0.0019 J**	0.0068 U	0.0049 U	0.0047 U	**0.0019 J**	**0.0028 J**	0.0066 U	0.0051 U	**0.0047 J**	0.0062 U	0.38 U	0.0046 U	0.0052 U
Trichloroethene	mg/kg	6	0.0056 U	0.0068 U	**0.0042 J**	0.0047 U	0.0059 U	0.0052 U	0.0066 U	0.0051 U	0.0056 U	0.0062 U	0.38 U	0.0046 U	0.0052 U
Xylenes	mg/kg	2,800	**0.0063 J**	**0.0047 J**	0.015 U	0.014 U	0.018 U	0.015 U	0.02 U	0.015 U	0.017 U	0.019 U	1.1 U	0.014 U	0.016 U
Semi-Volatile Organic Compounds^															
1,1-Biphenyl	mg/kg	200	**0.092 J**	0.082 U	**0.18**	**0.02 J**	0.076 U	**0.033 J**	**0.97**	**0.036 J**	**0.095**	0.076 U	0.78 U	0.071 U	**0.031 J**
2,4-Dimethylphenol	mg/kg	16,000	0.37 U	**0.021 J**	0.079 U	0.072 U	0.076 U	0.075 U	**0.021 J**	0.074 U	**0.015 J**	0.076 U	0.78 U	0.071 U	0.081 U
2-Methylnaphthalene	mg/kg	3,000	**6.6**	**0.064 J**	**2.2**	**0.18**	**0.035 J**	**0.41**	**0.7**	**0.14**	**0.29**	**0.0023 J**	**1.2**	0.073 U	**0.057**
2-Methylphenol	mg/kg	41,000	0.37 U	0.082 U	0.079 U	0.072 U	0.076 U	0.075 U	0.1 U	0.074 U	**0.018 J**	0.076 U	0.78 U	0.071 U	0.081 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	**0.59 J**	0.16 U	**0.021 J**	0.14 U	0.15 U	0.15 U	**0.047 J**	0.15 U	**0.054 J**	0.15 U	1.6 U	0.14 U	0.16 U
Acenaphthene	mg/kg	45,000	**0.86**	0.084 U	**0.71**	**0.013 J**	**0.018 J**	**0.01**	**0.024**	**0.0099 J**	**0.06 J**	0.0075 U	**0.44**	0.073 U	**0.027**
Acenaphthylene	mg/kg	45,000	**2.3**	**0.13**	0.08 U	**0.018 J**	**0.057 J**	**0.017**	**0.049**	**0.24**	**0.62**	0.0075 U	**0.14**	**0.0063 J**	**0.088**
Acetophenone	mg/kg	120,000	0.37 U	0.082 U	0.079 U	**0.025 J**	0.076 U	**0.018 J**	**0.085 J**	0.074 U	**0.029 J**	0.076 U	0.78 U	0.071 U	0.081 U
Anthracene	mg/kg	230,000	**2.6**	**0.04 J**	**2**	**0.038 J**	**0.28**	**0.043**	**0.9**	**0.18**	**0.87**	**0.0015 J**	0.079 U	**0.016 J**	**0.17**
Benz[a]anthracene	mg/kg	21	**6.6**	**0.025 J**	**3.1**	**0.087**	**1.5**	**0.16**	**0.42**	**0.57**	**2.1**	0.0075 U	**0.03 J**	**0.088**	**0.64**
Benzaldehyde	mg/kg	120,000	0.37 U	**0.035 J**	**0.23**	**0.034 J**	0.076 U	**0.032 J**	**0.067 J**	**0.026 J**	**0.037 J**	0.076 U	0.78 U	0.071 U	0.081 U
Benzo[a]pyrene	mg/kg	2.1	**8**	**0.02 J**	**2.8**	**0.086**	**1**	**0.22**	**0.22**	**0.67**	**1.7**	0.0075 U	**0.024 J**	**0.088**	**0.72**
Benzo[b]fluoranthene	mg/kg	21	**20**	**0.028 J**	**6.2**	**0.1**	**1.5**	**0.24**	**0.54**	**0.99**	**2.6**	**0.0013 J**	**0.034 J**	**0.18**	**1.4**
Benzo[g,h,i]perylene	mg/kg		**3.6**	**0.13**	**1.2**	**0.063 J**	**0.42**	**0.14**	**0.079**	**0.33**	**0.76**	0.0075 U	0.079 U	**0.054 J**	**0.32**
Benzo[k]fluoranthene	mg/kg	210	**20.3**	**0.029 J**	**6.2**	**0.045 J**	**0.48**	**0.083**	**0.49**	**0.47**	**1.4**	**0.0013 J**	**0.034 J**	**0.16**	**1.2**
bis(2-Ethylhexyl)phthalate	mg/kg	160	**0.68**	**0.18**	**0.32**	**0.033 J**	0.076 U	0.075 U	0.1 U	**0.031 J**	**0.034 J**	0.076 U	0.78 U	0.071 U	0.081 U
Carbazole	mg/kg		0.37 U	0.082 U	**0.13**	0.072 U	**0.12**	**0.026 J**	0.1 U	**0.091**	**0.26**	0.076 U	0.78 U	0.071 U	**0.12**
Chrysene	mg/kg	2,100	**7**	**0.013 J**	**3.2**	**0.088**	**1.1**	**0.16**	**0.55**	**0.58**	**1.9**	**0.00069 J**	**0.087**	**0.085**	**0.6**
Dibenz[a,h]anthracene	mg/kg	2.1	**0.89**	0.084 U	**0.48**	**0.023 J**	**0.2**	**0.048**	**0.037**	**0.12**	**0.32**	0.0075 U	0.079 U	**0.024 J**	**0.12**
Diethylphthalate	mg/kg	660,000	0.37 U	0.082 U	0.079 U	**0.019 J**	0.076 U	0.075 U	0.1 U	0.074 U	0.072 U	0.076 U	0.78 U	0.071 U	0.081 U
Di-n-butylphthalate	mg/kg	82,000	0.37 U	**0.024 J**	0.079 U	0.072 U	0.076 U	0.075 U	0.1 U	0.074 U	0.072 U	**0.022 J**	0.78 U	0.071 U	0.081 U
Fluoranthene	mg/kg	30,000	**7.2**	**0.015 J**	**8**	**0.11**	**1.9**	**0.21**	**1.2**	**0.74**	**3.7**	**0.001 J**	**0.044 J**	**0.11**	**1.1**
Fluorene	mg/kg	30,000	**1.5**	**0.011 J**	**1.1**	**0.017 J**	**0.024 J**	**0.0095**	**0.46**	**0.027 J**	**0.31**	0.0075 U	**0.64**	0.073 U	**0.071**
Hexachloroethane	mg/kg	8	0.37 U	0.082 U	0.079 U	0.072 U	0.076 U	0.075 U	0.1 U	0.074 U	0.072 U	0.076 U	0.78 U	0.071 U	0.081 U
Indeno[1,2,3-c,d]pyrene	mg/kg	21	**3.1**	**0.013 J**	**1.3**	**0.047 J**	**0.46**	**0.13**	**0.076**	**0.33**	**0.82**	0.0075 U	0.079 U	**0.045 J**	**0.32**
Naphthalene	mg/kg	17	**3.5**	**0.082 J**	**6.6**	**0.15**	**0.042 J**	**0.37**	**0.69**	**0.48**	**1.1**	**0.0024 J**	**0.19**	0.073 U	**0.4**
Phenanthrene	mg/kg		**5.2**	**0.046 J**	**8.7**	**0.13**	**0.92**	**0.2**	**1.5**	**0.36**	**2.4**	**0.003 J**	**1.3**	**0.043 J**	**0.45**
Phenol	mg/kg	250,000	0.37 U	**0.035 J**	**0.021 J**	0.072 U	0.076 U	0.075 U	**0.03 J**	**0.018 J**	**0.056 J**	0.076 U	0.78 U	0.071 U	0.081 U
Pyrene	mg/kg	23,000	**9.8**	**0.029 J**	**6.3**	**0.09**	**1.4**	**0.17**	**1.1**	**0.59**	**3**	**0.0091**	**1.7**	**0.092**	**1**
PCBs															
Aroclor 1242	mg/kg	0.97	N/A	0.0581 U	N/A	0.0556 U	N/A	**0.162**	N/A	0.055 U	N/A	0.054 U	N/A	0.0557 U	N/A
Aroclor 1254	mg/kg	0.97	N/A	0.0581 U	N/A	0.0556 U	N/A	0.0548 U	N/A	0.055 U	N/A	0.054 U	N/A	**0.0407 J**	N/A
Aroclor 1260	mg/kg	0.99	N/A	**0.163**	N/A	0.0556 U	N/A	0.0548 U	N/A	0.055 U	N/A	0.054 U	N/A	0.0557 U	N/A
Aroclor 1262	mg/kg		N/A	0.0581 U	N/A	0.0556 U	N/A	0.0548 U	N/A	0.055 U	N/A	0.054 U	N/A	0.0557 U	N/A
Aroclor 1268	mg/kg		N/A	0.0581 U	N/A	0.0556 U	N/A	0.0548 U	N/A	0.055 U	N/A	0.054 U	N/A	**0.101**	N/A
PCBs (total)	mg/kg	0.97	N/A	**0.163**	N/A	0.0556 U	N/A	**0.162**	N/A	0.055 U	N/A	0.054 U	N/A	**0.1417**	N/A
TPH															
Diesel Range Organics	mg/kg	6,200	**2,790**	**468**	**899**	**196**	**97.3**	**938**	**5,240**	**146**	**183**	**124**	**6,840**	**20.3**	**100**
Gasoline Range Organics	mg/kg	6,200	10.8 U	11.7 U	12.2 U	10 U	11.6 U	13 U	14.3 U	11.9 U	**12.8 J**	12.4 U	**67.2**	10.5 U	9.8 U

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

J: The positive result reported for this analyte is a quantitative estimate.
B: The compound/analyte was not detected substantially above the level of the associated method blank/preparation or field blank.
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.
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 - Sub-Parcel B6-2
Summary of Organics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-056-SB-1	B6-056-SB-8	B6-063-SB-1	B6-063-SB-9	B6-064-SB-1	B6-064-SB-8	B6-065-SB-1*	B6-065-SB-4*	B6-066-SB-1*	B6-066-SB-5*	B6-067-SB-1	B6-067-SB-5	B6-069-SB-1*
Volatile Organic Compounds															
1,2,3-Trichlorobenzene	mg/kg	930	0.0046 U	0.0067 UJ	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	0.25 U	0.0051 U	0.0059 U	0.0045 U
1,2-Dichlorobenzene	mg/kg	9,300	0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	**0.53**	0.0051 U	0.0059 U	0.0045 U
1,2-Dichloroethene (Total)	mg/kg	2,300	0.0092 U	0.013 U	0.014 U	0.01 U	0.011 U	0.011 U	0.013 U	0.012 U	0.0099 U	0.5 U	0.01 U	0.012 U	0.009 U
1,3-Dichlorobenzene	mg/kg		0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	**0.11 J**	0.0051 U	0.0059 U	0.0045 U
1,4-Dichlorobenzene	mg/kg	11	0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	**0.5**	0.0051 U	0.0059 U	0.0045 U
2-Butanone (MEK)	mg/kg	190,000	0.0092 U	0.013 U	0.014 U	0.01 U	0.011 U	0.011 U	0.013 U	0.012 U	0.0099 U	0.5 U	0.01 UJ	0.012 UJ	0.009 U
Acetone	mg/kg	670,000	0.0092 UJ	**0.01 J**	0.014 UJ	0.01 UJ	0.011 UJ	0.011 UJ	0.013 U	0.012 U	0.0099 U	0.35 B	0.01 UJ	0.012 UJ	0.0077 B
Benzene	mg/kg	5.1	0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	0.25 U	0.0051 U	0.0059 U	0.0045 U
cis-1,2-Dichloroethene	mg/kg	2,300	0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	0.25 U	0.0051 U	0.0059 U	0.0045 U
Cyclohexane	mg/kg	27,000	0.0092 U	**0.007 J**	0.014 U	0.01 U	0.011 U	0.011 U	0.013 U	0.012 U	0.0099 U	**0.38 J**	0.01 U	0.012 U	0.009 U
Ethylbenzene	mg/kg	25	0.0046 U	**0.015**	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	**0.14 J**	0.0051 U	**0.0013 J**	0.0045 U
Isopropylbenzene	mg/kg	9,900	0.0046 U	**0.055**	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	**0.95**	0.0051 U	0.0059 U	0.0045 U
Methyl Acetate	mg/kg	1,200,000	0.046 U	0.067 U	0.068 U	0.05 U	0.055 U	0.053 U	0.065 U	0.06 U	0.049 U	2.5 U	0.051 R	0.059 R	0.045 U
Tetrachloroethene	mg/kg	100	0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	0.25 U	0.0051 U	0.0059 U	0.0045 U
Toluene	mg/kg	47,000	0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	0.25 U	0.0051 U	**0.0025 J**	0.0045 U
Trichloroethene	mg/kg	6	0.0046 U	0.0067 U	0.0068 U	0.005 U	0.0055 U	0.0053 U	0.0065 U	0.006 U	0.0049 U	0.25 U	0.0051 U	0.0059 U	0.0045 U
Xylenes	mg/kg	2,800	0.014 U	**0.039**	0.021 U	**0.0029 J**	0.016 U	0.016 U	0.02 U	0.018 U	0.015 U	**1.3**	0.015 U	**0.0062 J**	0.013 U
Semi-Volatile Organic Compounds^															
1,1-Biphenyl	mg/kg	200	0.072 U	**0.039 J**	0.073 U	0.082 U	0.076 U	0.084 U	0.08 U	**0.02 J**	**0.024 J**	**6.4**	0.074 U	0.078 U	0.077 U
2,4-Dimethylphenol	mg/kg	16,000	0.072 UJ	0.083 U	0.073 U	0.082 U	0.076 R	0.084 U	0.08 U	0.081 U	0.074 U	0.76 U	0.074 U	0.078 U	0.077 U
2-Methylnaphthalene	mg/kg	3,000	0.071 U	**0.081**	0.074 U	**0.14**	0.077 U	**0.014**	**0.1**	**0.16**	**0.063 J**	**8.1**	**0.027**	**0.043 J**	**0.0061 J**
2-Methylphenol	mg/kg	41,000	0.072 UJ	0.083 U	0.073 U	0.082 U	0.076 R	0.084 U	0.08 U	0.081 U	0.074 U	0.076 U	0.074 U	0.078 U	0.077 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	0.14 UJ	0.17 U	0.15 U	0.16 U	0.15 R	0.17 U	0.16 U	0.16 U	0.15 U	**0.24**	0.15 U	0.15 U	0.15 U
Acenaphthene	mg/kg	45,000	0.071 U	**0.25**	0.074 U	**0.032**	**0.014 J**	**0.026 J**	**0.019 J**	**0.019 J**	0.15 U	**8.1**	**0.02**	**0.033 J**	**0.0017 J**
Acenaphthylene	mg/kg	45,000	**0.0097 J**	**0.11**	0.074 U	**0.085**	**0.038 J**	**0.0023 J**	**0.047 J**	**0.073 J**	**0.12 J**	**2.4**	**0.0065 J**	**0.022 J**	**0.0095**
Acetophenone	mg/kg	120,000	0.072 U	0.083 U	0.073 U	0.082 U	0.076 U	0.084 U	0.08 U	0.081 U	0.074 U	0.76 U	0.074 U	0.078 U	0.077 U
Anthracene	mg/kg	230,000	**0.013 J**	**0.57**	**0.0075 J**	**0.19**	**0.032 J**	**0.037 J**	**0.094**	**0.14**	**0.054 J**	**9**	**0.074**	**0.098**	**0.015**
Benz[a]anthracene	mg/kg	21	**0.056 J**	**0.8**	**0.034 J**	**0.21**	**0.38**	**0.047 J**	**0.35**	**0.49**	**0.22**	**5.8**	**0.16 J**	**0.42**	**0.12**
Benzaldehyde	mg/kg	120,000	0.072 U	0.083 U	0.073 U	0.082 U	0.076 U	0.084 U	0.08 U	**0.03 J**	**0.024 J**	0.076 U	0.074 UJ	0.078 UJ	0.077 U
Benzo[a]pyrene	mg/kg	2.1	**0.057 J**	**0.73**	**0.018 J**	**0.17**	**0.31**	**0.039 J**	**0.34**	**0.49**	**0.35**	**5.1**	**0.13 J**	**0.46**	**0.07**
Benzo[b]fluoranthene	mg/kg	21	**0.17**	**1.5**	**0.04 J**	**0.24**	**0.68**	**0.058 J**	**0.66**	**0.98**	**0.55**	**9.9**	**0.24 J**	**0.73**	**0.12**
Benzo[g,h,i]perylene	mg/kg		**0.055 J**	**0.26**	**0.02 J**	**0.088**	**0.24**	**0.021 J**	**0.1**	**0.13**	**0.4**	**1.8**	**0.068**	**0.24**	**0.042**
Benzo[k]fluoranthene	mg/kg	210	**0.17**	**1.3**	**0.015 J**	**0.12**	**0.27**	**0.024 J**	**0.6**	**0.9**	**0.48**	**8.6**	**0.091 J**	**0.29**	**0.044**
bis(2-Ethylhexyl)phthalate	mg/kg	160	0.022 B	0.083 UJ	0.073 UJ	0.082 U	0.076 UJ	0.084 U	0.08 U	0.081 U	**0.23**	**4**	0.074 U	0.023 B	0.077 U
Carbazole	mg/kg		0.072 U	**0.03 J**	0.073 U	**0.071 J**	0.076 U	0.084 U	0.08 U	**0.032 J**	0.074 U	**0.42 J**	**0.043 J**	**0.038 J**	0.077 U
Chrysene	mg/kg	2,100	**0.097**	**0.76**	**0.027 J**	**0.2**	**0.55**	**0.046 J**	**0.28**	**0.42**	**0.21**	**6.2**	**0.18 J**	**0.47**	**0.11**
Dibenz[a,h]anthracene	mg/kg	2.1	**0.014 J**	**0.14**	0.074 U	**0.033**	**0.065 J**	**0.0072 J**	**0.043 J**	**0.048 J**	**0.068 J**	**0.6**	**0.024**	**0.083**	**0.012**
Diethylphthalate	mg/kg	660,000	0.072 U	0.083 U	0.073 U	0.082 U	0.076 U	0.084 U	0.08 U	0.081 U	0.074 U	0.76 U	0.074 U	0.017 B	0.077 U
Di-n-butylphthalate	mg/kg	82,000	0.072 U	0.083 U	0.073 U	0.082 U	0.076 U	0.084 U	0.08 U	0.081 U	**0.02 J**	**0.36 J**	0.074 U	0.078 U	0.077 U
Fluoranthene	mg/kg	30,000	**0.11**	**1.2**	**0.037 J**	**0.62**	**0.71**	**0.11 J**	**0.5**	**0.68**	**0.18**	**13.2**	**0.4 J**	**0.73**	**0.16**
Fluorene	mg/kg	30,000	0.071 U	**0.37**	0.074 U	**0.15**	**0.0078 J**	**0.033 J**	**0.028 J**	**0.021 J**	**0.017 J**	**10.6**	**0.013**	**0.028 J**	**0.0015 J**
Hexachloroethane	mg/kg	8	0.072 U	**0.13**	0.073 U	0.082 U	0.076 U	0.084 U	0.08 U	0.081 U	0.074 U	0.076 U	0.074 U	0.078 U	0.077 U
Indeno[1,2,3-c,d]pyrene	mg/kg	21	**0.047 J**	**0.3**	**0.014 J**	**0.088**	**0.2**	**0.02 J**	**0.12**	**0.14**	**0.22**	**1.7**	**0.066**	**0.23**	**0.04**
Naphthalene	mg/kg	17	0.023 B	**0.28**	0.028 B	**2.5**	0.023 B	**0.049 J**	**0.073 J**	**0.14**	**0.068 J**	**10.5**	**0.031 J**	0.074 B	**0.0068 J**
Phenanthrene	mg/kg		**0.045 J**	**1**	**0.03 J**	**0.78**	**0.21**	**0.15 J**	**0.26**	**0.37**	**0.11 J**	**30**	**0.22 J**	**0.34**	**0.052**
Phenol	mg/kg	250,000	0.072 UJ	0.083 U	0.073 U	0.082 U	0.076 R	0.084 U	0.08 U	0.081 U	**0.031 J**	**0.71**	0.074 U	0.078 U	0.077 U
Pyrene	mg/kg	23,000	**0.094**	**1.1**	**0.037 J**	**0.43**	**0.95**	**0.085 J**	**0.41**	**0.64**	**0.24**	**13.4**	**0.31 J**	**0.64**	**0.12**
PCBs															
Aroclor 1242	mg/kg	0.97	0.0543 U	N/A	0.0534 U	N/A	0.0532 U	N/A	0.0592 U	N/A	0.0575 U	N/A	0.054 U	N/A	0.0585 U
Aroclor 1254	mg/kg	0.97	**0.142**	N/A	0.0534 U	N/A	0.0532 U	N/A	0.0592 U	N/A	0.0575 U	N/A	0.054 U	N/A	0.0585 U
Aroclor 1260	mg/kg	0.99	0.0543 U	N/A	0.0534 U	N/A	0.0532 U	N/A	**0.631**	N/A	**0.104**	N/A	0.054 U	N/A	0.0585 U
Aroclor 1262	mg/kg		0.0543 U	N/A	0.0534 U	N/A	0.0532 U	N/A	0.0592 U	N/A	0.0575 U	N/A	0.054 U	N/A	0.0585 U
Aroclor 1268	mg/kg		**1.07**	N/A	**0.0375 J**	N/A	**0.096**	N/A	0.0592 U	N/A	0.0575 U	N/A	0.054 U	N/A	0.0585 U
PCBs (total)	mg/kg	0.97	**1.212**	N/A	**0.0375 J**	N/A	**0.096**	N/A	**0.631**	N/A	**0.104**	N/A	0.054 U	N/A	0.0585 U
TPH															
Diesel Range Organics	mg/kg	6,200	**52.8 J**	**1,430 J**	**144 J**	**24 J**	**37.2 J**	**5 J**	**35.1**	**117**	**280**	**11,000**	**32.8 J**	**92.4 J**	**25.6**
Gasoline Range Organics	mg/kg	6,200	9.3 U	**12.5**	10.4 U	10.1 U	12.3 U	10.9 U	15.5 U	11.3 U	11.2 U	**129**	11.1 U	13.2 U	8.5 U

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

J: The positive result reported for this analyte is a quantitative estimate.
B: The compound/analyte was not detected substantially above the level of the associated method blank/preparation or field blank.
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.
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 - Sub-Parcel B6-2
Summary of Organics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-069-SB-8.5*	B6-070-SB-1*	B6-070-SB-4*	B6-074-SB-1*	B6-074-SB-4*	B6-075-SB-1	B6-076-SB-1	B6-076-SB-8	B6-081-SB-1	B6-081-SB-5	B6-082-SB-1*	B6-082-SB-5*
Volatile Organic Compounds														
1,2,3-Trichlorobenzene	mg/kg	930	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 UJ	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
1,2-Dichlorobenzene	mg/kg	9,300	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 UJ	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
1,2-Dichloroethene (Total)	mg/kg	2,300	0.01 U	0.016 U	0.0097 U	0.016 U	0.01 U	0.011 U	0.011 U	0.011 U	0.013 U	0.013 UJ	0.014 U	0.01 U
1,3-Dichlorobenzene	mg/kg		0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 UJ	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
1,4-Dichlorobenzene	mg/kg	11	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 UJ	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
2-Butanone (MEK)	mg/kg	190,000	0.01 U	0.016 U	0.0097 U	0.016 U	**0.0054 J**	0.011 U	0.011 UJ	0.011 UJ	0.013 U	0.013 UJ	0.014 U	0.01 U
Acetone	mg/kg	670,000	0.0062 B	**0.013 J**	0.011 B	0.016 U	**0.021**	0.011 UJ	0.011 UJ	0.011 UJ	0.013 UJ	0.013 UJ	0.014 U	0.01 U
Benzene	mg/kg	5.1	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 U	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
cis-1,2-Dichloroethene	mg/kg	2,300	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 U	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
Cyclohexane	mg/kg	27,000	0.01 U	0.016 U	0.0097 U	0.016 U	0.01 U	0.011 U	0.011 U	0.011 U	0.013 U	0.013 UJ	0.014 U	0.01 U
Ethylbenzene	mg/kg	25	0.0051 U	0.0081 U	0.0049 U	0.0082 U	**0.0013 J**	0.0053 U	0.0053 U	**0.28**	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
Isopropylbenzene	mg/kg	9,900	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 U	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
Methyl Acetate	mg/kg	1,200,000	0.051 U	0.081 U	0.049 U	0.082 U	0.052 U	0.053 U	0.053 R	0.054 R	0.063 U	0.067 UJ	0.069 U	0.05 U
Tetrachloroethene	mg/kg	100	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 U	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
Toluene	mg/kg	47,000	0.0051 U	0.0081 U	0.0049 U	0.0082 U	**0.002 J**	0.0053 U	0.0053 U	**0.0077**	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
Trichloroethene	mg/kg	6	0.0051 U	0.0081 U	0.0049 U	0.0082 U	0.0052 U	0.0053 U	0.0053 U	0.0054 U	0.0063 U	0.0067 UJ	0.0069 U	0.005 U
Xylenes	mg/kg	2,800	0.015 U	0.024 U	0.015 U	0.025 U	**0.011 J**	0.016 U	0.016 U	**1**	0.019 U	0.02 UJ	0.021 U	0.015 U
Semi-Volatile Organic Compounds^														
1,1-Biphenyl	mg/kg	200	**0.37**	0.092 U	0.074 U	0.1 U	0.08 U	**0.066 J**	**0.017 J**	**0.04 J**	0.075 U	0.081 U	0.075 U	0.081 U
2,4-Dimethylphenol	mg/kg	16,000	**0.029 J**	0.092 U	0.074 U	0.1 U	0.08 U	0.07 U	0.076 U	**0.033 J**	0.075 U	0.081 U	0.075 U	0.081 U
2-Methylnaphthalene	mg/kg	3,000	**0.58**	**0.041 J**	**0.02**	0.01 U	**0.0028 J**	**0.53**	**0.052 J**	**0.27**	**0.013**	**0.012**	**0.013**	0.0082 U
2-Methylphenol	mg/kg	41,000	**0.023 J**	0.092 U	0.074 U	0.1 U	0.08 U	0.07 U	0.076 U	**0.015 J**	0.075 U	0.081 U	0.075 U	0.081 U
3&4-Methylphenol(m&p Cresol)	mg/kg	41,000	**0.077 J**	0.18 U	0.15 U	0.2 U	0.16 U	0.14 U	0.15 U	**0.045 J**	0.15 U	0.16 U	0.15 U	0.16 U
Acenaphthene	mg/kg	45,000	**0.58**	**0.01 J**	**0.0061 J**	**0.0014 J**	**0.0018 J**	**0.0093 J**	**0.024 J**	**0.95**	**0.0026 J**	**0.0017 J**	**0.0018 J**	0.0082 U
Acenaphthylene	mg/kg	45,000	**1.8**	**0.018 J**	**0.012**	0.01 U	**0.0015 J**	**0.057 J**	**0.039 J**	0.078 U	**0.0074**	**0.0087**	**0.0066 J**	0.0082 U
Acetophenone	mg/kg	120,000	**0.044 J**	0.092 U	0.074 U	0.1 U	0.08 U	**0.03 J**	0.076 U	0.077 U	0.075 U	0.081 U	0.075 U	0.081 U
Anthracene	mg/kg	230,000	**4.5**	**0.027 J**	**0.048**	**0.0053 J**	**0.0055 J**	**0.057 J**	**0.34**	**0.27**	**0.0092**	**0.011**	**0.01**	**0.0015 J**
Benz[a]anthracene	mg/kg	21	**9.2**	**0.096**	**0.13**	**0.0042 J**	**0.012**	**0.2**	**1.8**	**1.5**	**0.036**	**0.022**	**0.041**	**0.0058 J**
Benzaldehyde	mg/kg	120,000	**0.047 J**	**0.026 J**	0.074 U	**0.028 J**	0.08 U	**0.085**	0.076 UJ	0.077 UJ	0.075 U	0.081 U	0.075 U	0.081 U
Benzo[a]pyrene	mg/kg	2.1	**7.3**	**0.066 J**	**0.1**	**0.0023 J**	**0.0089**	**0.22**	**1.3**	**3.2**	**0.041**	**0.03**	**0.036**	**0.0044 J**
Benzo[b]fluoranthene	mg/kg	21	**8.4**	**0.088 J**	**0.14**	**0.0063 J**	**0.022**	**0.52**	**2.7**	**3.9**	**0.085**	**0.069**	**0.093**	**0.0096**
Benzo[g,h,i]perylene	mg/kg		**2.4**	**0.03 J**	**0.045**	**0.0014 J**	**0.0049 J**	**0.21**	**0.24**	**1.6**	**0.035**	**0.033**	**0.027**	**0.0023 J**
Benzo[k]fluoranthene	mg/kg	210	**3.1**	**0.038 J**	**0.058**	**0.0055 J**	**0.019**	**0.53**	**2.5**	**1.7**	**0.085**	**0.025**	**0.081**	**0.0083**
bis(2-Ethylhexyl)phthalate	mg/kg	160	**0.026 J**	0.092 U	0.074 U	0.1 U	0.08 U	0.04 B	0.076 UJ	0.077 UJ	0.075 U	0.081 U	0.075 U	0.081 U
Carbazole	mg/kg		**0.83**	0.092 U	0.074 U	0.1 U	0.08 U	**0.027 J**	**0.24**	**0.16**	0.075 U	0.081 U	0.075 U	0.081 U
Chrysene	mg/kg	2,100	**6.3**	**0.056 J**	**0.11**	**0.0034 J**	**0.011**	**0.32**	**1.3**	**1.5**	**0.043**	**0.037**	**0.04**	**0.0057 J**
Dibenz[a,h]anthracene	mg/kg	2.1	**0.9**	**0.015 J**	**0.014**	0.01 U	**0.002 J**	**0.065 J**	**0.099**	**0.59**	**0.011**	**0.0097**	**0.009**	**0.0016 J**
Diethylphthalate	mg/kg	660,000	0.075 U	0.092 U	0.074 U	0.1 U	0.08 U	0.07 U	0.076 U	0.077 U	0.075 U	0.081 U	0.075 U	0.081 U
Di-n-butylphthalate	mg/kg	82,000	0.075 U	0.092 U	0.074 U	0.1 U	0.08 U	0.07 U	0.076 U	0.077 U	0.075 U	0.081 U	0.075 U	0.081 U
Fluoranthene	mg/kg	30,000	**11.6**	**0.086 J**	**0.24**	**0.009 J**	**0.022**	**0.29**	**3.4**	**1.4**	**0.062**	**0.031**	**0.058**	**0.0069 J**
Fluorene	mg/kg	30,000	**2.4**	**0.016 J**	**0.0091**	**0.0039 J**	**0.0033 J**	**0.015 J**	**0.022 J**	**0.13**	**0.0019 J**	**0.0027 J**	**0.0018 J**	0.0082 U
Hexachloroethane	mg/kg	8	0.075 U	0.092 U	0.074 U	0.1 U	0.08 U	0.07 U	0.076 U	0.077 U	0.075 U	0.081 U	0.075 U	0.081 U
Indeno[1,2,3-c,d]pyrene	mg/kg	21	**2.8**	**0.03 J**	**0.049**	**0.0015 J**	**0.0044 J**	**0.18**	**0.28**	**1.7**	**0.03**	**0.028**	**0.022**	**0.0021 J**
Naphthalene	mg/kg	17	**1.5**	**0.03 J**	**0.063**	**0.024**	**0.021**	**0.34**	**0.17**	**0.28**	**0.014**	**0.012**	**0.0064 J**	0.0082 U
Phenanthrene	mg/kg		**10.5**	**0.052 J**	**0.13**	**0.015**	**0.016**	**0.43**	**1.2**	**0.82**	**0.032**	**0.027**	**0.035**	**0.0037 J**
Phenol	mg/kg	250,000	**0.099**	0.092 U	0.074 U	0.1 U	**0.64**	0.07 U	0.076 U	**0.029 J**	0.075 U	0.081 U	0.075 U	0.081 U
Pyrene	mg/kg	23,000	**8.7**	**0.099**	**0.26**	**0.0063 J**	**0.016**	**0.27**	**2.6**	**1.4**	**0.053**	**0.029**	**0.051**	**0.0064 J**
PCBs														
Aroclor 1242	mg/kg	0.97	N/A	0.0615 U	N/A	0.0704 U	N/A	0.0517 U	0.058 U	N/A	0.055 U	N/A	0.054 U	N/A
Aroclor 1254	mg/kg	0.97	N/A	0.0615 U	N/A	0.0704 U	N/A	0.0517 U	**0.0983**	N/A	0.055 U	N/A	0.054 U	N/A
Aroclor 1260	mg/kg	0.99	N/A	0.0615 U	N/A	0.0704 U	N/A	0.0517 U	0.058 U	N/A	0.055 U	N/A	0.054 U	N/A
Aroclor 1262	mg/kg		N/A	0.0615 U	N/A	0.0704 U	N/A	0.0517 U	0.058 U	N/A	0.055 U	N/A	0.054 U	N/A
Aroclor 1268	mg/kg		N/A	0.0615 U	N/A	0.0704 U	N/A	0.0517 U	0.058 U	N/A	0.055 U	N/A	0.054 U	N/A
PCBs (total)	mg/kg	0.97	N/A	0.0615 U	N/A	0.0704 U	N/A	0.0517 U	**0.0983**	N/A	0.055 U	N/A	0.054 U	N/A
TPH														
Diesel Range Organics	mg/kg	6,200	**1,200**	**152**	**51.6**	**29**	**11.2**	**62.5 J**	**75.6 J**	**150 J**	**10.8 J**	**23.8 J**	**13.2**	**3.8 J**
Gasoline Range Organics	mg/kg	6,200	11.6 U	14 U	9.7 U	16.5 U	10.4 U	10.5 U	11.6 U	**20.6**	16 U	13.7 U	10.3 U	12 U

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

J: The positive result reported for this analyte is a quantitative estimate.
B: The compound/analyte was not detected substantially above the level of the associated method blank/preparation or field blank.
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.
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 - Sub-Parcel B6-2
Summary of Inorganics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-019-SB-1*	B6-019-SB-4*	B6-020-SB-1*	B6-020-SB-4*	B6-033-SB-1	B6-033-SB-4	B6-034-SB-1*
Metals									
Aluminum	mg/kg	1,100,000	**24,900**	**14,200**	**26,000**	**23,400**	**7,210**	**16,900**	**44,200**
Arsenic	mg/kg	3	**6.2**	**7.8**	**6**	**3**	**3.6**	**11.4**	2.1 U
Barium	mg/kg	220,000	**199**	**169**	**307**	**269**	**95.1 J**	**298 J**	**643**
Beryllium	mg/kg	2,300	**2.5**	**1.8**	**4**	**3.3**	**0.29 J**	**1.5**	**5.9**
Cadmium	mg/kg	980	1.3 B	**8.3**	1.4 B	**2.6**	1.4 B	**4.7**	0.4 B
Chromium	mg/kg	120,000	**730**	**1,410**	**487**	**645**	**1,490**	**867**	**8.9**
Cobalt	mg/kg	350	**4.7**	**13.9**	**3.1 J**	**1.5 J**	**5.3**	**18.4**	**1.9 J**
Copper	mg/kg	47,000	**55.8**	**205**	**75.2**	**35**	**94.3 J**	**139 J**	**7.7**
Iron	mg/kg	820,000	**132,000**	**152,000**	**61,800**	**86,100**	**165,000 J**	**115,000 J**	**14,200**
Lead	mg/kg	800	**126**	**466**	**91.6**	**104**	**61.5 J**	**237 J**	**3.5**
Manganese	mg/kg	26,000	**17,600**	**36,600**	**17,800**	**30,200**	**65,400**	**42,600**	**7,520**
Mercury	mg/kg	350	**0.007 J**	**0.028 J**	**0.045 J**	**0.0061 J**	**0.0037 J**	**0.06 J**	0.11 U
Nickel	mg/kg	22,000	**42.5**	**58.3**	**53.5**	**16**	**119 J**	**35.9 J**	**1.7 J**
Selenium	mg/kg	5,800	3.5 U	3.2 U	3.4 U	3.2 U	4.2 UJ	3.5 UJ	**4.1**
Silver	mg/kg	5,800	**1.4 J**	**2.4 J**	2.6 U	**0.75 J**	3.2 U	2.6 U	2.5 U
Thallium	mg/kg	12	8.7 U	**4.6 J**	8.5 U	7.9 U	**71.6 J**	**37.1 J**	8.3 U
Vanadium	mg/kg	5,800	**660**	**3,700**	**1,110**	**1,870**	**5,280**	**2,930**	**39.9**
Zinc	mg/kg	350,000	**301**	**3,160**	**331**	**603**	**157 J**	**1,030 J**	**3.4 J**
Other									
Cyanide	mg/kg	150	**1.3**	**0.63 J**	**0.67**	**0.22 J**	**0.85**	**1.6**	**0.45 J**

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Table 2 - Sub-Parcel B6-2
Summary of Inorganics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-034-SB-4*	B6-035-SB-1*	B6-035-SB-4*	B6-036-SB-1*	B6-036-SB-8*	B6-037-SB-1*	B6-037-SB-5*
Metals									
Aluminum	mg/kg	1,100,000	**16,900**	**17,000**	**17,700**	**14,300**	**8,430**	**19,700**	**11,400**
Arsenic	mg/kg	3	**3.6**	2.3 U	**4.5**	**3.8**	2.2 U	2.5 U	**10.5**
Barium	mg/kg	220,000	**60.2**	**241**	**220**	**204**	**178**	**166**	**130**
Beryllium	mg/kg	2,300	**0.35 J**	**1**	**1.4**	**1.3**	0.87 U	**1.6**	**0.83 J**
Cadmium	mg/kg	980	1.5 U	1.3 B	1.8 B	**2.8**	**4.1**	0.88 B	**2.3**
Chromium	mg/kg	120,000	**20.8**	**1,330**	**103**	**603**	**1,360**	**787**	**593**
Cobalt	mg/kg	350	**2 J**	**7.6**	**10.1**	**7.4**	**3.6 J**	**1.3 J**	**7.6**
Copper	mg/kg	47,000	**5.9**	**70.6**	**458**	**63.6**	**60.3**	**30.7**	**117**
Iron	mg/kg	820,000	**18,200**	**157,000**	**45,600**	**98,400**	**131,000**	**140,000**	**158,000**
Lead	mg/kg	800	**13.9**	**58.1**	**204**	**165**	**295**	**31.5**	**484**
Manganese	mg/kg	26,000	**61.2**	**69,100**	**4,820**	**27,400**	**60,300**	**18,400**	**20,000**
Mercury	mg/kg	350	**0.022 J**	0.1 U	**0.088 J**	**0.062 J**	**0.048 J**	**0.0099 J**	**0.072 J**
Nickel	mg/kg	22,000	**5.9 J**	**16.4**	**21.7**	**24.2**	**13.2**	**17.9**	**54.7**
Selenium	mg/kg	5,800	4.1 U	3.7 U	2.6 B	4 U	3.5 U	4 U	3.6 U
Silver	mg/kg	5,800	3.1 U	2.8 U	2.7 U	3 U	2.6 U	3 U	2.7 U
Thallium	mg/kg	12	10.2 U	9.2 U	9.1 U	10.1 U	8.7 U	10 U	9.1 U
Vanadium	mg/kg	5,800	**26.4**	**3,920**	**188**	**1,280**	**3,460**	**492**	**315**
Zinc	mg/kg	350,000	**17.3**	**152**	**836**	**712**	**611**	**150**	**642**
Other									
Cyanide	mg/kg	150	0.66 U	**0.076 J**	**1.1**	**3.1**	**0.43 J**	**0.41 J**	**0.7**

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Table 2 - Sub-Parcel B6-2
Summary of Inorganics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-038-SB-1*	B6-038-SB-4*	B6-047-SB-1*	B6-047-SB-6*	B6-048-SB-1*	B6-048-SB-8*	B6-053-SB-1*
Metals									
Aluminum	mg/kg	1,100,000	**23,400**	**17,800**	**7,290**	**12,300**	**8,290**	**20,400**	**8,400**
Arsenic	mg/kg	3	2.6 U	**5.2**	**3.5**	**7.4**	2.2 U	**24.5**	**12.9**
Barium	mg/kg	220,000	**472**	**269**	**68.2**	**162**	**88**	**696**	**72**
Beryllium	mg/kg	2,300	**1.8**	**1.3**	**0.32 J**	**0.27 J**	0.9 U	**2**	**0.24 J**
Cadmium	mg/kg	980	1.3 B	1.7 B	0.73 B	1.6 B	0.81 B	**15.2**	1.3 B
Chromium	mg/kg	120,000	**599**	**189**	**759**	**1,190**	**669**	**406**	**734**
Cobalt	mg/kg	350	**4.5 J**	**14.5**	**5.6**	**10.8**	**1.3 J**	**34.8**	**141**
Copper	mg/kg	47,000	**40.6**	**81.3**	**35.6**	**105**	**29.3**	**248**	**369**
Iron	mg/kg	820,000	**74,100**	**90,500**	**173,000**	**119,000**	**96,800**	**296,000**	**186,000**
Lead	mg/kg	800	**59.3**	**152**	**23**	**164**	**18.5**	**1,240**	**99.7**
Manganese	mg/kg	26,000	**56,400**	**9,020**	**29,500**	**50,300**	**34,600**	**15,200**	**37,400**
Mercury	mg/kg	350	**0.064 J**	**0.41**	**0.007 J**	**0.021 J**	**0.026 J**	**0.44**	**0.29**
Nickel	mg/kg	22,000	**14.4**	**37.8**	**18**	**24.3**	**7.7 J**	**136**	**39.6**
Selenium	mg/kg	5,800	4.2 U	3.3 U	3.3 U	3.7 U	3.6 U	4.5 U	**6.4**
Silver	mg/kg	5,800	3.2 U	2.5 U	2.5 U	2.8 U	2.7 U	**1.2 J**	3.2 U
Thallium	mg/kg	12	10.6 U	8.2 U	8.3 U	9.3 U	9 U	11.3 U	10.7 U
Vanadium	mg/kg	5,800	**1,660**	**528**	**2,610**	**2,310**	**2,990**	**1,670**	**4,360**
Zinc	mg/kg	350,000	**168**	**582**	**153**	**280**	**52.8**	**6,700**	**365**
Other									
Cyanide	mg/kg	150	**0.78**	**1.4**	**0.59**	**1.5**	**0.49 J**	**7**	**0.61**

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Table 2 - Sub-Parcel B6-2
Summary of Inorganics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-053-SB-4*	B6-054-SB-1*	B6-054-SB-4*	B6-055-SB-1*	B6-055-SB-7*	B6-056-SB-1	B6-056-SB-8
Metals									
Aluminum	mg/kg	1,100,000	**6,350**	**45,700**	**41,800**	**10,800**	**14,100**	**33,100**	**21,100**
Arsenic	mg/kg	3	**9.4**	2 U	2.1 U	**6**	**3.5**	2.3 U	**6.3**
Barium	mg/kg	220,000	**60.2**	**386**	**463**	**296**	**94.6**	**289 J**	**216 J**
Beryllium	mg/kg	2,300	0.82 U	**7.5**	**7.5**	0.78 U	**0.78 J**	**4.4**	**1.7**
Cadmium	mg/kg	980	1 B	0.21 B	0.25 B	1 B	0.41 B	0.52 B	0.71 B
Chromium	mg/kg	120,000	**771**	**6.6**	**5.8**	**1,370**	**35.7**	**324 J**	**64.5 J**
Cobalt	mg/kg	350	**145**	**1.2 J**	**0.97 J**	**2.1 J**	**8.4**	**2.3 J**	**7.5**
Copper	mg/kg	47,000	**383**	**8.9**	**2.1 J**	**52**	**29.7**	**25.4 J**	**40.1 J**
Iron	mg/kg	820,000	**108,000**	**22,000**	**5,830**	**93,900**	**21,900**	**63,000**	**26,800**
Lead	mg/kg	800	**82.6**	2 U	**3.9**	**44.8**	**69.9**	**38.7 J**	**109 J**
Manganese	mg/kg	26,000	**28,500**	**4,080**	**4,050**	**66,300**	**500**	**8,200**	**3,180**
Mercury	mg/kg	350	**0.2**	0.11 U	0.11 U	**0.0098 J**	**0.039 J**	**0.015 J**	**0.057 J**
Nickel	mg/kg	22,000	**36.4**	**1.7 J**	8.2 U	**26.3**	**20.3**	**29.8 J**	**19.1 J**
Selenium	mg/kg	5,800	3.3 U	**3.3**	3.3 U	3.1 U	3.9 U	3.6 U	4.2 U
Silver	mg/kg	5,800	2.5 U	2.4 U	2.5 U	**13.4**	2.9 U	2.7 U	3.2 U
Thallium	mg/kg	12	8.2 U	7.9 U	8.2 U	**30.9**	9.8 U	**5.9 J**	10.6 U
Vanadium	mg/kg	5,800	**3,430**	**43**	**36.1**	**10,500**	**71.4**	**428 J**	**147 J**
Zinc	mg/kg	350,000	**278**	4 U	**1.9 J**	**79.7**	**135**	**98.6 J**	**226 J**
Other									
Cyanide	mg/kg	150	**1.3**	**0.27 J**	**0.28 J**	**1.4**	**0.18 J**	0.25 B	0.43 B

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Table 2 - Sub-Parcel B6-2
Summary of Inorganics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-063-SB-1	B6-063-SB-9	B6-064-SB-1	B6-064-SB-8	B6-064-SB-10*	B6-065-SB-1*	B6-065-SB-4*
Metals									
Aluminum	mg/kg	1,100,000	**28,700**	**12,800**	**34,400**	**16,400**	N/A	**29,300**	**24,100**
Arsenic	mg/kg	3	2 U	**2.7**	2.3 U	**4.7**	**5**	**7.7**	**7.4**
Barium	mg/kg	220,000	**588 J**	**69.8 J**	**246 J**	**87.9 J**	N/A	**270**	**226**
Beryllium	mg/kg	2,300	**2.3**	**0.75 J**	**1.6**	**1.1**	N/A	**1.7**	**1.7**
Cadmium	mg/kg	980	0.46 B	0.24 B	0.48 B	0.19 B	N/A	**2.5**	**2.6**
Chromium	mg/kg	120,000	**108 J**	**28.7 J**	**584 J**	**37.9 J**	N/A	**155**	**192**
Cobalt	mg/kg	350	**2.1 J**	**12**	**1.2 J**	**9.5**	N/A	**9.8**	**10.8**
Copper	mg/kg	47,000	**10.6 J**	**17.1 J**	**28.8 J**	**16.4 J**	N/A	**80.1**	**94.9**
Iron	mg/kg	820,000	**14,100**	**19,200**	**146,000**	**20,200**	N/A	**53,200**	**57,300**
Lead	mg/kg	800	**13.7 J**	**29.2 J**	**11.5 J**	**19.8 J**	N/A	**190**	**203**
Manganese	mg/kg	26,000	**8,680**	**457**	**21,800**	**299**	N/A	**3,820**	**4,450**
Mercury	mg/kg	350	0.11 U	**0.02 J**	**0.013 J**	**0.024 J**	N/A	**0.16**	**0.1 J**
Nickel	mg/kg	22,000	**6.3 J**	**25.8 J**	**21.6 J**	**22.6 J**	N/A	**42.6**	**47**
Selenium	mg/kg	5,800	3.1 U	4.1 U	3.7 U	4.3 U	N/A	2.6 B	3.5 U
Silver	mg/kg	5,800	2.4 U	3.1 U	**1.6 J**	3.2 U	N/A	2.9 U	2.7 U
Thallium	mg/kg	12	**4.3 J**	10.2 U	**4.7 J**	10.7 U	N/A	9.8 U	8.8 U
Vanadium	mg/kg	5,800	**403 J**	**72.6 J**	**478 J**	**50.9 J**	N/A	**108**	**162**
Zinc	mg/kg	350,000	**60.1 J**	**105 J**	**50.1 J**	**53.1 J**	N/A	**455**	**454**
Other									
Cyanide	mg/kg	150	0.46 B	0.085 B	0.23 B	0.6 B	N/A	**4.6**	**3.6**

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Table 2 - Sub-Parcel B6-2
Summary of Inorganics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-066-SB-1*	B6-066-SB-5*	B6-067-SB-1	B6-067-SB-5	B6-069-SB-1*	B6-069-SB-8.5*
Metals								
Aluminum	mg/kg	1,100,000	**34,600**	**25,600**	**12,400**	**13,000**	**13,700**	**12,600**
Arsenic	mg/kg	3	**4.2**	**5.2**	2.3 U	**3.9**	2.3 U	1.9 U
Barium	mg/kg	220,000	**385**	**378**	**106 J**	**170 J**	**82.5**	**167**
Beryllium	mg/kg	2,300	**4.6**	**3.3**	**1.3**	**0.71 J**	**0.9 J**	0.77 U
Cadmium	mg/kg	980	1.1 B	1.3 B	1.1 B	**12.1**	1 B	**9.6**
Chromium	mg/kg	120,000	**102**	**104**	**1,120**	**1,270**	**907**	**1,730**
Cobalt	mg/kg	350	**4.6**	**5.5**	**2.2 J**	**10.3**	4.6 U	**4.2**
Copper	mg/kg	47,000	**106**	**73.9**	**41.6 J**	**175 J**	**15.7**	**86.5**
Iron	mg/kg	820,000	**44,700**	**53,400**	**211,000 J**	**124,000 J**	**163,000**	**116,000**
Lead	mg/kg	800	**116**	**154**	**68.7 J**	**421 J**	**16.6**	**1,290**
Manganese	mg/kg	26,000	**4,190**	**4,890**	**23,100**	**29,800**	**26,000**	**30,300**
Mercury	mg/kg	350	**0.012 J**	**0.0059 J**	**0.022 J**	0.11 U	**0.0039 J**	**0.087 J**
Nickel	mg/kg	22,000	**19.3**	**25.8**	**32.9 J**	**46.2 J**	**12.6**	**22.1**
Selenium	mg/kg	5,800	3.3 U	3.5 U	3.7 UJ	3.4 UJ	3.7 U	3.1 U
Silver	mg/kg	5,800	2.5 U	2.6 U	2.8 U	2.5 U	2.8 U	2.3 U
Thallium	mg/kg	12	8.3 U	8.6 U	**20.2 J**	**49.7 J**	9.2 U	7.7 U
Vanadium	mg/kg	5,800	**135**	**138**	**1,580**	**4,830**	**1,090**	**3,770**
Zinc	mg/kg	350,000	**286**	**225**	**197 J**	**1,530 J**	**76.8**	**853**
Other								
Cyanide	mg/kg	150	**0.65 J**	**0.42 J**	**0.49 J**	**2.7**	**0.22 J**	**0.47 J**

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Table 2 - Sub-Parcel B6-2
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Sparrows Point, Maryland

Parameter	Units	PAL	B6-070-SB-1*	B6-070-SB-4*	B6-074-SB-1*	B6-074-SB-4*	B6-075-SB-1	B6-076-SB-1
Metals								
Aluminum	mg/kg	1,100,000	**22,500**	**7,800**	**14,900**	**13,700**	**27,200**	**16,300**
Arsenic	mg/kg	3	**3.3**	2 U	**7.2**	**6.4**	**5**	**9.6**
Barium	mg/kg	220,000	**349**	**122**	**25.7**	**64.3**	**275 J**	**222 J**
Beryllium	mg/kg	2,300	**2.4**	0.81 U	**0.84 J**	**1.2**	**3.9**	**1.5**
Cadmium	mg/kg	980	**1.9**	**1.9**	0.46 B	0.42 B	**1.5**	**4.4**
Chromium	mg/kg	120,000	**506**	**1,200**	**25.3**	**34.1**	**342 J**	**505**
Cobalt	mg/kg	350	**6.5**	**3.7 J**	**7.1**	**10**	**5.5**	**11.4**
Copper	mg/kg	47,000	**50.4**	**50.3**	**16.3**	**23.2**	**59.3 J**	**118 J**
Iron	mg/kg	820,000	**68,800**	**97,900**	**27,600**	**41,700**	**85,800**	**112,000 J**
Lead	mg/kg	800	**82.9**	**112**	**11.7**	**34.4**	**113 J**	**511 J**
Manganese	mg/kg	26,000	**40,200**	**57,400**	**315**	**581**	**12,400**	**12,500**
Mercury	mg/kg	350	**0.027 J**	**0.029 J**	**0.03 J**	**0.023 J**	0.099 U	**0.12**
Nickel	mg/kg	22,000	**21.9**	**16.8**	**18.6**	**24.4**	**22.3 J**	**41.7 J**
Selenium	mg/kg	5,800	4.5 U	3.2 U	4.7 U	4 U	2.3 B	3.5 UJ
Silver	mg/kg	5,800	3.4 U	2.4 U	3.5 U	3 U	2.4 U	2.7 U
Thallium	mg/kg	12	11.2 U	8.1 U	11.7 U	9.9 U	**3.9 J**	**9 J**
Vanadium	mg/kg	5,800	**1,740**	**2,940**	**29.6**	**50**	**388 J**	**765**
Zinc	mg/kg	350,000	**376**	**316**	**49.4**	**112**	**288 J**	**1,720 J**
Other								
Cyanide	mg/kg	150	**0.75**	**1.1**	**0.054 J**	**0.12 J**	**0.6 J-**	**1.5**

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Summary of Inorganics Detected in Soil
Sparrows Point, Maryland

Parameter	Units	PAL	B6-076-SB-8	B6-081-SB-1	B6-081-SB-5	B6-082-SB-1*	B6-082-SB-5*
Metals							
Aluminum	mg/kg	1,100,000	**8,750**	**41,300**	**32,500**	**18,700**	**11,200**
Arsenic	mg/kg	3	**2.2 J**	**3.7**	**2.3 J**	**5.5**	**6.3**
Barium	mg/kg	220,000	**68.5 J**	**354 J**	**1,010 J**	**190**	**56.2**
Beryllium	mg/kg	2,300	**0.43 J**	**6.2**	**3.7**	**1.3**	**0.53 J**
Cadmium	mg/kg	980	0.88 B	1.1 B	1 B	1.3 B	1.5 U
Chromium	mg/kg	120,000	**1,070**	**200 J**	**1,070 J**	**41**	**20**
Cobalt	mg/kg	350	**2.4 J**	**2.7 J**	**2.9 J**	**12.4**	**4.8 J**
Copper	mg/kg	47,000	**90 J**	**27.3 J**	**23.9 J**	**42.8**	**14.9**
Iron	mg/kg	820,000	**172,000 J**	**59,700**	**72,900**	**52,100**	**21,900**
Lead	mg/kg	800	**87.2 J**	**50 J**	**47.5 J**	**244**	**12**
Manganese	mg/kg	26,000	**32,400**	**5,340**	**26,900**	**2,440**	**129**
Mercury	mg/kg	350	**0.019 J**	0.11 U	**0.0088 J**	**0.018 J**	**0.008 J**
Nickel	mg/kg	22,000	**28.3 J**	**12.5 J**	**13.1 J**	**25.4**	**14.8**
Selenium	mg/kg	5,800	3.7 UJ	**3.7 J**	4.1 U	3.4 U	3.9 U
Silver	mg/kg	5,800	2.8 U	2.8 U	**1.1 J**	2.5 U	2.9 U
Thallium	mg/kg	12	**42.7 J**	9.3 U	**41.8**	8.5 U	9.7 U
Vanadium	mg/kg	5,800	**3,850**	**359 J**	**4,120 J**	**123**	**24**
Zinc	mg/kg	350,000	**197 J**	**187 J**	**92.8 J**	**478**	**34.7**
Other							
Cyanide	mg/kg	150	**0.55 J**	0.29 B	**0.7 J-**	**0.27 J**	0.74 U

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

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

Table 3 - Sub-Parcel B6-2
Summary of Organics Detected in Groundwater
Sparrows Point, Maryland

Parameter	Units	PAL	FM-010-PZS	FM-011-PZS*	SW-077-MWS*	SW-078-MWS*	TM10-PZM007	TM12-PZM006*	TM14-PZM005*	TM16-PZM007	TM17-PZM005	TM18-PZM005
Volatile Organic Compounds												
1,1-Dichloroethane	µg/L	2.7	1 U	1 U	1 U	1 U	**0.7 J**	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (Total)	µg/L	70	2 U	2 U	2 U	2 U	**2.1**	2 U	2 U	2 U	2 U	2 U
2-Butanone (MEK)	µg/L	5,600	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**9.1 J**	10 U
Acetone	µg/L	14,000	10 U	10 U	**19.3**	10 U	10 U	10 U	10 U	**5.8 J**	**97.7**	**4 J**
Benzene	µg/L	5	1 U	1 U	0.24 B	1 U	1 U	**1.2**	**0.42 J**	**1.1**	1 U	1 U
Carbon disulfide	µg/L	810	1 U	**2.7**	1 U	1 U	1 U	1 U	**0.98 J**	1 U	1 U	1 U
cis-1,2-Dichloroethene	µg/L	70	1 U	1 U	1 U	1 U	**2.1**	1 U	1 U	1 U	1 U	1 U
Cyclohexane	µg/L	13,000	10 U	10 U	**0.16 J**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methyl tert-butyl ether (MTBE)	µg/L	14	1 U	**2.6**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**3.7**
Tetrachloroethene	µg/L	5	1 U	1 U	1 U	1 U	**0.65 J**	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	1,000	**0.45 J**	1 U	**0.23 J**	1 U	1 U	**0.55 J**	**0.31 J**	0.72 B	1 U	1 U
Xylenes	µg/L	10,000	3 U	3 U	3 U	3 U	3 U	3 U	3 U	**1 J**	3 U	3 U
Semi-Volatile Organic Compounds^												
1,4-Dioxane	µg/L	0.46	**0.091 J**	**0.34**	0.1 U	**0.072 J**	**0.25**	0.1 U	0.1 U	**0.095 J**	**0.06 J**	**0.18**
2,3,4,6-Tetrachlorophenol	µg/L	240	**1.3**	1 U	1 U	1 U	1.1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dimethylphenol	µg/L	360	**12**	1 U	1 U	1 U	1.1 U	1 U	**5.1**	**5**	1 U	1 U
2-Methylnaphthalene	µg/L	36	**0.72 J**	0.1 U	**0.18**	0.1 U	0.11 UJ	**0.55**	**0.7**	**0.95**	0.023 B	**0.19**
2-Methylphenol	µg/L	930	**0.37 J**	1 U	1 U	1 U	1.1 U	1 U	**0.31 J**	1 U	1 U	1 U
3&4-Methylphenol(m&p Cresol)	µg/L	930	**1.3 J**	2 U	2 U	2.1 U	2.1 U	2.1 U	**1.1 J**	**1.2 J**	2.1 U	2.1 U
Acenaphthene	µg/L	530	**1.1 J**	0.1 U	**0.17**	0.1 U	**0.11**	**0.17**	**0.94**	**1.3**	**0.059 J**	**1.3**
Acenaphthylene	µg/L	530	**0.059 J**	0.1 U	**0.022 J**	0.1 U	**0.03 J**	**0.41**	**0.11**	**0.11**	0.1 U	**0.04 J**
Anthracene	µg/L	1,800	**0.19 J**	0.1 U	**0.099 J**	0.1 U	**0.056 J**	**0.42**	**0.44**	**0.16**	**0.064 J**	**0.29**
Benz[a]anthracene	µg/L	0.03	**0.046 J**	0.1 U	**0.03 J**	0.1 U	**0.049 J**	**0.11**	**0.081 J**	0.1 U	**0.024 J**	**0.16**
Benzo[a]pyrene	µg/L	0.2	**0.0073 J**	0.1 U	0.1 U	0.1 U	**0.023 J**	**0.016 J**	**0.019 J**	0.1 U	0.1 U	**0.12**
Benzo[b]fluoranthene	µg/L	0.25	0.1 UJ	0.1 U	0.1 U	0.1 U	**0.045 J**	**0.03 J**	**0.031 J**	0.1 U	0.1 U	**0.23**
Benzo[g,h,i]perylene	µg/L		0.1 UJ	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.062 J**
Benzo[k]fluoranthene	µg/L	2.5	**0.013 J**	0.1 U	0.1 U	0.1 U	**0.048 J**	**0.012 J**	**0.018 J**	0.1 U	0.1 U	**0.2**
bis(2-Ethylhexyl)phthalate	µg/L	6	1 U	**0.27 J**	1 U	**0.83 J**	1.1 UJ	1 U	1 U	1 U	**0.29 J**	**0.24 J**
Carbazole	µg/L		**1.1**	1 U	**0.31 J**	1 U	1.1 U	**1.1**	**3.8**	**1.2**	1 U	**1**
Chrysene	µg/L	25	**0.028 J**	0.1 U	**0.014 J**	0.1 U	**0.029 J**	**0.067 J**	**0.051 J**	**0.018 J**	**0.012 J**	**0.16**
Fluoranthene	µg/L	800	**0.59 J**	0.1 U	**0.19**	0.1 U	**0.16**	**1.4**	**0.86**	**0.29**	**0.072 J**	**0.91**
Fluorene	µg/L	290	**0.59 J**	0.1 U	**0.13**	0.1 U	**0.098 J**	**0.73**	**1.7**	**1.2**	**0.039 J**	**1**
Indeno[1,2,3-c,d]pyrene	µg/L	0.25	0.1 UJ	0.1 U	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.055 J**
Naphthalene	µg/L	0.17	**7.9 J**	0.054 B	**1.7**	0.1 U	0.059 B	**12.9**	**3.7**	**2.9**	0.043 B	**0.83**
Pentachlorophenol	µg/L	1	**7.6**	2.6 U	**2.8**	2.6 U	2.6 U	**1.1 J**	**2.6**	2.6 U	2.6 U	2.6 U
Phenanthrene	µg/L		**1.6 J**	0.1 U	**0.52**	0.1 U	**0.21**	**2.6**	**3.4**	**1.4**	**0.081 J**	**1.2**
Phenol	µg/L	5,800	**0.22 J**	1 U	**0.4 J**	1 U	1.1 U	1 U	1 U	1 U	1 U	1 U
Pyrene	µg/L	120	**0.46 J**	0.1 U	**0.13**	0.1 U	**0.13**	**0.9**	**0.53**	**0.2**	**0.067 J**	**0.58**
TPH												
Diesel Range Organics	µg/L	47	**924**	103 U	**288**	**97.8 J**	**700**	**387**	**553**	**1,280 J**	**852 J**	**462 J**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL)
*Indicates non-validated
^PAH compounds were analyzed via SIM

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

Table 4 - Sub-Parcel B6-2
Summary of Inorganics Detected in Groundwater
Sparrows Point, Maryland

Parameter	Units	PAL	FM-010-PZS	FM-011-PZS*	SW-077-MWS*	SW-078-MWS*	TM10-PZM007	TM12-PZM006*	TM14-PZM005*	TM16-PZM007	TM17-PZM005	TM18-PZM005
Total Metals												
Aluminum	µg/L	20,000	N/A	N/A	**762**	**2,560**	**5,930**	**274**	**474**	**1,010**	**63.8**	**152**
Antimony	µg/L	6	N/A	N/A	6 U	**2.8 J**	6 U	6 U	6 U	6 U	6 U	6 U
Arsenic	µg/L	10	N/A	N/A	5 U	5 U	5 U	5 U	5 U	**4.9 J**	**15.1**	**4 J**
Barium	µg/L	2,000	N/A	N/A	**444**	**21.5**	**98.9**	**56.4**	**63.6**	**35.4**	**375**	**110**
Beryllium	µg/L	4	N/A	N/A	1 U	**2.1**	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	µg/L	5	N/A	N/A	3 U	**2.4 J**	**2.4 J**	3 U	3 U	3 U	**0.69 J**	**0.71 J**
Chromium	µg/L	100	N/A	N/A	**2.7 J**	**2.3 J**	**210**	**1.5 J**	**1.7 J**	1.4 B	**1.2 J**	1.5 B
Chromium VI	µg/L	0.035	10 U	10 U	10 U	10 U	**5,000[¥] J**	10 U	10 U	10 U	10 U	10 U
Cobalt	µg/L	6	N/A	N/A	5 U	**828**	**1.8 J**	5 U	5 U	5 U	5 U	**2.9 J**
Copper	µg/L	1,300	N/A	N/A	**2.1 J**	**2.2 J**	**35.4**	5 U	5 U	5 U	5 U	**7.6**
Iron	µg/L	14,000	N/A	N/A	**107**	**164,000**	**26,000**	**122**	**243**	**129**	**27,800**	**11,800**
Lead	µg/L	15	N/A	N/A	5 U	5 U	**150**	5 U	5 U	5 U	5 U	**19.6**
Manganese	µg/L	430	N/A	N/A	**23.7**	**13,000**	**6,070**	**21.5**	**9.6**	**16.2**	**4,080**	**2,090**
Mercury	µg/L	2	N/A	N/A	0.2 U	0.2 U	**0.05 J**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	µg/L	390	N/A	N/A	**2.2 J**	**835**	**17.4 J**	10 U	10 U	**0.95 J**	**6.1 J**	**2.7 J**
Selenium	µg/L	50	N/A	N/A	8 U	8 U	**3.2 J**	8 U	8 U	8 U	8 U	8 U
Silver	µg/L	94	N/A	N/A	6 U	**2.2 J**	6 U	6 U	6 U	6 U	6 U	6 U
Thallium	µg/L	2	N/A	N/A	10 U	10 U	**14.5**	10 U	10 U	10 U	10 U	10 U
Vanadium	µg/L	86	N/A	N/A	**65.6**	**10.2**	**1,100**	**216**	**156**	**407**	**4.5 J**	**8.8**
Zinc	µg/L	6,000	N/A	N/A	2.4 B	**668**	**412 J**	2.6 B	**14**	4.5 B	**1.1 J**	**38.7**
Dissolved Metals												
Aluminum, Dissolved	µg/L	20,000	**612**	50 U	**702**	**658**	**222**	**247**	**378**	**1,060**	**57.2**	**30.8 J**
Antimony, Dissolved	µg/L	6	6 U	6 U	6 U	2.4 B	6 U	6 U	6 U	6 U	6 U	**2.3 J**
Arsenic, Dissolved	µg/L	10	**3.9 J**	5 U	5 U	5 U	5 U	5 U	5 U	**4.6 J**	**19.2**	5 U
Barium, Dissolved	µg/L	2,000	**49.1**	**25.7**	**426**	**21.1**	**32.1**	**55.8**	**58**	**36.7**	**408**	**107**
Beryllium, Dissolved	µg/L	4	1 U	1 U	1 U	**1.8**	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium, Dissolved	µg/L	5	3 U	3 U	3 U	**2.5 J**	3 U	3 U	3 U	3 U	**0.96 J**	3 U
Chromium, Dissolved	µg/L	100	**1.6 J**	5 U	**1.6 J**	5 U	**2.5 J**	5 U	**1 J**	**2.5 J**	**1.8 J**	**1.3 J**
Cobalt, Dissolved	µg/L	6	5 U	**9.2**	5 U	**880**	5 U	5 U	5 U	5 U	10 U	**2.6 J**
Copper, Dissolved	µg/L	1,300	5 U	5 U	5 U	**3.5 J**	**1.6 J**	5 U	5 U	5 U	5 U	5 U
Iron, Dissolved	µg/L	14,000	**56.2 J**	**12,100**	**50.1 J**	**156,000**	**53 J**	**12.6 J**	**15.4 J**	**76.8**	**27,500**	**11,100**
Lead, Dissolved	µg/L	15	5 U	**4.1 J**	5 U	**3.4 J**	**2.7 J**	5 U	5 U	5 U	10 U	5 U
Manganese, Dissolved	µg/L	430	**7.3**	**764**	**7.4**	**13,000**	**12.7**	5 U	5 U	**4.8 J**	**3,810**	**2,110**
Nickel, Dissolved	µg/L	390	2.4 B	**8 J**	**2.5 J**	**887**	10 U	10 U	**0.7 J**	2.1 B	0.7 B	2.3 B
Silver, Dissolved	µg/L	94	6 U	6 U	6 U	**1.9 J**	6 U	6 U	6 U	6 U	6 U	6 U
Thallium, Dissolved	µg/L	2	**5.1 J**	10 U	**4.1 J**	10 U	**6.4 J**	**3.6 J**	10 U	**4.9 J**	20 U	10 U
Vanadium, Dissolved	µg/L	86	**392**	**1.4 J**	**64.6**	**8.4**	**645**	**212**	**151**	**427**	**6.5**	**6.5**
Zinc, Dissolved	µg/L	6,000	**1.5 J**	5.2 B	1.4 B	**687**	10 U	1.6 B	2.5 B	3.9 B	10 U	**11.4**
Other												
Cyanide	µg/L	200	**28.8**	10 U	10 U	10 U	**5.2 J**	**14.2**	**14.7**	**17.6**	**10.2**	10 U

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

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

[¥]The reported result of 5,000 µg/L for hexavalent chromium in TM10-PZM007 is suspect because high turbidities present in some unfiltered samples resulted in a matrix interference for the colorimetric method 7196. This sample was recollected on July 15, 2016 to be analyzed for dissolved and total hexavalent chromium, and both analyses returned non-detect results with a reporting limit of 10 µg/L. The results of the resample event are used in lieu of the original hexavalent chromium result. The original reported result of 5,000 µg/L does not represent a legitimate detection and does not appear on Figure GW-1.

Table 5 - Sub-Parcel B6-2
COPC Screening 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	B6-066-SB-5	6.4		0.017	0.43	51	39.22	410	20	no
1,2,3-Trichlorobenzene	87-61-6	B6-048-SB-8	0.0031	J	0.0031	0.003	51	1.96		93	no
1,2-Dichlorobenzene	95-50-1	B6-066-SB-5	0.53		0.0029	0.14	51	7.84		930	no
1,3-Dichlorobenzene	541-73-1	B6-066-SB-5	0.11	J	0.11	0.11	51	1.96			no
1,4-Dichlorobenzene	106-46-7	B6-066-SB-5	0.5		0.5	0.50	51	1.96	11	2,500	no
2,4-Dimethylphenol	105-67-9	B6-076-SB-8	0.033	J	0.015	0.02	50	10.00		1,600	no
2-Butanone (MEK)	78-93-3	B6-019-SB-1	0.0077	J	0.0024	0.005	51	13.73		19,000	no
2-Methylnaphthalene	91-57-6	B6-066-SB-5	8.1		0.0023	0.56	51	80.39		300	no
2-Methylphenol	95-48-7	B6-069-SB-8.5	0.023	J	0.015	0.02	50	6.00		4,100	no
Acenaphthene	83-32-9	B6-066-SB-5	8.1		0.0014	0.29	51	84.31		4,500	no
Acenaphthylene	208-96-8	B6-066-SB-5	2.4		0.0015	0.21	51	84.31			no
Acetone	67-64-1	B6-019-SB-1	0.039		0.0066	0.02	51	23.53		67,000	no
Acetophenone	98-86-2	B6-048-SB-8	0.085	J	0.018	0.04	51	13.73		12,000	no
Aluminum	7429-90-5	B6-054-SB-1	45,700		6,350	19,716	51	100.00		110,000	no
Anthracene	120-12-7	B6-066-SB-5	9		0.0015	0.49	51	96.08		23,000	no
Aroclor 1242	53469-21-9	B6-048-SB-1	0.162		0.054	0.11	26	7.69	0.95		no
Aroclor 1254	11097-69-1	B6-056-SB-1	0.142		0.0407	0.09	26	15.38	0.97	1.5	no
Aroclor 1260	11096-82-5	B6-065-SB-1	0.631		0.0842	0.25	26	15.38	0.99		no
Arsenic	7440-38-2	B6-048-SB-8	24.5		2.2	6.25	52	71.15	3	48	YES (C)
Barium	7440-39-3	B6-081-SB-5	1,010	J	25.7	242	51	100.00		22,000	no
Benz[a]anthracene	56-55-3	B6-069-SB-8.5	9.2		0.0042	0.86	51	96.08	21		no
Benzaldehyde	100-52-7	B6-038-SB-4	0.23		0.018	0.05	51	31.37	820	12,000	no
Benzene	71-43-2	B6-037-SB-5	0.0072		0.0015	0.003	51	11.76	5.1	42	no
Benzo[a]pyrene	50-32-8	B6-037-SB-5	8		0.0023	0.82	51	96.08	2.1	22	YES (C)
Benzo[b]fluoranthene	205-99-2	B6-037-SB-5	20		0.0013	1.46	51	98.04	21		no
Benzo[g,h,i]perylene	191-24-2	B6-037-SB-5	3.6		0.0014	0.36	51	94.12			no
Benzo[k]fluoranthene	207-08-9	B6-037-SB-5	20.3		0.0013	1.12	51	98.04	210		no
Beryllium	7440-41-7	B6-054-SB-1 & B6-054-SB-4	7.5		0.24	2.12	51	88.24	6,900	230	no
bis(2-Ethylhexyl)phthalate	117-81-7	B6-066-SB-5	4		0.015	0.44	51	27.45	160	1,600	no
Cadmium	7440-43-9	B6-048-SB-8	15.2		1.5	5.10	51	29.41	9,300	98	no
Carbazole	86-74-8	B6-069-SB-8.5	0.83		0.026	0.15	51	45.10			no
Chromium	7440-47-3	B6-069-SB-8.5	1,730		5.8	567	51	100.00		180,000	no
Chrysene	218-01-9	B6-037-SB-5	7		0.00069	0.78	51	98.04	2,100		no
cis-1,2-Dichloroethene	156-59-2	B6-038-SB-4	0.0045	J	0.0045	0.005	51	1.96		230	no
Cobalt	7440-48-4	B6-053-SB-4	145		0.97	12.2	51	98.04	1,900	35	YES (NC)
Copper	7440-50-8	B6-035-SB-4	458		2.1	81.0	51	100.00		4,700	no

Table 5 - Sub-Parcel B6-2
COPC Screening 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?
Cyanide	57-12-5	B6-048-SB-8	7		0.054	1.10	51	82.35		120	no
Cyclohexane	110-82-7	B6-066-SB-5	0.38	J	0.007	0.19	51	3.92		2,700	no
Dibenz[a,h]anthracene	53-70-3	B6-069-SB-8.5	0.9		0.0016	0.13	51	84.31	2.1		no
Diethylphthalate	84-66-2	B6-020-SB-1	2.5		0.019	0.90	51	5.88		66,000	no
Di-n-butylphthalate	84-74-2	B6-066-SB-5	0.36	J	0.02	0.11	51	7.84		8,200	no
Ethylbenzene	100-41-4	B6-076-SB-8	0.28		0.00094	0.07	51	11.76	25	2,000	no
Fluoranthene	206-44-0	B6-066-SB-5	13.2		0.00078	1.37	51	100.00		3,000	no
Fluorene	86-73-7	B6-066-SB-5	10.6		0.0015	0.42	51	86.27		3,000	no
Hexachloroethane	67-72-1	B6-056-SB-8	0.13		0.13	0.13	51	1.96	8	46	no
Indeno[1,2,3-c,d]pyrene	193-39-5	B6-037-SB-5	3.1		0.0015	0.36	51	92.16	21		no
Iron	7439-89-6	B6-048-SB-8	296,000		5,830	91,875	51	100.00		82,000	YES (NC)
Isopropylbenzene	98-82-8	B6-066-SB-5	0.95		0.055	0.50	51	3.92		990	no
Lead	7439-92-1	B6-069-SB-8.5	1,290		3.5	166	51	98.04		800	YES (NC)
Manganese	7439-96-5	B6-035-SB-1	69,100		61.2	21,832	51	100.00		2,600	YES (NC)
Mercury	7439-97-6	B6-048-SB-8	0.44		0.0037	0.06	51	84.31		35	no
Methyl Acetate	79-20-9	B6-054-SB-4	0.46	J	0.46	0.46	45	2.22		120,000	no
Naphthalene	91-20-3	B6-066-SB-5	10.5		0.0024	0.78	51	80.39	17	59	no
Nickel	7440-02-0	B6-048-SB-8	136		1.7	29.1	51	98.04	64,000	2,200	no
PCBs (total)	1336-36-3	B6-056-SB-1	1.212		0.0375	0.25	26	46.15	0.94		YES (C)
Phenanthrene	85-01-8	B6-066-SB-5	30		0.0008	1.42	51	100.00			no
Phenol	108-95-2	B6-066-SB-5	0.71		0.018	0.16	50	22.00		25,000	no
Pyrene	129-00-0	B6-066-SB-5	13.4		0.0063	1.30	51	98.04		2,300	no
Selenium	7782-49-2	B6-053-SB-1	6.4		3.3	4.38	51	7.84		580	no
Silver	7440-22-4	B6-055-SB-1	13.4		0.75	3.12	51	13.73		580	no
Tetrachloroethene	127-18-4	B6-038-SB-1	0.011		0.0041	0.007	51	7.84	100	39	no
Thallium	7440-28-0	B6-033-SB-1	71.6	J	3.9	25.1	51	25.49		1.2	YES (NC)
Toluene	108-88-3	B6-076-SB-8	0.0077		0.0017	0.003	51	15.69		4,700	no
Trichloroethene	79-01-6	B6-038-SB-4	0.0042	J	0.0042	0.004	51	1.96	6	1.9	no
Vanadium	7440-62-2	B6-055-SB-1	10,500		24	1,633	51	100.00		580	YES (NC)
Xylenes	1330-20-7	B6-066-SB-5	1.3		0.0029	0.26	51	17.65		250	no
Zinc	7440-66-6	B6-048-SB-8	6,700		1.9	520	51	98.04		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 6 - Sub-Parcel B6-2
Assessment of Lead

Exposure Unit	Surface/Sub-Surface	Arithmetic Mean (mg/kg)
Development Area (50.5 ac.)	Surface	86.6
	Sub-Surface	241
	Pooled	163

Lead Screening Levels	
Soil Concentration	Source
400 mg/kg	Integrated Exposure Uptake Biokinetic (IEUBK) model
800 mg/kg	Composite Worker Regional Screening Level (RSL)
2,518 mg/kg	Adult Lead Model (ALM) - See Below

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

Table 7 - Sub-Parcel B6-2
Exposure Point Concentrations - Construction Worker Soil

			Construction Worker LOD (50.5 ac.)					
			Surface Soil EPCs		Sub-Surface Soil EPCs		Pooled Soil EPCs	
Parameter	Cancer COPC Screening Level (mg/kg)	Non-Cancer COPC Screening Level (mg/kg)	EPC Type LOD	EPC LOD (mg/kg)	EPC Type LOD	EPC LOD (mg/kg)	EPC Type LOD	EPC LOD (mg/kg)
Arsenic	3.00	48.0	95% KM (t) UCL	**5.19**	95% GROS Adjusted Gamma UCL	**11.4**	95% GROS Approximate Gamma UCL	**7.22**
Cobalt	1,900	35.0	97.5% KM (Chebyshev) UCL	**42.9**	95% H-UCL	21.5	95% KM (Chebyshev) UCL	28.7
Iron		82,000	95% Student's-t UCL	**115,800**	95% Student's-t UCL	**109,500**	95% Student's-t UCL	**106,200**
Manganese		2,600	95% Student's-t UCL	**30,859**	97.5% Chebyshev (Mean, Sd) UCL	**43,913**	95% Approximate Gamma UCL	**29,363**
Thallium		1.20	95% KM (Percentile Bootstrap) UCL	**14.3**	95% KM (Percentile Bootstrap) UCL	**17.4**	95% KM (t) UCL	**13.4**
Vanadium		580	95% Adjusted Gamma UCL	**2,702**	95% Chebyshev (Mean, Sd) UCL	**3,115**	95% Approximate Gamma UCL	**2,284**
PCBs (total)	0.94		95% KM (% Bootstrap) UCL	0.22			95% KM (% Bootstrap) UCL	0.23
Benzo[a]pyrene	2.10	22	95% KM (Chebyshev) UCL	0.43	95% KM (Chebyshev) UCL	**3.36**	95% KM (Chebyshev) UCL	1.81

Bold indicates EPC higher than lowest COPC SL
COPC = Constituent of Potential Concern
Highlighting indicates parameter not sampled in the sub-surface

Table 8 - Sub-Parcel B6-2
Surface Soils
Construction Worker Risk Ratios

36 Day		Construction Worker LOD (50.5 ac.)				
			Construction Worker			
			SSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	5.19	105	670	4.9E-08	0.008
Cobalt	Thyroid	42.9	37,460	6,664	1.1E-09	0.006
Iron	Gastrointestinal	115,800		1,670,426		0.07
Manganese	Nervous	30,859		29,569		1
Thallium	Dermal	14.3		95.5		0.1
Vanadium	Dermal	2,702		11,148		0.2
PCBs (total)		0.22	22.9		9.6E-09	
Benzo[a]pyrene	Developmental	0.43	115	25.4	3.7E-09	0.02
					6E-08	↓

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	Cardiovascular	0
	Dermal	0
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0

Table 9 - Sub-Parcel B6-2
Sub-Surface Soils
Construction Worker Risk Ratios

36 Day		Construction Worker LOD (50.5 ac.)				
			Construction Worker			
			SSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	11.4	105	670	1.1E-07	0.02
Cobalt	Thyroid	21.5	37,460	6,664	5.7E-10	0.003
Iron	Gastrointestinal	109,500		1,670,426		0.07
Manganese	Nervous	43,913		29,569		1
Thallium	Dermal	17.4		95.5		0.2
Vanadium	Dermal	3,115		11,148		0.3
Benzo[a]pyrene	Developmental	3.36	115	25.4	2.9E-08	0.1
					1E-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	Cardiovascular	0
	Dermal	0
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0

Table 10 - Sub-Parcel B6-2
Pooled Soils
Construction Worker Risk Ratios

36 Day		Construction Worker LOD (50.5 ac.)				
			Construction Worker			
			SSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	7.22	105	670	6.9E-08	0.01
Cobalt	Thyroid	28.7	37,460	6,664	7.7E-10	0.004
Iron	Gastrointestinal	106,200		1,670,426		0.06
Manganese	Nervous	29,363		29,569		1
Thallium	Dermal	13.4		95.5		0.1
Vanadium	Dermal	2,284		11,148		0.2
PCBs (total)		0.23	22.9		1.0E-08	
Benzo[a]pyrene	Developmental	1.81	115	25.4	1.6E-08	0.07
					1E-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	Cardiovascular	0
	Dermal	0
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0

Table 11 - Sub-Parcel B6-2
Exposure Point Concentrations - Composite Worker (and Visitor) Soil

			Composite Worker Area (50.5 ac.)					
			Surface Soil EPCs		Sub-Surface Soil EPCs		Pooled Soil EPCs	
Parameter	Cancer COPC Screening Level (mg/kg)	Non-Cancer COPC Screening Level (mg/kg)	EPC Type Composite	EPC Comp. (mg/kg)	EPC Type Composite	EPC Comp. (mg/kg)	EPC Type Composite	EPC Comp. (mg/kg)
Arsenic	3.00	48.0	95% KM (t) UCL	**5.19**	95% GROS Adjusted Gamma UCL	**11.4**	95% GROS Approximate Gamma UCL	**7.22**
Cobalt	1,900	35.0	97.5% KM (Chebyshev) UCL	**42.9**	95% H-UCL	21.5	95% KM (Chebyshev) UCL	28.7
Iron		82,000	95% Student's-t UCL	**115,800**	95% Student's-t UCL	**109,500**	95% Student's-t UCL	**106,200**
Manganese		2,600	95% Student's-t UCL	**30,859**	97.5% Chebyshev (Mean, Sd) UCL	**43,913**	95% Approximate Gamma UCL	**29,363**
Thallium		1.20	95% KM (Percentile Bootstrap) UCL	**14.3**	95% KM (Percentile Bootstrap) UCL	**17.4**	95% KM (t) UCL	**13.4**
Vanadium		580	95% Adjusted Gamma UCL	**2,702**	95% Chebyshev (Mean, Sd) UCL	**3,115**	95% Approximate Gamma UCL	**2,284**
PCBs (total)	0.94		95% KM (% Bootstrap) UCL	0.22			95% KM (% Bootstrap) UCL	0.23
Benzo[a]pyrene	2.10	22	95% KM (Chebyshev) UCL	0.43	95% KM (Chebyshev) UCL	**3.36**	95% KM (Chebyshev) UCL	1.81

Bold indicates EPC higher than lowest COPC SL
COPC = Constituent of Potential Concern
Highlighting indicates parameter not sampled in the sub-surface

Table 12 - Sub-Parcel B6-2
Surface Soils
Composite Worker Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Composite Worker			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	5.19	3.00	480	1.7E-06	0.01
Cobalt	Thyroid	42.9	1,900	350	2.3E-08	0.1
Iron	Gastrointestinal	115,800		820,000		0.1
Manganese	Nervous	30,859		26,000		1
Thallium	Dermal	14.3		12.0		1
Vanadium	Dermal	2,702		5,800		0.5
PCBs (total)		0.22	0.94		2.3E-07	
Benzo[a]pyrene	Developmental	0.43	2.10	220	2.0E-07	0.002
					2E-06	↓

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

Total HI	Cardiovascular	0
	Dermal	2
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0

Table 13 - Sub-Parcel B6-2
Sub-Surface Soils
Composite Worker Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Composite Worker			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	11.4	3.00	480	3.8E-06	0.02
Cobalt	Thyroid	21.5	1,900	350	1.1E-08	0.06
Iron	Gastrointestinal	109,500		820,000		0.1
Manganese	Nervous	43,913		26,000		2
Thallium	Dermal	17.4		12.0		1
Vanadium	Dermal	3,115		5,800		0.5
Benzo[a]pyrene	Developmental	3.36	2.10	220	1.6E-06	0.02
					5E-06	↓

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

Total HI	Cardiovascular	0
	Dermal	2
	Thyroid	0
	Gastrointestinal	0
	Nervous	2
	Developmental	0

Table 14 - Sub-Parcel B6-2
Pooled Soils
Composite Worker Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Composite Worker			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	7.22	3.00	480	2.4E-06	0.02
Cobalt	Thyroid	28.7	1,900	350	1.5E-08	0.08
Iron	Gastrointestinal	106,200		820,000		0.1
Manganese	Nervous	29,363		26,000		1
Thallium	Dermal	13.4		12.0		1
Vanadium	Dermal	2,284		5,800		0.4
PCBs (total)		0.23	0.94		2.4E-07	
Benzo[a]pyrene	Developmental	1.81	2.10	220	8.6E-07	0.008
					4E-06	↓

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

Total HI	Cardiovascular	0
	Dermal	2
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0

Table 15 - Sub-Parcel B6-2
Surface Soils
Child Visitor Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Child Visitor			
			RSLs		Risk Estimates	
Parameter	**Target Organ**	**EPC mg/kg**	**Cancer**	**Non-Cancer**	**Risk**	**HQ**
Arsenic	**Cardiovascular; Dermal**	5.19	2.41	92.8	2.2E-06	0.06
Cobalt	**Thyroid**	42.9	29,200	62.2	1.5E-09	0.7
Iron	**Gastrointestinal**	115,800		145,000		0.8
Manganese	**Nervous**	30,859		4,960		6
Thallium	**Dermal**	14.3		2.07		7
Vanadium	**Dermal**	2,702		1,040		3
PCBs (total)		0.22	0.91		2.4E-07	
Benzo[a]pyrene	**Developmental**	0.43	1.85	47.6	2.3E-07	0.009
					3E-06	↓

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

Child Visitor Input Assumptions obtained from the State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater (June 2008):

A (acres): 0.5 ac
AF (skin adherence factor): 0.2 mg/cm^2
BW (body weight): 15 kg
ED (exposure duration): 6 yr
EF (exposure frequency): 132 d/yr
ET (exposure time): 4 hr
IR (soil ingestion rate): 200 mg/d
SA (surface area): 2,350 cm^2/d

Total HI	Cardiovascular	0
	Dermal	10
	Thyroid	1
	Gastrointestinal	1
	Nervous	6
	Developmental	0

Table 16 - Sub-Parcel B6-2
Sub-Surface Soils
Child Visitor Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Child Visitor			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	11.4	2.41	92.8	4.7E-06	0.1
Cobalt	Thyroid	21.5	29,200	62.2	7.4E-10	0.3
Iron	Gastrointestinal	109,500		145,000		0.8
Manganese	Nervous	43,913		4,960		9
Thallium	Dermal	17.4		2.07		8
Vanadium	Dermal	3,115		1,040		3
Benzo[a]pyrene	Developmental	3.36	1.85	47.6	1.8E-06	0.07
					7E-06	↓

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

Child Visitor Input Assumptions obtained from the State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater (June 2008):

A (acres): 0.5 ac
AF (skin adherence factor): 0.2 mg/cm^2
BW (body weight): 15 kg
ED (exposure duration): 6 yr
EF (exposure frequency): 132 d/yr
ET (exposure time): 4 hr
IR (soil ingestion rate): 200 mg/d
SA (surface area): 2,350 cm^2/d

Total HI	Cardiovascular	0
	Dermal	12
	Thyroid	0
	Gastrointestinal	1
	Nervous	9
	Developmental	0

Table 17 - Sub-Parcel B6-2
Pooled Soils
Child Visitor Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Child Visitor			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	7.22	2.41	92.8	3.0E-06	0.08
Cobalt	Thyroid	28.7	29,200	62.2	9.8E-10	0.5
Iron	Gastrointestinal	106,200		145,000		0.7
Manganese	Nervous	29,363		4,960		6
Thallium	Dermal	13.4		2.07		6
Vanadium	Dermal	2,284		1,040		2
PCBs (total)		0.23	0.91		2.5E-07	
Benzo[a]pyrene	Developmental	1.81	1.85	47.6	9.8E-07	0.04
					4E-06	↓

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

Child Visitor Input Assumptions obtained from the State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater (June 2008):

A (acres): 0.5 ac
AF (skin adherence factor): 0.2 mg/cm^2
BW (body weight): 15 kg
ED (exposure duration): 6 yr
EF (exposure frequency): 132 d/yr
ET (exposure time): 4 hr
IR (soil ingestion rate): 200 mg/d
SA (surface area): 2,350 cm^2/d

Total HI	Cardiovascular	0
	Dermal	9
	Thyroid	0
	Gastrointestinal	1
	Nervous	6
	Developmental	0

Table 18 - Sub-Parcel B6-2
Surface Soils
Youth Visitor Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Youth Visitor			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	**Cardiovascular; Dermal**	5.19	5.01	386	1.0E-06	0.01
Cobalt	**Thyroid**	42.9	14,600	331	2.9E-09	0.1
Iron	**Gastrointestinal**	115,800		774,000		0.1
Manganese	**Nervous**	30,859		25,900		1
Thallium	**Dermal**	14.3		11.1		1
Vanadium	**Dermal**	2,702		5,560		0.5
PCBs (total)		0.22	1.44		1.5E-07	
Benzo[a]pyrene	**Developmental**	0.43	3.04	156	1.4E-07	0.003
					1E-06	↓

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

Youth Visitor Input Assumptions obtained from the State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater (June 2008):

A (acres): 0.5 ac
AF (skin adherence factor): 0.2 mg/cm^2
BW (body weight): 40 kg
ED (exposure duration): 12 yr
EF (exposure frequency): 132 d/yr
ET (exposure time): 4 hr
IR (soil ingestion rate): 100 mg/d
SA (surface area): 4,320 cm^2/d

Total HI	Cardiovascular	0
	Dermal	2
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0

Table 19 - Sub-Parcel B6-2
Sub-Surface Soils
Youth Visitor Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Youth Visitor			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	**Cardiovascular; Dermal**	11.4	5.01	386	2.3E-06	0.03
Cobalt	**Thyroid**	21.5	14,600	331	1.5E-09	0.06
Iron	**Gastrointestinal**	109,500		774,000		0.1
Manganese	**Nervous**	43,913		25,900		2
Thallium	**Dermal**	17.4		11.1		2
Vanadium	**Dermal**	3,115		5,560		0.6
Benzo[a]pyrene	**Developmental**	3.36	3.04	156	1.1E-06	0.02
					3E-06	↓

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

Youth Visitor Input Assumptions obtained from the State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater (June 2008):

A (acres): 0.5 ac
AF (skin adherence factor): 0.2 mg/cm^2
BW (body weight): 40 kg
ED (exposure duration): 12 yr
EF (exposure frequency): 132 d/yr
ET (exposure time): 4 hr
IR (soil ingestion rate): 100 mg/d
SA (surface area): 4,320 cm^2/d

Total HI	Cardiovascular	0
	Dermal	2
	Thyroid	0
	Gastrointestinal	0
	Nervous	2
	Developmental	0

Table 20 - Sub-Parcel B6-2
Pooled Soils
Youth Visitor Risk Ratios

		Composite Worker Area (50.5 ac.)				
			Youth Visitor			
			RSLs		Risk Estimates	
Parameter	Target Organ	EPC mg/kg	Cancer	Non-Cancer	Risk	HQ
Arsenic	Cardiovascular; Dermal	7.22	5.01	386	1.4E-06	0.02
Cobalt	Thyroid	28.7	14,600	331	2.0E-09	0.09
Iron	Gastrointestinal	106,200		774,000		0.1
Manganese	Nervous	29,363		25,900		1
Thallium	Dermal	13.4		11.1		1
Vanadium	Dermal	2,284		5,560		0.4
PCBs (total)		0.23	1.44		1.6E-07	
Benzo[a]pyrene	Developmental	1.81	3.04	156	6.0E-07	0.01
					2E-06	↓

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

Youth Visitor Input Assumptions obtained from the State of Maryland Department of the Environment Cleanup Standards for Soil and Groundwater (June 2008):

A (acres): 0.5 ac
AF (skin adherence factor): 0.2 mg/cm^2
BW (body weight): 40 kg
ED (exposure duration): 12 yr
EF (exposure frequency): 132 d/yr
ET (exposure time): 4 hr
IR (soil ingestion rate): 100 mg/d
SA (surface area): 4,320 cm^2/d

Total HI	Cardiovascular	0
	Dermal	2
	Thyroid	0
	Gastrointestinal	0
	Nervous	1
	Developmental	0

APPENDIX A

TRADEPOINT
ATLANTIC
1600 Sparrows Point Boulevard
Baltimore, Maryland 21219

October 9, 2017

Maryland Department of Environment
1800 Washington Boulevard
Baltimore MD, 21230

Attention: Ms. Barbara Brown

Subject: Request to Enter Temporary CHS Review
Tradepoint Atlantic Parcel B-6-2

Dear Ms. Brown:

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 (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 B-6-2 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

Construction Worker Soil Screening Levels
36 Work Day Exposure
Calculation Spreadsheet - Sub-Parcel B6-2

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
36 Work Day Exposure
Calculation Spreadsheet - Sub-Parcel B6-2

Area of site (ac)	Ac	50.5
Overall duration of construction (wk/yr)	EW	7.2
Exposure frequency (day/yr)	EF	**36**
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	**13.5**
Overall duration of traffic (s)	Tt	**1,036,800**
Surface area (m2)	AR	**204,366**
Length (m)	LR	**452**
Distance traveled (km)	ΣVKT	**163**
Particulate emission factor (m3/kg)	PEFsc	**158,343,347**
Derivation of dispersion factor - volatilization (g/m2-s per kg/m3)	Q/Csa	**6.57**
Total time of construction (s)	Tcv	**1,036,800**

Input
Calculation

Chemical	Toxicity Criteria Source	^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				105	78,405	105	676	72,244	670
Cobalt	P	-	9.00E-03	3.00E-03	2.00E-05	1	3.00E-03	**0.01**	1			-	4.50E+01					37,460	37,460	7,159	96,326	6,664
Iron	P	-	-	7.00E-01	-	1	7.00E-01	**0.01**	1			-	2.50E+01							1,670,426		1,670,426
Manganese (Non-diet)	I	-	-	2.40E-02	5.00E-05	0.04	9.60E-04	**0.01**	1			-	6.50E+01							33,709	240,814	29,569
Thallium (Soluble Salts)	P	-	-	4.00E-05	-	1	4.00E-05	**0.01**	1			-	7.10E+01							95.5		95.5
Vanadium and Compounds	A	-	-	1.00E-02	1.00E-04	0.026	2.60E-04	**0.01**	1			-	1.00E+03							11,412	481,628	11,148
PCB Total	I	2.00E+00	5.71E-04	-	-	1		0.14	1	2.40E-02	6.30E-06	1.70E-02	4.68E+02	7.80E+04	4.66E-08	9.89E+3	60.6	36.9	22.9			
Benzo[a]pyrene	I	1.00E+00	6.00E-04	3.00E-04	2.00E-06	1	3.00E-04	0.13	1	4.80E-02	5.60E-06	1.87E-05	3.54E+03	5.90E+05	2.37E-11	4.39E+5	124	1,553	115	530	26.6	25.4

*chemical specific parameters found in Chemical Specific Parameters Spreadsheet at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016
^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 or IRIS 2017 Recent Additions at https://www.epa.gov/iris/iris-recent-additions
C: chemical specific parameters found in Cal EPA at https://www.dtsc.ca.gov/AssessingRisk/upload/HHRA-Note-3-2016-01.pdf
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

APPENDIX C

RIPARIUS CONSTRUCTION, INC.

Tradepoint Retail Area Mass Grading
Ground Intrusive Work Schedule

January 12, 2018

Task Name	# Of Working Days	Anticipated Exposure Days	Approximate Dates of Tasks	
			Start	Finish
Subcontractor awards	5	0	Thur 02/01/18	Wed 02/07/18
Submittals	10	0	Thur 02/01/18	Wed 02/14/18
Sediment and Erosion Controls	10	0	Mon 02/19/18	Fri 03/02/18
Cut and Fill Grading Activities	35	0	Mon 02/26/18	Wed 4/18/18
Storm installation	18	18	Mon 03/26/18	Wed 04/18/18
Pumping Station/Sewer Installation	36	36	Wed 03/26/18	Tue 05/08/2018
Water installation	21	21	Mon 04/23/18	Tue 05/22/2018

Crews performing ground intrusive work shall not exceed 36 days

APPENDIX D

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
- 5dzăű a l·ă]
- 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)

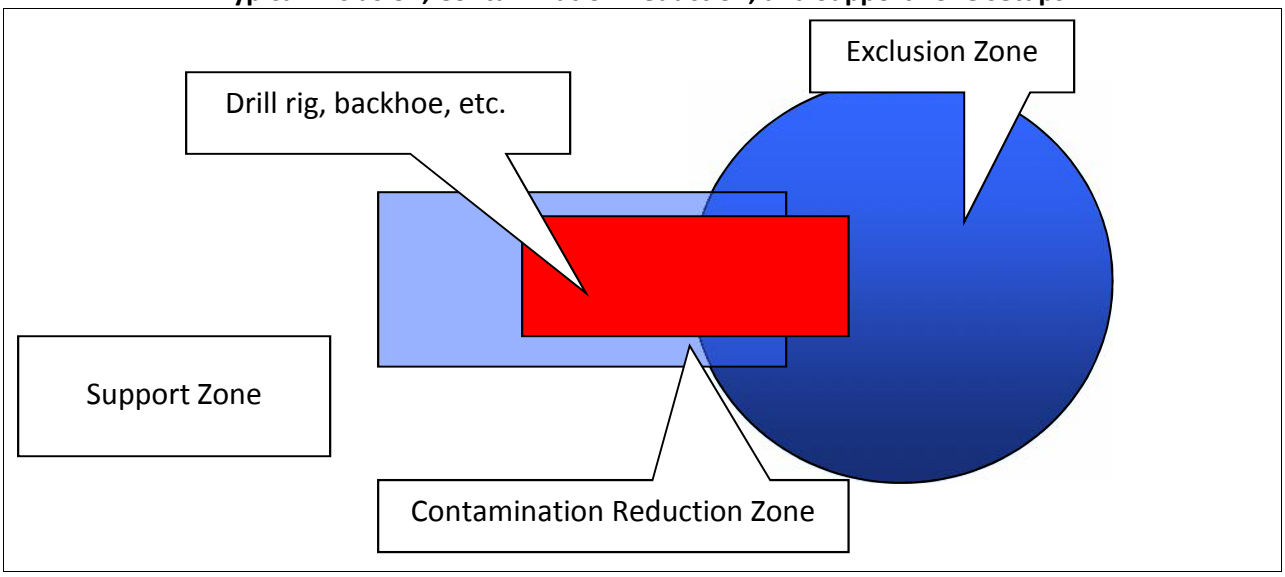
Between the EZ and the SZ will be the CRZ, which will provide a transition between the potentially contaminated EZ and the clean SZ. The CRZ (located upwind of the EZ, if possible) will be a corridor leading from the EZ and will serve as a buffer to further reduce the probability of the SZ becoming contaminated. 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

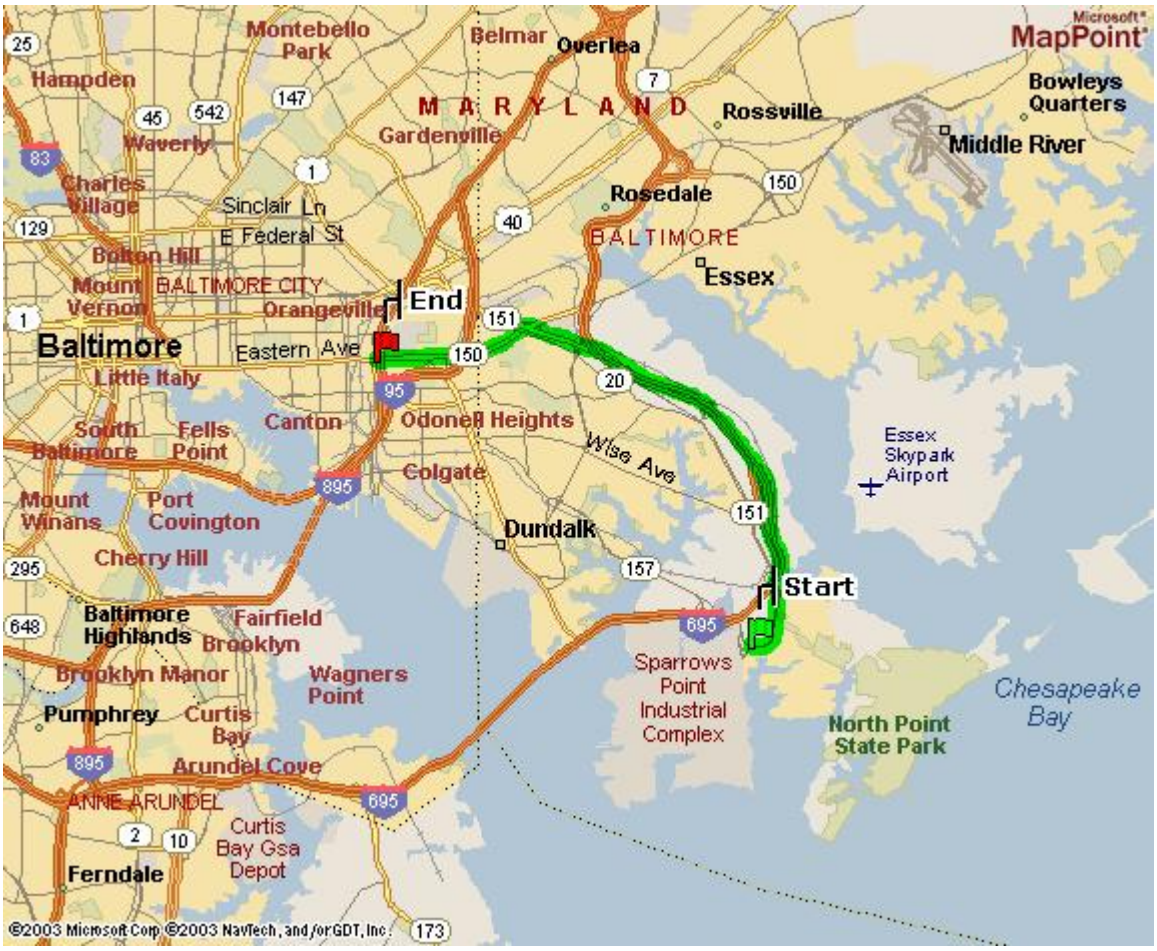
Hospital

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

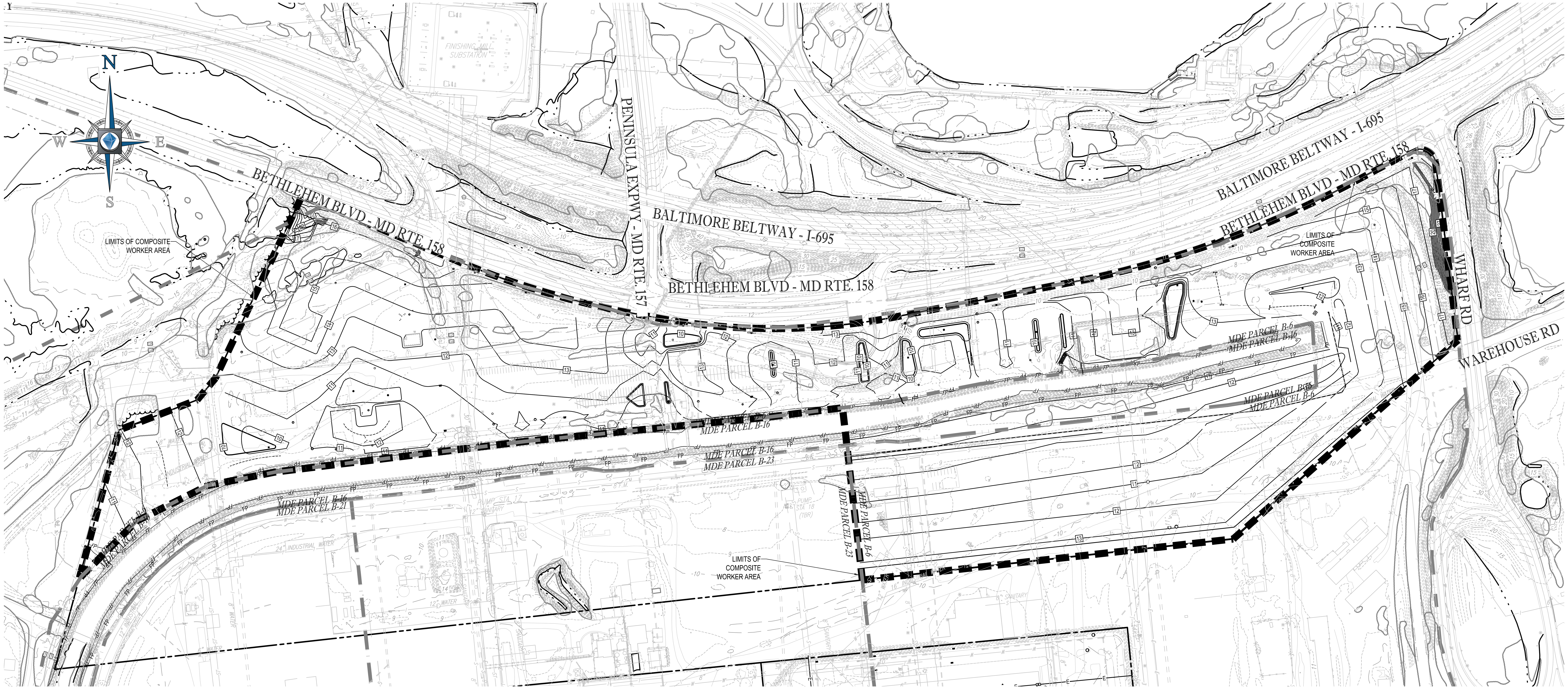
_____ _____

EAG Supervisor/Project Manager Signature Date

ATTACHMENT B

Material Safety Data Sheets (MSDSs)

APPENDIX E



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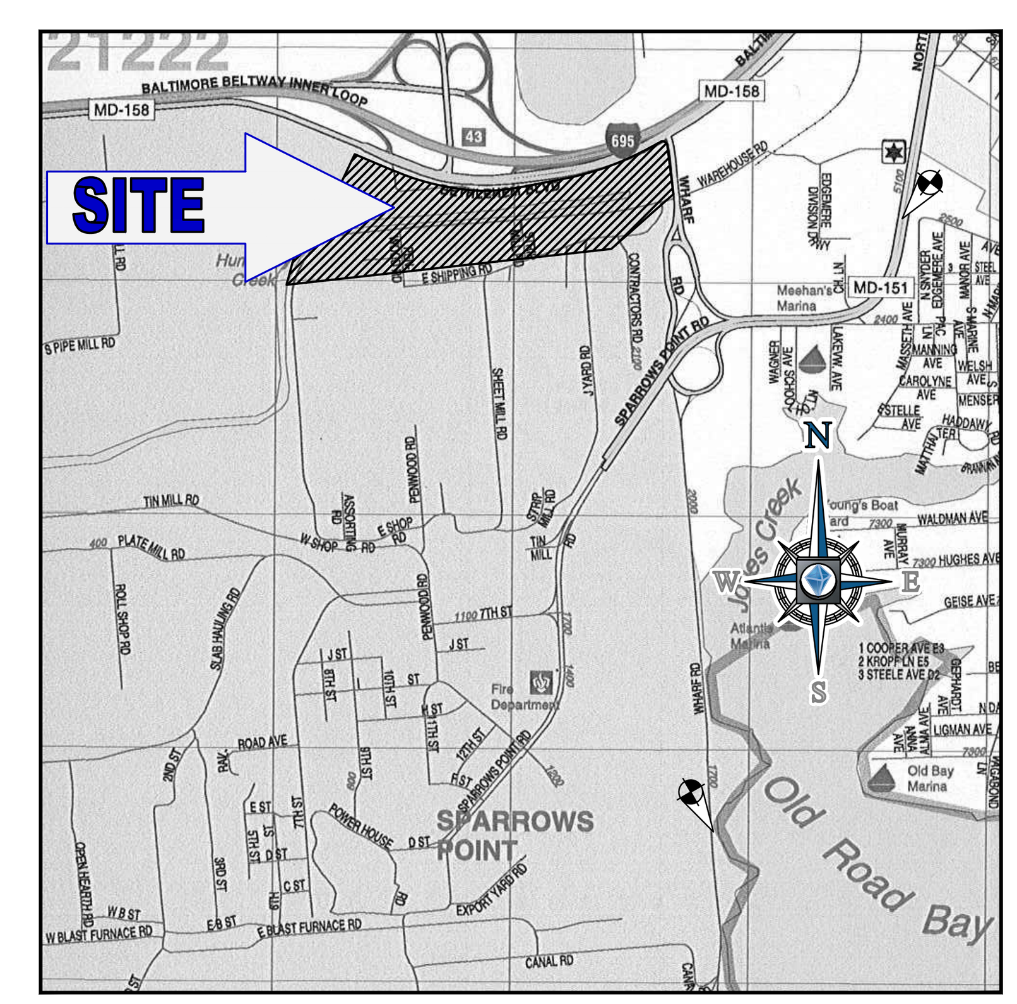


LOCATION MAP

COPYRIGHT ADC THE MAP PEOPLE
PERMIT USE NO. 20602153-5
SCALE: 1"=2000'

MARYLAND COORDINATE SYSTEM (MCS)

ELEVATIONS BASED ON NAVD 88, COORDINATES AND MERIDIAN ARE BASED ON THE MARYLAND COORDINATE SYSTEM (MCS) PER MONUMENTS BCO #1433 AND GIS 2

BOHLER ENGINEERING

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING PROGRAM MANAGEMENT LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN PERMITTING SERVICES TRANSPORTATION SERVICES

- UPSTATE NEW YORK
- NEW ENGLAND
- BOSTON, MA
- NEW YORK, NY
- NEW YORK METRO
- NORTHERN NEW JERSEY
- SOUTHERN NEW JERSEY
- PHILADELPHIA, PA
- PITTSBURGH, PA
- LEHIGH VALLEY, PA
- SOUTHEASTERN, PA
- REHOBOTH BEACH, DE
- BALTIMORE, MD
- SOUTHERN MARYLAND
- NORTHERN VIRGINIA
- CENTRAL VIRGINIA
- RALEIGH, NC
- WASHINGTON, DC
- CHARLOTTE, NC
- ATLANTA, GA
- TAMPA, FL
- SOUTH FLORIDA
- DALLAS, TX

REVISIONS

REV	DATE	COMMENT	BY
1	12/20/17	REVISED PER COUNTY & MDE COMMENTS	DSH

DIG WITH C.A.R.E. CALL BEFORE YOU DIG

THE FOLLOWING STATES REQUIRE NOTIFICATION BY EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE STATE. IN VIRGINIA, MARYLAND, THE DISTRICT OF COLUMBIA, AND DELAWARE CALL - 811
(WV 1-800-245-4848) (PA 1-800-242-1776) (DC 1-800-257-7777)
(VA 1-800-552-7001) (MD 1-800-257-7777) (DE 1-800-282-8555)

NOT APPROVED FOR CONSTRUCTION

PROJECT No.:	MD1620661
DRAWN BY:	DML
CHECKED BY:	MJG
DATE:	01/19/18
SCALE:	AS NOTED
CAD I.D.:	EX0

PROJECT:

PROPOSED GRADING EXHIBIT

FOR

TRADEPOINT ATLANTIC

LOCATION OF SITE
RETAIL AREA
BETHLEHEM BLVD (MD RTE. 158)
TAX MAP 111, PARCEL 318
BALTIMORE, MD 21219
BALTIMORE COUNTY

BOHLER ENGINEERING
901 DULANEY VALLEY ROAD, SUITE 801
TOWSON, MARYLAND 21204
Phone: (410) 821-7900
Fax: (410) 821-7987
MD@BohlerEng.com

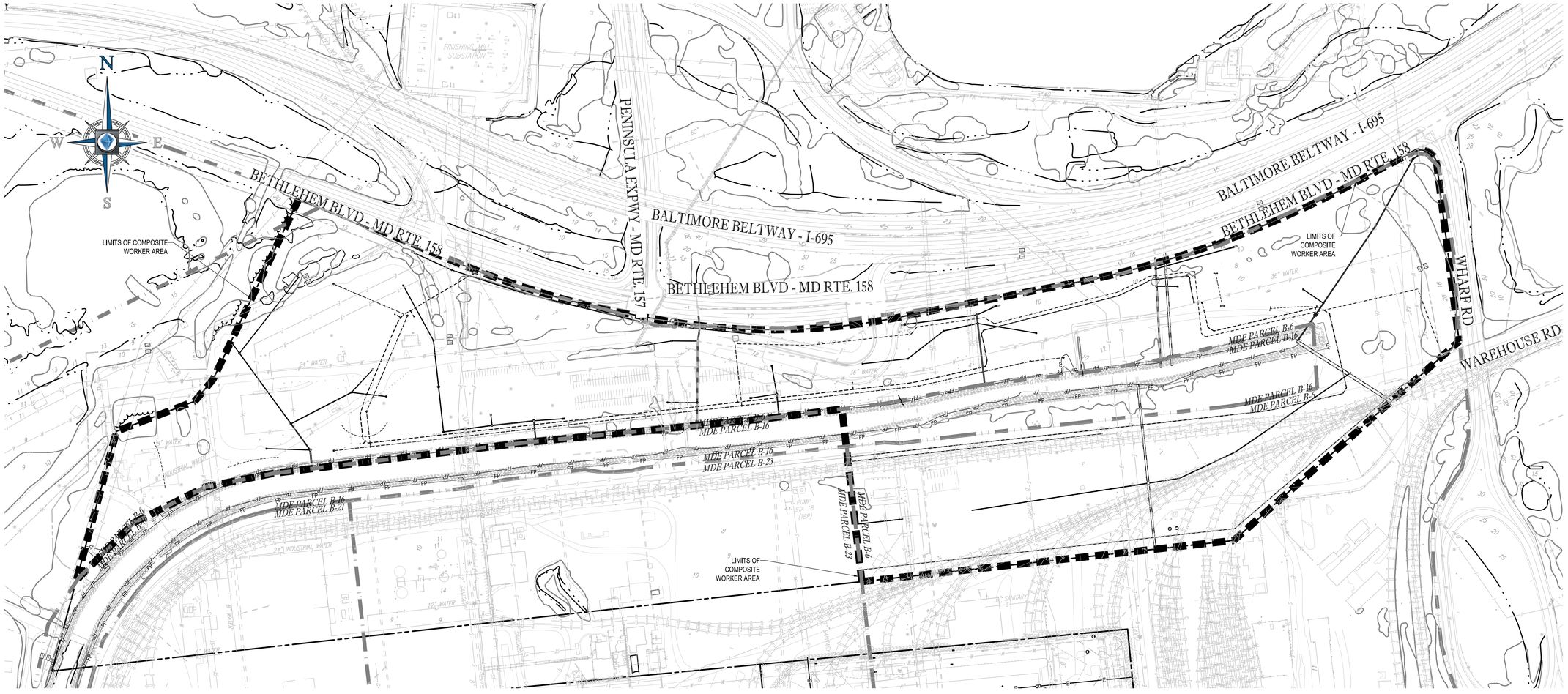
SHEET TITLE:

PROPOSED GRADING EXHIBIT

SHEET NUMBER:

C-01

MDE #18-SF-0032



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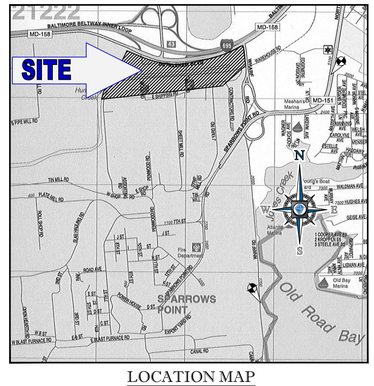

LOCATION MAP

SCALE: 1"=2000'

MARYLAND COORDINATE SYSTEM (MCS)

ELEVATIONS BASED ON NAVD 88, COORDINATES AND MERIDIAN ARE BASED ON THE MARYLAND COORDINATE SYSTEM (MCS) PER MONUMENTS BCO #1433 AND GIS 2

BOHLER ENGINEERING

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
TRANSPORTATION ENGINEERING
LANDSCAPE ARCHITECTURE
PROGRAM MANAGEMENT
PLANNING SERVICES

- UPSTATE NEW YORK
- NEW ENGLAND
- BOSTON, MA
- ALBANY, NY
- NEW YORK METRO
- NORTHERN NEW JERSEY
- SOUTHERN NEW JERSEY
- PHILADELPHIA, PA
- PITTSBURGH, PA
- SOUTHEASTERN, PA
- NORTHERN VIRGINIA
- RICHMOND, VIRGINIA
- RALEIGH, NC
- BEHOKOTH BEACH, DE
- BALTIMORE, MD
- SOUTHERN MARYLAND
- NORTHERN VIRGINIA
- SOUTH FLORIDA
- CHARLOTTE, NC
- ATLANTA, GA
- TAMPA, FL
- RALEIGH, NC
- DALLAS, TX
- WASHINGTON, DC

THE INFORMATION, DATA, AND DESIGNS CONTAINED ON THESE PLANS ARE PROPRIETARY TO BOHLER ENGINEERING, ONLY APPROVED, SIGNED AND SEALED PLANS SHALL BE UTILIZED FOR CONSTRUCTION PURPOSES

REVISIONS

REV	DATE	COMMENT	BY
1	12/20/17	REVISED PER COUNTY & MDE COMMENTS	DSH

THE FOLLOWING STATES REQUIRE NOTIFICATION BY EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE STATE IN VIRGINIA, MARYLAND, THE DISTRICT OF COLUMBIA, AND DELAWARE CALL - 811
(WV 1-800-245-4848) (PA 1-800-242-1776) (DC 1-800-257-7777)
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LOCATION OF SITE
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TOWSON, MARYLAND 21204
Phone: (410) 821-7900
Fax: (410) 821-7987
MD@BohlerEng.com

SHEET TITLE:

PROPOSED UTILITY EXHIBIT

SHEET NUMBER:

C-01

MDE #18-SF-0032

APPENDIX F

Appendix F-1

Finishing Mills Groundwater Investigation Report Resources

Table 11
Vapor Intrusion Criteria Comparison

Sample Location	Parameter	Result (ug/L)	Final Flag	Target Groundwater Concentration (ug/L) TCR=1E-05 or THQ=1	Comparison = Result / Target	Exceeds Criteria	Toxicity Type
FM-002-PZS	Cyanide	3.7	J	3.5	1.06	YES	NC
FM-004-PZI	Cyanide	4.6	J	3.5	1.31	YES	NC
FM-004-PZS	Cyanide	8.1	J	3.5	2.31	YES	NC
FM-005-PZS	Cyanide	33.5		3.5	9.57	YES	NC
FM-006-PZS	Cyanide	4.9	J+	3.5	1.40	YES	NC
FM-007-PZS	Cyanide	3.6	J	3.5	1.03	YES	NC
FM-008-PZS	Cyanide	12.1		3.5	3.46	YES	NC
FM-010-PZS	Cyanide	28.8		3.5	8.23	YES	NC
FM-016-PZS	Cyanide	6.2	J	3.5	1.77	YES	NC
FM-017-PZS	Cyanide	8.4	J	3.5	2.40	YES	NC
FM05-PZM004	Cyanide	9.3	J	3.5	2.66	YES	NC
SW-075-MWS	Cyanide	9.6	J+	3.5	2.74	YES	NC
SW-079-MWS	Cyanide	31.4		3.5	8.97	YES	NC
SW-081-MWS	Cyanide	1350	J+	3.5	385.71	YES	NC
TM07-PZM005	Cyanide	31.4		3.5	8.97	YES	NC
TM09-PZM007	Cyanide	45.8		3.5	13.09	YES	NC
TM10-PZM007	Cyanide	5.2	J	3.5	1.49	YES	NC
TM11-PZM007	Cyanide	58.3		3.5	16.66	YES	NC
TM12-PZM006	Cyanide	14.2		3.5	4.06	YES	NC
TM13-PZM007	Cyanide	18		3.5	5.14	YES	NC
TM14-PZM005	Cyanide	14.7		3.5	4.20	YES	NC
TM15-PZM007	Cyanide	73.6		3.5	21.03	YES	NC
TM15-PZM011	Cyanide	33.3		3.5	9.51	YES	NC
TM16-PZM007	Cyanide	17.6		3.5	5.03	YES	NC
TM17-PZM005	Cyanide	10.2		3.5	2.91	YES	NC

NC indicates non-carcinogenic hazard

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.

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	FM-001-PZI	FM-001-PZS	FM-002-PZI	FM-002-PZS	FM-003-PZI	FM-003-PZS	FM-004-PZI
Cancer Risk									
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	0	0	0	2.2E-11	1.4E-09	6.9E-09	5.5E-10
Naphthalene	SVOC	Nervous; Respiratory	1.8E-09	3.3E-09	1.2E-09	0	2.8E-09	5E-09	1.6E-09
1,1-Dichloroethane	VOC	None Specified	0	0	0	5.8E-08	2.8E-08	6.09E-07	4.2E-08
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	2.3E-06	0
Benzene	VOC	Immune	0	0	0	0	0	0	0
Bromodichloromethane	VOC	Urinary	0	0	0	0	0	0	0
Chloroform	VOC	Hepatic	3.06E-07	0	7.2E-08	0	5E-07	0	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	3.7E-07	0
Cumulative Vapor Intrusion - Target Cancer Risk =			3E-07	3E-09	7E-08	6E-08	5E-07	3E-06	4E-08
Non-Cancer Hazard									
Cyanide	Other	None Specified	0	0.71	0	1.1	0.69	0	1.3
Cumulative Vapor Intrusion - Hazard Index =			0	0.7	0	1	0.7	0	1
1,1-Dichloroethene	VOC	Hepatic	0	0	0	4.3E-04	0	0.16	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	4E-04	0	0.2	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0

Values highlighted in red indicate exceedances of the
cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	FM-004-PZS	FM-005-PZI	FM-005-PZS	FM-006-PZI	FM-006-PZS	FM-007-PZI	FM-007-PZS
Cancer Risk									
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	7.9E-10	1.08E-10	7.2E-11	0	7E-12	0	0
Naphthalene	SVOC	Nervous; Respiratory	1E-08	5.5E-09	1.5E-07	2.9E-09	1.5E-09	1.7E-09	3.0E-09
1,1-Dichloroethane	VOC	None Specified	0	0	1.4E-08	0	0	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0	0
Benzene	VOC	Immune	0	0	0	0	0	0	0
Bromodichloromethane	VOC	Urinary	0	0	0	0	0	0	0
Chloroform	VOC	Hepatic	0	0	0	0	0	0	1.9E-07
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			1E-08	6E-09	2E-07	3E-09	2E-09	2E-09	2E-07
Non-Cancer Hazard									
Cyanide	Other	None Specified	2.3	0.57	9.6	0	1.4	0	1.0
Cumulative Vapor Intrusion - Hazard Index =			2	0.6	10	0	1	0	1
1,1-Dichloroethene	VOC	Hepatic	8.8E-04	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			9E-04	0	0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	FM-008-PZI	FM-008-PZS	FM-009-PZI	FM-009-PZS	FM-010-PZS	FM-011-PZI	FM-011-PZS	FM-012-PZI
Cancer Risk										
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	0	7.5E-12	1.8E-11	0	7E-12	4.6E-11	2.6E-11	0
Naphthalene	SVOC	Nervous; Respiratory	9E-08	3.2E-08	1.6E-09	1.8E-09	4.0E-07	2.2E-09	2.7E-09	3.4E-09
1,1-Dichloroethane	VOC	None Specified	0	0	0	0	0	3.6E-08	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0	0	0
Benzene	VOC	Immune	0	0	0	0	0	0	0	0
Bromodichloromethane	VOC	Urinary	0	0	0	0	0	0	0	0
Chloroform	VOC	Hepatic	3.6E-07	0	1.6E-06	0	0	0	0	3.6E-07
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	6.6E-08	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	1.2E-08	1.3E-09	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			5E-07	1E-07	2E-06	2E-09	4E-07	5E-08	4E-09	4E-07
Non-Cancer Hazard										
Cyanide	Other	None Specified	0	3.5	0	0.86	8.2	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	3	0	0.9	8	0	0	0
1,1-Dichloroethene	VOC	Hepatic	0	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	FM-012-PZS	FM-013-PZI	FM-013-PZS	FM-014-PZI	FM-014-PZS	FM-015-PZI	FM-015-PZS	FM-016-PZI
Cancer Risk										
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	0	1.3E-11	6.5E-11	1.9E-10	3.6E-11	2.8E-11	0	4.8E-11
Naphthalene	SVOC	Nervous; Respiratory	6E-09	0.000000007	1.2E-08	0.000000007	1.4E-09	2.2E-09	1.5E-08	1.5E-09
1,1-Dichloroethane	VOC	None Specified	0	0	2.3E-08	5.8E-08	0	0	0	2.4E-08
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0	0	0
Benzene	VOC	Immune	0	0	0	0	0	0	0	0
Bromodichloromethane	VOC	Urinary	0	0	0	0	0	0	0	0
Chloroform	VOC	Hepatic	0	1.06E-06	2.4E-07	0	0	2.7E-07	0	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	5E-08	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			6E-09	1E-06	3E-07	6E-08	1E-09	3E-07	2E-08	3E-08
Non-Cancer Hazard										
Cyanide	Other	None Specified	0	0	0	0	0.74	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0.7	0	0	0
1,1-Dichloroethene	VOC	Hepatic	0	0	0	4.5E-03	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	5E-03	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	FM-016-PZS	FM-017-PZS	FM01-PZM003	FM01-PZM041	FM05-PZM004	FM05-PZM024	SW-048-MWS
Cancer Risk									
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	1.2E-09	6.5E-12	0	0	2.8E-12	0	0
Naphthalene	SVOC	Nervous; Respiratory	1.6E-09	1.7E-08	2.6E-09	1.2E-09	5.4E-06	2.4E-07	1.9E-09
1,1-Dichloroethane	VOC	None Specified	2.4E-07	1.4E-08	0	0	0	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0	0
Benzene	VOC	Immune	0	6.2E-08	0	0	3.8E-07	0	0
Bromodichloromethane	VOC	Urinary	0	0	0	0	0	0	0
Chloroform	VOC	Hepatic	5E-07	0	7.8E-06	0	0	0	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			7E-07	9E-08	8E-06	1E-09	6E-06	2E-07	2E-09
Non-Cancer Hazard									
Cyanide	Other	None Specified	1.8	2.4	0	0	2.7	0	0
Cumulative Vapor Intrusion - Hazard Index =			2	2	0	0	3	0	0
1,1-Dichloroethene	VOC	Hepatic	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	SW-053-MWS	SW06-PZM001	SW06-PZM053	SW-075-MWI	SW-075-MWS	SW-076-MWI
Cancer Risk								
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	0	0	0	0	0	1E-11
Naphthalene	SVOC	Nervous; Respiratory	0	2.7E-09	1.2E-09	1.9E-09	2.1E-08	0
1,1-Dichloroethane	VOC	None Specified	0	0	0	0	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0
Benzene	VOC	Immune	0	0	0	0	9.3E-08	0
Bromodichloromethane	VOC	Urinary	0	0	0	0	0	0
Chloroform	VOC	Hepatic	0	0	1.6E-06	1.3E-06	2.7E-07	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	1.7E-09
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			0	3E-09	2E-06	1E-06	4E-07	2E-09
Non-Cancer Hazard								
Cyanide	Other	None Specified	0	0	0	0	2.7	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	3	0
1,1-Dichloroethene	VOC	Hepatic	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0.55
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0.5

Values highlighted in red indicate exceedances of the
cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	SW-076-MWS	SW-077-MWI	SW-077-MWS	SW-078-MWI	SW-078-MWS	SW-079-MWI	SW-079-MWS
Cancer Risk									
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	0	0	0	0	5.5E-12	0	7.2E-12
Naphthalene	SVOC	Nervous; Respiratory	9E-10	2.1E-09	8.5E-08	0	0	9E-09	6E-07
1,1-Dichloroethane	VOC	None Specified	0	0	0	0	0	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0	0
Benzene	VOC	Immune	0	0	3.5E-08	0	0	0	3.6E-08
Bromodichloromethane	VOC	Urinary	0	3.2E-07	0	9.5E-07	0	0	0
Chloroform	VOC	Hepatic	0	3.8E-06	0	6.4E-06	0	6.7E-07	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			9E-10	4E-06	1E-07	7E-06	6E-12	7E-07	6E-07
Non-Cancer Hazard									
Cyanide	Other	None Specified	0	0	0	0	0	0	9
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	9
1,1-Dichloroethene	VOC	Hepatic	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	SW-080-MWI	SW-080-MWS	SW-081-MWI	SW-081-MWS	TM07-PZM005	TM07-PZM045	TM09-PZM007
Cancer Risk									
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	3.7E-10	2E-11	1.4E-09	6E-12	6.5E-12	2.08E-11	1.5E-10
Naphthalene	SVOC	Nervous; Respiratory	1.1E-09	0	0.000000007	1.9E-07	7E-09	1.6E-09	3.1E-07
1,1-Dichloroethane	VOC	None Specified	4.8E-07	1.7E-07	5.5E-08	0	2.0E-08	0	7.6E-08
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0	0
Benzene	VOC	Immune	0	0	0	1.3E-07	0	0	1.03E-07
Bromodichloromethane	VOC	Urinary	0	0	0	0	0	0	0
Chloroform	VOC	Hepatic	7.8E-07	0	0	0	0	0	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	2.4E-09	0	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			1E-06	2E-07	6E-08	3E-07	3E-08	2E-09	5E-07
Non-Cancer Hazard									
Cyanide	Other	None Specified	0	0	0	385.7	9.0	0	13.1
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	386	9	0	13
1,1-Dichloroethene	VOC	Hepatic	2.7E-02	1.09E-03	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			3E-02	1E-03	0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0	0.1
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0	0.1

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	TM09-PZM047	TM10-PZM007	TM11-PZM007	TM11-PZM034	TM12-PZM006	TM13-PZM007
Cancer Risk								
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	0	1.9E-11	1.6E-10	7.7E-12	0	0
Naphthalene	SVOC	Nervous; Respiratory	0	3.0E-09	2.3E-07	6E-09	6.5E-07	1.2E-06
1,1-Dichloroethane	VOC	None Specified	0	2.1E-08	3.03E-08	0	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0	0
Benzene	VOC	Immune	0	0	5.9E-08	0	1.7E-07	3.8E-07
Bromodichloromethane	VOC	Urinary	0	0	0	1.4E-07	0	0
Chloroform	VOC	Hepatic	0	0	0	2.08E-06	0	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			0	2E-08	3E-07	2E-06	8E-07	2E-06
Non-Cancer Hazard								
Cyanide	Other	None Specified	0	1.5	16.7	0	4.1	5.1
Cumulative Vapor Intrusion - Hazard Index =			0	1	17	0	4	5
1,1-Dichloroethene	VOC	Hepatic	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

Parameter	Type	Organ Systems	TM13-PZM046	TM14-PZM005	TM15-PZM007	TM15-PZM011	TM15-PZM031
Cancer Risk							
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	0	0	0	1.3E-11	0
Naphthalene	SVOC	Nervous; Respiratory	3.8E-06	1.9E-07	5.7E-06	1.5E-06	0
1,1-Dichloroethane	VOC	None Specified	0	0	0	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0	0	0
Benzene	VOC	Immune	0	6.09E-08	2.9E-07	1.7E-07	0
Bromodichloromethane	VOC	Urinary	0	0	0	0	0
Chloroform	VOC	Hepatic	1.5E-06	0	0	0	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	3.9E-08	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	0	0	0
Vinyl chloride	VOC	Hepatic	0	0	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			5E-06	2E-07	6E-06	2E-06	0
Non-Cancer Hazard							
Cyanide	Other	None Specified	0	4.2	21.0	9.5	0
Cumulative Vapor Intrusion - Hazard Index =			0	4	21	10	0
1,1-Dichloroethene	VOC	Hepatic	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 12
Cumulative Vapor Intrusion Comparison

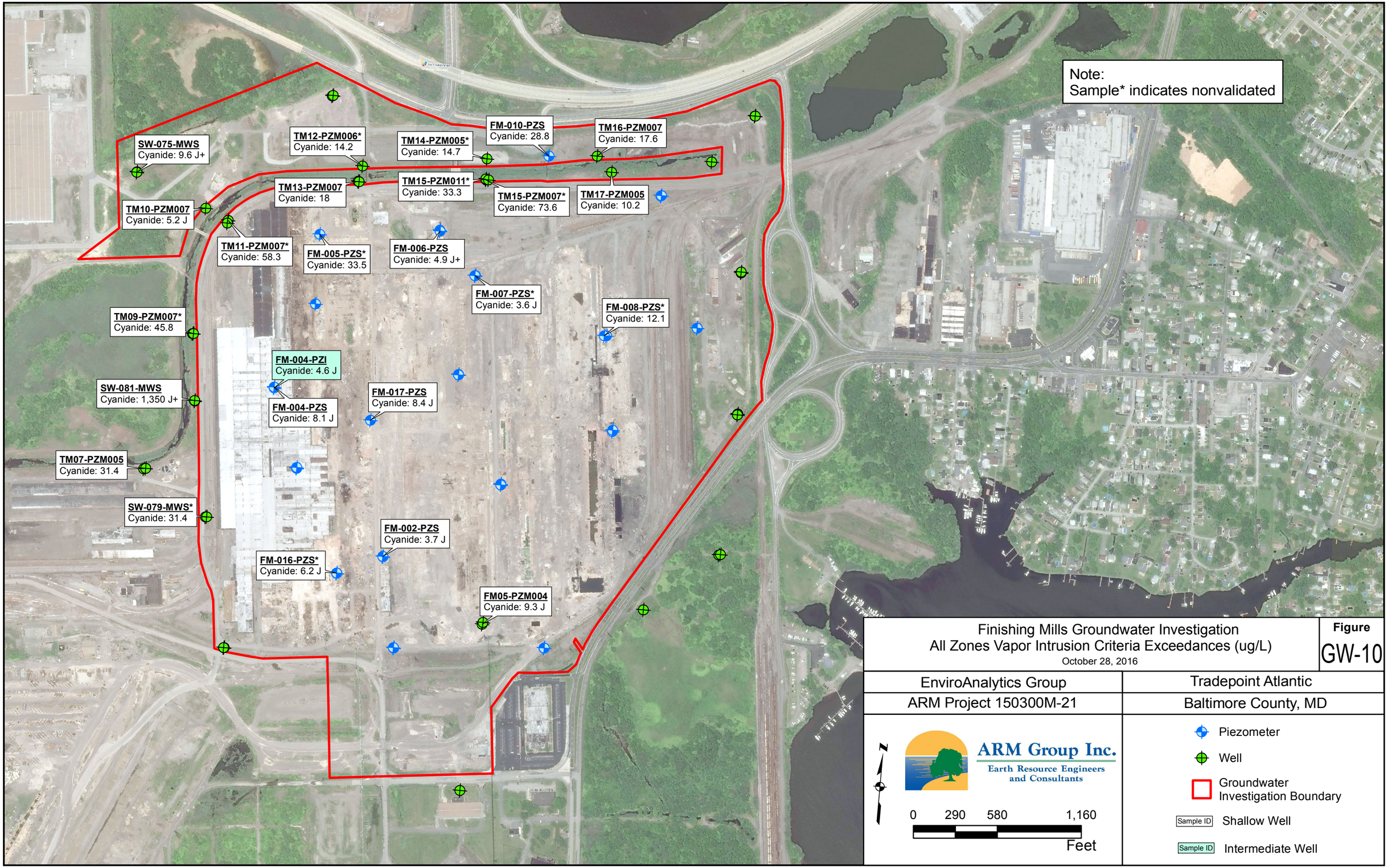
Parameter	Type	Organ Systems	TM16-PZM007	TM17-PZM005	TM18-PZM005
Cancer Risk					
1,4-Dioxane	SVOC	Hepatic; Nervous; Respiratory; Urinary	7.3E-12	4.6E-12	1.4E-11
Naphthalene	SVOC	Nervous; Respiratory	1.5E-07	2.2E-09	4.2E-08
1,1-Dichloroethane	VOC	None Specified	0	0	0
1,2-Dichloroethane	VOC	None Specified	0	0	0
Benzene	VOC	Immune	1.6E-07	0	0
Bromodichloromethane	VOC	Urinary	0	0	0
Chloroform	VOC	Hepatic	0	0	0
Ethylbenzene	VOC	Developmental; Hepatic; Urinary	0	0	0
Methyl tert-butyl ether (MTBE)	VOC	Hepatic; Ocular; Urinary	0	0	1.9E-09
Vinyl chloride	VOC	Hepatic	0	0	0
Cumulative Vapor Intrusion - Target Cancer Risk =			3E-07	2E-09	4E-08
Non-Cancer Hazard					
Cyanide	Other	None Specified	5.0	2.9	0
Cumulative Vapor Intrusion - Hazard Index =			5	3	0
1,1-Dichloroethene	VOC	Hepatic	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0
Trichloroethene	VOC	Cardiovascular; Developmental; Immune	0	0	0
Cumulative Vapor Intrusion - Hazard Index =			0	0	0

Values highlighted in red indicate exceedances of the cumulative vapor intrusion criteria
TCR > 1E-05
THI > 1

Table 13
Ambient Water Quality Criteria Comparison

Parameter (Shallow Zone)	Mean Concentration (ug/L)	Consumption of Organism Only Criteria (ug/L)	Consumption of Organism Only Average Comparison	Salt Water Chronic Criteria (ug/L)	Salt Water Chronic Average Comparison
Shallow Hydrogeologic Zone					
2-Methylnaphthalene	1.93	N/A		2.1	0.92
Aluminum	826.4	N/A		87	9.50
Aluminum, Dissolved	384.0	N/A		87	4.41
Anthracene	0.32	40,000	0.00	0.73	0.44
Arsenic	4.11	1.4	2.93	36	0.11
Arsenic, Dissolved	3.27	1.4	2.34	36	0.09
Barium	82.5	N/A		200	0.41
Barium, Dissolved	76.8	N/A		200	0.38
Benzo[a]anthracene	0.05	0.18	0.29	0.027	1.94
Benzo[a]pyrene	0.01	0.18	0.08	0.014	0.99
Benzo[b]fluoranthene	0.03	0.18	0.15	9.07	0.00
Benzo[k]fluoranthene	0.02	0.18	0.12	N/A	
Carbon disulfide	0.48	N/A		0.92	0.52
Chromium	17.8	N/A		50	0.36
Cobalt	0.36	N/A		1	0.36
Cobalt, Dissolved	0.19	N/A		1	0.19
Copper	3.31	N/A		3.1	1.07
Cyanide	121.5	140	0.87	1	121.5
Fluorene	1.55	5,300	0.00	3.9	0.40
Iron	5,170	N/A		1,000	5.17
Iron, Dissolved	2,829	N/A		1,000	2.83
Lead	13.0	N/A		8.1	1.61
Manganese	958.0	N/A		100	9.58
Manganese, Dissolved	437.0	N/A		100	4.37
Naphthalene	14.9	N/A		1.4	10.7
Nickel	2.75	4,600	0.00	8.2	0.34
PCBs (total)	0.06	N/A		0.03	1.94
Phenanthrene	2.28	N/A		4.6	0.50
Thallium	2.14	0.47	4.55	17	0.13
Thallium, Dissolved	2.88	0.47	6.12	17	0.17
Vanadium	273.0	N/A		50	5.46
Vanadium, Dissolved	252.9	N/A		50	5.06
Zinc	37.6	26,000	0.00	81	0.46

N/A indicates no criteria
Orange highlight indicates exceedance of criteria by a factor of 2 or more
Yellow highlight indicates exceedance of criteria by a factor of 10 or more
A glossary of laboratory flags can be viewed in the attached laboratory reports


Note:
Sample* indicates nonvalidated
SW-075-MWS
Cyanide: 9.6 J+
TM12-PZM006*
Cyanide: 14.2
TM14-PZM005*
Cyanide: 14.7
FM-010-PZS
Cyanide: 28.8
TM16-PZM007
Cyanide: 17.6
TM13-PZM007
Cyanide: 18
TM15-PZM011*
Cyanide: 33.3
TM15-PZM007*
Cyanide: 73.6
TM17-PZM005
Cyanide: 10.2
TM10-PZM007
Cyanide: 5.2 J
TM11-PZM007*
Cyanide: 58.3
FM-005-PZS*
Cyanide: 33.5
FM-006-PZS
Cyanide: 4.9 J+
FM-007-PZS*
Cyanide: 3.6 J
FM-008-PZS*
Cyanide: 12.1
TM09-PZM007*
Cyanide: 45.8
FM-004-PZI
Cyanide: 4.6 J
SW-081-MWS
Cyanide: 1,350 J+
FM-017-PZS
Cyanide: 8.4 J
FM-004-PZS
Cyanide: 8.1 J
TM07-PZM005
Cyanide: 31.4
SW-079-MWS*
Cyanide: 31.4
FM-002-PZS
Cyanide: 3.7 J
FM-016-PZS*
Cyanide: 6.2 J
FM05-PZM004
Cyanide: 9.3 J
Finishing Mills Groundwater Investigation
All Zones Vapor Intrusion Criteria Exceedances (ug/L)
October 28, 2016
Figure
GW-10
EnviroAnalytics Group
ARM Project 150300M-21
Tradepoint Atlantic
Baltimore County, MD
ARM Group Inc.
Earth Resource Engineers and Consultants
0
290
580
1,160
Feet
Piezometer
Well
Groundwater Investigation Boundary
Sample ID
Shallow Well
Sample ID
Intermediate Well

Note:
Sample* indicates nonvalidated

TM10-PZM007
Organism Consumption
Thallium (T): 14.5
Salt Water Chronic
Aluminum (T): 5,930
Benzo(a)anthracene: 0.049 J
Benzo(a)pyrene: 0.023 J
Chromium: 210
Cobalt (T): 1.8
Copper (T): 35.4
Cyanide: 5.2 J
Iron (T): 26,000
Lead (T): 150
Manganese (T): 6,070
Nickel (T): 17.4 J
Vanadium (T): 1,100
Zinc (T): 412 J

TM12-PZM006*
Organism Consumption
Thallium (D): 3.6 J
Salt Water Chronic
Aluminum (T): 274
Benzo(a)anthracene: 0.11
Benzo(a)pyrene: 0.016 J
Cyanide: 14.2
Naphthalene: 12.9
Vanadium (T): 216

TM14-PZM005*
Salt Water Chronic
Aluminum (T): 474
Benzo(a)anthracene: 0.081 J
Benzo(a)pyrene: 0.019 J
Carbon Disulfide: 0.98 J
Cyanide: 14.7
Naphthalene: 3.7
Vanadium (T): 156

FM-010-PZS
Organic Cunsumption
Arsenic (D): 3,9 J
Thallium (D): 5.1 J
Salt Water Chronic
Aluminum (D): 612
Benzo(a)anthracene: 0.046 J
Cyanide: 28.8
Naphthalene: 7.9 J
Vanadium (D): 392

TM16-PZM007
Organism Consumption
Arsenic (T): 4.9 J
Thallium (D): 4.6 J
Salt Water Chronic
Aluminum (T): 1,010
Cyanide: 17.6
Naphthalene: 2.9
Vanadium (T): 407

TM18-PZM005
Organism Consumption
Arsenic (T): 4 J
Benzo(b)fluoranthene: 0.23
Benzo(k)fluoranthene: 0.2
Salt Water Chronic
Aluminum (T): 152
Benzo(a)anthracene: 0.16
Benzo(a)pyrene: 0.12
Cobalt (T): 2.9 J
Copper (T): 7.6
Iron (T): 11,800
Lead (T): 19.6
Manganese (T): 2,090

TM13-PZM007
Salt Water Chronic
Aluminum (T): 150
Benzo(a)anthracene: 0.073 J
Cyanide: 18
Naphthalene: 23.3
PCBs (T): 0.75
Vanadium (T): 135

TM11-PZM007*
Salt Water Chronic
Aluminum (T): 101
Carbon Disulfide: 0.99 JB
Cyanide: 58.3
Manganese (T): 151
Naphthalene: 4.6

TM17-PZM005
Organism Consumption
Arsenic (T): 15.1
Salt Water Chronic
Barium (T): 375
Cyanide: 10.2
Iron (T): 27,800
Manganese (T): 4,080

TM15-PZM007*
Organism Consumption
Arsenic (T): 6.7
Thallium (T): 9.3 J
Salt Water Chronic
2-Methylnaphthalene: 18.1
Aluminum (T): 538
Anthracene: 1.3
Benzo(a)anthracene: 0.078 J
Carbon Disulfide: 1.2
Cyanide: 73.6
Fluorene: 11.9
Naphthalene: 113
Phenanthrene: 12.5
Vanadium (T): 806

TM15-PZM011*
Organism Consumption
Arsenic (T): 12.8
Salt Water Chronic
Aluminum (T): 549
Benzo(a)anthracene: 0.04 J
Carbon Disulfide: 1.5
Cyanide: 33.3
Naphthalene: 29.5
Vanadium (T): 67.1

TM09-PZM007*
Organism Consumption
Arsenic (T): 5.1
Salt Water Chronic
Aluminum (T): 551
Carbon Disulfide: 1.5
Cyanide: 45.8
Naphthalene: 6.2
Vanadium (T): 212

SW-081-MWS
Organism Consumption
Arsenic (T): 4.8 J
Thallium (D): 4.2 J
Cyanide: 1,350 J+
Salt Water Chronic
Aluminum (T): 805
Benzo(a)anthracene: 0.047 J
Cyanide: 1,350 J+
Naphthalene: 3.7 B
Vanadium (T): 246

TM07-PZM005
Organism Consumption
Thallium (T): 4 J
Salt Water Chronic
Aluminum (T): 146
Cyanide: 31.4
Vanadium (T): 176

Finishing Mills Groundwater Investigation
Shallow Zone Ambient Water Quality Criteria Exceedances (ug/L)
October 28, 2016

Figure
GW-11

EnviroAnalytics Group
ARM Project 150300M-21

Tradepoint Atlantic
Baltimore County, MD

ARM Group Inc.
Earth Resource Engineers and Consultants

0 290 580 1,160
Feet

Piezometer
Well
Groundwater Investigation Boundary
Sample ID Shallow Well

(T) = Total Metals
(D) = Dissolved Metals

Appendix F-2

Site-Wide Groundwater Study Report Resources

Table 2
Total Cyanide and Available Cyanide Comparison
Tradepoint Atlantic
Sparrows Point, Maryland

Sample ID	Unit	Vapor Intrusion Criteria	Ambient Water Quality Criteria				Total Cyanide Result	Available Cyanide Result
			Consumption of Organism Only Criteria	10x Consumption of Organism Only Critieria	Salt Water Chronic Criteria	10x Salt Water Chronic Criteria		
B8-018-PZ	ug/L	3.5	140	1,400	1	10	59.2	0.8 J
LF-01S	ug/L	3.5	140	1,400	1	10	44.6	0.68 J
LF-02	ug/L	3.5	140	1,400	1	10	148	5.3
RW19-PZM000	ug/L	3.5	140	1,400	1	10	1,330	1.7 J
SW-024-MWS	ug/L	3.5	140	1,400	1	10	296	1.6 J
SW-029-MWS	ug/L	3.5	140	1,400	1	10	1,420	3
SW-030-MWS	ug/L	3.5	140	1,400	1	10	64.6	0.63 J
SW-034-MWS	ug/L	3.5	140	1,400	1	10	71.8	0.65 J
SW-035-MWS	ug/L	3.5	140	1,400	1	10	225	1.2 J
SW-065-MWS	ug/L	3.5	140	1,400	1	10	1,030	1.7 J
SW-081-MWS	ug/L	3.5	140	1,400	1	10	1,350 J+	1.6 J
TM11-PZM007	ug/L	3.5	140	1,400	1	10	58.3	1 J
TM15-PZM007	ug/L	3.5	140	1,400	1	10	73.6	2.1

Sample Locations

Parcel Boundary

RW19-PZM000 has been renamed RW06-MW(S).

Parcel A9

Parcel A5

Parcel A11

Parcel A7

LF-01S
Total Cyanide (ug/L): 44.6
Available Cyanide (ug/L): 0.68 J

Parcel A8

Parcel A12

LF-02
Total Cyanide (ug/L): 148
Available Cyanide (ug/L): 5.3

Parcel A2

RW19-PZM000
Total Cyanide (ug/L): 1,330
Available Cyanide (ug/L): 1.7 J

Parcel A6

Parcel A4

TM15-PZM007
Total Cyanide (ug/L): 73.6
Available Cyanide (ug/L): 2.1

Parcel A1

Parcel A10

Parcel A3

TM11-PZM007
Total Cyanide (ug/L): 58.3
Available Cyanide (ug/L): 1 J

B8-018-PZ
Total Cyanide (ug/L): 59.2
Available Cyanide (ug/L): 0.8 J

SW-081-MWS
Total Cyanide (ug/L): 1,350 J+
Available Cyanide (ug/L): 1.6 J

Parcel B8

Parcel B14

Parcel B15

Parcel B22

Parcel B6

Parcel B16

Parcel B23

Parcel B21

Parcel B7

SW-024-MWS
Total Cyanide (ug/L): 296
Available Cyanide (ug/L): 1.6 J

Parcel B1

Parcel B2

Parcel B3

Parcel B17

Parcel B19

Parcel B5

Parcel B4

SW-029-MWS
Total Cyanide (ug/L): 1,420
Available Cyanide (ug/L): 3

SW-065-MWS
Total Cyanide (ug/L): 1,030
Available Cyanide (ug/L): 1.7 J

SW-035-MWS
Total Cyanide (ug/L): 225
Available Cyanide (ug/L): 1.2 J

Parcel B9

Parcel B18

SW-030-MWS
Total Cyanide (ug/L): 64.6
Available Cyanide (ug/L): 0.63 J

SW-034-MWS
Total Cyanide (ug/L): 71.8
Available Cyanide (ug/L): 0.65 J

Parcel B10

Parcel B13

Parcel B20

Parcel B11

Parcel B12

Bear Creek

Patapsco

0 500 1,000 2,000 Feet

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Site-Wide Groundwater Cyanide Groundwater Sample Results

July 10, 2017

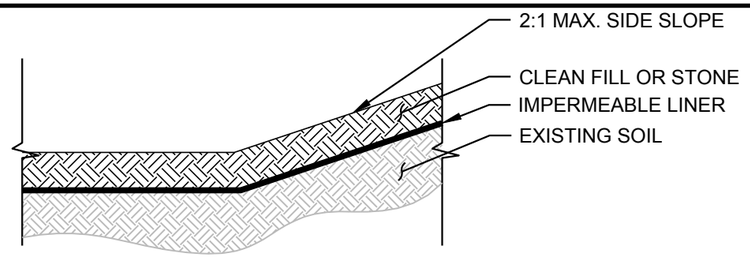
EnviroAnalytics Group

Tradepoint Atlantic
Baltimore County, MD

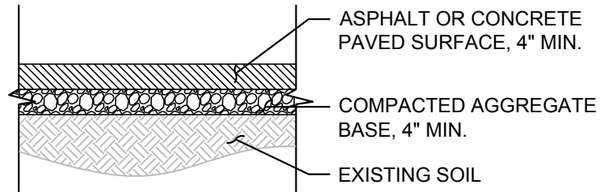
Figure
13

\\armgroup.lcl\CorpData\Projects\EnviroAnalytics Group\170194M EAG Groundwater Conditions Summary Report\GIS\Site-wide GW Cyanide.mxd

APPENDIX G



TYPICAL POND SECTION
NOT TO SCALE



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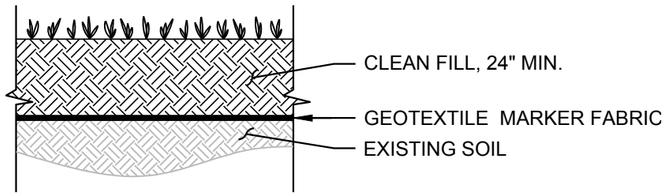

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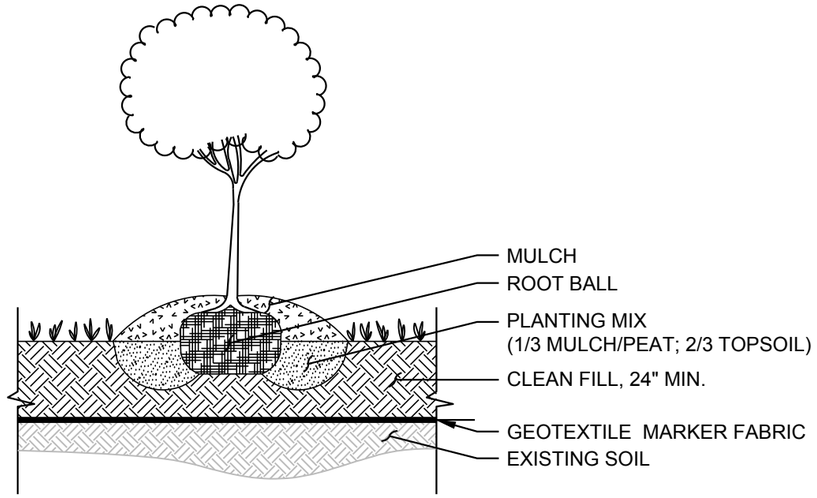

TYPICAL PLANTING SECTION
NOT TO SCALE

GEOTEXTILE MARKER FABRIC SPECIFICATIONS

THE GEOTEXTILE MARKER FABRIC SHALL BE A NONWOVEN PERVIOUS SHEET OF POLYPROPYLENE MATERIAL. ADD STABILIZERS AND/OR INHIBITORS TO THE BASE MATERIAL, AS NEEDED, TO MAKE THE FILAMENTS RESISTANT TO DETERIORATION BY ULTRAVIALET LIGHT, OXIDATION AND HEAT EXPOSURE. REGRIND MATERIAL, WHICH CONSISTS OF EDGE TRIMMINGS AND OTHER SCRAPS THAT HAVE NEVER REACHED THE CONSUMER, MAY BE USED TO PRODUCE THE GEOTEXTILE. POST-CONSUMER RECYCLED MATERIAL MAY BE USED. GEOTEXTILE SHALL BE FORMED INTO A NETWORK SUCH THAT THE FILAMENTS OR YARNS RETAIN DIMENSIONAL STABILITY RELATIVE TO EACH OTHER, INCLUDING THE EDGES. GEOTEXTILES SHALL MEET THE REQUIRE,MENTS SPECIFIED IN TABLE 1. WHERE APPLICABLE, TABLE 1 PROPERTY VALUES REPRESENT THE MINIMUM AVERAGE ROLL VALUES IN THE WEAKEST PRINCIPAL DIRECTION. VALUES FOR APPARENT OPENING SIZE (AOS) REPRESENT MAXIMUM AVERAGE ROLL VALUES

TABLE 1

		WOVEN SLIT FILM GEOTEXTILE		WOVEN MONOFILAMENT GEOTEXTILE		NONWOVEN GEOTEXTILE	
		MINIMUM AVERAGE ROLL VALUE[1]					
PROPERTY	TEST METHOD	MD	CD	MD	CD	MD	CD
Grab Tensile Strength	ASTM D-4632	200 lb	200 lb	370 lb	250 lb	200 lb	200 lb
Grab Tensile Elongation	ASTM D-4632	15%	10%	15%	15%	50%	50%
Trapezoidal Tear Strength	ASTM D-4533	75 lb	75 lb	100 lb	60 lb	80 lb	80 lb
Puncture Strength	ASTM D-6241	450 lb		900 lb		450 lb	
Apparent Opening Size[2]	ASTM D-4751	U.S. Sieve 30 (0.59 mm)		U.S. Sieve 70 (0.21 mm)		U.S. Sieve 70 (0.21 mm)	
Permittivity	ASTM D-4491	0.05 sec^{-1}		0.28 sec^{-1}		1.1 sec^{-1}	
Ultraviolet Resistance Retained at 500 hours	ASTM D-4355	70% strength		70% strength		70% strength	

[1] All numeric values except apparent opening size (AOS) represent minimum average roll values (MARV). MARV is calculated as the typical minus two standard deviations. MD is machine direction; CD is cross direction.

[2] Values for AOS represent the average maximum opening.

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designed JMA
checked TNP
drawn JMA
scale N/A
date 10/24/2017
project no. 160443M

drawing title: CAPPING SECTION DETAILS
project title: SPARROWS POINT AREA B ENVIROANALYTICS GROUP
SPARROWS POINT BALT. COUNTY, MARYLAND

Appendix F

APPENDIX H

GENERAL NOTES:

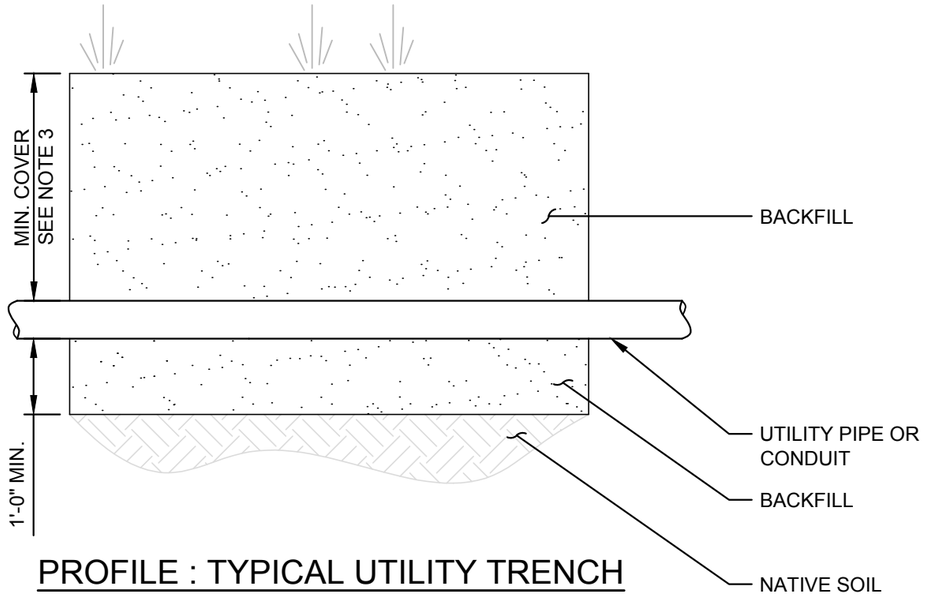
1. ALL PIPES OR CONDUIT SHALL BE LEAK-PROOF AND WATERTIGHT. ALL JOINTS SHALL BE SEALED OR GASKETED.

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.

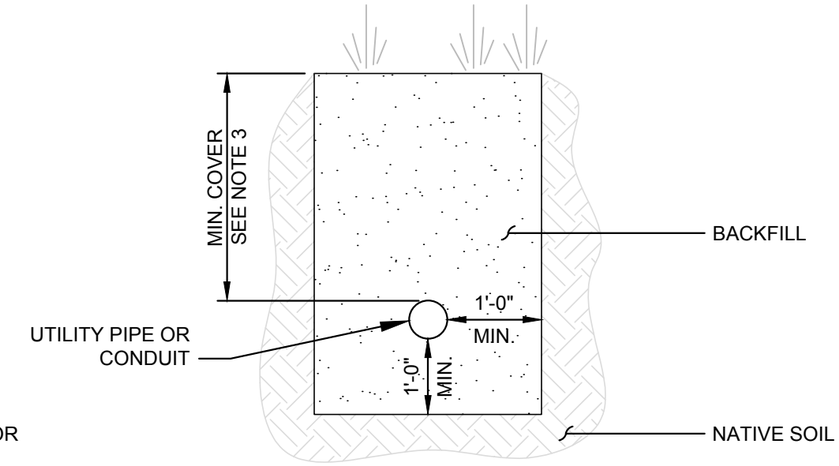
3. MINIMUM COVER ABOVE UTILITY SHALL BE BASED ON SPECIFIC UTILITY REQUIREMENTS.

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

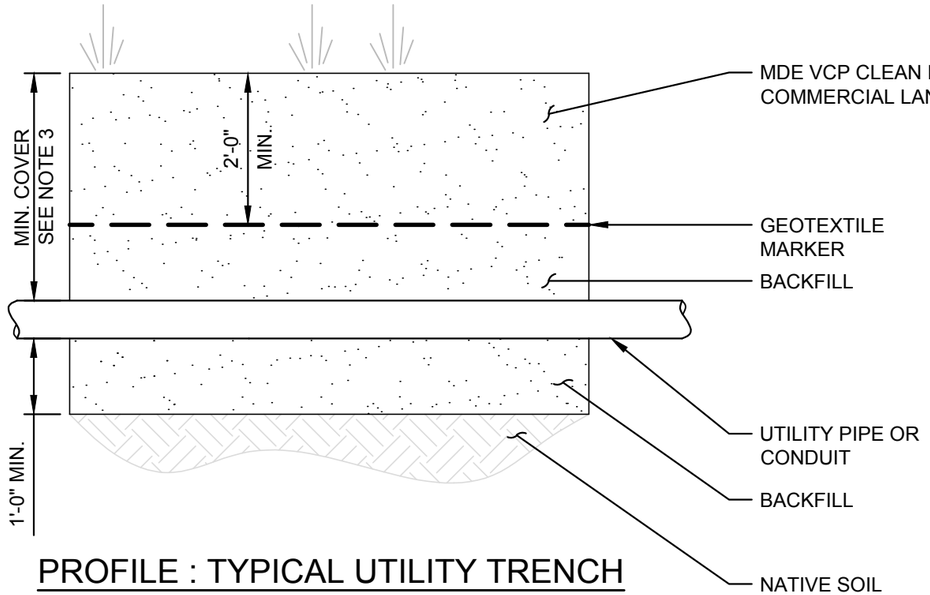
5. FOR ANY UTILITY SEGMENT WHICH GOES THROUGH AN AREA WHICH IS DESIGNATED TO RECEIVE A LANDSCAPED CAP, THE UPPER 2 FEET OF BACKFILL MUST MEET THE REQUIREMENTS OF MDE VCP CLEAN FILL FOR COMMERCIAL LAND USE. IN THIS CASE THE MDE VCP CLEAN FILL WILL BE UNDERLAIN BY A GEOTEXTILE MARKER FABRIC. UTILITY SEGMENTS WHICH GO THROUGH AREAS WHICH DO NOT REQUIRE CAPPING OR ARE DESIGNATED TO RECEIVED A PAVED CAP WILL BE BACKFILLED WITH MATERIALS APPROVED BY MDE FOR THIS USE.



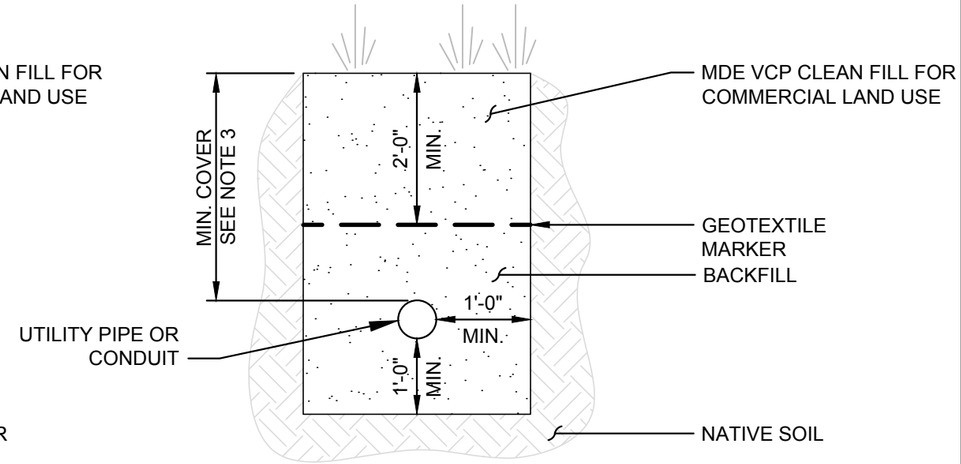
PROFILE : TYPICAL UTILITY TRENCH



SECTION : TYPICAL UTILITY



PROFILE : TYPICAL UTILITY TRENCH
(SEE NOTE 5)



SECTION : TYPICAL UTILITY
(SEE NOTE 5)

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TYPICAL UTILITY CROSS SECTIONS
Sparrows Point Site
EnviroAnalytics Group, LLC

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

Figure 1

APPENDIX I

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.

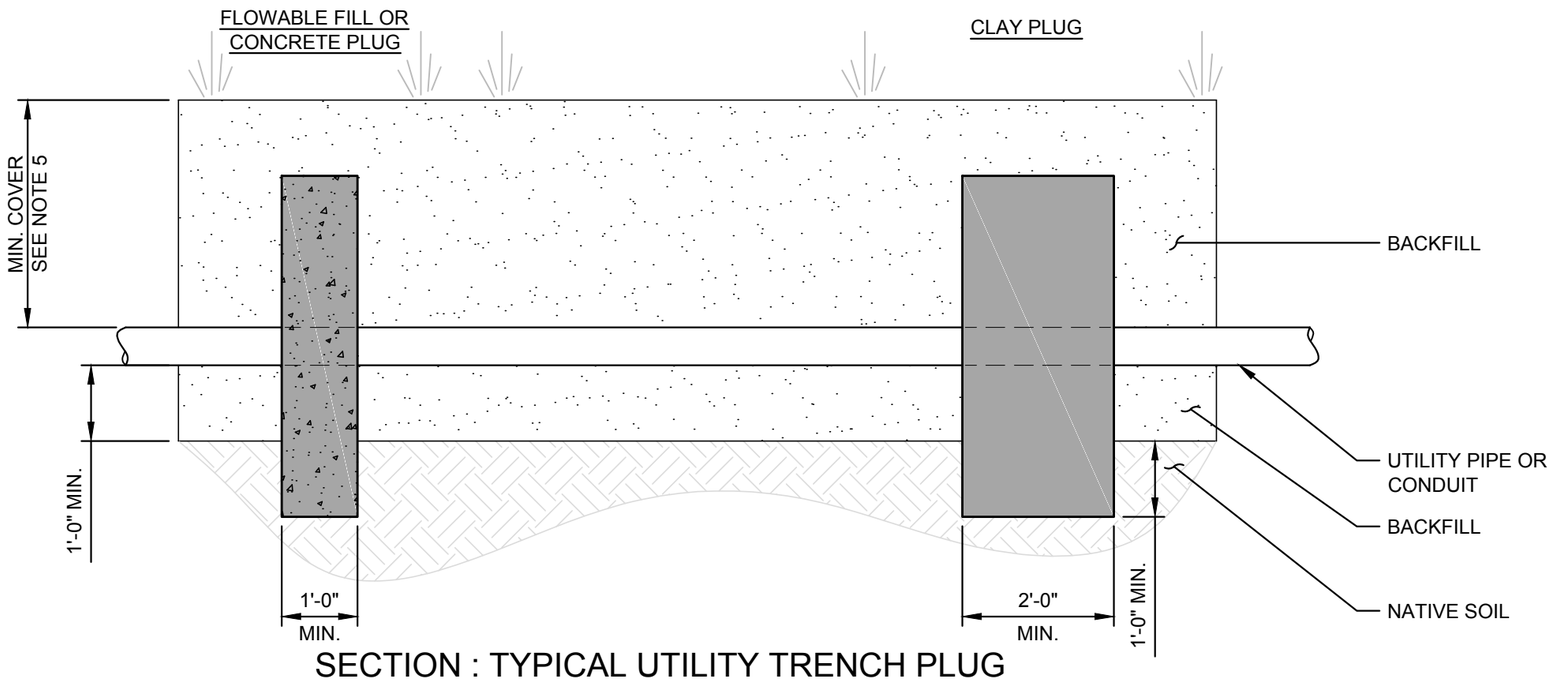
3. TRENCH PLUGS SHALL EXTEND A MINIMUM OF ONE (1) FOOT BEYOND PERMEABLE BEDDING OR BACKFILL IN ALL DIRECTIONS.

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.

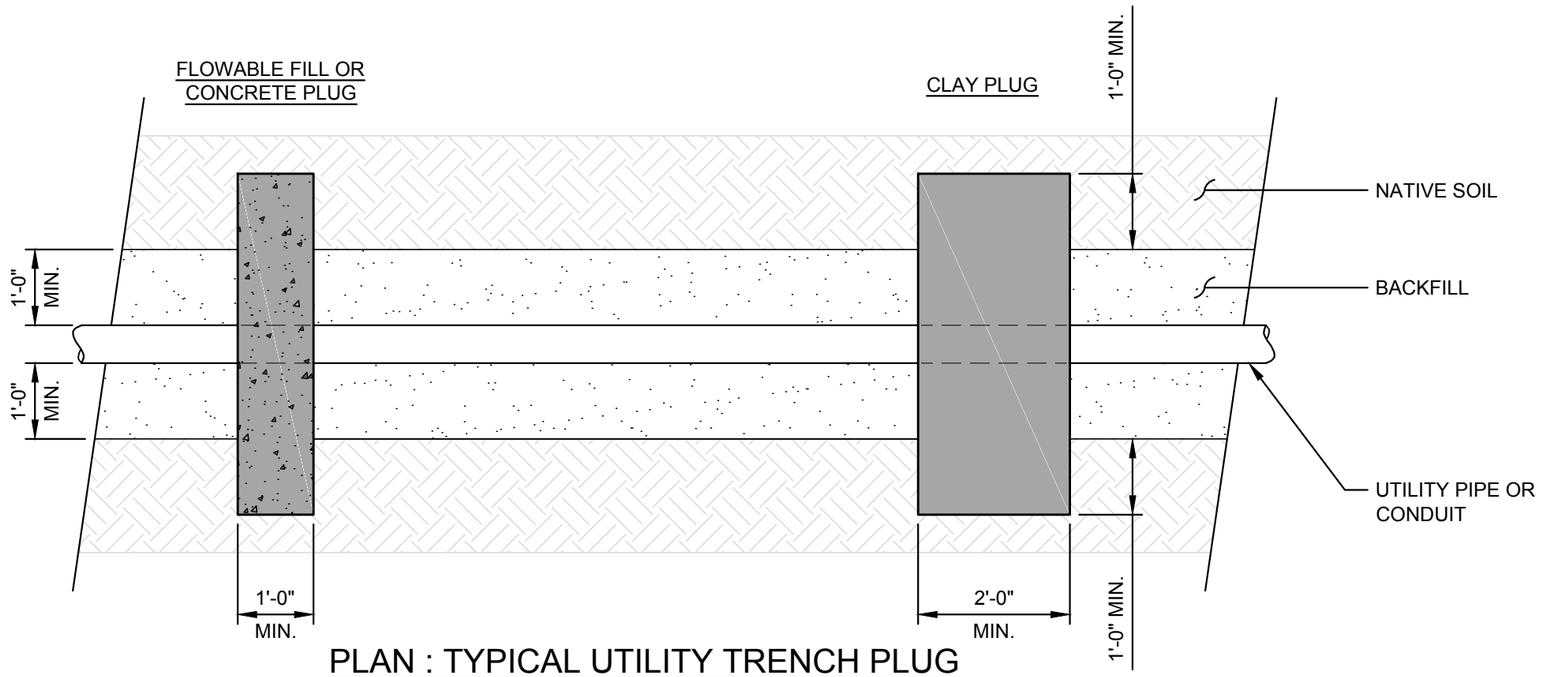
5. MINIMUM COVER ABOVE UTILITY SHALL BE BASED ON SPECIFIC UTILITY REQUIREMENTS.

6. TRENCHES SHALL BE BACKFILLED WITH BEDDING AND MATERIALS APPROVED BY MDE.

7. FOR ADDITIONAL REQUIREMENTS, INCLUDING THE USE OF MDE VCP CLEAN FILL FOR COMMERCIAL LAND USE AND INSTALLATION OF GEOTEXTILE MARKER FABRIC, REFER TO NOTE 5 ON THE TYPICAL UTILITY CROSS SECTIONS.



SECTION : TYPICAL UTILITY TRENCH PLUG



PLAN : TYPICAL UTILITY TRENCH PLUG

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UTILITY TRENCH PLUG
Sparrows Point Site
EnviroAnalytics Group, LLC

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

Figure 1

APPENDIX J

CONTAINMENT REMEDY OPERATIONS AND MAINTENANCE PLAN
SUB-PARCEL B6-2 FORMER SPARROWS POINT STEEL MILL

Containment Remedy Operations and Maintenance Overview

In accordance with the Sub-Parcel B6-2 Response and Development Work Plan (RADWP) for development on a designated portion of the Sparrows Point Peninsula in Sparrows Point, MD (the Site), post remediation care requirements include compliance with the conditions placed on the No Further Action Letter, Certificate of Completion, and deed restrictions recorded for the Site. In addition, maintenance will be performed on the capped areas to control degradation and exposure to the underlying soil. Inspections of the capped areas will be conducted annually. The responsible party will perform cap inspections, maintenance of the cap, and retain cap inspection records. Maintenance records will include the date of the inspection, name of the inspector, any noted issues, and subsequent resolution of the issues. Maintenance records will be maintained in a designated area at the Site for Maryland Department of the Environment (MDE) inspection and review, if requested.

The containment remedy (cap) will be constructed as described in the MDE-approved RADWP. The following sections provide details of the Operations and Maintenance Plan (O&M Plan) procedures to be followed at the Site to assess when maintenance of the capped areas is necessary.

Designated Pavement Area Inspections

The designated paved areas, as identified in the RADWP, will be maintained to ensure integrity of the cap. Paved areas subject to this O&M Plan include both exterior pavements (parking lots and roads) and interior pavements (building slabs).

Pavement area inspections will be conducted on an annual basis to ensure that the capped areas are maintained as needed. During the inspection, the capped surfaces will be inspected to check for the following potential conditions:

- Differential settlement and significant surface-water ponding;
- Erosion or cracking of the cap materials; and
- Obstruction or blocking of drainage facilities.

When inspections indicate that cap repair is necessary, repairs will be completed as soon as practically possible in compliance with any recorded deed restrictions. The work will be documented on a form similar to the attached example Pavement Inspection Form. The inspection documentation will include the results of each inspection, recommended maintenance actions, and the actual maintenance/repair implemented. The responsible party will maintain inspection forms and any resulting repair records.

Pavement Inspection Protocol

A pavement management system (pavement condition index) will be implemented in the designated areas of the Site. The purpose of this system is to plan and prioritize future pavement maintenance needs. The system is based on a numerical rating of pavement distresses as published by the United States Army Corps of Engineers. The following chart will be used to provide an index of the pavement condition.

PAVEMENT CONDITION INDEX (PCI)		
PCI	**Characterization**	**Description**
1	New crack-free surface	Black in color, smooth texture
2	Oxidation has started	Short hairline cracks start to develop; dark gray color.
3	Oxidation in advanced state	Hairline cracks are longer and wider; gray in color
4	Oxidation complete	Cracked area 0.25 inch wide and crack lines have found base faults
5	Moisture penetrating through 0.25 inch cracks; loose material, stone and sand, evident	Texture of surface becoming rough; Preventative maintenance
6	Cracks widen and join	Cracks and shrinkage evident at curb and gutter lines
7	Potholes develop in low spots	Gatoring areas begin to break up; overall texture very rough.
8	Potholes developing	Pavement breaking up
9	Heaving due to excessive moisture in base	Distorts entire surface

PAVEMENT CONDITION INDEX (PCI)		
PCI	**Characterization**	**Description**
10	General breakup of surface	General breakup of surface

An inspection indicating a PCI of 4 or greater for designated areas of the Site will require maintenance. The intent is that repairs should be completed before the pavement degrades beyond a PCI of 4. MDE will be notified in a timely manner of any repairs that are the result of a PCI of 4 or greater. The notification will include documentation of the conditions being repaired and the location of the repair.

Designated Landscaped Area Inspections

The planned Site redevelopment includes landscaped areas which also need to be maintained. In designated landscaped areas, identified in the RADWP, capping will include an MDE-approved geotextile fabric beneath a minimum two-foot thick clean fill and top soil layer. The designated landscaped areas will be maintained to ensure the integrity of the cap.

Landscape Inspection Protocol

Inspections will be performed by traversing the designated landscaped areas and observing the surface conditions. Landscaped areas will be inspected to evaluate the condition of the plants, signs of animal burrows, erosion, or other features that may compromise the cap integrity. If plants need to be replaced, they will be replaced with shallow-rooted species whose root systems will not penetrate beyond the cap thickness. Alternatively, an excavation notification may be submitted to the MDE VCP for review and approval to extend the cap thickness in the area of the plants to allow for deeper-rooted species. The extended cap thickness will encompass the maximum anticipated root depth of the plant(s).

When inspections indicate that capped landscaped areas are in need of repair, repairs will be completed as soon as practically possible and in compliance with the MDE deed restriction. A form similar to the attached example Landscape Inspection Form will be used to document the results of each inspection, the recommended maintenance actions, and the actual maintenance/repair implemented. The responsible party will maintain inspection forms and any resulting repair records. MDE will be notified in a timely manner if damage to the capped landscaped area(s) exceeds one foot in diameter and/or two feet in depth.

PAVEMENT INSPECTION FORM	Sub-Parcel B6-2 Development Fmr. Sparrows Point Steel Mill
Date:	Time:
Weather Conditions:	
General Pavement Conditions:	

PCI		Characterization	Description
1		New crack-free surface	Black in color, smooth texture
2		Oxidation has started	Short hairline cracks start to develop; dark gray color
3		Oxidation in advanced state	Hairline cracks are longer and wider; gray in color
RESPONSE REQUIRED	4	Oxidation complete	Crack area 0.25 inch wide and crack lines have found base faults
	5	Moisture penetrating through 0.25-inch cracks; loose material, stone and sand,evident	Texture of surface becoming rough; preventative maintenance
	6	Cracks widen and join	Cracks and shrinkage evident at curb and gutter lines
	7	Potholes develop in low spots	Gatoring areas begin to break up; overall texture very rough
	8	Potholes developing	Pavement breaking up
	9	Heaving due to excessive moisture in base	Distorts entire surface
	10	General breakup of surface	General breakup of surface

PAVEMENT INSPECTION FORM	Sub-Parcel B6-2 Development Fmr. Sparrows Point Steel Mill
CURB CONDITION	☐ Exists ☐ Sound ☐ Cracked ☐ Root Intrusion ☐ Deteriorated Comments: _____
SIDEWALK CONDITION	Comments: _____
RESPONSE REQUIRED	
WORK COMPLETED	
PHOTOGRAPHS / FIGURES ATTACHED	
RESPONSE CONTRACTOR	Work Completed By: _____ Date: Signature:

LANDSCAPE INSPECTION FORM	Sub-Parcel B6-2 Development Fmr. Sparrows Point Steel Mill
Date:	Time:
Weather Conditions:	
General Landscaping Description:	

GENERAL LANDSCAPE CONDITION	☐ Sound ☐ Erosion ☐ Root Intrusion ☐ Healthy Plant Condition ☐ Signs of Mortality ☐ Animal Burrows
GROUND COVER	☐ Dry ☐ Damp ☐ Wet Comments: _____
TREES	☐ Exists ☐ Healthy ☐ Poor Health ☐ Dead ☐ Fallen Comments: _____
SHRUBS	☐ Exists ☐ Healthy ☐ Poor Health ☐ Dead ☐ Fallen Comments: _____
EROSION	☐ Exists ☐ Slight ☐ Moderate ☐ Significant Comments: _____
HOLES	☐ Exists Depth of Holes: _____ Comments: _____

LANDSCAPE INSPECTION FORM	Sub-Parcel B6-2 Development Fmr. Sparrows Point Steel Mill
RESPONSE REQUIRED	
WORK COMPLETED	
PHOTOGRAPHS / FIGURES ATTACHED	
RESPONSE CONTRACTOR	Work Completed By: _____ Date: Signature: