ARM Group Inc.

Engineers and Scientists

March 25, 2019

Ms. Barbara Brown
Project Coordinator
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: Response and Development Work Plan
Area A: Sub-Parcel A11-1 (Revision 3)
Comment Response Letter
Tradepoint Atlantic
Sparrows Point, MD 21219

Dear Ms. Brown:

On behalf of EnviroAnalytics Group, LLC (EAG), ARM Group Inc. (ARM) is pleased to provide the following responses to comments received from the Maryland Department of the Environment (MDE) and the United States Environmental Protection Agency (USEPA) in an email dated February 4, 2019. The MDE and USEPA provided review comments regarding the previous Response and Development Work Plan (RADWP) submission (Revision 2) for Sub-Parcel A11-1 (the Site) of the Tradepoint Atlantic property located in Sparrows Point, Maryland. This letter provides responses to the comments and demonstrates that the requested changes to the RADWP have been addressed. Responses to the comments are provided below; the original comments are included in italics with responses following.

The revised RADWP text is provided as **Attachment 1** for incorporation into the Sub-Parcel A11-1 RADWP (Revision 3). The enclosed CD provides a compiled PDF of the entire report with the inserted replacement pages. Revised cover and spine cardstock sheets are also provided for insertion into the binders currently held by the agencies.

1. *Section 3.2.3 Summary of Results: "Additional evaluations or response actions for the impacts beyond the Sub-Parcel A11-1 boundary may be coordinated with the agencies outside of the scope of this RADWP."*

   While this statement is true, it is also true that environmental investigation of the entire parcel, including sub-parcel A11-1, is not complete and therefore, additional evaluations or response actions for the impacts within A11-1 may also be coordinated with the agencies outside of the scope of this RADWP.

Section 3.2.3 and Section 4.1.2 have been updated to clarify that any future evaluations or response actions performed inside or outside the Sub-Parcel A11-1 boundary may be coordinated with the agencies beyond the scope of this RADWP.

2. *Section 3.3.2 Establishment of Media Cleanup Objectives: "Because…, no additional remedial actions are required to mitigate the migration of NAPL or associated constituents in groundwater below the Site."*

   The Department has made no conclusion regarding the presence or absence of recoverable NAPL or the potential for NAPL to be a significant source of impact to groundwater. A NAPL investigation completion report has not been submitted to the Department for review and was limited in scope. If necessary, it is accurate to state that no remedial actions are required to mitigate the migration of NAPL or associated constituents in groundwater below the Site, at this time. There is significant groundwater contamination on and off the southeastern portion of the site and the investigation is still ongoing. Therefore, this statement is premature and should be amended.

   Section 3.3.2 has been modified to state that no additional response actions are proposed at this time under this RADWP. Any future response actions, if required either inside or outside the Sub-Parcel A11-1 boundary, will be coordinated with the agencies and conducted under a separate Work Plan or Work Plans.

3. *Section 4.1.2 Groundwater Remedies and Monitoring Approach: As previously stated, the Department has not had the opportunity to review a NAPL investigation completion report for the A11 parcel. Additionally, complete downgradient monitoring well installation details and sampling results have not been submitted for review. It should be noted that initial groundwater sampling results were submitted in January 2019 and confirmed significant groundwater contamination on the southeastern corner of Parcel A11. No determination has been made by the Department (or EPA representatives) that monitored natural attenuation (MNA) will be the selected remedy for this site. Potential remains for groundwater monitoring within the Parcel A11-1 boundary and data collected from the site in the near future will aide in making a final determination regarding long-term groundwater cleanup/monitoring.*

   Additionally, the Department has not made a conclusion regarding mobility of NAPL at the site. The investigation performed prior to submittal of the RDWP was limited in scope and final reporting has yet to be submitted for Agency review/comment. The MDE retains the ability to require additional environmental investigation/remediation work within the entire Parcel A11 boundary.

   All references to a monitored natural attenuation (MNA) approach have been removed from the RADWP. Although at this time MNA is still the preferred approach for the

impacts to the east of the Site, Section 4.1.2 has been modified to state generally that any required future response actions will be coordinated with the agencies.

4. *Section 4.2.7 Stormwater Management: The alternative use of clay liner in the stormwater management ponds is permissible, however, not at the thicknesses detailed in this plan. The minimum thickness referenced in this section (12") would be permitted on a site that did not require a restricted cap. However, the entire Site will be capped and therefore, stormwater management ponds must be constructed with appropriate cap thickness, to total 24". This language also needs to be changed in Section 5.1.5 where details of a clay liner are provided. A figure provided in Appendix C, depicting the typical pond cap thickness needs to be updated with the required 24" thickness as well.*

   All references to the required minimum thicknesses for clay liners used in the stormwater management ponds have been updated to require at least 12 inches of clay with at least 12 inches of overlying clean fill or stone. The update was applied to Sections 4.2.7 and 5.1.5. The minimum layer thicknesses in the typical pond section shown in **Appendix C** have been updated accordingly.

5. *Section 5.2.2 Dewatering: Identify, on a figure, the location of the catch basin that would be used to pipe water to the TMC during dewatering activities. Also, Interstate 695 sits between the parcel and the TMC therefore it seems unlikely that water could be piped directly to the canal during dewatering. Please clarify.*

   Tradepoint Atlantic has clarified that all dewatering discharges will be trucked directly to the Humphrey Creek Waste Water Treatment Plant. Sections 4.2.3 and 5.2.2 have been updated to reflect the selected disposal method.

6. *Section 5.5 Post Remediation Requirements: Include a statement that clarifies that long-term groundwater monitoring requirements for the entire Parcel A11 site have not yet been determined and will be provided in a future document to be reviewed by the Department. Groundwater monitoring requirements will not necessarily be solely for off-site wells, as no conclusion has been made regarding the need for remediation/monitoring within the A11-1 development boundary. Approval of the RADWP does not indicate that additional environmental investigation/monitoring work is complete within A11-1. It should be noted that the Phase II Investigation report for the entire Parcel A11 has not been finalized and a significant amount of data related to site contamination is pending submittal to the Department for review.*

   The requested statement has been added to Section 5.5. A future document submitted to the agencies will propose a long-term groundwater monitoring approach for the groundwater impacts associated with Parcel A11 (which may include areas within Sub-Parcel A11-1 or another boundary as appropriate).

7. ***USEPA Comment:*** *Section 4.2.5 and Figure 13: The future sub-slab vapor monitoring points should be distributed throughout the warehouse rather than only at the eastern and western walls.*

   The conceptual design of the proposed passive/active venting system remains unchanged. The venting system will initially be a passive system, with some negative pressure created below the floor slab through a wind-blown turbine connected to the vent pipes. If indoor air concentrations are later determined to exceed health-based levels based on post-construction indoor air sampling, an electric fan or blower will be connected to the end of the venting system to increase the effectiveness.

   The preliminary layout has been slightly modified following additional design consideration and coordination with Tradepoint Atlantic and the development General Contractor. The revised layout can be viewed on the updated version of **Figure 13** (now provided as **Figure 13a** and **Figure 13b**). Four new sub-slab vapor monitoring points are proposed to be distributed throughout the structure as shown on **Figure 13a/b**. The originally proposed sub-slab vapor monitoring points will be retained as cleanouts for the sub-slab PVC vapor mitigation system, and one or more of these cleanouts can also be used as additional vapor sampling points. Additional minor adjustments to the locations of the vapor monitoring points and/or cleanouts may be necessary during, or prior to, construction based on the final interior layout of the building. Sections 4.2.5 and 5.5 have been updated to reflect the newly proposed sampling points.

Additional Revisions:

8. Section 5.1.6 (Dust Control) has been updated to use revised language for dust control which has been used in recent RADWP submissions. Additional minor revisions have been incorporated into this section to clarify the specific field procedures for implementing the dust monitoring program.

9. Section 7.0 (Implementation Schedule) has been updated.

If you have any questions, or if we can provide any additional information at this time, please do not hesitate to contact ARM Group Inc. at 410-290-7775.

Respectfully submitted,
ARM Group Inc.

Melissa A. Replogle, E.I.T.
Staff Engineer

T. Neil Peters, P.E.
Senior Vice President

Attachment 1

RESPONSE AND DEVELOPMENT WORK PLAN

AREA A: SUB-PARCEL A11-1
TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

Prepared For:

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Respectfully Submitted,

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Revision 3 – March 25, 2019

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1.0 INTRODUCTION

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared this Response and Development Work Plan (RADWP) for a portion of the Tradepoint Atlantic property that has been designated as Area A: Sub-Parcel A11-1 (the Site). Tradepoint Atlantic submitted a letter (**Appendix A**) requesting an expedited remedial plan review to achieve construction deadlines for the proposed development on this Site. The full Parcel A11 comprises roughly 102 acres of the approximately 3,100-acre former plant property located as shown on **Figure 1**. The Sub-Parcel A11-1 consists of 12.7 acres within the eastern portion of Parcel A11. Outside of the main development area designated as Sub-Parcel A11-1, a temporary easement with an area of approximately 1.3 acres within the Limit of Disturbance (LOD) will be utilized to install a force main and pump station to the west.

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

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

Sub-Parcel A11-1 is part of the acreage that was removed (Carveout Area) from inclusion in the Multimedia Consent Decree between Bethlehem Steel Corporation, the USEPA, and the MDE (effective October 8, 1997) as documented in correspondence received from the USEPA on September 12, 2014. Based on this agreement, USEPA determined that no further investigation or corrective measures will be required under the terms of the Consent Decree for the Carveout Area. However, the SA reflects that the property within the Carveout Area will remain subject to the USEPA's Resource Conservation and Recovery Act (RCRA) Corrective Action authorities.

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

In consultation with the MDE, Tradepoint Atlantic affirms that it desires to accelerate the assessment, remediation and redevelopment of certain sub-parcels within the larger site due to current market conditions. To that end, the MDE and Tradepoint Atlantic agree that the Controlled

Hazardous Substance (CHS) Act (Section 7-222 of the Environment Article) and the CHS Response Plan (Code of Maryland Regulations (COMAR) 26.14.02) shall serve as the governing statutory and regulatory authority for completing the development activities on the Sub-Parcel A11-1 and complement the statutory requirements of the VCP (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 any 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 Sub-Parcel A11-1 consists of 12.7 acres currently slated for development as a warehouse facility with exterior laydown yards (**Figure 2**). Development activities will generally include grading; construction of a 79,000 square foot building; and paving of parking and laydown areas and roadways. Subsequent site-use would involve workers in the on-site building, and truck drivers entering and leaving the Site with goods.

This RADWP provides a Site description and history; summary of environmental conditions identified by the Phase I Environmental Site Assessment (ESA); summary of environmental conditions identified by the Parcel A11 Phase II Investigation and supplemental sampling activities; a brief discussion of a human health Screening Level Risk Assessment (SLRA) conducted for the identified conditions; and any necessary engineering and/or institutional controls to facilitate the planned development and address the impacts and potential human health exposures. These controls include work practices and applicable protocols that are submitted for approval to support the development and use of the Site. Engineering/institutional controls approved and installed for this RADWP shall be described in closure certification documentation submitted to the MDE demonstrating that exposure pathways on the Site are addressed in a manner that protects public health and the environment. The remaining acreage of Parcel A11 will be

addressed in future work associated with completion of the obligations of the ACO and associated VCP requirements. This work will include assessments of risk and, if necessary, RADWPs to address risks associated with future land use.

2.0 SITE DESCRIPTION AND HISTORY

2.1. SITE DESCRIPTION

The Sub-Parcel A11-1 Development Area consists of 12.7 acres in the eastern portion of Parcel A11 as shown on **Figure 2**. A temporary easement (with an area of approximately 1.3 acres within the LOD) will be utilized to install a force main and pump station to the west of the main development area. The Site is currently zoned Manufacturing Heavy-Industrial Major (MH-IM), and is not occupied. The Sub-Parcel A11-1 Development Area was formerly occupied by a Contractor Area. All historical buildings have been demolished, and the Site has been cleared of all significant vegetation. There is no groundwater use within the Tradepoint Atlantic property.

Sub-Parcel A11-1 is at an average elevation of approximately 13 feet above mean sea level (amsl). Elevations generally range between 11 and 14 feet over Sub-Parcel A11-1, with the exception of a few higher elevations caused by small soil/slag stockpiles. Elevations are fairly uniform at the Site with no clear discharge direction for surface water drainage. According to Figure B-2 of the Stormwater Pollution Prevention Plan (SWPPP) Revision 5 dated June 1, 2017, stormwater from the main development area of Sub-Parcel A11-1 is discharged through the drainage ditch along Peninsula Expressway and into Bear Creek at National Pollutant Discharge Elimination System (NPDES) Outfall 069. Stormwater from the far southern portion of the development area flows toward Bear Creek to the south of Greys Landfill, ultimately discharging at NPDES Outfall 070.

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.

According to the Description of Current Conditions (DCC) Report, prepared by Rust Environment and Infrastructure dated January 1998, several features of potential concern were historically located within the Contractor Area (all of which have been removed), including an earthen oil pit, underground storage tanks (USTs), gas pumps and a pump island, unlabeled drums and containers with evidence of leaking and staining, and a small Coal Tar Area. Numerous features at risk for leaks and releases (drums, tanks, fuel pumps, etc.) have been identified in specific contractor areas within various historical reports. The western portion of the Site was formerly used as a spare parts storage yard. Currently, the Site is largely vacant with piles of stockpiled materials (soil and/or slag). Additional information regarding historical activities conducted within Parcel A11 can be found in the approved Phase II Investigation Work Plan dated May 18, 2016.

3.0 ENVIRONMENTAL SITE ASSESSMENT RESULTS

3.1. PHASE I ENVIRONMENTAL SITE ASSESSMENT

A Phase I ESA was completed by Weaver Boos Consultants for the entire Sparrows Point property on May 19, 2014. Weaver Boos completed site visits of Sparrows Point from February 19 through 21, 2014, for the purpose of characterizing current conditions at the former steel plant. The Phase I ESA identified particular features across the Tradepoint Atlantic property which presented potential risks to the environment. These Recognized Environmental Conditions (RECs) included buildings and process areas where releases of hazardous substances and/or petroleum products potentially may have occurred. The Phase I ESA also relied upon findings identified during a previous visual site inspection (VSI) conducted as part of the RCRA Facility Assessment (RFA) prepared by A.T. Kearney, Inc. dated August 1993, for the purpose of identifying Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) on the property. This 1991 VSI is regularly cited in the 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 REC was identified within the Site boundary as defined in the Phase I ESA:

Contractor Equipment Storage (REC 16, Finding 256):
According to the Phase I ESA, a Contractor Area was located directly to the east of Greys Landfill within the boundary of Parcel A11. The Phase I ESA indicated that, based on the DCC Report and interviews with site personnel, this area was previously used as a storage area for contractor equipment, and may have been historically used to dispose of wastes of unknown types and quantities. Further action was recommended in this area due to the potential for surface and subsurface impacts as a result of the storage/dumping activities. Additional historical information regarding the Contractor Area is provided in Section 2.2.

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 A11-1 boundary based on this review.

3.2. PHASE II INVESTIGATION(S)

3.2.1. Parcel A11 Phase II Investigation

A Phase II Investigation specific to soil conditions was performed for the Site in accordance with the requirements outlined in the ACO as further described in the Phase II Investigation Work Plan – Area A: Parcel A11 (Revision 1) dated May 18, 2016. Findings from the original Parcel A11 Phase II Investigation were presented within the Phase II Investigation Report (Revision 0) dated March 27, 2018, and the pertinent findings are summarized in this document.

The Phase II Investigation for soil conditions was developed to target specific features which represented a potential release of hazardous substances and/or petroleum products to the environment, including RECs, SWMUs, and AOCs (discussed above) as well as numerous other targets defined from former operations that would have the potential for environmental contamination. Soil samples were also collected at site-wide locations to ensure full coverage of the parcel. The Phase II Investigation for overall groundwater conditions included collection points distributed regularly throughout and along the perimeter of the Parcel A11 boundary.

A total of 143 soil samples (from 62 boring locations) and 11 shallow groundwater samples were collected for analysis between July 27, 2016 and March 8, 2017 as part of the Parcel A11 Phase II Investigation. Nine additional wells (GL-02 (-5), GL-03 (-3), GL-08 (-3), GL-09 (-2), GL-11 (-1), GL-17 (-1), GL-18 (-3), GL-19, and TS-01 (-7)) are sampled semi-annually as part of the separate Greys Landfill groundwater monitoring, and relevant data collected from these sample locations were included within the Parcel A11 Phase II Investigation Report to supplement the overall groundwater characterization. The relevant soil and groundwater sample locations which provided pertinent data for discussion of the upcoming development of Sub-Parcel A11-1 are shown on **Figure 3** and **Figure 4**, respectively.

Soil and groundwater samples obtained from Parcel A11 were submitted to Pace Analytical Services, Inc. (PACE) and 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), Oil & Grease, USEPA Target Analyte List (TAL) Metals, hexavalent chromium, and cyanide based on the parcel-specific sampling plan. Shallow soil samples collected from 0 to 1 foot below ground surface (bgs) were also analyzed for polychlorinated biphenyls (PCBs). The relevant laboratory Certificates of Analysis (including Chains of Custody) and Data Validation Reports (DVRs) from the Phase II Investigation are included as electronic attachments.

3.2.2. Supplemental Delineation Investigation

During the Phase II Investigation, several soil samples were identified with elevated concentrations of SVOCs, particularly naphthalene. To supplement the original Phase II Investigation, a Work

Plan for the delineation of naphthalene (and associated chemical constituents including benzene and benzo[a]pyrene) was submitted to the MDE and USEPA to facilitate additional soil and groundwater delineation sampling activities in Parcel A11. The scope of the supplemental investigation proposed within the Work Plan has since been greatly expanded from the original scope, and the findings have been periodically reported to the MDE and USEPA. Pertinent findings from the supplemental sampling activities are summarized in this document.

A total of 293 soil samples (from 119 boring locations) and 21 shallow groundwater samples were collected for analysis between June 12, 2018 and August 23, 2018 as part of the supplemental delineation sampling activities. The relevant soil and groundwater sample locations which provided pertinent data for discussion of the upcoming development of Sub-Parcel A11-1 are shown on **Figure 5** and **Figure 6**, respectively. The samples from the original Phase II Investigation are also shown for reference.

Soil and groundwater samples obtained from the supplemental delineation activities were submitted to PACE and analyzed for the TCL-VOCs, PAHs, TPH-DRO/GRO, and Oil & Grease. The relevant laboratory Certificates of Analysis (including Chains of Custody) from the supplemental investigation are included as electronic attachments. These additional samples did not undergo the formal validation process, so DVRs are not provided.

3.2.3. Summary of Results

Soil and groundwater results relevant for the Sub-Parcel A11-1 Development Area were screened against the Project Action Limits (PALs) established in the property-wide Quality Assurance Project Plan (QAPP) dated April 5, 2016, or based on other direct agency guidance (e.g., TPH/Oil & Grease). The PALs for relevant polynuclear aromatic hydrocarbons (PAHs) have been adjusted based on revised toxicity data published by the USEPA. **Table 1** and **Table 2** provide a summary of the detected compounds (organics and inorganics) in the soil samples collected during both the original Phase II Investigation as well as during the supplemental delineation sampling. **Table 3** and **Table 4** provide a summary of the detected compounds (organics and inorganics) in the groundwater samples obtained during both investigations, including the most recent analytical data (May 2018) obtained from the Greys Landfill groundwater monitoring wells.

The PAL exceedances in soil and groundwater are highlighted on the respective detection summary tables. PAL exceedances in soil included four inorganics (arsenic, manganese, thallium, and vanadium), one VOC (benzene), eight SVOCs (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, and naphthalene), TPH-DRO/GRO, and Oil & Grease. PAL exceedances in groundwater included six total/dissolved metals (arsenic, cadmium, cobalt, iron, manganese, and thallium), 10 VOCs (1,1,2,2-tetrachloroethane, 1,1-dichloroethane, 1,2-dibromo-3-chloropropane, benzene, bromodichloromethane, carbon tetrachloride, chloroform, methylene chloride, toluene, and vinyl chloride), 11 SVOCs (1,4-dioxane, 2-methylnaphthalene, benz[a]anthracene,

benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, naphthalene, n-nitroso-di-n-propylamine, and pyrene), TPH-DRO/GRO, and Oil & Grease.

There were widespread locations within, or adjacent to, the proposed development LOD with soil exceedances of the TPH/Oil & Grease PAL (6,200 mg/kg) and/or potential indications of NAPL in the soil cores. **Figure 7** provides an overview of the distribution of NAPL observed in soil cores within the proposed LOD. Due to the widespread presence of NAPL, utility alignments and inverts must be considered with respect to these impacts prior to trenching.

Although NAPL was observed in numerous locations, free-phase product has not been observed to accumulate in any of the NAPL screening piezometers (gauged at standard 0-hr, 48-hr, and 30-day intervals) or groundwater monitoring points (gauged prior to sampling) that are relevant for the proposed development. A summary of the NAPL gauging status for wells and piezometers near the development LOD is provided as **Figure 8**, indicating that all NAPL screening piezometers have clean 30-day measurements (i.e., no detected presence of NAPL). At this time, all NAPL screening piezometers at the Site have been abandoned. Each piezometer was gauged a final time on the abandonment date in accordance with agency guidance, and NAPL was not detected at any location.

A human health Screening Level Risk Assessment (SLRA) has typically been performed for soils within development sub-parcels to determine potential future risks to Composite Workers and Construction Workers. Based on existing data obtained during the Parcel A11 Phase II Investigation and supplemental delineation sampling, there is a potentially unacceptable risk for future Composite Worker occupants of the Site due to NAPL contamination and associated VOC and SVOC constituents, in particular elevated levels of benzene, benzo[a]pyrene, and naphthalene. These constituents, along with other representative VOCs and SVOCs in Parcel A11 (selected based on prior analysis presented in the Parcel A11 Phase II Investigation Report), are provided in the table below along with concentrations corresponding to baseline carcinogenic risk screening levels of 1E-6 to 1E-4:

Parameter	1E-6 (RSLs) (mg/kg)	1E-5 (mg/kg)	1E-4 (mg/kg)
Biphenyl	410	4,100	41,000
Benzene	5.10	51.0	510
Benz(a)anthracene	21.0	210	2,100
Benzo(a)pyrene	2.10	21.0	210
Benzo(b)fluoranthene	21.0	210	2,100
Dibenz(a,h)anthracene	2.10	21.0	210
Indeno(1,2,3-c,d)pyrene	21.0	210	2,100
Naphthalene	17.0	170	1,700

The concentrations associated with 1E-4 were considered to be the delineation thresholds for each individual compound during the preceding delineation activities. However, since the carcinogenic risk is cumulative for PAHs, the delineation thresholds for the three primary risk drivers were set at approximately 1/3 of the concentration corresponding to the risk level of 1E-4, as follows:

Delineation Thresholds	
Benzene	150
Benzo(a)pyrene	75.0
Naphthalene	500

The soil data obtained during the original Phase II Investigation and the supplemental delineation sampling were compared to the listed delineation thresholds. If a soil sample contained a concentration of benzene, benzo[a]pyrene, or naphthalene above one of the specified delineation thresholds, the associated soil boring was flagged with elevated chemical data. Soil borings exhibiting these analytical exceedances were often co-located with observations of NAPL in the soil cores. Based on this screening approach, summaries of elevated soil conditions at the Site are presented in **Figures 9a** (above 5 feet bgs) and **9b** (below 5 feet bgs). As shown on the figures, there are three main areas which are potentially impacted by NAPL and/or associated elevated chemical data. One of these areas is positioned in the eastern portion of the Site and is partially located below the future warehouse building footprint. The remaining areas overlap with the western portion of the LOD, along the temporary easement which will be utilized to install a force main and pump station.

In addition to the confirmed presence of NAPL and elevated chemical data at the Site, groundwater conditions are also a concern. There is no potential for direct exposure to groundwater for a Composite Worker since groundwater is not used on the Tradepoint Atlantic property (and is not proposed to be utilized); however, elevated levels of VOCs and SVOCs in groundwater in the vicinity of the Site could potentially cause an unacceptable vapor intrusion condition for the proposed warehouse building. A summary of groundwater conditions is presented as **Figure 10**, including groundwater elevation contours (developed from depth to water measurements obtained on January 16, 2018) and the most recent analytical data for the main compounds of interest: benzene, benzo[a]pyrene, and naphthalene. Elevated concentrations of one or more of these VOCs/SVOCs were documented at various locations, including below the eastern half of the proposed warehouse building. Elevated aqueous concentrations east of the development boundary may be indicative of past contaminant migration, and a number of downgradient wells are in the process of being installed to define and monitor the downgradient plume. Additional evaluations or response actions for the impacts inside or outside the Sub-Parcel A11-1 boundary may be coordinated with the agencies beyond the scope of this RADWP.

Based on the documented conditions in soil and groundwater, surface engineering controls are proposed at the Site as a containment remedy, supplemented by a sub-slab vapor barrier with a

passive/active venting system to be installed below the building footprint. These measures are proposed to mitigate potential risks to future Composite Workers based on current conditions. During development, all of the required intrusive construction work or activities which require the handling of potentially impacted materials will be performed by Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) trained workers. The use of OSHA HAZWOPER trained workers will mitigate potential risks to Construction Workers by ensuring that the on-site work is performed by personnel who are trained and equipped for the conditions at the Site.

The contractor will develop a site-specific Health and Safety Plan (HASP) which will be applied to all on-site OSHA HAZWOPER trained workers who may be engaged in intrusive construction work or otherwise handle potentially impacted materials. OSHA HAZWOPER trained workers will not be required during construction activities which do not have a significant exposure risk, such as above-grade building construction.

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

3.3.1. General

Based on the results and conclusions of the site investigation activities and human health risk screening, this section presents a summary of the identification and evaluation of remedial alternatives for Sub-Parcel A11-1 in general accordance with USEPA guidance under CERCLA. In particular, this section presents the establishment of media cleanup objectives, the identification and initial screening of remedial alternatives for meeting the cleanup objectives, a detailed evaluation of the final remedial alternatives based on the CERCLA evaluation criteria, and a recommendation of the most appropriate remedial alternative based on the evaluation criteria.

3.3.2. Establishment of Media Cleanup Objectives

This section summarizes the cleanup objectives for Sub-Parcel A11-1 based on the results of the site investigation activities, plans for redevelopment of the Site, applicable environmental cleanup regulations, and an evaluation of potential risks to human health and the environment. In general, the cleanup objectives for Sub-Parcel A11-1 are to mitigate potential risks to future Composite Workers and Construction Workers associated with the identified NAPL contamination and associated VOC and SVOC constituents in soil and groundwater. These objectives are further discussed as follows:

- Potential future direct contact risks to NAPLs and contaminated soils should be mitigated through appropriate containment, treatment, or/or removal actions.

- Potential future inhalation risks from VOCs/SVOCs in soil, groundwater and NAPLs should be mitigated through appropriate containment, treatment, or/or removal actions.

- While there are no current or anticipated future exposure pathways to impacted groundwater (since groundwater is not used on the Tradepoint Atlantic property and is not proposed to be used), potential future exposures to contaminated groundwater should be mitigated through use restrictions or treatment. No additional remedial actions are proposed to mitigate the potential migration of NAPL or associated constituents in groundwater below the Site as part of this RADWP. If additional response actions are required to address the presence of NAPL in the subsurface either inside or outside Sub-Parcel A11-1, such measures will be proposed under a separate Work Plan or Work Plans.

3.3.3. Identification of Remedial Alternatives

This section presents the identification of potential remedial alternatives to be evaluated against the threshold screening criteria (i.e., protection of human health and the environment; attainment of media cleanup objectives; and controlling the sources). The potential remedial alternatives were developed based on the media clean-up objectives, communications with the MDE, and professional experience with the identification and screening of remedial alternatives, and consist of the following.

- Alternative 1 – No Action: This alternative does not include the implementation of any remedial activities, and essentially represents leaving the Site in its existing condition. This alternative does not address the media cleanup objectives, but is presented as a baseline condition for comparison purposes.

- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: This alternative has been developed to meet the media cleanup objectives, and generally involves the following major activities: placement of a cap (concrete floor slab of building, asphalt pavement, and/or soil cap) above the areas of contamination to prevent direct contact exposures; installation of a sub-slab vapor barrier and passive venting system that can be upgraded to an active venting and sub-slab depressurization system to restrict the migration of vapors into the proposed new building; utilization of low-permeability utility backfill and/or trench plugs to prevent preferential contaminant migration along utilities that pass through the areas of contamination; and long-term property use restrictions, inspection and maintenance of the cap and vapor barrier systems, and downgradient groundwater monitoring to ensure that the controls remain effective.

- Alternative 3 – In-Situ Treatment by Chemical Stabilization: This alternative represents one of a number of potential in-situ treatment alternatives for the identified contamination. In particular, this alternative would involve the in-situ treatment of the contamination through the injection of specialized chemical reagents using direct push technology or

injection wells. The treatment works as a two-step process, generally consisting of permeability reduction followed by chemical weathering and NAPL encapsulation. The goal of the treatment would be to reduce contaminant concentrations to the point that no additional engineering controls or long-term monitoring would be required. Treatability studies would be required to confirm the effectiveness of the treatment and to refine the application rates and methods.

- Alternative 4 – Removal and Disposal: This alternative has been developed for comparative purposes, and would involve the excavation and off-site disposal of all contaminated soils and NAPLs, above and below the water table. Excavated materials would have to be dewatered, loaded and transported to an approved off-site disposal facility. Any materials that are determined to be RCRA-hazardous would require treatment and disposal at an approved off-site hazardous waste facility. The excavated area would be backfilled with clean fill to facilitate the planned redevelopment.

3.3.4. Initial Screening of Remedial Alternatives

This section presents an initial screening of the identified remedial alternatives against the threshold criteria (i.e., protection of human health and the environment; attainment of media cleanup objectives; and controlling the sources). The screening is summarized as follows:

- Protection of Human Health and the Environment: Alternative 1 (No Action) does not provide adequate protection of human health and the environment because it does not mitigate the identified risks or address the remedial objective. Alternatives 2 through 4 (In-Place Containment, In-Situ Treatment, and Removal and Disposal) have the potential to provide adequate protection of human health and the environment, although Alternative 3 (In-Situ Treatment) and particularly Alternative 4 (Removal and Disposal) have the potential to increase short-term exposure risks in association with waste treatment and handling.

- Attainment of Media Cleanup Objectives: Alternative 1 (No Action) would not meet any of the established media cleanup objectives, while Alternatives 2 through 4 (In-Place Containment, In-Situ Treatment, and Removal and Disposal) would address all of the established media cleanup objectives.

- Controlling the Sources: Historic sources of contamination to the area have previously been eliminated through the decommissioning and removal of the previous steel production operations at the Site. Alternative 1 (No Action) would not provide any additional control of the existing contaminants, although Alternatives 2 through 4 (In-Place Containment, In-Situ Treatment, and Removal and Disposal) would provide varying levels of control with respect to the risks posed by the existing contamination.

Based on this initial screening, Alternative 1 (No Action) does not meet the threshold screening criteria, but Alternatives 2 through 4 (In-Place Containment, In-Situ Treatment, and Removal and Disposal) would meet the threshold criteria and will be retained for detailed evaluation in the following section of this report. Even though the No Action Alternative does not meet the threshold criteria, it has also been retained for detailed evaluation in the following section of this report to provide a baseline condition for comparison purposes.

3.3.5. **Detailed Evaluation of Alternatives**

This section presents a detailed evaluation of the remedial alternatives that were identified and screened in the previous section. This detailed evaluation has been conducted with respect to the following evaluation/balancing criteria: long-term effectiveness; toxicity, mobility and volume reduction; short-term effectiveness; implementability; community acceptance; state acceptance; and cost. A summary of the detailed evaluation of alternatives is presented on **Table 5**.

3.3.5.1. Long-Term Effectiveness

This criterion refers to the expected effectiveness, reliability and risk of failure of the alternatives, including the effectiveness under analogous site conditions, the potential impact resulting from a failure of the alternative, and the projected useful life of the alternative.

- Alternative 1 – No Action: This alternative is not effective in the long-term because it does not address the identified contamination or exposure pathways of concern.
- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: The proposed capping and vapor control measures have been proven to be effective in the long-term at similar sites with similar conditions. Property use restrictions, and continued inspections, maintenance, and monitoring will ensure the long-term effectiveness of this alternative.
- Alternative 3 – In-Situ Treatment by Chemical Stabilization: The long-term effectiveness of this alternative is currently unknown and would have to be estimated from treatability studies and possibly additional sampling. The treatment measures have the potential to increase contaminant mobility in the long-term because of the required disturbance and chemical changes.
- Alternative 4 – Removal and Disposal: This alternative provides long-term effectiveness through the removal and secure disposal of contaminated materials.

3.3.5.2. Reduction in Toxicity, Mobility, or Volume of Wastes

This criterion generally refers to how much the remedial alternatives will reduce the waste toxicity, mobility and/or volume, primarily through treatment.

- Alternative 1 – No Action: This alternative does not provide any reduction in the toxicity, mobility or volume of the contaminated materials.

- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: This alternative does not provide any reduction in toxicity, mobility or volume through treatment, but the effective treatment of similar waste materials is commonly regarded as technically impracticable. The planned cap and vapor migration controls will help reduce potential contaminant mobility.

- Alternative 3 – In-Situ Treatment by Chemical Stabilization: This alternative has the potential to provide significant reduction in contaminant toxicity, mobility and volume through treatment, but this would need to be confirmed through treatability studies, and in-situ treatment has the potential to increase contaminant mobility.

- Alternative 4 – Removal and Disposal: This alternative does not provide any reduction in toxicity, mobility or volume through treatment. The significant site disturbance associated with this alternative could increase contaminant mobility in the short term.

3.3.5.3. Short-Term Effectiveness

This criterion generally refers to potential short-term risks to on-site workers and the community in association with implementation of the remedial alternatives, such as might be associated with the excavation, handling, treatment, containment, and transportation of contaminated materials.

- Alternative 1 – No Action: This alternative does not increase or decrease short-term exposure risks.

- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: This alternative can be quickly implemented with minimal short-term exposure risks. Any such short-term exposure risks would be mitigated through the implementation of site-specific health and safety controls to be executed by OSHA HAZWOPER trained workers.

- Alternative 3 – In-Situ Treatment by Chemical Stabilization: This alternative would be expected to increase short-term exposure risks through the intrusive disturbance of contaminated materials and the handling of reactive chemicals.

- Alternative 4 – Removal and Disposal: This alternative is expected to significantly increase short-term risks to on-site workers and the community because of the exposure, handling and transportation of a relatively large volume of waste.

3.3.5.4. Implementability

This criterion refers to the relative ease of alternative implementation (construction), including duration, administrative and technical feasibility, and availability of the required services and materials.

- Alternative 1 – No Action: This alternative is not expected to be implementable because it does not address the applicable environmental requirements.
- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: This alternative can be quickly implemented with readily available, typically acceptable, and proven technologies.
- Alternative 3 – In-Situ Treatment by Chemical Stabilization: This alternative presents implementation concerns because it requires specialized equipment and materials, and treatability studies would be required to confirm the technical feasibility.
- Alternative 4 – Removal and Disposal: This alternative presents significant implementation concerns because of potential short-term exposure risks, required air-emission and odor controls, the removal of materials from below the groundwater table, and the handling and transportation of a relatively large volume of waste materials.

3.3.5.5. Community Acceptance

This criterion refers to the known or anticipated community acceptance associated with the remedial alternatives.

- Alternative 1 – No Action: This alternative is not expected to be favorable because it does not address the identified contamination or the remedial objectives.
- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: This alternative is expected to be acceptable because it addresses the remedial objectives without increasing risks to the community.
- Alternative 3 – In-Situ Treatment by Chemical Stabilization: This alternative is potentially acceptable depending on the results of treatability studies and other supplemental studies.
- Alternative 4 – Removal and Disposal: This alternative is potentially acceptable, but the transportation of large volumes of waste through any community is generally not favorable, and fugitive emissions and odors are expected to be a potential concern.

3.3.5.6. State Acceptance

This criterion refers to how the remedial alternatives will comply with applicable environmental regulations (e.g., permit requirements).

- Alternative 1 – No Action: This alternative is not expected to be acceptable because it does not meet the remedial action objectives.
- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: This alternative is expected to be acceptable because it meets the remedial action objectives and can be implemented in a manner consistent with all anticipated regulatory and permitting requirements.
- Alternative 3 – In-Situ Treatment by Chemical Stabilization: This alternative is potentially acceptable depending in the results of treatability and other supplemental studies.
- Alternative 4 – Removal and Disposal: This alternative is potentially acceptable, but the relocation of large volumes of wastes is generally not favorable.

3.3.5.7. Cost

This criterion addresses the anticipated short- and long-term costs associated with implementation of the remedial alternatives.

- Alternative 1 – No Action: This alternative does not have any cost.
- Alternative 2 – In-Place Containment with Cap and Vapor Barrier: The estimated costs for implementation of this alternative (~$0.3 million) are relatively low in both the short term and long term.
- Alternative 3 – In-Situ Treatment by Chemical Stabilization: The costs for this alternative would depend on the results of treatability studies and subsequent designs, but preliminary estimates from vendor-supplied data and previous experience indicate an anticipated cost of at least $3 million.
- Alternative 4 – Removal and Disposal: The costs for this alternative would depend on the final volume of materials to be removed, the need for air-emission and other controls during excavation and handling, the amount of excavated material that could be characterized as RCRA-hazardous waste, and costs for off-site transportation, treatment and disposal. Preliminary estimates based on previous experience with similar materials and typical waste transportation and disposal costs indicate anticipated costs of at least $6 million.

3.3.6. **Justification and Recommendation of Remedial Alternative**

Based on the detailed evaluation of remedial alternatives as presented in the preceding section(s), **Alternative 2 – In-Place Containment with Cap and Vapor Barrier, is recommended for Sub-Parcel A11-1**. This alternative clearly satisfies the evaluation criteria better than the other potential alternatives, and is an appropriate and favorable remedial alternative for the identified

contamination. Supporting rational for selection of Alternative 2 – In-Place Containment with Cap and Vapor Barrier is summarized below:

- it satisfies the threshold screening criteria;
- it best satisfies the detailed alternative evaluation criteria;
- it meets the media cleanup goals;
- it can be readily and quickly implemented with proven and reliable technologies;
- it is consistent and compatible with the proposed site development plans;
- it provides for long-term protection of human health and the environment; and
- it can be conducted in accordance with applicable regulations.

4.0 PROPOSED SITE DEVELOPMENT PLAN

Tradepoint Atlantic is proposing to construct a warehouse building and supporting parking and laydown areas on Sub-Parcel A11-1. The proposed development will include improvements on approximately 12.7 acres of land intended for occupancy in the eastern portion of Parcel A11 with the entire Site being fully capped by surface engineering controls. The proposed future use of Sub-Parcel A11-1 is Tier 3 – Industrial. The remainder of Parcel A11 will be addressed in separate development plans in accordance with the requirements of the ACO that will include RADWPs, if necessary. Outside of the main development area designated as Sub-Parcel A11-1, a temporary easement (with a total area of approximately 1.3 acres within the LOD) will be utilized to install a force main and pump station to the west.

Certain compounds 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. Potential risks/hazards exist for future adult Composite Workers based on existing impacts to soil including NAPL and chemical constituents exceeding the PALs. Surface engineering controls are required throughout the Site to be protective of future adult Composite Workers by preventing contact with potentially contaminated surface soil (or relocated subsurface soil) at the Site. Based on the existing conditions and following prior discussions with the MDE and USEPA, the entire Site will be subject to surface engineering controls (i.e., capping). In addition, a sub-slab vapor barrier with a passive/active venting system will be installed below the future building footprint.

Construction Workers may contact impacted surface and/or subsurface soil during earth movement activities associated with construction, including the installation of the stormwater utilities outside of the primary development area. All of the required intrusive construction work or activities which require the handling of potentially impacted materials will be performed by OSHA HAZWOPER trained workers. The use of OSHA HAZWOPER trained workers will mitigate potential risks to Construction Workers by ensuring that the on-site work is performed by personnel who are trained and equipped for the conditions at the Site. OSHA HAZWOPER trained workers will not be required during construction activities which do not have a significant exposure risk, such as above-grade building construction.

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

The development plan for the Site is indicated in **Figure 2**, and the detailed development drawings provided by Morris & Ritchie Associates, Inc. (MRA) are included as **Appendix B**. The process of constructing the proposed warehouse building and support facilities will involve the tasks listed below. As-built and regulatory documentation for the outlined tasks and procedures will be provided in a Sub-Parcel A11-1 Development Completion Report.

4.1. RESPONSE PHASE

4.1.1. Groundwater Network Abandonment

Permanent groundwater monitoring wells LF-03D, LF-04S, and LF-05 were formerly located inside the development boundary as shown on **Figure 11**. Each of the listed monitoring wells was required to be abandoned to facilitate development and to prevent future interruptions at the warehouse facility. In addition, several NAPL screening piezometers (none of which accumulated free-phase product) were formerly located inside the LOD as shown on **Figure 11** and were also required to be abandoned. The well and piezometer abandonments were completed prior to construction activities being initiated at the Site (but following the conditional approval of this RADWP received from the MDE on October 15, 2018) to ensure that the above-ground casings would not be damaged so the groundwater points could be properly abandoned. Each groundwater point was gauged on the final abandonment date in accordance with MDE guidance, and NAPL was not detected at any location. Each groundwater point was then abandoned in accordance with COMAR 26.04.04.34 through 36.

4.1.2. Groundwater Remedies and Monitoring Approach

There is no potential for direct exposure to groundwater for a Composite Worker since groundwater is not used on the Tradepoint Atlantic property (and is not proposed to be utilized); however, elevated levels of VOCs and SVOCs in groundwater in the vicinity of the Site could potentially cause an unacceptable vapor intrusion condition for the proposed warehouse building without additional action. Elevated aqueous concentrations east of the development boundary may be indicative of past contaminant migration. However, the site investigation activities completed to date have indicated the absence of measurable NAPL; therefore, the NAPL does not appear to be highly mobile. Groundwater at the Site is being addressed via the following actions:

- Capping Remedy with Groundwater Use Restrictions: The capping remedy (i.e., surface engineering controls) and groundwater use restrictions will be installed at the Site to eliminate direct exposures to contaminants in groundwater. The capping remedy also reduces the potential for additional migration of contaminants into groundwater by reducing the influx of surface water through infiltration.

- Vapor Barrier – A vapor barrier remedy will be installed to prevent exposures to organic vapors that have volatilized from groundwater by preventing the migration of vapors through the floor slab and into the building.

- Groundwater Monitoring – Groundwater impacts below the Site will be addressed by a combination of the remedies listed above (capping and vapor barrier). To further evaluate groundwater and prevent potential exposures in other areas of the Tradepoint Atlantic property, nine shallow downgradient wells will be installed to define and monitor the downgradient plume. The locations of these downgradient wells are shown in relation to the existing groundwater elevation contours (developed from depth to water measurements obtained on January 16, 2018) on **Figure 12**. The downgradient well network will be subject to long-term groundwater monitoring to observe any change in the distribution or migration of the exiting contaminant plume. Pending the results of the downgradient sampling additional paired wells may be warranted in the future to facilitate groundwater sampling in the intermediate hydrogeologic zone. Any additional evaluations or response actions for the impacts inside or outside the Sub-Parcel A11-1 boundary will be coordinated with the agencies beyond the scope of this RADWP.

4.2. DEVELOPMENT PHASE

4.2.1. Erosion and Sediment Control Installation

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 below the cap.

4.2.2. Grading and Site Preparation

As indicated on the development plans in **Appendix B**, site grading will occur within the Sub-Parcel A11-1 boundary. 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 and will be documented prior to transport to the Site. Processed slag aggregate sourced from the Tradepoint Atlantic property or other materials approved by the MDE for industrial use may be used as fill below the final surface engineering controls. Fill sources shall be free of organic material, frozen material, or other deleterious material. In the case that there is excess material (not anticipated), 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 the MDE accordingly. No excess material will leave the 3,100-acre property without prior approval from the MDE.

4.2.3. Installation of Structures and Underground Utilities

The warehouse facility, parking/laydown areas, and other infrastructure associated with Sub-Parcel A11-1 will be installed at the grades and lines shown on the development plans. Soils relocated or removed during construction may be replaced on-site below the warehouse or exterior areas, but soil removed from utility trenches cannot be used as fill within the utility trenches unless such materials are approved for this use by the VCP. Additional protocols for the installation of utilities at the Site are provided in Section 5.1.2.

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 being trucked directly to the wastewater treatment plant or will be disposed of at an appropriate off-site facility.

4.2.4. Floor Slabs and Paving

Much of the Site will be covered with floor slabs or paving as indicated in the development plans provided in **Appendix B**. The paved areas will receive a layer of subbase material which will consist of compacted aggregate base, which may include processed slag aggregate sourced from the Tradepoint Atlantic property. Processed slag aggregate sourced from the Tradepoint Atlantic property or other materials approved by the MDE for industrial use may be used as fill below the final surface engineering controls.

The required minimum thicknesses of all site-wide pavement sections which will serve as surface engineering controls are indicated in the general cap sections provided in **Appendix C**. According to the development plans, all paved areas at the Site will be installed with a minimum of 24 inches of compacted aggregate based and a minimum of 4 inches of overlying pavement (asphalt or concrete) surface, which meet these required minimum thicknesses.

4.2.5. Sub-slab Vapor Barrier with Passive/Active Venting System

As noted earlier, a sub-slab vapor barrier with a passive/active venting system (sub-slab depressurization system) will be constructed below the concrete floor slab of the proposed new building to prevent the intrusion of VOC/SVOC vapors to indoor air. The venting system will initially be a passive system, with some negative pressure created below the floor slab through a wind-blown turbine connected to the vent pipes. If indoor air concentrations are later determined to exceed health-based levels based on post-construction indoor air sampling, an electric fan or blower will be connected to the end of the venting system to increase the effectiveness.

The venting system will be split into two separate areas to help provide for better overall flow control and potential isolation of any smaller areas of concern, with solid-walled riser pipes extending to the roof line. The preliminary design of the sub-slab barrier and passive/active venting system is depicted on the attached **Figure 13a/b** through **Figure 15**. The general contractor responsible for construction of the venting system at the Site will be ARCO/Murray.

The vapor barrier will consist of a polyethylene membrane at least 15-mils thick that has been proven to be effective for similar applications. The barrier will be chemically resistant to the anticipated vapor concentrations, and will be sealed at all penetrations, seams, and edges. The manufacturer's information and seaming details for the selected Stego® Wrap vapor barrier are presented in **Appendix D**. Installation methods for the vapor barrier, including methods for ensuring the seams and any penetrations are sealed properly are included in **Appendix D** – Vapor Barrier Information (see "Installation Instructions"). Detailed installation specifications have also been developed and are included in **Appendix D**. The methods for sealing any seams or surface penetrations generally include overlapping pieces of the Stego® Wrap and then sealing with Stego® Tape or Stego® Mastic. The installation of the Stego® Wrap vapor barrier will be performed by a construction crew that will be trained for the installation by a certified technician or engineer from Stego® Industries. The certified technician or engineer will review representative portions of the Stego® Wrap vapor barrier prior to concrete placement, and daily oversight during installation will be provided by the Environmental Professional (EP) providing oversight on the project.

A detailed monitoring program will be developed in the future to ensure sub-slab vapor and indoor air are monitored periodically if the venting system remains passive (see Section 5.5). The monitoring frequency for sub-slab vapor and/or indoor air may be reduced over time depending on the analytical results. The approximate locations of the sub-slab vapor monitoring points are shown on **Figure 13a/b**. One or more of the cleanouts for the sub-slab PVC vapor mitigation system (detailed in **Figure 15**) may be used for additional sub-slab vapor sampling. Minor adjustments to the locations of the vapor monitoring points and/or cleanouts may be necessary during, or prior to, construction based on the final interior layout of the building.

4.2.6. Landscaping

Small areas of the Site will be landscaped between the exterior paved areas. The required minimum thicknesses of all site-wide landscaping sections which will serve as surface engineering controls are indicated in the general cap sections provided in **Appendix C**. According to the development plans, all landscape areas at the Site will be installed with a minimum of 6 inches of clean topsoil overlying 18 inches of clean fill, with an underlying geotextile marker fabric between the clean fill and the underlying materials. The proposed landscape sections meet the minimum capping requirements.

4.2.7. **Stormwater Management**

The stormwater management plan for the Site is provided within the development plans provided in **Appendix B**. Stormwater infrastructure will be installed throughout the Site and will include the installation of two new stormwater management ponds. The ponds will ultimately discharge toward the northeast into a roadside drainage ditch running along the southern edge of Peninsula Expressway. The required minimum thicknesses of all pond sections which will serve as surface engineering controls are indicated in the general cap sections provided in **Appendix C**. Stormwater ponds at the Site will be installed with an impermeable liner between the existing soil (or fill) and overlying clean fill or stone. Alternatively, a low-permeability clay liner with a minimum thickness of 12 inches may be used in lieu of the impermeable liner, in which case it must also be covered by a minimum of 12 inches of clean fill or stone. If a low-permeability clay liner is used, the material must undergo geotechnical testing and be approved by the MDE prior to its use, as outlined in Section 5.1.5.

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

5.0 DEVELOPMENT IMPLEMENTATION PROTOCOLS

5.1. DEVELOPMENT PHASE

This plan presents protocols for the handling of soils and fill materials in association with the development of Sub-Parcel A11-1. In particular, this plan highlights the minimum standards for construction practices and managing potentially contaminated materials to reduce potential risks to workers and the environment.

Certain compounds are present in the soils located near the surface and in the subsurface at concentrations in excess of the PALs. 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 A11-1. There were no samples where detections of lead were identified in excess of 10,000 mg/kg. There were widespread locations within, or adjacent to, the proposed development LOD with soil exceedances of the TPH/Oil & Grease PAL (6,200 mg/kg) and/or potential indications of NAPL in the soil cores. **Figures 9a** and **9b** provide an overview of the distribution of the NAPL and associated elevated chemical impacts in soil within Sub-Parcel A11-1. Due to the widespread presence of NAPL, utility alignments and inverts must be considered with respect to these impacts prior to trenching.

Construction Workers may contact impacted surface and/or subsurface soil during earth movement activities associated with construction, including the installation of the stormwater utilities outside of the primary development area. All of the required intrusive construction work or activities which require the handling of potentially impacted materials will be performed by OSHA HAZWOPER trained workers. The use of OSHA HAZWOPER trained workers will mitigate potential risks to Construction Workers by ensuring that the on-site work is performed by personnel who are trained and equipped for the conditions at the Site. OSHA HAZWOPER trained workers will not be required during construction activities which do not have a significant exposure risk, such as above-grade building construction.

Based on the prior investigation findings, surface engineering controls are required at the Site to be protective of future adult Composite Workers by preventing contact with potentially contaminated surface soil (or relocated subsurface soil) at the Site. Based on the existing conditions and following prior discussions with the MDE and USEPA, the entire Site will be subject to surface engineering controls (i.e., capping). In addition, a sub-slab vapor barrier with a passive/active venting system will be installed below the building footprint. The proposed

pavement caps, landscape caps, and stormwater pond sections will meet the required minimum specifications for surface engineering controls provided in **Appendix C**.

5.1.1. 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 MDE. In addition, the following measures will be taken to prevent contaminated soil from exiting the Site:

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

5.1.2. 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 include the construction manager and the EP providing oversight on the project. During the meeting, the construction manager and the EP shall review the proposed excavation and trenching locations and any associated utility inverts. The construction manager will be responsible for conveying all relevant information regarding excavation/grading and/or utility work to the site workers who will be involved with these activities. Evidence of NAPL has been observed to be widespread within the development LOD based on prior investigations (see attached summary figures). The Utility Excavation NAPL Contingency Plan must also be reviewed prior to the initiation of intrusive activities. The HASP for the project shall also be reviewed and discussed.

The EP will provide oversight of soil excavation/trenching activities as described in Section 5.6. Soil excavation/trenching will occur during various phases of the proposed construction. In general, excavated materials are expected to be suitable for replacement on the Site. However, the EP will monitor the soil excavation activities for signs of significantly contaminated material which may not be suitable for reuse (as described below). The EP will also be responsible for monitoring organic vapor concentrations in the worker breathing zone within the trenches and will coordinate with the designated Site Safety Officer (provided by the contractor) to determine whether any increased level of health and safety protection is required.

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.

All utility trenches will be backfilled with bedding and backfill materials approved by the MDE for industrial use. A general utility cross section is provided as **Appendix E**. 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 F**) provides protocols to be followed if NAPL is encountered during the construction activities. All utility corridors which pass through areas containing elevated chemical impacts and that have the potential to preferentially transmit contaminated vapors or groundwater along the utility line shall be plugged using 1) low permeability backfill material; or 2) trench plugs in accordance with the details shown on the utility trench plug detail within the Utility Excavation NAPL Contingency Plan. **Figure 16** highlights areas which have already been identified with NAPL or elevated VOC/SVOC impacts in soil or groundwater based on prior investigations. Mitigative measures (i.e., low permeability backfill and/or trench plugs) will be required in these areas; an approximately 25-foot buffer was added surrounding the known impacts to conservatively define the area where mitigative measures shall be implemented to prevent potential migration.

The EP will monitor all soil excavation and utility trenching 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 significant contamination. 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 significant 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. Materials stockpiled due to evidence of contamination 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.

5.1.3. 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 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. The resulting analytical data will be submitted to the MDE to determine the suitability of the material for reuse. If the MDE determines that the materials are unsuitable for reuse, 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 an appropriate off-site non-hazardous landfill for proper disposal if the concentrations of excavated sampled materials indicate that the materials are not hazardous, but still are not suitable for reuse. The quantities of all materials that require disposal off-site, if any, will be recorded and identified in the Development Completion Report.

5.1.4. Fill

Processed slag aggregate sourced from the Tradepoint Atlantic property or other materials approved by the MDE for industrial use may be used as fill below the proposed surface engineering controls. Soil excavated on the sub-parcel has been determined to be suitable for re-use at the Site below the surface engineering controls, unless such materials are determined by the EP/MDE to be unsuitable for use as outlined in Section 5.1.2 and Section 5.1.3.

All over-excavated utility trenches will be backfilled with bedding and backfill approved by the MDE for industrial use. As with structural fill, processed slag aggregate and other materials approved for industrial use can be used as backfill in utility trenches since the entire sub-parcel 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, and a geotextile marker fabric will be placed between the VCP clean fill and any underlying material. Soil removed from utility trenches cannot be used as fill within the utility trenches unless such materials are approved for this use by the VCP. A general utility detail drawing is provided as **Appendix E**. Material imported to the Site will be screened according to MDE guidance for suitability.

All utility corridors which pass through areas containing elevated chemical impacts and that have the potential to preferentially transmit contaminated vapors or groundwater along the utility line shall be plugged using 1) low permeability backfill material (less than or equal to the permeability of the existing subgrade); or 2) trench plugs in accordance with the details shown in the Utility Excavation NAPL Contingency Plan (**Appendix F**) and referenced on **Figure 16**.

5.1.5. Clay Liner Installation (if applicable)

If a clay liner is used in lieu of the impermeable liner between the existing soil (or fill) and overlying clean fill or stone in the proposed stormwater ponds, the following requirements will be met. As shown in **Appendix C**, the low-permeability clay liner will have a minimum thickness of 12 inches and will be covered by a minimum of 12 inches of clean fill or stone.

Low-permeability clay for the stormwater pond liner construction (if selected) shall consist of relatively homogeneous materials that are not gap-graded or susceptible to soil piping and shall have at least 15% of the material finer than the No. 200 sieve size.

If a clay liner is selected, the EP is responsible for ensuring testing as required to approve the low-permeability clay. An independent geotechnical testing laboratory shall carry out the following advance tests on each off-site source of material proposed for construction of the low-permeability clay liner.

- Standard Proctor – ASTM D 698
- Hydraulic Conductivity Tests – ASTM D 5084

The test results shall be submitted to the EP and the MDE for review and the material shall be approved by both parties prior to transportation to the Site. The low-permeability clay must be compacted to a density that corresponds to a hydraulic conductivity of $1x10^{-5}$ cm/s or lower as determined during laboratory testing. The in-place moisture content and compaction shall be measured by the EP during construction to match the selected laboratory conditions and verify compliance with the requirements approved by the MDE. Compaction testing shall be conducted with a nuclear density gauge in accordance with ASTM D 6938 at a frequency of at least one test per 2,500 square feet and at least one test per lift. The compacted liner shall be at least 12 inches thick and shall consist of at least two separate lifts of material placed in 8-inch maximum loose lift thickness (or 4 inches where hand-operated equipment is used). Materials that do not meet the compaction, moisture content, and/or other material specifications shall be reworked until acceptable results are obtained, or rejected and replaced with suitable materials.

5.1.6. Dust Control

General construction operations, including soil excavation and transport, and trenching for utilities will be performed at the Site. These activities are anticipated to be performed in areas of soil

impacted with COPCs. Best management practices should be undertaken at the Sparrows Point property as a whole to prevent the generation of dust which could impact other areas of the property outside of the immediate work zone. To limit worker exposure to contaminants borne on dust and windblown particulates, dust monitoring will be performed in the immediate work zone and at the upwind and downwind perimeter of the Site, and dust control measures will be implemented if warranted based on the monitoring results. The action level proposed for the purpose of determining the need for dust suppression techniques (e.g. watering and/or misting) during the development activities at the Site will be 3.0 mg/m³. The lowest of the site-specific dust action levels, OSHA PELs, and ACGIH TLV was selected as the proposed action level.

The EP will be responsible for the dust monitoring program. Air monitoring will be performed using Met One Instruments, Inc. E-Sampler dust monitors or equivalent real-time air monitoring devices. The EP will set-up dust monitoring equipment at the outset of ground intrusive work or other dust-generating activities, and continuous dust monitoring will be performed during this work. In addition to work area monitoring, a dust monitor will be placed at two of the four perimeters of the Site. The selected perimeter locations will correspond to the upwind and downwind boundaries based on the prevailing wind direction predicted for that day. The prevailing wind direction will be assessed during the day, and the positions of the perimeter monitors will be adjusted if there is a substantial shift in the prevailing wind direction.

Once all dust-generating activities are complete (which may occur at a later stage of the project once ground intrusive work has been completed or after the Site has been capped), the dust monitoring program may be discontinued. If additional dust-generating activities commence, additional dust monitoring activities will be performed.

If sustained dust concentrations exceed the action level (3.0 mg/m³) at any of the monitoring locations as a result of conditions occurring at the Site, operations will be stopped temporarily until dust suppression can be implemented. Operations may be resumed once monitoring indicates that dust concentrations are below the action level. The background dust concentration will be utilized to evaluate whether Site activities are the source of the action level exceedance. The background dust concentration will be based on measurements over a minimum of a 1-hour period at the upwind Site boundary. The upwind data will be used to calculate a time weighted average background dust concentration. As noted above, the locations of the perimeter dust monitors may be adjusted periodically if there is a substantial shift in the prevailing wind direction.

As applicable, air monitoring will be conducted during development implementation activities 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 at the upwind and downwind Site boundaries to ensure contaminants are not migrating off-site. The concentration measured at the downwind perimeter shall not exceed the action level of 3.0 mg/m³, unless caused

by background dust from upwind of the Site. If exceedances of the action level are identified downwind for more than five minutes, the background dust concentration shall be evaluated to determine whether the action level exceedances are attributable to Site conditions. If on-site activities are the source of the exceedances, dust control measures and additional monitoring will be implemented. The dust suppression measures may include wetting or misting using 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 area. A pre-construction meeting will be held to discuss the potential of windblown particulates from other activities impacting the air monitoring required for this RADWP. Site contact information will be provided to address the possibility of upwind dust impacts. If dust is observed above the action level (3.0 mg/m^3) 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 A11-1 development.

5.2.1. Groundwater PAL Exceedances

A total of 23 shallow groundwater wells and temporary groundwater sample collection points (shown on **Figure 6**) were sampled within and surrounding the development LOD during the Parcel A11 Phase II Investigation as well as supplemental sampling activities. Aqueous PAL exceedances in shallow groundwater in the vicinity of the development LOD included both inorganic and organic compounds, including several elevated detections of VOCs and SVOCs. The aqueous PAL exceedances from the shallow hydrogeologic zone that are relevant for this RADWP are provided in the detection summary tables (**Table 3** and **Table 4**). While the concentrations of PAL exceedances are not deemed to be a significant human health hazard since there is no on-site groundwater use, proper water management is required to prevent unacceptable discharges or risks to on-site workers.

5.2.2. Dewatering

Dewatering may be necessary during the installation of underground utilities (within trenches/excavations). 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 transported to the Humphrey Creek Waste Water Treatment Plant (HCWWTP). The water 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 water will be trucked directly to the HCWWTP.

The EP will inspect any 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. It is notable that the groundwater under some areas of the proposed development contains concentrations of VOCs and/or SVOCs which exceed the threshold levels for acceptable treatment at the HCWWTP (listed below). These areas are highlighted on **Figure 17** based on the summary of groundwater conditions presented in **Figure 10** and supporting analytical data presented in **Table 3**. Any dewatering that is completed within these defined areas will necessarily require analytical testing of the intrusive water, and at a minimum the water shall be analyzed for VOCs and SVOCs.

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

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

Documentation of any water testing, as well as the selected disposal option, will be reported to the MDE in the Development Completion Report. Any permits or permit modifications related to dewatering will be provided to the agencies as addenda to this RADWP.

5.3. HEALTH AND SAFETY

Since the project is expected to encounter soil that is impacted with elevated levels of COPCs, in particular elevated VOCs/SVOCs and NAPL, all of the required intrusive construction work or activities which require the handling of potentially impacted materials will be performed by OSHA

HAZWOPER trained workers. The use of OSHA HAZWOPER trained workers will mitigate potential risks to Construction Workers by ensuring that the on-site work is performed by personnel who are trained and equipped for the conditions at the Site.

The contractor providing the OSHA HAZWOPER trained workers will develop a site-specific HASP which will be applied to all on-site workers who may be engaged in the above-referenced activities. The HASP will specify workspace monitoring, Action Levels, and the appropriate Personal Protection Equipment (PPE) for worker health and safety protection for the project. A Site Safety Officer must be designated within the contractor's HASP. A copy of the HASP will be maintained on-site and will be made available to the EP. The EP will be responsible for monitoring organic vapor concentrations in the worker breathing zone within the trenches and will coordinate with the designated Site Safety Officer (provided by the contractor) to determine whether any increased level of health and safety protection (including engineering controls and/or PPE) is required. The designated Site Safety Officer will be responsible for ensuring compliance with the requirements of the HASP, and for enforcing these requirements.

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 material. The EP may elect to adopt the contractor's HASP, or can prepare their own site-specific HASP.

OSHA HAZWOPER trained workers will not be required during construction activities which do not have a significant exposure risk, such as above-grade building construction.

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. The entire Tradepoint Atlantic property will be subject to the groundwater use restriction.
- 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 for 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.

The responsible party will file the above deed restrictions as defined by the MDE-VCP in the NFA and COC. The Tenant will be required to sign onto the Environmental Covenant with restriction in the NFA. Tradepoint Atlantic will notify the Tenant of this requirement and will provide MDE with contact information for the Tenant prior to issuance of the NFA.

5.5. POST REMEDIATION REQUIREMENTS

Post remediation requirements will include compliance with the conditions specified in the NFA, COC, and the deed restrictions recorded for the Site. Deed restrictions will be recorded within 30 days after receipt of the final NFA. In addition, the 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.

Long-term groundwater monitoring requirements for the entire Parcel A11 site have not yet been determined. A document presenting the findings of the on-going groundwater delineation response actions will be provided to the agencies. This document will propose a long-term groundwater monitoring approach for the groundwater impacts associated with Parcel A11 (which may include areas within Sub-Parcel A11-1 or another boundary as appropriate).

Additional requirements will include inspection procedures and maintenance of the containment remedies to minimize degradation which could lead to future exposures. An Operations and Maintenance Plan (O&M Plan) for the Site will be submitted in the future for MDE approval. This O&M Plan will include long-term inspection and maintenance requirements for the capped areas of the Site as well as the vapor barrier.

The O&M Plan will also include details regarding future monitoring of indoor air and sub-slab vapor below the warehouse. A plan that includes details about the locations and sampling methods for indoor air sampling will be submitted to the agencies within the O&M Plan for review once the internal building design is complete and prior to building occupancy to demonstrate that the vapor barrier is an effective remedy. This O&M Plan will also include a detailed future monitoring program to ensure sub-slab vapor and indoor air are monitored periodically if the venting system remains passive. The monitoring frequency for sub-slab vapor and/or indoor air may be reduced over time depending on the analytical results (to be specified in the O&M Plan). The proposed sub-slab vapor sampling locations are shown on **Figure 13a/b**. In addition, one or more of the sub-slab PVC vapor mitigation system cleanouts shown on **Figure 13a/b** (detailed in **Figure 15**) may be used for further sampling. Minor adjustments to the locations of the vapor monitoring points and/or cleanouts may be necessary during, or prior to, construction based on the final interior layout of the building.

The responsible party will perform cap/barrier inspections, perform maintenance of the cap/barrier, retain inspection records, and perform indoor air and/or sub-slab vapor sampling as required by the O&M Plan.

5.6. CONSTRUCTION OVERSIGHT

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

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 significant contamination. 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 (as described in Section 5.1.2; Soil Excavation and Utility Trenching). The EP will also inspect any water that collects in the excavations/trenches on an as-needed basis to coordinate appropriate sampling prior to disposal (as described in Section 5.2.2; Dewatering).

Daily inspections, as necessary, will be performed during general site grading and cap construction activities to verify that the Stego® Wrap vapor barrier is installed in accordance with the manufacturers specifications and any seams or surface penetrations are sealed properly (as described in Section 4.2.5; Sub-slab Vapor Barrier with Passive/Active Venting System), appropriate fill materials are being used (as described in Section 5.1.4; Fill), geotechnical testing and field verification is performed as required for any clay liners (as described in Section 5.1.5; Clay Liner Installation), dust control measures are being implemented as appropriate (as described in Section 5.1.6; Dust Control), and surface engineering controls are being installed with the appropriate minimum thicknesses (as shown on the RADWP attachments). Oversight by an EP will not be required during construction activities which do not have a significant environmental component, such as above-grade building construction.

Records shall be provided by the EP to document:

- Compliance with soil screening requirements
- Proper water management, including documentation of any testing and water disposal
- Compliance with geotechnical testing requirements and field verification for stormwater pond clay liners (if applicable)
- Observations of construction activities during site grading and cap construction
- Proper construction of sub-slab vapor barrier with passive/active venting system
- Proper cap thickness and construction

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. Any permits or permit modifications from State or local authorities will be provided as addenda to this RADWP.

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 MDE 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	October 15, 2018 (conditional) March 29, 2019 (final)
Response Phase	
Groundwater Network Abandonment	November 2018
Monitoring Well Installation	December 2018
Development Phase	
Installation of Erosion and Sediment Controls	April 2019 (start)
Slag (or Alternative Fill) Delivery and Placement	April 2019 (start)
Site Preparation/Grading – Building Pad & Parking	April 2019 (start)
Installation of Underground Utilities Domestic Fire & Water Loop (4 weeks) Sanitary Lines (2 weeks) Stormwater (6 weeks) Pond Excavation and Grading (4 weeks)	May 2019 (start)

Installation of Building	May 2019 (start)
Tank Installation	August 2019
Installation of Pavements	August 2019
Submittal of Development Completion Report/ Notice of Completion of Remedial Actions*	January 2020
Request for a NFA from the MDE	February 2020
Recordation of institutional controls in the land records office of Baltimore County	Within 30 days of receiving the approval of NFA from the MDE
Submit proof of recordation with Baltimore County	Upon receipt from Baltimore County

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

FIGURES

Notes:

1. Locations and spacing of sub-slab vent pipe alignments and vapor monitoring locations are provided for demonstration purposes only; the configuration shown is subject to modification during final design.

2. All utilities that are installed through areas containing NAPL or elevated chemical impacts and that have the potential to preferentially transmit contaminated vapors or groundwater along the utility line shall be either:
   i) backfilled with low permeability backfill material (less than or equal to the permeability of the existing subgrade); or
   ii) installed with trench plugs along the alignment in accordance with the details shown on Figure 1 of the Utility Excavation NAPL Contingency Plan.

- Vapor Extraction Cleanout (Potential Sampling Point)
- Sub-Slab Vapor Sampling Point
- Solid Pipe Header and Riser
- Vapor Collection Boundary
- Perforated/Screened Venting Pipe
- Approx. Areas Containing NAPL or Elevated VOC/SVOC Impacts (Based on Figures 9a/9b/10)
- Site Boundary
- Utility Easement
- Parcel Boundary

Sub-Parcel A11-1 - Preliminary Layout Passive/Active Venting System

March 22, 2019

Figure 13a

ARM Group Inc.
Engineers and Scientists

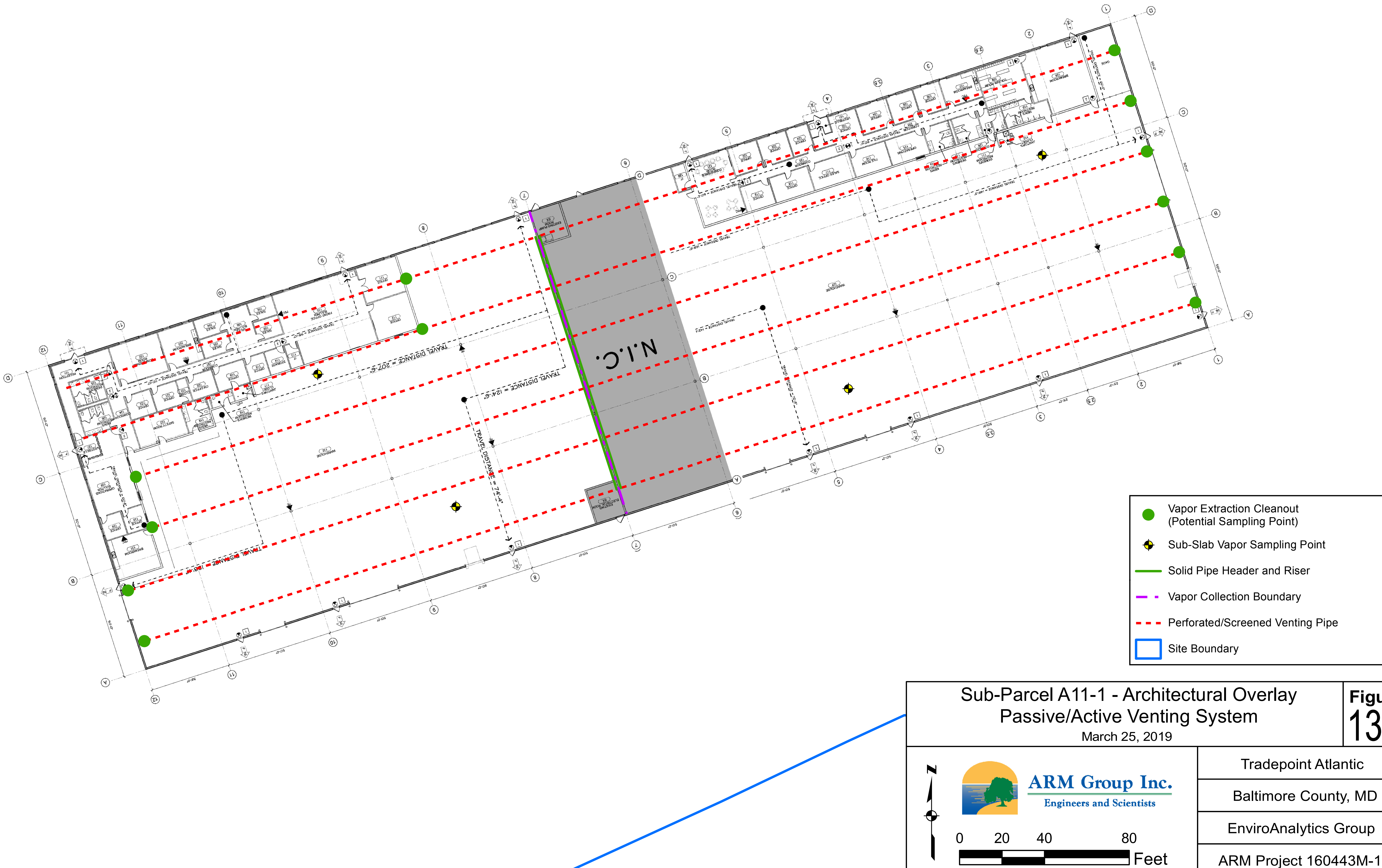
0 50 100 200 Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project 160443M-17



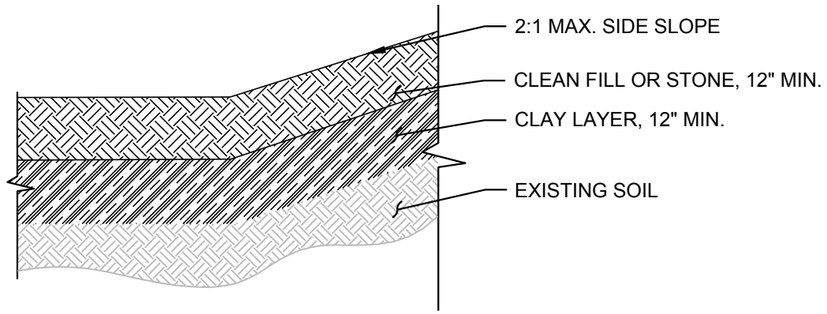
Sub-Parcel A11-1 - Architectural Overlay
Passive/Active Venting System
March 25, 2019

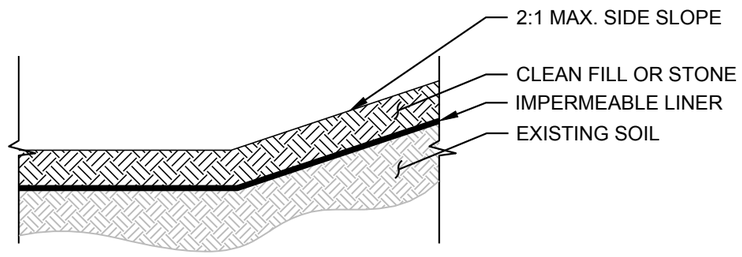
Figure
13b

ARM Group Inc.
Engineers and Scientists

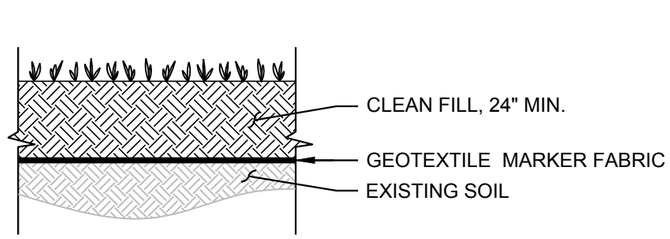
Tradepoint Atlantic
Baltimore County, MD
EnviroAnalytics Group
ARM Project 160443M-17

APPENDIX C





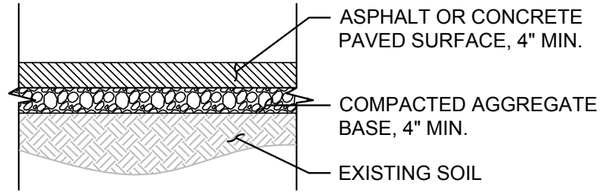
TYPICAL POND SECTIONS
NOT TO SCALE



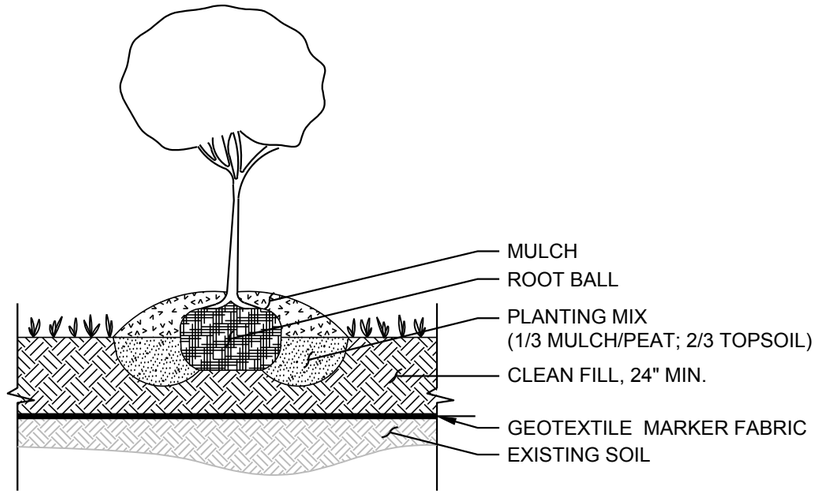
TYPICAL LANDSCAPE SECTION
NOT TO SCALE

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 REQUIREMENTS 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



TYPICAL PAVING SECTION
NOT TO SCALE



TYPICAL PLANTING SECTION
NOT TO SCALE

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.

ARM Group Inc.
Engineers and Scientists

designed	RJC	scale	N/A
checked	TNP	date	1/31/2019
drawn	RJC	project no.	160443M

drawing title: CAPPING SECTION DETAILS

project title: SPARROWS POINT ENVIROANALYTICS GROUP

SPARROWS POINT
BALT. COUNTY, MARYLAND

Appendix C