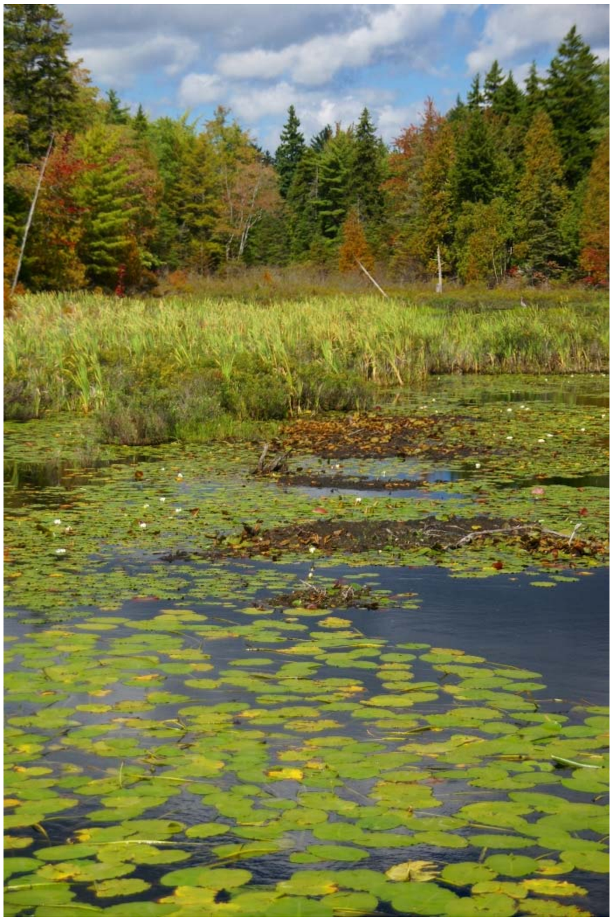
Results you can rely on



Subsurface Investigation Report Amendment II

Colonial Pipeline Company
Bel Air Pump Station
MDE Case No. 18-0459HA

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2942 Charles Street
Fallston, Harford County, Maryland

October 15, 2018

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APPENDICES

ACRONYM LIST

AMSL	Above Mean Sea Level
BGS	Below Ground Surface
CDP	Census-Designated Place
CSM	Conceptual Site Model
DNR	Department of Natural Resources
GAC	Granular Activated Carbon
HA	Hand Auger
IRM	Interim Remedial Measures
L/min	Liters Per Minute
LNAPL	Light Non-Aqueous Phase Liquid
MDE	Maryland Department of Environment
MD GWQS	Maryland Groundwater Quality Standard
MDSPGP	Maryland State Programmatic General Permit
mg/kg	Milligram Per Kilogram
NRCS	Non-Residential Cleanup Standard
NWI	National Wetlands Inventory
OSRO	Oil Spill Response Organization
OWS	Oil/Water Separator
PCW	Petroleum Contact Water
PID	Photoionization Detector
PPM	Part(s) Per Million
RCS	Residential Cleanup Standard
ROO	Report of Observations
ROW	Right of Way
SIR	Site Investigation Report
SIRA	Site Investigation Report Amendment
TPH-DRO	Total Petroleum Hydrocarbons Diesel Range Organics
TPH-GRO	Total Petroleum Hydrocarbons Gasoline Range Organics
TSDF	Treatment, Storage, and Disposal Facility
USACE	United States Army Core of Engineers
USGS	United State Geological Survey
VOC	Volatile Organic Compound
WBWR	West Branch Winters Run
µg/L	Microgram Per Liter

1.0 INTRODUCTION

The Maryland Department of Environment (MDE), in a Report of Observations (ROO) dated July 27, 2018, directed Colonial Pipeline Company (Colonial) to submit a supplemental site assessment that summarizes the investigative and remedial activities conducted at the Colonial Bel Air Station (the Site) in response to a release of distillate petroleum products reported on March 7, 2018 (MDE Case No. 18-0459HA). The Site is a pump (or booster) station used to modulate pressure and flow rates on the main interstate pipeline and is located at 2942 Charles Street in Fallston, Maryland (**Figure 1**). In the letter dated July 27, 2018, MDE directed that the report include, at a minimum:

"submit the results of this supplemental site assessment and scope of excavation in a report to the Department. When submitting sampling results, include a detailed accounting of the investigation conducted; data summary tables (including fuel oxygenates and naphthalene) and scaled site maps showing actual sampling locations (i.e., soil boring/monitoring well locations); area and extents of excavation; and any dissolved and liquid phase hydrocarbon thicknesses encountered. Provide qualitative and/or quantitative discussions and if further remediation is required, include recommendations for further actions."

The purpose of this report is to comply with MDE directive. TRC Environmental Corporation (TRC) has prepared this Subsurface Investigation Report Amendment (SIRA) on behalf of Colonial.

1.1 Background

On March 7, 2018, Colonial personnel conducted a routine Site visit as part of the weekly facility inspection program. Upon arrival in the operation area of the Site, the operator noticed a petroleum odor and began an inspection of the pump station yard. The operator observed light non-aqueous phase liquid phase (LNAPL) in the pipeline system valve observation access wells. The valve observation access wells are shallow (generally less than three feet deep) and encased by plastic pipe covered by lids. Their purpose is to allow for access to and routine inspection of subsurface valves and controls associated with the pumping station. The operator immediately contacted the Colonial Control Center to isolate the pump station loop from the main line system. The MDE and Harford County were contacted, and emergency response actions were initiated. The main line (Line 03) was shut down thereafter, and upstream and downstream pipeline flow block valves were closed. The release was later determined to be a mix of distillate products (kerosene and diesel).

An oil spill response organization (OSRO) and a pipeline maintenance and repair contractor, respectively, were mobilized to the Site, and crews initially worked in shifts to cover 24-hour operating periods. The Harford County Hazmat Response Team was also activated. Continuous air monitoring was conducted in an effort to ensure vapor emissions from site work were below health-based limits. Initial Site assessment observations indicated that released LNAPL had entered the facility stormwater yard drain system and preferentially moved to the valve observation access wells, the oil/water separator (OWS), and secondary containment (stormwater) pond.

Facility containment actions included closing the secondary containment pond discharge line valve, installation of absorbent booms across the secondary containment pond, and placement of plumber's plugs and/or caps on the discharge lines below the pond outfall. The water level in the secondary containment pond, however, was below the pond discharge elevation. There was no evidence of water or LNAPL discharge from the pond.

Removal actions included the use of vacuum trucks and vacuum tankers to evacuate LNAPL from the secondary containment pond, the facility oil/water separator, valve observation access wells, the facility stormwater yard drain lines, and sequentially from isolated areas of LNAPL puddling in the remedial excavation areas. LNAPL recovered from the above-referenced areas appeared to have a black-colored tint. As LNAPL was recovered from each valve observation access port, the access ports were monitored for rebounding LNAPL thickness. Based on LNAPL recovery field observations, excavation was initiated near the intersection of the main line (Line 03) and the pumping station product piping loop, where LNAPL appeared to recover more rapidly than in other areas. Petroleum-impacted soil and the stormwater yard drain bedding material was excavated and staged on plastic and covered by plastic in a bermed containment area pending off-site disposal. During subsequent subsurface excavation and investigation, a leak was discovered on the 20-inch alternate discharge line on the pumping station loop in the early morning of March 8, 2018. Upon discovery of the leak, secondary containment was placed under the leak point to prevent further discharge of LNAPL. The pipeline was repaired in accordance with approved procedures, and the pipeline was returned to service on the evening of March 8, 2018. The excavation area and repair have remained open for inspection as part of the ongoing Phase II Site maintenance activities (see below), and the integrity of the repair has been monitored and visually confirmed.

Following the repair and response activities, a subsurface investigation was initiated. To date, the subsurface investigation and remediation has proceeded in three phases.

Phase I focused on investigating and remediating the stormwater yard drain system, the valve observation access wells, and the stormwater swale between the OWS and the pond. In addition, an "outside-in" approach was taken to investigate the potential for the main line and the parallel stub line (i.e., 30-inch diameter Line 03, and 8-inch diameter Line 36, respectively) that traverse the Site as potential preferential migration pathways, to characterize the subsurface hydrogeology for development of a conceptual site model (CSM), and to ascertain the extent of the residual petroleum material. Borings were initially completed away and/or in the inferred upgradient direction from the release area and then in the downgradient direction to define the subsurface stratigraphy, identify the presence and depth of an upper-water zone, and to log potential low permeability layers that would impede the downward migration of LNAPL outside of potentially impacted areas.

Phase II focused on inspection of the portions of Line 03 and Line 36 located upgradient and downgradient flow directions from the leak location and the pumping station loop to identify the potential impacts to and replacement of pipeline protective coating from contact with LNAPL. In addition, the Phase II work includes the excavation of soil in proximity to and removal of the alternate suction line. The Phase II work provided insight to the extents of LNAPL migration.

Phase III is focused on remediation efforts of soil and groundwater in the vicinity of the pumping station loop, specifically the HA-3 LNAPL area, and delineation of the groundwater downgradient from the HA-

3 area near monitoring well MW-5.. Some ongoing Phase II work along the pumping station loop will also contribute to Phase III remedial efforts.

In addition to Phase I through III activities, the MDE directed Colonial to complete monthly gauging of and quarterly sampling of site monitoring wells in correspondence dated May 15, 2018. The wells have been gauged monthly since May 2018 and the first quarterly sampling event was completed in July 2018.

1.2 Phase I – Initial Response and Site Hydrogeological Characterization

On March 8, 2018, TRC mobilized to the Site to begin the Phase I investigation. As described in Section 5, the Phase I activities extended into June 2018 and included:

- Advancement of 17 borings to a depth of 10 feet or less with a hand auger;
- Installation of 10 borings with a direct push technology (Geoprobe) rig with soil logging to depths ranging from approximately 7 to 24 feet;[1]
- Collection of 11 soil samples from the Geoprobe soil borings;
- Collection of 88 post-excavation soil samples from the yard drain, valve observation access wells, and OWS to pond stormwater drainage swale excavations;
- Collection of four (4) sediment samples from the stormwater retention pond for laboratory analysis;
- Sampling and gauging of six (6) on-Site monitoring wells installed in the upper water-bearing zone;
- Collection of a water sample from the on-Site supply (station) well;
- Collection of 10 water samples from off-Site residential wells; and
- Collection of three (3) surface water samples: one (1) each from the drainage swale located on the northeast side of the Site and downgradient from the secondary containment pond outfall, and two (2) from West Branch Winters Run (WBWR) at the Colonial crossing located off Site to the north.

The MDE was present during phases of the investigative activities, provided feedback and direction for the Site work, and prepared the ROO dated March 12, 2018. The results of these investigations were presented in a detailed Subsurface Investigation Report (TRC, 2018a), submitted to MDE on June 12, 2018, and a Subsurface Investigation Report Amendment (TRC, 2018b), submitted to MDE on July 18, 2018.

1.3 Phase II – Pipeline Re-Coating and Alternate Suction Line Removal

Phase II was initiated to evaluate the integrity of the coating on the pipelines (Line 03 and Line 36), the pumping loop piping, and related components in early April 2018. Given the proximity to the pipelines and related controls, the Phase II work has been completed through hand excavation. Impacted coating is cleaned, the pipeline and appurtenances sandblasted, and the coating restored in accordance with approved procedures. During the process, side walls are shored for safety purposes, and soil removed

[1] The letter report from Colonial to the MDE dated March 21, 2018 incorrectly cited the completion of 11 Geoprobe borings.

for off-site disposal. Pipeline coating that was initially identified for removal and replacement was located approximately 60 feet in both the north and south directions from the leak point along the 30-inch diameter main pipeline (Line 03). Subsequent to the main pipeline recoat work, the alternate suction line and related valves and controls were removed. Additional soil was excavated for off-site disposal in association with alternate suction line work. Fifteen post-excavation soil samples were collected during Phase II, with results reported in the June 2018 SIR and July 2018 SIRA.

Phase II activities along the pumping loop piping and components are ongoing and additional post excavation samples will be collected as needed. The results of the pumping loop Phase II activities will be reported under separate cover.

Given the heavy precipitation during the Phase II period, water from the excavation was initially pumped to an on-Site fractionation (frac) tank for off-Site disposal. In July 2018, a General Permit for the Discharge of Treated Ground Water from Oil Contaminated Ground Water Sources was issued for on-site treatment and discharge of the frac tank water.

MDE was also present during portions of this phase of the investigative activities, observed the efforts, and prepared the ROO dated April 4, 2018.

1.4 Phase III - HA-3 LNAPL Area

As reported in the June 2018 SIR, monitoring well MW-5 was initially sampled in April 2018 and did not contain dissolved-phase VOCs. During the July 2018 quarterly sampling event, dissolved-phase VOCs were detected in MW-5. In response to this detection, TRC conducted additional soil and groundwater investigation on July 27, 2018, including:

- Advancement of seven (7) direct push Geoprobe soil borings in the vicinity of MW-5;
- Collection of five (5) soil samples for analysis of Total Petroleum Hydrocarbons – Diesel Range Organics (TPH-DRO), Total Petroleum Hydrocarbons – Gas Range Organics (TPH-GRO), and Volatile Organic Compounds (VOCs) including naphthalene and fuel oxygenates; and
- Collection of five (5) groundwater samples from temporary well points for analysis of VOCs including naphthalene and fuel oxygenates.

The MDE was present during the MW-5 investigative activities, provided feedback and direction for the Site work, and prepared the ROO date July 27, 2018 for which this SIRA is being submitted.

Forensic assessment indicates the HA-3 LNAPL has been present at the Site for an extended period but the recent site disturbances and elevated precipitation appears to have mobilized the previously stable residual petroleum constituents toward MW-5. As such expedited remedial action of the HA-3 LNAPL area was implemented after discovery of dissolved-phase ground water impact at MW-5. Excavation of the LNAPL area was conducted in August 2018 and included the following:

- Dewatering and vapor extraction of the excavation area for LNAPL removal, excavation stability, and health and safety from VOC vapors when the excavation is open. Dewatering started on July 31, 2018 and continued through and after the excavation.
- Excavation of an area of approximately 1,000 square feet to a depth of 8-feet of contaminated soil for offsite disposal

- Collection of post excavation soil samples to assess soil conditions after the remedial excavation effort.

Additional excavation of the HA-3 area is scheduled for late October 2018. The results of the follow-up work in the HA-3 area will be detailed in a future report.

1.5 Report Outline

The July 27, 2018 MDE ROO is included as **Appendix A**. Soil boring permits and documentation are included as **Appendix B**; soil boring logs are included as **Appendix C**; laboratory analytical reports are included as **Appendix D;** soil disposal manifests are included in **Appendix E**; and groundwater disposal manifests are included as **Appendix F**.

This Report presents evaluations of the investigative and remedial work and addresses the following issues:

- Dissolved-phase groundwater impact at MW-5; and
- Remedial action at HA-3 LNAPL area.

Sources of data that were used in developing the Report include the following:

- Installation of hand auger borings, Geoprobe borings, and monitoring wells;
- Evaluation of analytical parameters for soil, pond sediment, groundwater, and surface water;
- General review of geologic maps and literature;
- Review of historical, Site-specific topographic maps showing the pre-construction topography;
- Evaluation of LNAPL;
- The off-site recycling of approximately 410 tons of petroleum-impacted soil during the HA-3 LNAPL are excavation. Excavation and off-site recycling is ongoing; and
- The off-site recycling of 4,306-gallons of water and 392-gallons of LNAPL Evacuation of water for off-site recycling is ongoing.

2.0 SITE DESCRIPTION

2.1 Site Setting

The Site is located on the United States Geological Survey (USGS) Jarrettsville, Maryland Topographic Quadrangle Map near 39.563758 North latitude, and 76.478624 West longitude in Harford County, Maryland. The Site is located approximately 10 miles to the northwest of Bel Air, Maryland. Site elevations range from 429 feet above mean seal level (AMSL) near Charles Street to approximately 519 feet AMSL on the southwest side of the Site. The Site is depicted on **Figure 1**, showing the location, land use, and topography.

2.2 Site Description

The 2942 Charles Street property is comprised of one parcel of land that totals approximately 16.08 acres in size and is located within Fallston (a census-designated place [CDP]) in Harford County, Maryland. The legal identifier for the property as provided by the Maryland Department of Assessments and Taxation is Map 39, Grid 002B, Parcel 0401, and Tax Identification 04012054. According to the Harford County GIS mapping system, the Site is zoned for commercial use. As detailed in Section 4.0, the booster station is constructed on made land that filled an existing natural topographic draw.

The Site was constructed to serve as a booster (or pumping) station for Colonial's Line 03 in the mid-1960s. The majority of the Site is undeveloped land covered by mowed grass and trees. Access to the operations portion of the Site is along an approximately 500-feet long driveway extending uphill and to the southwest from Charles Street. The approximately 2.5-acre operations area is surrounded by a chain link fence and contains an Operations Building, an electrical substation, three (3) aboveground pipeline booster pumps (Units 1 through 3), and an aboveground pressure relief tank. In addition, the pipeline booster station includes both aboveground and underground piping, controls, and related equipment. The steel pipelines are coated with a protective material and also have cathodic protection. The booster station pumps are used to move the product through the pipeline at a desired flow rate and pressure. Aerial Site plans detailing current topography is provided as **Figure 2**. A Site Plan detailing the Site infrastructure and layout is provided as **Figure 3**.

The pipeline right of way (ROW) extends through the Site from the southwest to northeast. The ROW is occupied by Colonial's mainline Line 03, a 30-inch diameter pipeline, and a stub line, Line 36, an 8-inch diameter pipeline. The pumping station loop, which provides suction to and discharge from the three pumping units is a U-shaped pipe run that lies perpendicular to the pipelines. In addition to the Colonial pipelines, a ROW for a TransCanada natural gas pipeline and four (4) Crown Castle (Crown) fiber optic (telecommunication) cable conduits traverse the eastern side of the property.

2.3 Surrounding Land Use

The Site is generally rural and surrounded by residential properties containing tracts of undeveloped land. There are areas of agricultural use to the south, west, and east and by Charles Street to the north. The majority of the area is zoned agricultural and rural residential, with the land use designated as agricultural. A TransCanada natural gas compressor station lies less than 400 feet from the southeastern edge of the Site.

2.4 Utilities, Septic Systems, and Private Supply Wells

Fiber optic cable conduits (Crown) and a natural gas pipeline (TransCanada) ROW traverse the eastern side of the Site, and two (2) petroleum pipelines (Colonial) run along the length of a separate ROW near the center of the Site. The three (3) utility ROWs generally trend southwest to northeast, converge near Charles Street (approximately 800-feet northeast of the pump station equipment), and then cross under Charles Street and WBWR. Near the operations area of the Site, the Crown and Trans Canada ROW are approximately 150-feet south-southeast of the Colonial ROW. Electric and telephone utilities appear to be carried by overhead wires. Local cable service is marked as an underground approach to the Site.

The Site has an on-Site supply well used for the lavatory and cleaning water. Bottled water is supplied for drinking. The Site has a septic system situated to the east of the Operations Building. The surrounding properties obtain their drinking water from private supply wells and utilize private septic systems for sanitary waste disposal.

2.5 Area Drinking Water Supply Wells and Water Intakes

Area properties utilize local groundwater as their drinking water from private supply wells. Municipal water supply wells were not identified in the local surrounding area. The area is defined as a High Risk Groundwater Use Area as per the Title 26 Code of Maryland Regulations Part 2, Subtitle 10, Sec. 26.10.02.03. - High Risk Groundwater Use Area.

Approximately 2-miles downstream, the WBWR meets the East Branch Winters Run to form Winters Run. Approximately 9.5-miles downstream (east) of the Site, the Maryland American Water Company operates a surface water intake on Winters Run for the Maryland American Bel Air Water System under Water Appropriation Permit ID HA1976S015. WBWR is designated as a Use IV-P stream.

2.6 Sensitive Areas

The MDE, and the United States Army Corps of Engineers (USACE), Baltimore District, have issued Statewide Maintenance Authorizations, Maryland State Programmatic General Permits (MDSPGPs) for Colonial for work in jurisdictional areas along its ROW. As part of the approval process, the Maryland Department of Natural Resources (DNR), Wildlife and Heritage Service reviewed its rare, threatened and endangered species database for stream crossings along the pipeline ROW. The Maryland DNR did not list potential concerns for rare, threatened or endangered species along the pipeline corridor in proximity to the WBWR crossing, located just north of the Site.

The National Wetland Inventory (NWI) Wetland Mapper identifies portions of the lowlands located adjacent to WBWR as wetlands. A wet area is also located to the north of the pond outfall and along a former drainage channel that appears to have been disturbed by work in the TransCanada and Crown ROW. This area is not mapped by the NWI, nor has it been field-delineated.

3.0 GEOLOGIC AND HYDROGEOLOGIC SETTING

3.1 Physiographic and Topographic Setting

The Site is located in the Piedmont Physiographic Region. This is an area of gently rolling hills underlain by bedrock and capped by the weathered bedrock residuum, or saprolite. The Site slopes from the northeast, along Charles Street, to the southwest, near the operating portions of the Site and the bounding hillside. Site elevations range from 429 feet AMSL near Charles Street to approximately 519 feet AMSL on the southwest side of the Site. Based on pre-construction topographic maps in Colonial files and field observations discussed below, the operation area of the Site appears to be constructed on relatively uniform fill material placed on top of the native saprolite in the native topographic draw that originates in the hillside to the southwest of the Site. The ground surface of operation area of the Site is flat lying at an elevation of approximately 477 feet AMSL.

3.2 Area Geology

According to the Geologic Map of Harford County (1968), the Site is underlain the Lower Pelitic Schist of the Wissahickon Formation. These Precambrian Age materials are derived from metamorphosed sedimentary rocks and described as a medium- to coarse-grained biotite-oligoclase-muscovite-quartz schist with the accessory minerals garnet, staurolite, and kyanite. The on-Site supply well is cased to a depth of approximately 35 feet suggesting that competent rock is encountered at this depth near the supply well location.

Saprolite overlies the parent material schist. The saprolite is generally comprised of low permeability clays developed from the in-situ weathering of the mica minerals in the schist. Depending on the weathering profile, the fabric of the parent rock can be observed in the saprolite at depths where the minerals have retained their original orientation. The saprolite tends to be thinner beneath slopes and thick beneath broad upland areas.

Excavations and borings completed at the Site (see Section 5) encountered a relatively uniform dense, brown, silty clay, which was also logged as brown clayey sand, to depths of up to approximately 20 feet below ground surface (bgs). The uniform fill material placed as a foundation for the pump station appears to be a micaceous, brown silty clay consistent with a screened quarry material from a local source within the regional expression of the Wissahickon Schist. The remnant topographic draw was over-excavated and then the fill was placed upon the saprolite that formed the new temporary ground surface. The remnant draw that was filled, trends from the southwest to northeast across the pumping station loop with the thickness of the fill material increasing to the northeast toward the location of MW-6 and the outfall of the pond. The objective for use of a uniform imported fill is to provide material selected to meet the geotechnical engineering requirements for the pump station and the purpose of over-excavation and subsequent fill is to minimize the potential for differential settlement. Pump station construction documents confirm that portions of the fill material were structurally compacted to proctor densities of approximately 90% or greater to prevent settling of the pump station infrastructure. Along with the clayey nature of the fill material and underlying saprolite, this structural compaction resulted in a low permeability zone in and around the release area.

The Geologic Map of Harford County also maps alluvial deposits on the lower elevations near the wetlands and floodplain adjacent to WBWR. These deposits are derived from weathering and transport of the materials from the hillsides to the lowlands adjacent to the streams and are chiefly comprised of micaceous silt and clayey sand.

From a structural standpoint, the Site is located on the southeast flank of the axis of the Baltimore-Washington Anticline. The primary structural feature in the formation is metamorphic foliation in the schist. In close proximity to the Site, the bedrock primary foliation is mapped to strike northeast-southwest (approximately parallel with the Site driveway) and dip 54 degrees to the southeast.

3.3 Soils

The area surrounding the made land of the Site is mantled with soil developed from the saprolite of weathered bedrock as the parent material. The Natural Resource Conservation Service Web Soil Survey maps the majority of the soils at the Site as the Manor Loam with slopes ranging from 8 to 25 percent. The soil mapped on the hilltops to the west and south sides of the Site are the Chester Silt. The Manor Channery Loam is mapped on the east side of the Site. The four soil types are described as well drained. Depth to first water is presented as generally greater than 80 inches.

3.4 Area Hydrogeology

This Jarrettsville-Fallston area of the Piedmont Physiographic Province is characterized by bedrock aquifers within Precambrian Age metamorphic rocks of the region. The primary porosity of the bedrock is relatively low, and groundwater flow generally occurs along fractures, joints, and foliation comprising the secondary porosity. The Lower Pelitic Schist of the Wissahickon Formation is the least productive aquifer in the area. As noted by the Harford County Health Department, it often proves difficult to develop an adequate supply well that is able to produce the requisite one gallon per minute flow rate in this low-yielding formation.

When the water table occurs within the weathered residuum (saprolite) above the bedrock, groundwater flow occurs within the pore spaces between the mineral grains or within relict foliation. A shallow water table near the contact between the basal interval of the saturated saprolite and the upper weathered bedrock zone is often present in this area.

3.5 Site Hydrogeology

As noted in the Jarrettsville Quadrangle Hydrogeology (Atlas No. 5), depth to water is related to proximity to the perennial streams that transect the area and relative elevation to the valley floors on the adjacent hillsides. The orientation of many valleys, draws, and streams channels seem to be controlled by joints and fractures. Near perennial streams like WBWR, depth to water is mapped at less than 10 feet bgs. As the hillslopes are traversed, depth to water ranges from 10 to 35 feet, and may be greater than 35 feet deep on hilltops. The likely discharge point for shallow groundwater at the Site is the drainage swale and wet area to the north of the secondary containment pond outfall and to the east of the entrance driveway.

The Site is engineered to direct precipitation surface runoff at away from the operating area. This engineered stormwater management system minimizes infiltration and hydraulic loading to the below ground infrastructure. The historical pre-construction draw begins uphill (southwest-west) from the pump station and encounters the operational areas at the southwest corner. Surface water from the draw is directed through a shallow swale around the west side of the operational area that continues along the west side of the driveway to Charles Street to the northeast. On the southeast-east side of the Site, a drainage swale is installed along the fence line to direct runoff from the adjacent hillside away from the operating areas of the Site. The drainage swale runs along the eastern and southern side of the Site, through a secondary containment pond, and directs flow toward Charles Street.

Within the gravel covered operating area (product piping loop), a system of shallow perforated yard drains, lined with a permeable stone ballast material, conveys stormwater through an OWS to the secondary containment (stormwater) pond. Under normal operating conditions, the stormwater runoff has no industrial contact with the sealed product pipeline system. The remainder of the operating area and impermeable areas of the Site are sloped toward the southeast side swale with the secondary containment pond. The gravel covered area near the electrical substation is sloped toward the northern side swale, and drains toward this feature.

On the north side of the Site (downhill), the aforementioned shallow swale flows along the northwest side of the drive. On the southeast side of the drive, stormwater flows off the grassy area toward the TransCanada-Crown ROW, where a drainage ditch parallels the entrance driveway and is visible approximately 300 feet to the south of Charles Street. The drainage ditch flows under Charles Street through a culvert, then dissipates into the wetland on the south side of WBWR. There is no discernible channel connecting the culvert to WBWR.

Further to the southeast than the features discussed above, an additional drainage channel (swale) is located along the southeastern side of the Colonial property, outside all Colonial operating areas, in a topographic valley that trends toward the TransCanada compressor station. It appears that maintenance work along the TransCanada-Crown ROW has disturbed flow along this drainage channel and resulted in a wet area, where standing water is observed, between the pond outfall and the above-referenced drainage swale that parallels the Site driveway.

4.0 CONCEPTUAL SITE MODEL

Three (3) geologic CSM cross-sections that present known Site conditions are included as **Figure 13 (Cross-Section A-A'), Figure 14 (Cross-Section B-B'), and Figure 15 (Cross-Section C-C')**, and the cross-section locations are shown on **Figure 12** of the June 2018 SIR. Reference to the cross-sections during review of the CSM is recommended.

The geologic setting has been presented in detail in Section 3.2. The Site is located in the Piedmont Physiographic Region, an area of gently rolling hills underlain by bedrock and capped by the weathered bedrock residuum, or saprolite, which is known to be thicker beneath draw settings such as the Site. Line 03 was first constructed into a natural draw extending southeast from the West Branch Winters Run in the early 1960's and then the Bel Air Pump Station was constructed in the mid-1960s. Prior to pipeline construction, the Site location was the upper elevation reach of a native southwest to northeast trending draw situated upon the Wissahickon Schist with a surface cross-section from north to south that resembled a shallow 'V'. It appears a significant volume of cut-and-fill earthwork was required to construct the pump station. Before any facility buildings, utilities, or piping were completed the natural shallow 'V' was enlarged into a rectangular 'U' morphology by excavation of large volumes of soil, saprolite, and bedrock. The rectangular 'U' was then filled with a uniform, imported fill that was selected by geotechnical engineers to provide competent and uniform support of the pumping station and pipeline facilities and, to the maximum extent, to eliminate the potential for differential settling that might stress the facility infrastructure. Comparison of the topographic contours of the current topography and historical topography indicates the size of the area where these topographic changes were made. There were significant changes in slope to the southwest-west and southeast of the pumping station where the majority of construction cut and material removal from the Site occurred. In addition, the pre-construction topographic draw that originated above (southwest of) the Site, likely served as a wet-weather conveyance, and made confluence with the other channel in the lowland northeast of the operations area of the Site.

Cross-Section A-A' is a presentation of the Site geology and select anthropogenic conditions along the path of the historical valley drainage. The historical ground surface, represented by a red line, was not disturbed throughout the eastern 2/3 of the cross-section, but was removed as a construction 'cut' at the western end. Boring/wells GP-5/MW-1, GP-4/MW-4, and MW-6 were specifically located to intersect the historical drainage channel. In the twenty-seven (27) soil borings conducted during the Phase I activities and the ten (10) borings conducted during Phase III activities, physical evidence of the historic ground surface was encountered at only two (2) locations, both within the historical valley drainage channel. In GP-4/MW-4, a gravel lens likely remnant from the base of the historical channel and wood fragments were encountered immediately above saprolite. In MW-6, a well-sorted sand with no clay and quartz fragments, again likely remnant from the base of the historical channel, were encountered immediately above saprolite. Groundwater levels at each boring are shown on the cross-section. In monitoring wells these elevations represent the water level during the April 5, 2018 well sampling event. For soil borings, they represent the field interpreted depth of the water table based on soil sample logging. Although the soil boring observations and water level elevations in the monitoring wells are not quantitatively directly comparable, the trend of groundwater flow from highest to lowest, southwest to northeast, along the trend of the central drainage feature of the historical valley to the inferred discharge area at the eastern lowlands, is clearly identifiable.

Cross-Section B-B' and Cross-Section C-C' are presentations of the Site geology and select anthropogenic conditions generally perpendicular to the path of the historical valley drainage from the perspective of looking down the valley to the east. The historical ground surface 'V' and excavated rectangular 'U' (imported fill to saprolite contact) are illustrated on both. Cross-Section B-B' transects the pump loop road and therefore contains illustrations of more anthropogenic features of the pump station. Cross-Section C-C' is important as it contains a representation of the former valley drainage channel (Historical Soil/Stream Bed Zone) that was documented by field observations at GP-4/MW-4. The water elevation symbols on Cross Section C-C' confirm the CSM water flow pattern of highest elevations to left and right flowing to the lowest water table elevation at the center of the historical valley. Cross-Section B-B' is a representation of the geological conditions at the pump station loop. As shown on Cross-Section B-B' the pump station loop is directly above the historical valley drainage channel. The representations of the water table on Cross-Section B-B' are variable due to the anthropogenic features and may not be dependable for interpretation of overall flow direction. The water table was observed at higher elevations within the pumping station loop area because the surface contours in this area are engineered to capture surface water, gravel covered to promote percolation and collection by the yard drains and subsequent separation by the oil/water separator if necessary. The water elevation at GP-10/MW-3 is lower. This is likely due to the perturbations to conditions associated with two (2) former underground storage tanks that were at this location. The tank locations are shown on Cross-Section Location Map. The tanks were originally installed to a depth of 14-feet below surface as shown on Cross-Section B-B' and were removed circa 2010, as was reported to the MDE in 2010.

Overall groundwater flow at the Site has been quantified by well survey and static water level measurements of the monitoring wells at the Site. The flow direction is generally down valley to the northeast but a southeasterly component is also indicated due to GP-10/MW-3. As stated above, the southeasterly component presentation is associated with the perturbations cause by historical storage tanks. Vertical flow within the fill area is controlled at the imported fill to saprolite boundary where the dense saprolite inhibits downward flow and induces flow along the contact which slopes down valley to the northeast as shown on Cross-Section A-A'. The water level perturbations shown on Cross-Section B-B', which are caused by pump station engineered features (gravel inside pump loop road and former storage tanks), are present, but the in situ 'overprint' controls flow as water flows along the fill-to-saprolite contact down valley to the northeast. The 'overprint' can be seen on Cross-Section C-C' approximately 60 feet further downslope where the fill-to-saprolite contact matches the historical ground surface at GP-4/MW-4. Overall geological conditions are further illustrated by Cross-Section A-A', where the fill-to-saprolite contact matches the historical ground surface down valley from GP-4/MW-4 through to the lowlands, and where the water table and historic flow channel intersect surface water.

With regard to potential groundwater impact, dissolved-phase VOC constituents have been detected in GP-7/MW-2 and TPH-DRO has been detected in GP-4/MW-4, GP-7/MW-2, and MW-6, just above the PQL for TPH-DRO. The TPH-DRO detections are uniform through these three (3) locations, which may be indicative of pre-release conditions. VOC concentrations and TPH-DRO levels detected in MW-5 are due to the HA-3 LNAPL area and are not indicative of pre-release conditions. The TPH-DRO occurrence has been delineated by the 'Ditch Confluence' confluence surface water sample, which did not contain detectable levels of TPH-DRO. If the VOCs detected at GP-7/MW-4 are mobile, then the groundwater flow will follow the geological 'overprint' and will flow toward the downgradient well MW-6 as shown by Cross Section A-A'.

Although soil impact from the release has been vertically delineated, remediated to the MDE RSC/NRSC, or capped, impact from residual weathered gasoline in the vicinity of HA-3 appears to have permeated portions of the compacted imported fill beneath the pump station loop and made contact with the groundwater. As the native clayey saprolite is denser than the fill, the impact has been spread laterally with the flow of groundwater along the fill-to-saprolite contact and the fill-to-historical-ground-surface contacts. The relative location of the facility potable well is shown on all three (3) cross sections, and the lack of detection of TPH-DRO or VOCs in the facility potable well confirms that the impact has not appreciably penetrated deeper than these contacts. In response to impact at MW-5, borings were conducted to assess groundwater conditions. During this investigation, impact was identified at GP-12. The hydrologic model of the contaminant transport in the fill valley and groundwater flow maps indicated groundwater flow to sentinel well MW-6. Groundwater samples at MW-6 have not reported contamination confirming impact at MW-5 is delineated. Further assessment between GP-12 and MW-6 will refine the contaminant transport model. Based on this CSM and the information provided herein, it has been demonstrated that the groundwater impact from the pump station and the HA-3 LNAPL area has been delineated. Monitoring of MW-2 and MW-5 Site wells will continue on a quarterly basis and the need for additional wells will be evaluated.

5.0 RESPONSE AND INTERIM REMEDIAL MEASURES

The response and interim remedial measures (IRM) activities have proceeded in multiple, often concurrent, activities and includes the Phase I and Phase II work. Initial response and containment activities included yard drain excavation and restoration, access well excavation, stormwater swale excavation and lining, and pipeline excavation and repair. Initial response and LNAPL recovery activities began following the observation of LNAPL in pump station system valve observation access wells and on the pond on March 7, 2018.

5.1 Initial Response & Containment

As detailed in **Section 1.1**, initial response actions to the reported event began on March 7, 2018, with the execution of pipeline system containment actions, which included isolating the pump station loop piping from the main line pipeline (Line 03), deactivation of Line 03 pumping, and the subsequent closing of the pump station upstream and downstream Line 03 block valves. Pump station facility containment actions included deploying absorbent booms across the stormwater pond, closing the stormwater pond discharge line valve, and placement of plumber's plugs and/or caps on pond discharge lines below the pond outfall. Subsurface excavation activities ensued, and a leak point was identified and repaired on the pump station alternate discharge line.

During the pipeline system containment and excavation actions, monitoring and recovery of observed LNAPL and petroleum contact water (PCW) began across the Site. LNAPL and PCW were evacuated from the valve observation access wells, stormwater pond, the facility OWS, the stormwater yard drain lines, isolated areas of LNAPL puddling in the excavation areas, and temporary monitoring wells utilizing vacuum trucks.

5.2 Yard Drain Excavation

During the initial response activities, the facility OWS was inspected for the presence of LNAPL, which was observed to be present. The current piping configuration of the facility OWS receives flow from the yard (i.e., area inside loop the road) stormwater drain system. Upon further investigation, LNAPL residuals were observed in the yard drain (perforated) piping and pipe bedding materials. The yard drain system was excavated in an effort to remove LNAPL residuals deposited from the release event and replaced with new pipe bedding material, new perforated PVC drain pipe, and backfilled with imported fill to match surrounding elevations and cover.

An area of residual impacts, which are unrelated to the release identified on March 7, 2018, was identified on the west side of the pumping station loop, and this area was addressed during the HA-3 area investigation and remediation activities discussed in this report.

5.3 Access Well Excavation

During the initial response activities, LNAPL was first observed in valve observation access wells (see Table 4.1 of the June 2018 SIR). These access wells, constructed of corrugated HDPE pipe with diameters of 15 to 64 inches, maintain access to valves and controls connected to the pipeline and pump station system that are set at elevations below the ground surface. Following the removal of LNAPL and PCW from the access wells, the access wells were excavated in an effort to remove LNAPL residuals from the release event. As part of the Phase II recoat excavation work, many of the access well locations were over-excavated.

5.4 Stormwater Swale and Pond Sediment

During Site inspection activities immediately following the discovery of the release, the discharge of LNAPL and PCW from the OWS to the south side stormwater swale leading to the retention pond was observed. Surface soils were removed from the topsoil lining the swale as part of the initial response.

Following excavation and sampling, the swale was restored, exceeding original condition by installing an impermeable conveyance channel for the OWS discharge and to minimize future surface water infiltration and hydraulic loading to the subsurface.

5.5 Pipeline Excavation

Following the repair of pump station alternate discharge line, further maintenance on the Line 03 and Line 36 pipelines were required to replace the protective coating on both lines that was in contact with released LNAPL discovered on March 7, 2018. The Line 03 and Line 36 pipelines were excavated as part of the Phase II activities in both directions from the release area until coating that did not require removal and replacement was observed. The pumping station loop has also been excavated for Phase II recoat work.

Following excavation, impacted coating was cleaned, and the pipeline and appurtenances sandblasted, and the coating restored in accordance with approved procedures. The recoat excavation area was expanded for removal of the alternate suction line and related appurtenances. The excavation was backfilled with clean fill, and the surface was restored to match the existing grade and local surface covering.

The pumping station piping recoat and excavation work is ongoing, and the results of these activities will be detailed in a future report.

5.6 Waste Management

Excavated soils and pipe bedding materials were stockpiled on plastic sheeting, bermed with hay bales and/or concrete jersey barriers, and covered with plastic sheeting. The stockpiled soil and pipe bedding material was then periodically transported for off-Site treatment/disposal to Soil Safe of Logan Township, New Jersey,

During the initial response activities, recovered LNAPL and groundwater were transported to Monarch Environmental Services, LLC of Woodstown, New Jersey (Monarch).

Sorbent booms and pads utilized to recover LNAPL in the stormwater pond, access wells, and excavations were placed in a lined roll-off container along with other impacted materials and general refuse (e.g., personal protective equipment, disposable bailers, and media sampling materials). The material was transported to Monarch for treatment/disposal.

6.0 PHASE I INVESTIGATIVE ACTIVITIES AND RESULTS

From March to June 2018, TRC conducted multiple Phase I investigations to evaluate soil and groundwater conditions in response to the release discovered on March 7, 2018. These investigations included soil borings via hand auger and direct push technology, temporary well point installation for visual inspection of groundwater and groundwater sampling, installation of permitted monitoring wells for groundwater assessment and long term groundwater monitoring, surface water sampling at WBWR and on-Site drainage channel from the retention pond, and residential sampling at ten (10) neighboring properties.

6.1 Soil Boring Investigation (Hand Auger and Direct Push)

In March 2018, TRC conducted hand auger and direct push (Geoprobe) investigation consisting of a total of 17 hand auger borings and ten (10) direct push soil borings to depths ranging from 7.5-feet to 24-feet bgs to characterize the Site geology and to delineate soil and potential LNAPL impact from the release discovered on March 7, 2018. Hand auger (HA) borings were identified as HA-1 through HA-17 and advanced within the pumping station loop in an effort to confirm that residual petroleum did not migrate outside the loop, evaluate potential LNAPL presence, and delineate soil impact along the yard drain lines. Hand auger borings were also conducted outside the pumping loop to evaluate potential downgradient migration of impact and to assist in selection and utility clearance of direct push boring locations. Select hand auger borings were finished with a temporary well point to visually evaluate groundwater conditions and presence of LNAPL. Direct push borings were identified as GP-1 through GP-10. Six (6) direct push borings were finished as temporary monitoring wells for groundwater observations and sampling

Observations from borings and initial response test pits indicated that, other than in the annular space of the yard drains and access wells, soil impact north and west of the release area within the pumping loop road was delineated. With regards to the yard drain system, the hand auger observations indicate soil impact from the release had not extended horizontally outside of the immediate vicinity of the yard drain lines that were impacted during the release.

Observations from several borings indicated that residual LNAPL unrelated to the release reported on March 7, 2018 was present in the area of HA-3, HA-4, and HA-14. In conjunction with the Geoprobe investigation results the hand auger field delineation suggests the HA-3 residual LNAPL area is delineated. The hand auger borings were filled with bentonite at the conclusion of the Geoprobe investigation.

LNAPL samples were collected by TRC and Colonial personnel from the HA-3 area temporary wells and the release area excavation designated as North and South, respectively. Results of the analysis reported that the North (HA-3 area) LNAPL was weathered gasoline that had lost significant ‘light end’ compounds and the South (release area) LNAPL was a mixture of diesel fuel and kerosene.

The HA-3 area remediation conducted under Phase III is discussed in Section 8.0.

6.2 Monitoring Well Installation

Based on observations during the direct push soil boring investigation, five (5) direct push locations were chosen for installation of permanent monitoring wells for long-term groundwater monitoring. As the hand auger and direct push borings outside the pump loop road encountered the apparent water table near or at the contact with in-situ geologic material, typically saprolite, the wells were installed with the intent to intercept that interval.

The installed wells consisted of 4-inch diameter schedule 40 PVC and 20 slot schedule 40 PVC screen with a well sand gravel pack and a bentonite clay seal.

6.3 Groundwater Sampling and Gauging

As part of the initial Phase I activities, TRC and Colonial conducted a groundwater sampling and gauging event in April 2018. Groundwater samples were collected from the on-Site potable supply well, from potable drinking water wells from 10 nearby residences, and from on-Site monitoring wells. Monitoring wells continue to be gauged monthly and sampled quarterly as requested by MDE. May, June, and July 2018 gauging results and the July 2018 groundwater data were provided in the Quarterly Monitoring Report – May to July 2018 dated August 2018 (TRC, 2018c).

7.0 Phase III SUPPLEMENTAL SOIL AND GROUNDWATER INVESTIGATION

7.1 Groundwater Resample of MW-5

Monitoring well MW-5 was sampled on July 11, 2018 as part of the quarterly monitoring program for the Site. Analytical Results of this sampling event reported benzene impact above the Maryland Groundwater Quality Standard (MD GWQS) of 5 ug/L at a concentration of 880 ug/L; toluene above the MD GWQS of 1,000 ug/L at a concentration of 2,300 ug/L; and TPH-DRO and DRO above the MD GWQS of 47 ug/L at concentrations of 760 ug/L and 12,000 ug/L respectively. Details of the sampling event are discussed in the previously submitted Quarterly Monitoring Report – May to July 2018 (TRC, 2018c).

On July 26, 2018, MW-5 was resampled to confirm the July 11, 2018 results and assess dissolved-phase concentration trends. The monitoring well was sampled via low flow/micro-purge sampling method. A decontaminated stainless steel low flow pump and a disposable polyethylene tubing was used to sample groundwater. Field sampling personnel maintained a purge rate in a range of 0.1 to 0.5 liters per minute (L/min) without exceeding the well discharge rate. Utilizing a multi-parameter water quality meter, field personnel monitored and recorded the pH, conductivity, temperature, dissolved oxygen, oxidation-reduction potential, and turbidity at set 5-minute intervals until the water quality parameters stabilized. Stabilization is indicated by three consecutive readings differing by less than 10 percent for each parameter (or +/-0.3 for pH). The groundwater sample was put on ice, accompanied by a chain of custody, and delivered to Caliber for analysis of VOC's including naphthalene and fuel oxygenates.

Analytical results reported benzene impact above the MD GWQS of 5 ug/L at a concentration of 1,200 ug/L; toluene above the MD GWQS of 1,000 ug/L at a concentration of 2,800 ug/L; and naphthalene above the MD GWQS of 0.65 ug/L at a concentration of 44 ug/L. Results of this sampling event confirm the VOC presence and indicate that concentrations are present at levels requiring further action. Analytical results are tabulated on **Table 2**. Analytical reports are included as **Appendix D**.

7.2 Geoprobe Soil and Temporary Well Investigation

On July 27, 2018, a soil and groundwater investigation was conducted to delineate groundwater impact around and downgradient from MW-5, assess if soil in the area of MW-5 had been impacted in association with the groundwater impact, and delineate groundwater downgradient between MW-2 and MW-6. Temporary boring locations were chosen based on groundwater flow direction. A groundwater flow map for July 2018 is included as **Figure 4** and monitoring well groundwater elevations, through September 2018, are included as **Table 1**. Water levels at the Site have risen approximately four feet since April 2018 at a seasonal time in which water levels would typically be dropping.

Odyssey Environmental Services of Harrisburg, Pennsylvania (Odyssey), at the direction of TRC, advanced a total of seven (7) direct push soil borings to depths ranging from 8.0 to 19.0-feet. Five (5) soil samples were collected for analysis of TPH-DRO, TPH-GRO, and VOCs including fuel oxygenates and naphthalene and five (5) groundwater samples were collected from 1-inch temporary monitoring wells installed in select borings and analyzed for VOCs including fuel oxygenates and naphthalene. One GeoProbe point (GP-13) hit refusal and did not yield water and another Geoprobe point (GP-17) contained a sheen and was not submitted for laboratory analysis. There was insufficient water volume in the five other temporary points for collection of TPH samples. All samples were placed on ice, accompanied by a chain of custody, and delivered to Caliber for analysis.

Soil boring permit documents are included in **Appendix B**. Detailed soil boring logs are included in **Appendix C**. Soil boring locations with select soil and groundwater analytical data are shown on **Figure 5,** and on **Table 2** and **Table 3.** An overview of the basis for Geoprobe locations, general descriptions of soil and groundwater observations at the soil boring locations, and laboratory results is provided below.

- GP-11, GP-12, GP-13, GP-14, and GP-16 were conducted to assess soil and groundwater conditions around MW-5. GP-11 and GP-13 were installed east, downgradient, of MW-5 to depths of 16-feet and 14-feet, respectively (refusal at GP-13). GP-12 and GP-14 were installed to the north and south, sidegradient, of MW-5 to depths of 19 and 11.5, respectively. The soil borings did not exhibit evidence of impact or soil headspace impact. Soil samples were collected from each boring and analytical results reported no soil impact above MD Residential Cleanup Standard (RCS) used for reference. Groundwater samples were collected from GP-11, GP-12, GP-14, and GP-16. Groundwater analytical results reported benzene impact above the MD GWQS of 5 ug/L at GP-12 at a concentration of 11 ug/L. All other groundwater analytical results were below MD GWQS. Groundwater was note encountered at GP-13.
- GP-15 was conducted to assess groundwater impact downgradient from MW-2 which has exceeded the MD GWQS. GP-15 was installed approximately 50-feet east, down gradient, of MW-2. The soil boring did not exhibit evidence of impact or soil headspace impact. A temporary point was installed in the boring and a groundwater sample was collected. Analytical results reported no groundwater impact above MD GWQS. A soil sample was not collected.
- GP-17 was conducted to further delineate the HA-3 LNAPL area and assess if LNAPL was present under the loop road. GP-17 was installed in the loop road approximately 10-feet north of HA-3. No soil was recovered in the boring. A temporary well was installed in the boring to approximately 8-feet. Groundwater was observed to have odor and a sheen. No measurable LNAPL was encountered.

7.3 Results of Investigation

Results of the investigation indicate that groundwater impact around MW-5 has not migrated to GP-11, approximately 35-feet downgradient, and has not migrated to the south towards GP-14. However, benzene impact has migrated to GP-12, approximately 50-feet north of MW-5. Further delineation in the northern direction is required. Groundwater impact at MW-2 has not migrated to GP-15, approximately 50-feet downgradient indicating that the benzene impact in at MW-2 is stable and the area is further delineated. GP-17 has confirmed that LNAPL from the HA-3 LNAPL investigation has not migrated under the loop road.

8.0 PHASE III REMEDIAL EXCAVATION OF RESIDUAL LNAPL AT HA-3 AREA

8.1 Purpose and Design

During a March 7, 2018 to March 15, 2018 hand auger investigation at the Site to characterize Site geology and delineate soil impact from the March 7, 2018 release, residual LNAPL from a historical gasoline release unrelated to the March 7, 2018 was encountered. The horizontal extents of the LNAPL have been delineated during hand auger and direct push GeoProbe investigations from March to July 2018. The nature and extent of impact is discussed in Section 5.0 of the previously submitted June 2018 SIR.

The purpose of the current HA-3 Area remedial excavation is source removal of LNAPL that is appears to be contributing to groundwater impact detected at MW-5. Due to the nature of the Site (piping loop, underground utilities, structural integrity, etc.) and the ongoing pumping loop recoat work, all known LNAPL and soil impact at the HA-3 area cannot be immediately removed and will require several phases. The initial excavation encompassed an area of approximately 1,000 square feet (approximately 55-feet by 18-feet) and was limited to a depth of 8-feet to avoid penetrating the clay layer which could lead to vertical migration of LNAPL or potential sidewall collapse that compromise might nearby infrastructure. Due to the above mentioned limitations, some area of soil impact were not excavated and will be addressed with supplemental remedial actions. A second excavation, being conducted by hand as part of the pipeline loop maintenance, is planned and will contribute to source removal of LNAPL. In addition, supplemental excavation of the HA-3 Area adjacent to the loop road, which could not be removed during the ongoing site maintenance work, is scheduled for completion in late October 2018.

The initial mechanical excavation was dewatered and excavated and backfilled in four discrete (yet continuous) sections to ensure structural stability throughout the remedial effort. Each section was excavated and backfilled on a daily basis, with the dig limits defined by vertical boards from which the ensuing stage was initiated the following day. The initial source removal remedial excavation of the residual LNAPL at the HA-3 area is the only remedial action discussed in this report. Future remedial actions will be presented in separate submittals as completed.

8.2 Dewatering and LNAPL Removal

Prior to the remedial excavation, three (3) temporary dewatering points designated DW-1 through DW-3 were installed along the southern edge of the planned excavation. Along with the dewatering points, five (5) temporary vapor extraction points designated V-1 through V-5 were installed along the southern edge of the planned excavation in an effort to minimize ambient vapors for worker safety. Four (4) hand auger points (HA-X, HA-Y, HA-Z, and HA-20) were also installed within the LNAPL footprint. For a period of three (3) weeks prior to the excavation, the area was dewatered via a vacuum truck on a daily basis at both the dewatering and vapor extraction points. When the area was dewatered, the vacuum truck extracted VOC vapors from the subsurface while groundwater and LNAPL recharged into the dewatering and extraction points for another round of removal. There were several purposes for this pre-excavation extraction procedure: health and safety of contractors conducting the remediation by limiting exposure to LNAPL, VOC vapors, and a potential explosive atmosphere near combustible engine equipment; source removal of LNAPL; removal and hydraulic control of dissolved-phase contaminants; and structural stability of the excavation. Extracted groundwater and LNAPL was disposed offsite at an approved disposal facility and extracted vapors were directed through inline 55-gallon vapor-phase granular activated carbon (GAC) drum filters and discharged to the atmosphere. Approximately 2,231-gallons of groundwater and 297-gallons of LNAPL were removed prior to the excavation.

After the excavation was complete eight (8) additional extraction points designated V-6 through V-12 and HA-20 were installed between the southern excavation extent and the planned pipeline loop maintenance excavation for the continued purposes of health and safety, LNAPL removal, and dewatering for the planned Phase II pipeline loop recoat excavation. All temporary points were or will be removed and properly abandoned at the conclusion of the recoat and/or excavation work.

Groundwater and LNAPL levels were gauged and recorded prior to excavation and after excavation for seven days. The total extraction prior to and during excavation, from July 31, 2018 to August 31, 2018, comprised removal of a total of 4,306-gallons of water and 392-gallons of LNAPL. Dewatering and extraction point locations are shown of **Figure 6**. A summary of liquid levels during dewatering are tabulated in **Table 5**.

8.3 Excavation

From August 21, 2018 to August 23, 2018, the residual LNAPL area at HA-3 was excavated to approximately 8.0-feet below ground surface. Soil was removed by sections each day ranging from 10-feet by 18-feet to 15-feet by 18-feet. Groundwater was encountered seeping into the excavation at approximately 7-feet below ground surface along the northern and western extents of the excavation (where dewatering points were not placed due to space limitation for equipment. The groundwater seeping in was observed to have a slight sheen in some areas but no measurable or continuous film of LNAPL was observed seeping into the excavation. Seven post-excavation sidewall samples were collected at the groundwater interface level via hand auger. These were collected from the north, east, and west sidewalls of the excavation at approximate intervals of 10-feet. Collected soil samples were screened by a photoionization detector (PID), placed on ice, accompanied by a chain of custody, and delivered to Caliber for analysis of TPH-DRO, TPH-GRO, and VOCs via method 8260 including naphthalene and fuel oxygenates. VOCs were collected using USEPA Method 5035 procedures. During excavation activities, the area was continuously air monitored for benzene and the lower explosive limit (LEL). Post excavation sample locations are shown on **Figure 6**. A Cross Section Locator Map and Excavation Cross Section A-A' representing the HA-3 remedial excavation area and post-excavation sidewall sample location are presented as **Figures 7** and **Figure 8**, respectively.

Analytical results reported benzene impact above the MDE RCS of 12 mg/kg in PX-HA3-01 and PX-HA3--03 through PX-HA3-07 at concentrations ranging from 15 mg/kg to 46 mg/kg. Analytical results also reported TPH-DRO and TPH-GRO impact above their MDE RCS of 620 mg/kg in PX-HA3-01, PX-HA3-02, and PX-HA3-04 through PX-HA-07 at concentrations ranging from 1,900 mg/kg to 11,000 mg/kg for TPH-DRO and 1,300 mg/kg to 18,000 mg/kg for TPH-GRO. Soil analytical results for the post-excavation samples are tabulated in **Table 4.**

8.4 Backfill

Prior to excavation backfill, a high density polyethylene (HDPE) liner was installed vertically down the southern excavation sidewall to create a vertical barrier between the imported clean fill and the impact to the south that is to be hand excavated during ongoing loop maintenance activities. The excavation was then backfilled with imported clean fill to approximately 2-3 feet below ground surface in 2-feet-thick compacted lifts. To minimize the potential for surface water infiltration may induce further migration of dissolved impact, an HDPE liner was then installed horizontally over the entire excavation area at 2 to 3-feet below ground surface. The liner was covered with additional imported clean fill to the original surface grade. Existing extraction wells were preserved where possible to provide excavation dewatering and recovery of product and impacted groundwater. The planned pumping loop recoat hand excavation extents are shown on **Figure 6**. The vertical portion of the HDPE liner will define the northern limits of the remaining loop recoat excavation. The HA-3 and recoat excavations will meet at the vertical section of the HDPE liner, which will be removed upon backfill of the loop recoat excavation area.

8.5 Waste Management

Excavated soils were stockpiled on plastic sheeting, bermed with hay bales and/or concrete jersey barriers, and covered with plastic sheeting. Following waste characterization and receipt of characterization profile approval from the treatment, storage, and disposal facility (TSDF), the stockpiled soil and pipe bedding material was transported off-Site for treatment/disposal at Soil Safe of Logan Township, New Jersey. A total of approximately 410 tons of soil has been delivered to Soil Safe. The use of Soil Safe's Logan, New Jersey facility, as approved by the MDE, was confirmed in email correspondence to the MDE dated March 22, 2018.

Recovered LNAPL and groundwater were transported by Triumvirate Environmental of Baltimore, Maryland (Triumvirate) to designated TSDFs under existing and accepted profiles for LNAPL/PCW mixtures. The designated TSDFs, Triumvirate received the recovered fluids for treatment/disposal. From July 31, 2018 to August 31, 2018 a total of 4,306-gallons of water and 392-gallons of LNAPL has been received by the TSDFs for treatment/disposal. Soil and groundwater/LNAPL disposal manifests are included as **Appendix E** and **Appendix F**.

9.0 CONCLUSIONS & RECOMMENDATIONS

The MDE, in a Report of Observations dated July 27, 2018, directed Colonial to submit a supplemental site assessment report that summarizes the investigative and remedial action activities conducted at the Site since July 26, 2018. The purpose of this SIRA is to comply with MDE directives. Sections 2.0 through 9.0 have presented the Site description, physiographic setting, IRMs taken by Colonial, detailed accounting of the investigations conducted to date, and remedial action conducted at the HA-3 LNAPL area. Data summary tables and scaled Site maps showing sampling locations (e.g., post-remediation soil samples, soil borings, monitoring wells, and remedial excavation extents) are included. This section presents the conclusions of the investigation, including a CSM for the impacts observed and makes recommendations for further actions that are based upon the results obtained.

As discussed further below, Colonial has been able to confirm the source of release reported on March 7, 2018 and delineate the impact to soil and groundwater. In addition, during initial response efforts, Colonial identified a previously unknown area that was impacted (HA-3 LNAPL area) by an unrelated historical release and completed remedial action in that area. Ground water assessment activities at the Site are continuing, including the evaluation of impact in the vicinity of MW-2 and MW-5. These impacts have been confirmed as delineated on the basis of groundwater data from temporary wells.

9.1 Conclusions

The conclusions of the investigations detailed in this report are:

1. VOC groundwater impact was identified in samples taken from MW-5 on July 11, 2018, and confirmed through resampling on July 26, 2018. Prior to July 11, 2018 MW-5 had yielded samples attaining MD GWQS. Analytical data for the MW-5 sampling events indicates an increase in dissolved constituents. Evidence indicates that dissolved-phase groundwater impact from the HA-3 LNAPL area is migrating downgradient towards MW-5.

2. It is likely that the downgradient migration of dissolved-phase groundwater impact toward MW-5, which was not present in April 2018, has been exacerbated by the significant surface disturbance associated with IRM activities and record precipitation during 2018. Prior to the March 7, 2018 release, the yard was equipped with a drainage system for stormwater management. During IRM the drainage system was excavated and shallow soils were disturbed. The yard drainage system has been replaced but surface disturbances continue at the Site for pipeline re-coating and remedial activities. Therefore abnormally high precipitation has been able to infiltrate the subsurface and influence the distribution of the previously stable dissolved-phase petroleum constituents within and hydraulically downgradient of the HA-3 LNAPL Area. Between April and September 2018, water levels have risen approximately four feet at the Site.

3. Dissolved-phase groundwater impact at MW-5 has been delineated to the east, west, and south. A benzene concentration of 12 ug/L, above the MD GWQS of 5 ug/L, has been detected in GP-12, north of MW-5. GP-12 appears to be delineated by GP-13 (see Figure 5) but this occurrence will be evaluated as Colonial continues Site characterization subsequent to completion of the recoat activities.

4. No additional areas of soil impact were identified during the investigations conducted since prior reports.

5. Discovery of the dissolved-phase impact from the previously stable HA-3 LNAPL area prompted Colonial to design and conduct an expedited source removal remedial excavation at the HA-3 LNAPL area.

6. Prior to excavation, the area was dewatered for LNAPL recovery, excavation stability, and removal of VOC vapors. Dewatering and LNAPL recovery continued during and after the excavation. LNAPL levels were monitored for a period of one month. A total of 4,306-gallons of water and 392-gallons of LNAPL have been recovered from the HA-3 LNAPL area between July 31 and August 31, 2018.

7. An area of approximately 1,000 square feet (55 by 18-feet) was excavated to remove impacted soil and approximately 410 tons of soil was transported offsite for disposal. The area of excavation was limited due to permanent facility features but will continue with hand excavation at certain locations. Analytical results for six (6) of seven (7) post excavation soil samples along the north, east, and west sidewalls of the excavation indicate additional soil remediation may be required to attain MD soil cleanup standards.

8. Additional hand excavation in the HA-3 LNAPL area is planned as part of the loop pipeline maintenance and remedial action. This area is to the south of the HA-3 excavation and will be excavated up to the south sidewall of the HA-3 LNAPL area excavation. The area continues to be dewatered as the excavation progresses.

9. Dissolved-phase groundwater impact has been further delineated downgradient between MW-2 and MW-6. Impact is not present in GP-15, approximately 50-feet downgradient (east) of MW-2.

9.2 Recommendations

Based on the evidence presented herein, soil and water impacts remain in the immediate vicinity of the pump station loop and ancillary equipment. As requested in the MDE ROO (**Appendix A**), TRC has made the following recommendations for further actions:

1. Confirm delineation of the dissolved-phase groundwater impact at MW-5 and GP-12.

   1.1 Install an additional monitoring well downgradient from MW-5 and GP-12 to monitor migration of dissolved constituents;

   1.2 Include the additional monitoring well in the quarterly groundwater monitoring program;

   1.3 As directed by MDE, continue monthly gauging of the Site monitoring wells; and

   1.4 Prepare a Corrective Action Plan (CAP) to address the mobile dissolved-phase constituents in groundwater and complete appropriate remedial actions before impact to any sensitive receptor.

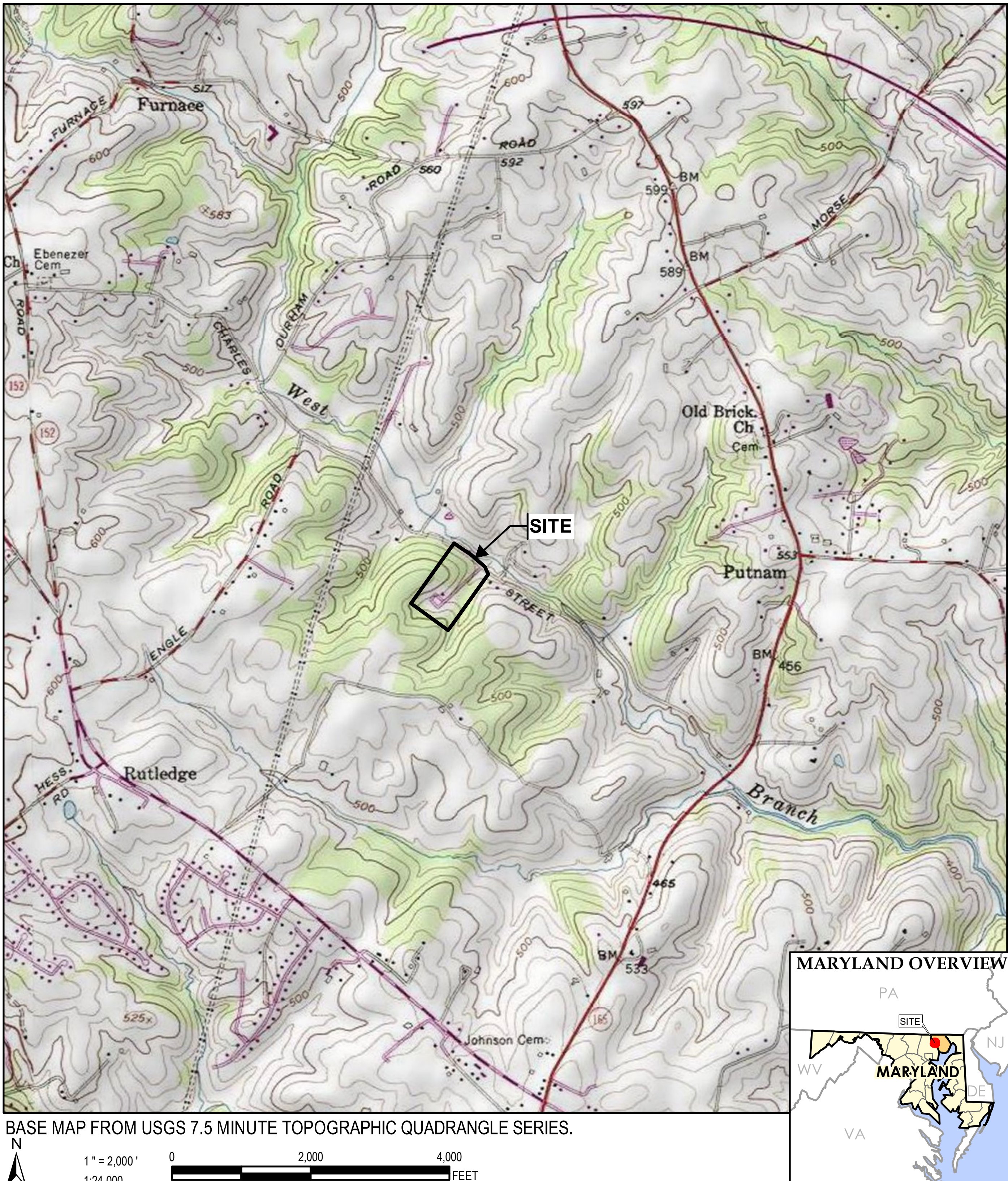
2. Include specific remedial measures in the CAP that may include groundwater recovery and treatment or in-situ remediation that will not be invasive or damaging to the pumping station pipeline, subsurface utilities, and ancillary equipment.

3. Conduct a vertical delineation of soil impact at the HA-3 LNAPL area within the pumping station loop to confirm vertical extents of impact exceeding applicable MD soil standards and complete appropriate remedial actions that may include in-situ soil remediation that will not be invasive or damaging to the pumping station pipeline, subsurface utilities, and ancillary equipment.

4. Continue the hand excavation of the pumping station loop up to the southern end of the HA-3 LNAPL area excavation. Collect post excavation soil samples every 10-feet to assess soil conditions.

5. Complete soil remediation at the HA-3 LNAPL area that may include an in situ program that will not be invasive or damaging to the pumping station pipeline, subsurface utilities, and ancillary equipment.

FIGURES



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 2,000 '

1:24,000

0 2,000 4,000 FEET

1601 Market Street, Suite 2555 Philadelphia, PA 19103 Phone: 215.563.2122 TRC - GIS	PROJECT: **COLONIAL PIPELINE COMPANY** **BEL AIR PUMP STATION** **FALLSTON, HARFORD COUNTY, MARYLAND**	DRAWN BY: M. LOVELACE CHECKED BY: B. HECKER APPROVED BY: D. CARLSON DATE: MAY 2018 PROJ. NO.: 299980.0000
	TITLE: **SITE LOCATION MAP**	FILE: 299980-1000-001slm.mxd **FIGURE 1**

S:\1-PROJECTS\COLONIAL_PIPELINE\FallstonMD\2018_299980 _2942_Charles\299980-1000-001slm.mxd -- Saved By: MLOVELACE on 5/30/2018, 10:48:02 AM

LEGEND

- APPROXIMATE RELEASE LOCATION
- CREEK
- NATURAL GAS PIPELINE
- FIBER OPTIC CABLES
- PETROLEUM PIPELINE
- 1' MINOR CONTOUR
- 5' MAJOR CONTOUR
- PROPERTY BOUNDARY

NOTES

1. BASE MAP IMAGERY FROM MARYLAND iMAP WEB SERVICE LAYER, 2016/2017.
2. UTILITY LINE LOCATIONS ARE APPROXIMATE BASED ON SURFACE MARKINGS AND SITE OBSERVATIONS.

N

0 75 150 Feet

1 " = 150 '

1:1,800

COLONIAL PIPELINE COMPANY
BEL AIR PUMP STATION
FALLSTON, HARFORD COUNTY, MARYLAND

AERIAL SITE PLAN WITH CURRENT TOPOGRAPHY

DRAWN BY:	M. LOVELACE	PROJ. NO.:	299980.0000
CHECKED BY:	B. HECKER	**FIGURE 2**	
APPROVED BY:	D. CARLSON		
DATE:	JUNE 2018		

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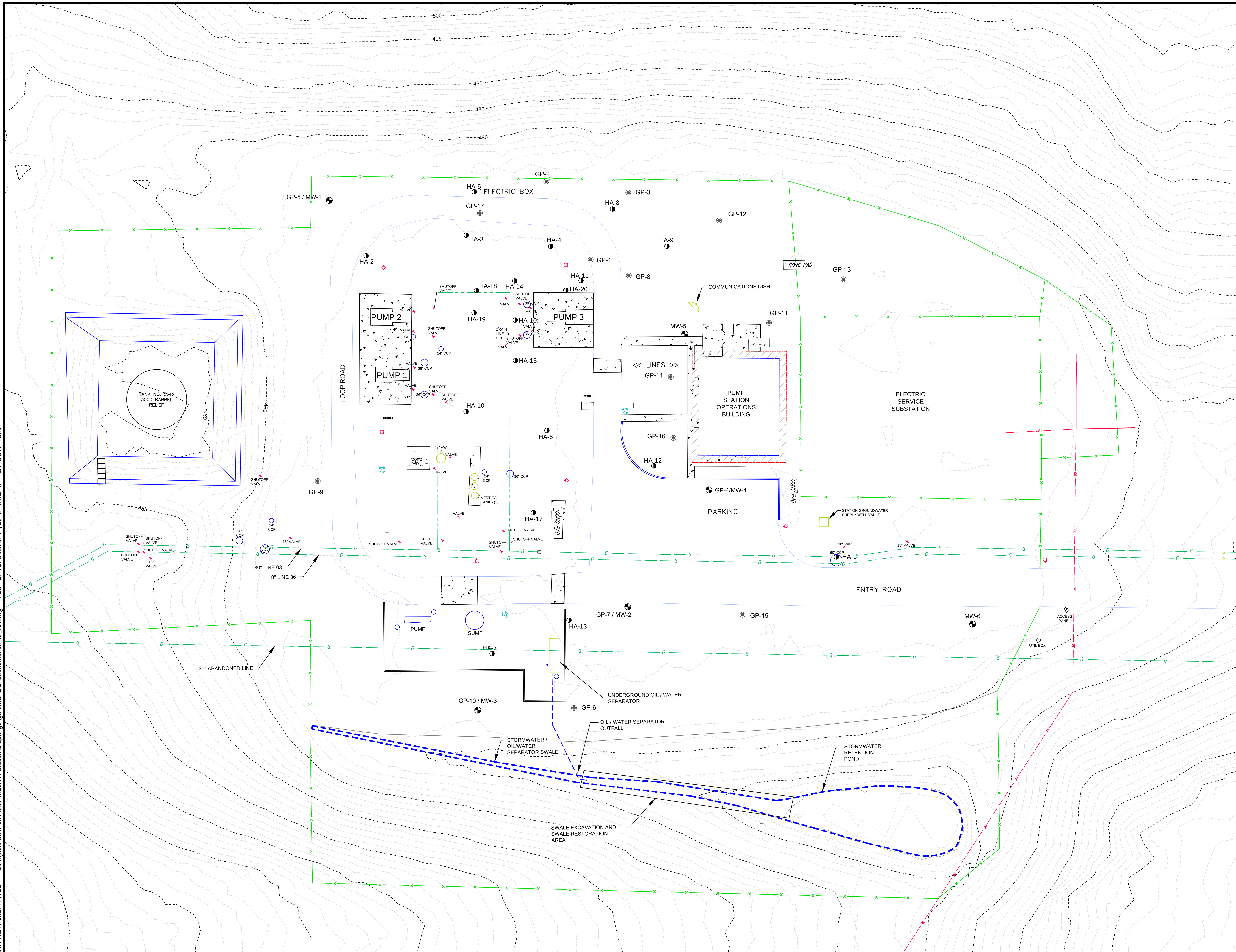
Philadelphia, PA 19103
Phone: 215.563.2122

299980-0000-002.mxd

TRC - GIS

Coordinate System: NAD 1983 StatePlane Maryland FIPS 1900 Feet (Foot US)
Map Rotation: 0

Plot Date: 6/12/2018, 08:50:19 AM by RSUEMNICHT -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\COLONIAL_PIPELINE\FallstonMD\2018_299980_2942_Charles\299980-0000-002.mxd



LEGEND

- GP-8 GEOPROBE BORING
- MW-5 MONITORING WELL
- HA-9 HAND AUGER BORING
- LIGHT POST
- HYDRANT
- APPROXIMATE LOOP LOCATION
- FENCE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND GAS LINE

NOTES:

1. LOCATION OF STORMWATER SWALE AND STORMWATER RETENTION POND ARE APPROXIMATE.
2. VALVE AND SHUTOFF VALVE LOCATIONS ARE SURVEYED GENERAL POINTS OF REFERENCE FOR PUMP STATION CONTROL POINTS AND PROCESS CONTROL FEATURES.

PROJECT: COLONIAL PIPELINE COMPANY
BEL AIR PUMP STATION
FALLSTON, HARFORD COUNTY, MARYLAND

TITLE: SITE PLAN

DRAWN BY:	D. KUDLA	PROJ. NO.:	299980.0000.0000
CHECKED BY:	D. CARLSON	FIGURE 3	
APPROVED BY:	D. CARLSON		
DATE:	SEPTEMBER 2018		

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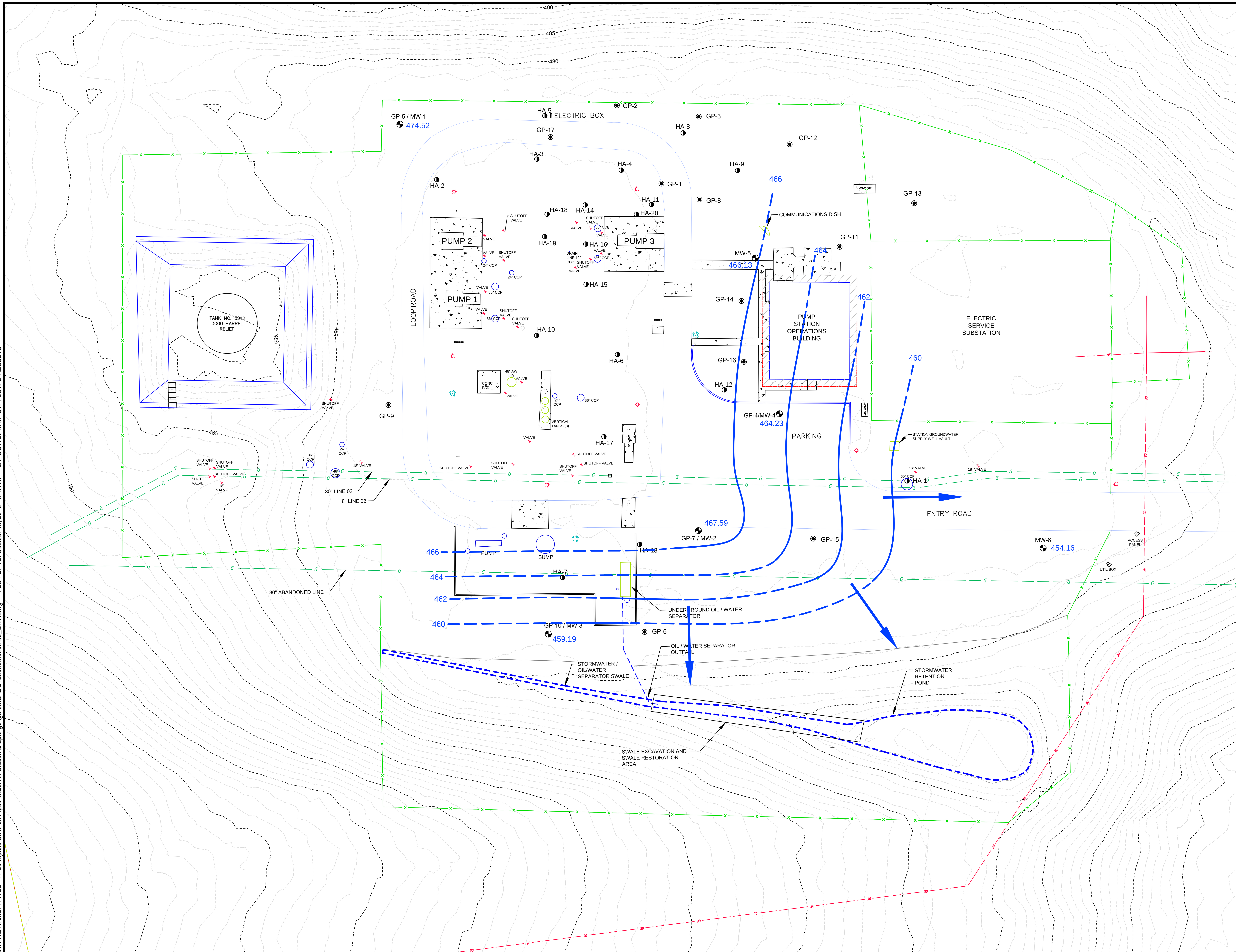
Suite 2555
Philadelphia, PA 19103
Phone: 215.563.2122

FILE NO.: 299980.0000.03_RA.dwg

22x34 — USER: dkudla — ATTACHED XREFS: — ATTACHED IMAGES:
DRAWING NAME: \\PHILLY-FP2\Projects\Colonial Pipeline\Bel Air Station & Spring\Figures\CADD\ 299980.0000.03_RA.dwg — PLOT DATE: October 11, 2018 - 3:32PM — LAYOUT: FIG03



LEGEND

GP-8	GEOPROBE BORING
MW-5	MONITORING WELL
HA-9	HAND AUGER BORING
	LIGHT POST
	HYDRANT
	FENCE
	OVERHEAD ELECTRIC LINE
	UNDERGROUND GAS LINE
	GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
	INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

1. LOCATION OF STORMWATER SWALE AND STORMWATER RETENTION POND ARE APPROXIMATE.
2. VALVE AND SHUTOFF VALVE LOCATIONS ARE SURVEYED GENERAL POINTS OF REFERENCE FOR PUMP STATION CONTROL POINTS AND PROCESS CONTROL FEATURES.

PROJECT:
COLONIAL PIPELINE COMPANY
BEL AIR PUMP STATION
FALLSTON, HARFORD COUNTY, MARYLAND

TITLE:
GROUNDWATER POTENTIOMETRIC MAP
JULY 2018

DRAWN BY:	D. SIEWERT/O. DE LEON	PROJ. NO.:	299980.0000.0000
CHECKED BY:	B. HECKER		**FIGURE 4**
APPROVED BY:	D. CARLSON		
DATE:	AUGUST 2018		

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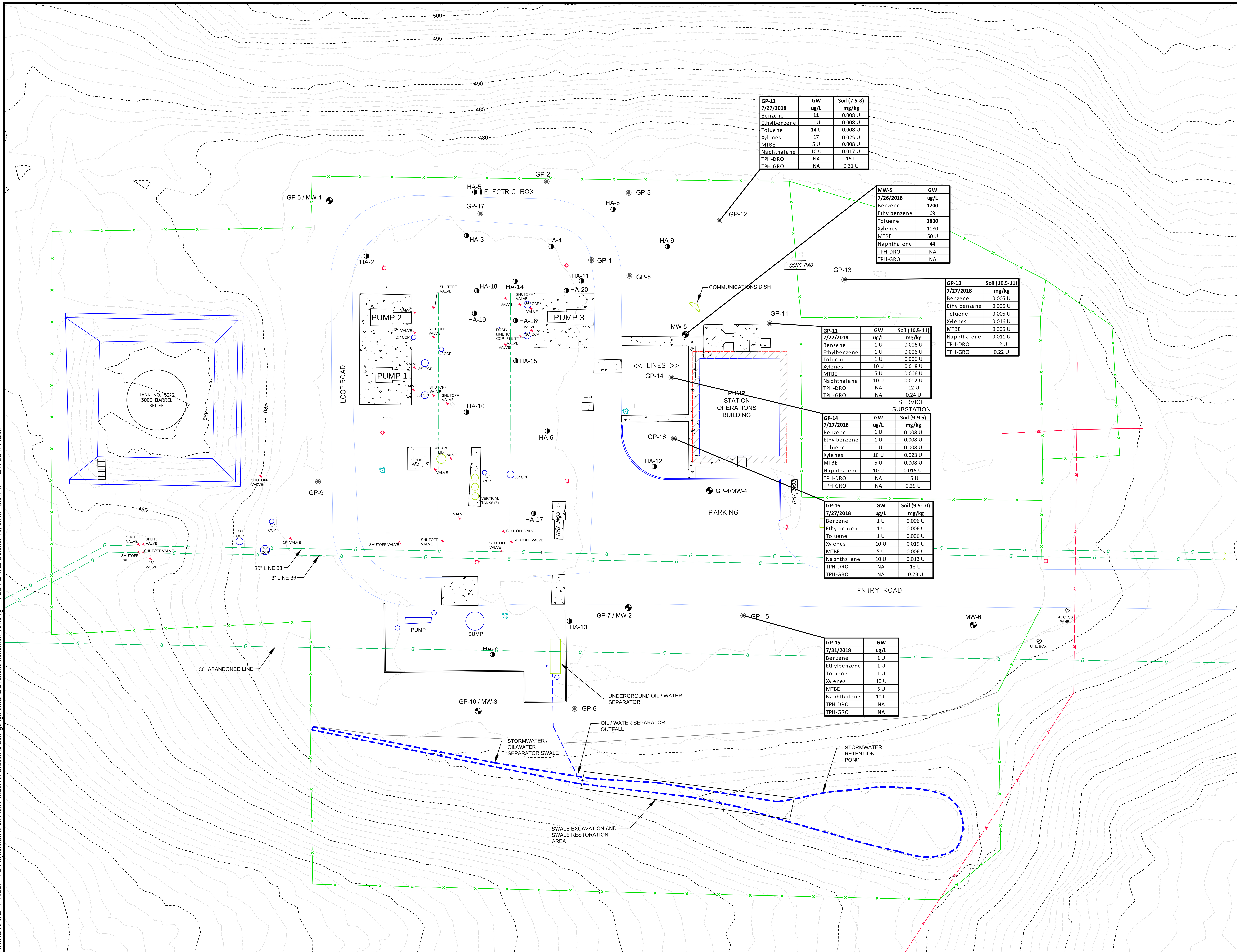
FILE NO.: 299980.0000.03_QMR.dwg

22x34 -- USER: dsudia -- ATTACHED XREFS: -- ATTACHED IMAGES:
DRAWING NAME: \\PHILLY-FP2\Projects\Colonial Pipeline\Bel Air Station & Spring\Figures\CADD\ 299980.0000.03_QMR.dwg -- PLOT DATE: October 15, 2018 - 8:47AM -- LAYOUT: 2018.07 GW FLOW & RESULTS
Version: 2017-10-21



GP-12	GW	Soil (7.5-8)
7/27/2018	ug/L	mg/kg
Benzene	**11**	0.008 U
Ethylbenzene	1 U	0.008 U
Toluene	14 U	0.008 U
Xylenes	17	0.025 U
MTBE	5 U	0.008 U
Naphthalene	10 U	0.017 U
TPH-DRO	NA	15 U
TPH-GRO	NA	0.31 U

MW-5	GW
7/26/2018	ug/L
Benzene	**1200**
Ethylbenzene	69
Toluene	**2800**
Xylenes	1180
MTBE	50 U
Naphthalene	**44**
TPH-DRO	NA
TPH-GRO	NA

GP-13	Soil (10.5-11)
7/27/2018	mg/kg
Benzene	0.005 U
Ethylbenzene	0.005 U
Toluene	0.005 U
Xylenes	0.016 U
MTBE	0.005 U
Naphthalene	0.011 U
TPH-DRO	12 U
TPH-GRO	0.22 U

GP-11	GW	Soil (10.5-11)
7/27/2018	ug/L	mg/kg
Benzene	1 U	0.006 U
Ethylbenzene	1 U	0.006 U
Toluene	1 U	0.006 U
Xylenes	10 U	0.018 U
MTBE	5 U	0.006 U
Naphthalene	10 U	0.012 U
TPH-DRO	NA	12 U
TPH-GRO	NA	0.24 U

GP-14	GW	Soil (9-9.5)
7/27/2018	ug/L	mg/kg
Benzene	1 U	0.008 U
Ethylbenzene	1 U	0.008 U
Toluene	1 U	0.008 U
Xylenes	10 U	0.023 U
MTBE	5 U	0.008 U
Naphthalene	10 U	0.015 U
TPH-DRO	NA	15 U
TPH-GRO	NA	0.29 U

GP-16	GW	Soil (9.5-10)
7/27/2018	ug/L	mg/kg
Benzene	1 U	0.006 U
Ethylbenzene	1 U	0.006 U
Toluene	1 U	0.006 U
Xylenes	10 U	0.019 U
MTBE	5 U	0.006 U
Naphthalene	10 U	0.013 U
TPH-DRO	NA	13 U
TPH-GRO	NA	0.23 U

GP-15	GW
7/31/2018	ug/L
Benzene	1 U
Ethylbenzene	1 U
Toluene	1 U
Xylenes	10 U
MTBE	5 U
Naphthalene	10 U
TPH-DRO	NA
TPH-GRO	NA

LEGEND

- GP-8 — GEOPROBE BORING
- MW-5 — MONITORING WELL
- HA-9 — HAND AUGER BORING
- LIGHT POST
- HYDRANT
- APPROXIMATE LOOP LOCATION
- FENCE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND GAS LINE

NOTES:

1. LOCATION OF STORMWATER SWALE AND STORMWATER RETENTION POND ARE APPROXIMATE.
2. VALVE AND SHUTOFF VALVE LOCATIONS ARE SURVEYED GENERAL POINTS OF REFERENCE FOR PUMP STATION CONTROL POINTS AND PROCESS CONTROL FEATURES.
3. BOLD VALUES INDICATE DETECTION ABOVE MDE TYPE I AQUIFER STANDARD.
4. VALUES IN ITALICS INDICATE PRACTICAL QUANTITATION LIMIT (PQL) ABOVE MDE TYPE I AQUIFER STANDARD.
5. U QUALIFIER INDICATES THAT THE COMPOUND WAS NOT DETECTED ABOVE THE (PQL).
6. NA INDICATES PARAMETER WAS NOT ANALYZED DUE TO INSUFFICIENT WATER VOLUME

0 20 40
SCALE IN FEET

PROJECT:
COLONIAL PIPELINE COMPANY
BEL AIR PUMP STATION
FALLSTON, HARFORD COUNTY, MARYLAND

TITLE:
SUPPLEMENTAL SOIL AND GROUNDWATER INVESTIGATION AND RESULTS - JULY 2018

DRAWN BY:	D. KUDLA	PROJ. NO.:	299980.0000.0000
CHECKED BY:	D. CARLSON		
APPROVED BY:	D. CARLSON		**FIGURE 5**
DATE:	SEPTEMBER 2018		

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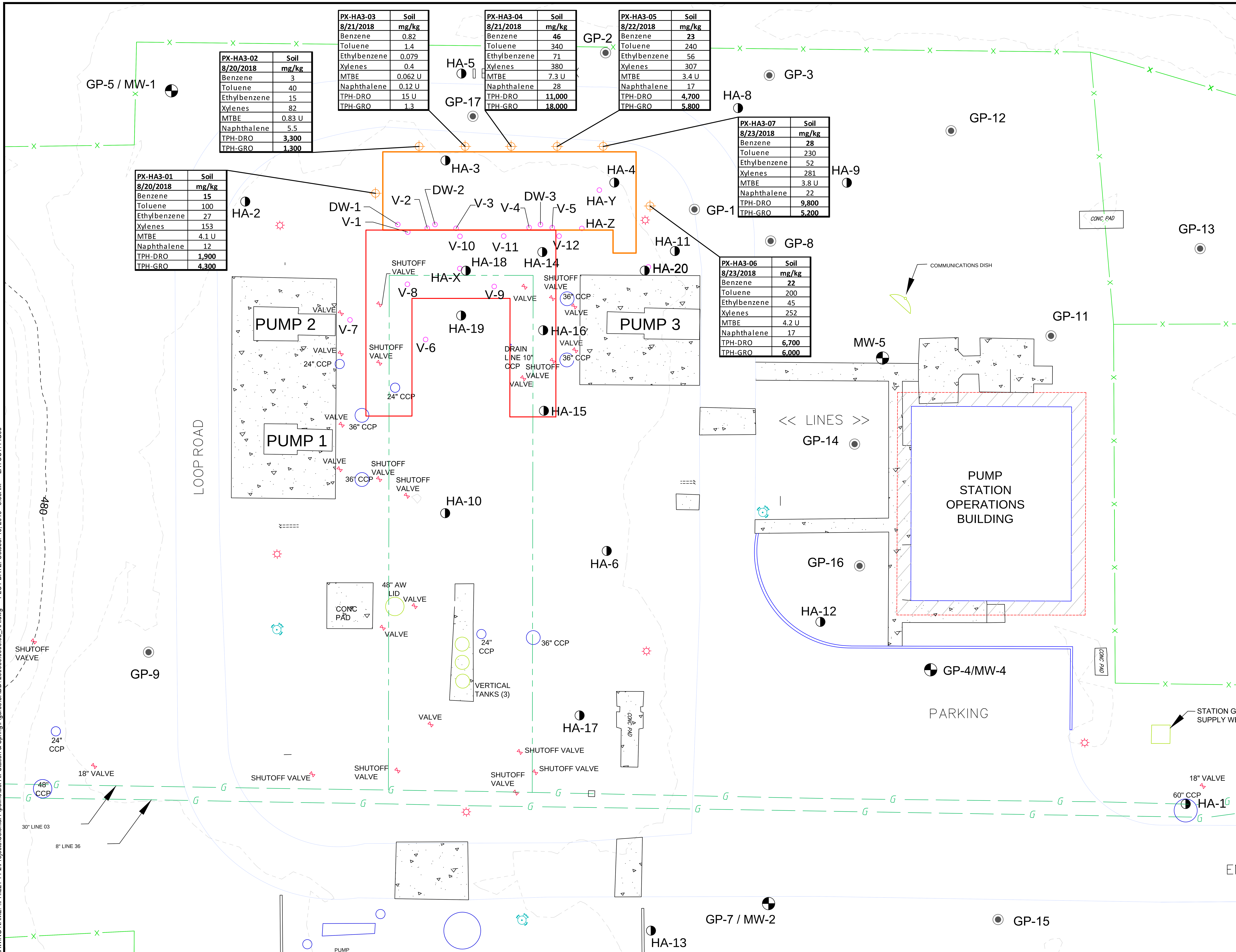
FILE NO.: 299980.0000.03_RA.dwg



PX-HA3-01	Soil
8/20/2018	mg/kg
Benzene	15
Toluene	100
Ethylbenzene	27
Xylenes	153
MTBE	4.1 U
Naphthalene	12
TPH-DRO	1,900
TPH-GRO	4,300

PX-HA3-02	Soil
8/20/2018	mg/kg
Benzene	3
Toluene	40
Ethylbenzene	15
Xylenes	82
MTBE	0.83 U
Naphthalene	5.5
TPH-DRO	3,300
TPH-GRO	1,300

PX-HA3-03	Soil
8/21/2018	mg/kg
Benzene	0.82
Toluene	1.4
Ethylbenzene	0.079
Xylenes	0.4
MTBE	0.062 U
Naphthalene	0.12 U
TPH-DRO	15 U
TPH-GRO	1.3

PX-HA3-04	Soil
8/21/2018	mg/kg
Benzene	46
Toluene	340
Ethylbenzene	71
Xylenes	380
MTBE	7.3 U
Naphthalene	28
TPH-DRO	11,000
TPH-GRO	18,000

PX-HA3-05	Soil
8/22/2018	mg/kg
Benzene	23
Toluene	240
Ethylbenzene	56
Xylenes	307
MTBE	3.4 U
Naphthalene	17
TPH-DRO	4,700
TPH-GRO	5,800

PX-HA3-07	Soil
8/23/2018	mg/kg
Benzene	28
Toluene	230
Ethylbenzene	52
Xylenes	281
MTBE	3.8 U
Naphthalene	22
TPH-DRO	9,800
TPH-GRO	5,200

PX-HA3-06	Soil
8/23/2018	mg/kg
Benzene	22
Toluene	200
Ethylbenzene	45
Xylenes	252
MTBE	4.2 U
Naphthalene	17
TPH-DRO	6,700
TPH-GRO	6,000

LEGEND

- GP-8 GEOPROBE BORING
- MW-5 MONITORING WELL
- HA-9 HAND AUGER BORING
- POST-EX SAMPLE LOCATION
- DEWATERING/VAPOR EXTRACTION POINT
- LIGHT POST
- HYDRANT
- EXCAVATION EXTENTS
- REMAINING LOOP EXCAVATION EXTENTS
- APPROXIMATE LOOP LOCATION
- FENCE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND GAS LINE

NOTES:

1. LOCATION OF YARD DRAIN EXCAVATION, STORMWATER SWALE, STORMWATER RETENTION POND, HAND AUGER SOIL BORINGS, AND POST EXCAVATION SOIL SAMPLES ARE APPROXIMATE.
2. VALVE AND SHUTOFF VALVE LOCATIONS ARE SURVEYED GENERAL POINTS OF REFERENCE FOR PUMP STATION CONTROL POINTS AND PROCESS CONTROL FEATURES
3. AN ACCESS WELL IS AN OBSERVATION PORT TO SHALLOW SUBSURFACE VALVES AND CONTROL POINTS.
4. POST EXCAVATION SOIL SAMPLES WERE EVALUATED AGAINST THE MARYLAND DEPARTMENT OF ENVIRONMENT (MDE) SOIL RESIDENTIAL CLEAN-UP STANDARD (RCS) FOR VOLATILE ORGANIC COMPOUNDS (VOCs), AND NON-RESIDENTIAL CLEAN-UP STANDARD FOR TOTAL PETROLEUM HYDROCARBON DIESEL RANGE ORGANICS (TPH-DRO) AND TOTAL PETROLEUM HYDROCARBON GASOLINE RANGE ORGANICS (TPH-GRO).
5. POST EXCAVATION SOIL SAMPLES WERE COLLECTED FROM 7.0 TO 7.5-FEET.

0 10 20
SCALE IN FEET

PROJECT:
COLONIAL PIPELINE COMPANY
BEL AIR PUMP STATION
FALLSTON, HARFORD COUNTY, MARYLAND

TITLE:
REMEDIAL EXCAVATION AND POST EXCAVATION SAMPLE LOCATIONS - AUGUST 2018

DRAWN BY:	D. KUDLA	PROJ. NO.:	299980.0000.0000
CHECKED BY:	D. CARLSON	**FIGURE 6**	
APPROVED BY:	D. CARLSON		
DATE:	SEPTEMBER 2018		

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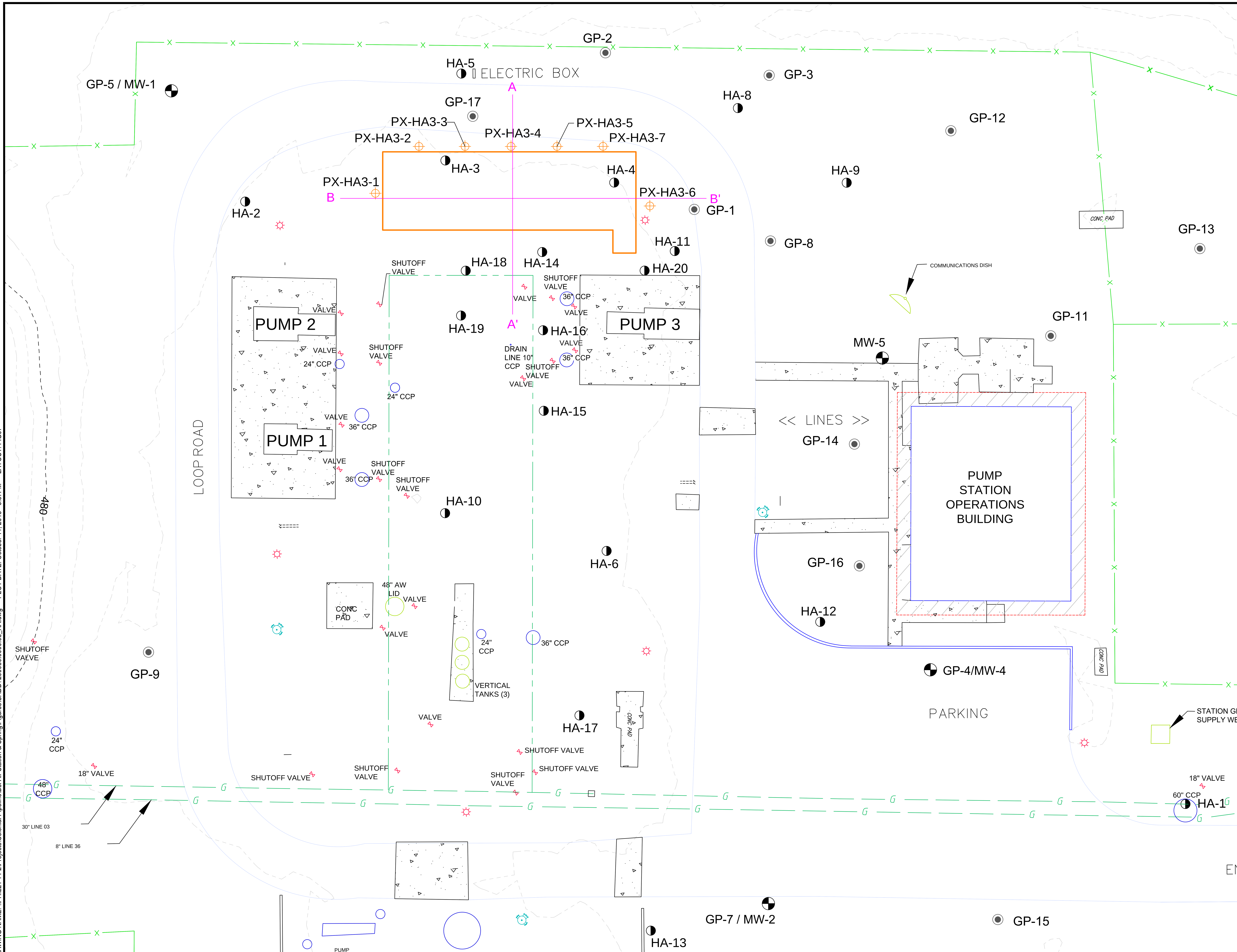
Philadelphia, PA 19103
Phone: 215.563.2122

FILE NO.: 299980.0000.03_RA.dwg

DRAWING NAME: \\PHILLY-FP2\Projects\Colonial Pipeline\Bel Air Station & Spring\Figures\CADD\ 299980.0000.03_RA.dwg — PLOT DATE: October 15, 2018 - 8:53AM — LAYOUT: FIG06



LEGEND

GP-8	GEOPROBE BORING
MW-5	MONITORING WELL
HA-9	HAND AUGER BORING
	LIGHT POST
	HYDRANT
	EXCAVATION EXTENTS
A A'	CROSS SECTION LOCATOR
	APPROXIMATE LOOP LOCATION
	FENCE
	OVERHEAD ELECTRIC LINE
	UNDERGROUND GAS LINE

NOTES:

1. LOCATION OF YARD DRAIN EXCAVATION, STORMWATER SWALE, STORMWATER RETENTION POND, HAND AUGER SOIL BORINGS, AND POST EXCAVATION SOIL SAMPLES ARE APPROXIMATE.
2. VALVE AND SHUTOFF VALVE LOCATIONS ARE SURVEYED GENERAL POINTS OF REFERENCE FOR PUMP STATION CONTROL POINTS AND PROCESS CONTROL FEATURES
3. AN ACCESS WELL IS AN OBSERVATION PORT TO SHALLOW SUBSURFACE VALVES AND CONTROL POINTS.

0 10 20
SCALE IN FEET

PROJECT:
COLONIAL PIPELINE COMPANY
BEL AIR PUMP STATION
FALLSTON, HARFORD COUNTY, MARYLAND

TITLE:
EXCAVATION CROSS SECTION LOCATOR MAP

DRAWN BY:	D. KUDLA	PROJ. NO.:	299980.0000.0000
CHECKED BY:	D. CARLSON	**FIGURE 7**	
APPROVED BY:	D. CARLSON		
DATE:	SEPTEMBER 2018		

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Philadelphia, PA 19103
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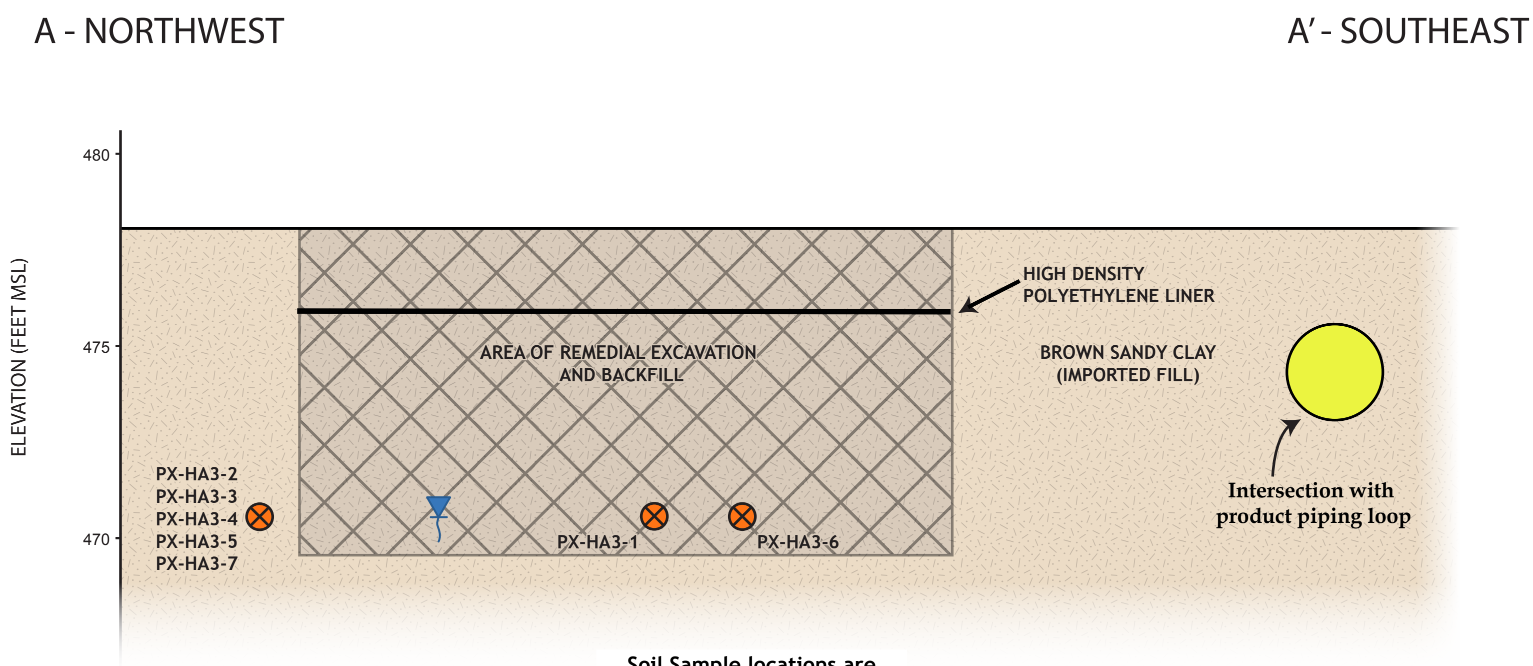


Excavation extends 27 ft forward (northeast) and 28 ft backward (southwest)

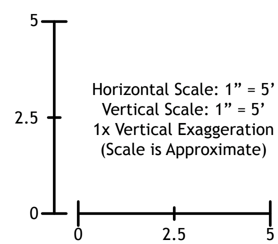
Soil Sample locations are projected eastward or southward to indicate the relative location with respect to the excavation profile

LEGEND

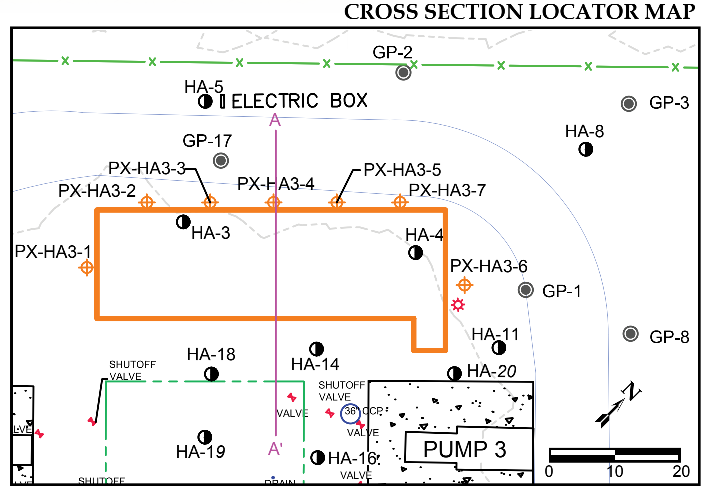
- APPARENT GROUNDWATER ELEVATION (Based on seepage observed along sidewalls)
- POST-EXCAVATION SIDEWALL SAMPLE

NOTES

1. GROUND SURFACE ELEVATION IS APPROXIMATE.



CROSS SECTION LOCATOR MAP



TRC 1601 Market Street, Suite 2555, Philadelphia, PA 19103, Phone: 215.563.2122, www.trcsolutions.com	PROJECT: **COLONIAL PIPELINE CORPORATION, BEL AIR STATION, FALLSTON, MARYLAND**
	TITLE: **EXCAVATION CROSS SECTION A-A'**

DRAWN BY:	L. AUNER
CHECKED BY:	N. RASHID
APPROVED BY:	D. CARLSON
DATE:	SEPTEMBER 2018
PROJ. NO.:	299980.0000
FILE:	29980-0000-ai04.ai

FIGURE 8

FILE PATH: P:\AI\Colonial_Pipeline\FallstonMD\299980\299980-0000-ai04.ai

TABLES

TABLE 1
Monitoring Well Groundwater Elevations

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Harford, County, Maryland

Gauging Date	Top of Casing Elevation	Depth to Water	Depth to Product	Product Thickness	Groundwater Elevation
MW-1					
4/4/2018	480.73	8.28	--	--	472.45
5/30/2018	480.73	5.79	--	--	474.94
6/28/2018	480.73	5.27	--	--	475.46
7/11/2018	480.73	6.21	--	--	474.52
8/9/2018	480.73	4.54	--	--	476.19
9/4/2018	480.73	4.52	--	--	476.21
MW-2					
4/4/2018	478.20	12.98	--	--	465.22
5/30/2018	478.20	10.42	--	--	467.78
6/28/2018	478.20	9.98	--	--	468.22
7/11/2018	478.20	10.61	--	--	467.59
8/9/2018	478.20	9.36	--	--	468.84
9/4/2018	478.20	9.54	--	--	468.66
MW-3					
4/4/2018	476.86	19.17	--	--	457.69
5/30/2018	476.86	17.75	--	--	459.11
6/28/2018	476.86	17.37	--	--	459.49
7/11/2018	476.86	17.67	--	--	459.19
8/9/2018	476.86	16.86	--	--	460.00
9/4/2018	476.86	17.03	--	--	459.83
MW-4					
4/4/2018	477.15	15.51	--	--	461.64
5/30/2018	477.15	13.52	--	--	463.63
6/28/2018	477.15	12.34	--	--	464.81
7/11/2018	477.15	12.92	--	--	464.23
8/9/2018	477.15	11.68	--	--	465.47
9/4/2018	477.15	12.08	--	--	465.07
MW-5					
4/4/2018	477.44	14.01	--	--	463.43
5/30/2018	477.44	11.76	--	--	465.68
6/28/2018	477.44	10.67	--	--	466.77
7/11/2018	477.44	11.31	--	--	466.13
8/9/2018	477.44	9.72	--	--	467.72
9/4/2018	477.44	10.30	--	--	467.14
MW-6					
4/4/2018	480.62	29.04	--	--	451.58
5/30/2018	480.62	27.35	--	--	453.27
6/28/2018	480.62	25.87	--	--	454.75
7/11/2018	480.62	26.46	--	--	454.16
8/9/2018	480.62	NM	--	--	-
9/4/2018	480.62	25.89	--	--	454.73
Top of casing (TOC) elevation in feet above mean sea level (amsl).					
Depth to water and depth to product in feet below TOC.					
Groundwater elevation in feet amsl.					
NM - Not measured					

TABLE 2
Groundwater Analytical Data Summary
Temporary Monitoring Wells & MW-5 Resample

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Harford County, Maryland

		Sample No.:	GP-11		GP-12		GP-14		GP-15		GP-16		MW-5	
		Date Sampled:	7/27/2018		7/27/2018		7/27/2018		7/31/2018		7/27/2018		7/26/2018	
		Lab Sample ID:	18072707-01		18072707-02		18072707-03		18073108-01		18072707-04		18072602-01	
		Lab:	Caliber		Caliber		Caliber		Caliber		Caliber		Caliber	
Parameter (µg/L)	***CAS No.***	***MD GWQS***												
Acetone	67-64-1	550	25	U	25	U	25	U	25	U	25	U	250	
Benzene	71-43-2	5	1	U	**11**		1	U	1	U	1	U	**1200**	
Bromodichloromethane	75-27-4	80	5	U	5	U	5	U	5	U	5	U	50	U
Bromoform	75-25-2	80	5	U	5	U	5	U	5	U	5	U	50	U
Bromomethane	*74-83-9*	*0.85*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
2-Butanone (MEK)	78-93-3	700	25	U	25	U	25	U	25	U	25	U	59	
Carbon Disulfide	75-15-0	100	5	U	5	U	5	U	5	U	5	U	50	U
Carbon tetrachloride	56-23-5	5	5	U	5	U	5	U	5	U	5	U	*50*	U
Chlorobenzene	108-90-7	100	5	U	5	U	5	U	5	U	5	U	50	U
Chloroethane	*75-00-3*	*3.6*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
Chloroform	67-66-3	80	5	U	5	U	5	U	5	U	5	U	50	U
Chloromethane	74-87-3	19	5	U	5	U	5	U	5	U	5	U	*50*	U
cis-1,2-Dichloroethene	156-59-2	70	5	U	5	U	5	U	5	U	5	U	50	U
cis-1,3-Dichloropropene	*10061-01-5*	*0.44*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
Cyclohexane	110-82-7	--	5	U	5	U	5	U	5	U	5	U	24	
1,2-Dibromo-3-chloropropane	*96-12-8*	*0.2*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
Dibromochloromethane	124-48-1	80	5	U	5	U	5	U	5	U	5	U	50	U
1,2-Dibromoethane	*106-93-4*	*0.05*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
1,2-Dichlorobenzene	95-50-1	600	5	U	5	U	5	U	5	U	5	U	50	U
1,3-Dichlorobenzene	*541-73-1*	*1.8*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
1,4-Dichlorobenzene	106-46-7	75	5	U	5	U	5	U	5	U	5	U	50	U
Dichlorodifluoromethane	75-71-8	--	5	U	5	U	5	U	5	U	5	U	50	U
1,1-Dichloroethane	75-34-3	90	5	U	5	U	5	U	5	U	5	U	50	U
1,2-Dichloroethane	107-06-2	5	5	U	5	U	5	U	5	U	5	U	*50*	U
1,1-Dichloroethene	75-35-4	7	5	U	5	U	5	U	5	U	5	U	*50*	U
1,2-Dichloropropane	78-87-5	5	5	U	5	U	5	U	5	U	5	U	*50*	U
1,3-Dichloropropene (total)	542-75-6	--	5	U	5	U	5	U	5	U	5	U	50	U
Ethylbenzene	100-41-4	700	1	U	1	U	1	U	1	U	1	U	69	
2-Hexanone	591-78-6	--	25	U	25	U	25	U	25	U	25	U	250	U
Isopropyl Ether	108-20-3	--	25	U	25	U	25	U	25	U	25	U	62	
Isopropylbenzene	98-82-8	66	5	U	5	U	5	U	5	U	5	U	50	U
Methyl Acetate	79-20-9	--	5	U	5	U	5	U	5	U	5	U	50	U
Methyl Tert Butyl Ether (MTBE)	1634-04-4	20	5	U	5	U	5	U	5	U	5	U	*50*	U
4-methyl-2-pentanone (MIBK)	108-10-1	630	25	U	25	U	25	U	25	U	25	U	250	U
Methylcyclohexane	108-87-2	--	5	U	5	U	5	U	5	U	5	U	17	
Methylene chloride	75-09-2	5	*10*	U	*15*	U	*15*	U	*10*	U	*15*	U	*100*	U
Nephthalene	*90-20-3*	*0.65*	*10*	U	*10*	U	*10*	U	*10*	U	*10*	U	**44**	
Styrene	100-42-5	100	5	U	5	U	5	U	5	U	5	U	50	U
tert-Amyl Alcohol (TAA)	75-85-4	--	25	U	25	U	25	U	25	U	25	U	410	
tert-Amyl Ethyl Ether (TAEE)	919-94-8	--	25	U	25	U	25	U	25	U	25	U	250	U
tert-Amyl Methyl Ether	994-05-8	--	25	U	25	U	25	U	25	U	25	U	250	U
tert-Butyl Alcohol	75-65-0	--	25	U	25	U	25	U	25	U	25	U	250	U
tert-Butyl Ethyl Ether	637-92-3	--	25	U	25	U	25	U	25	U	25	U	250	U
1,1,2,2-Tetrachloroethane	*79-34-5*	*0.053*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
Tetrachloroethene	127-18-4	5	5	U	5	U	5	U	5	U	5	U	*50*	U
Toluene	108-88-3	1000	1	U	14		1	U	1	U	1	U	**2800**	
trans-1,2-Dichloroethene	156-60-5	100	5	U	5	U	5	U	5	U	5	U	50	U
trans-1,3-Dichloropropene	*10061-02-6*	*0.44*	*5*	U	*5*	U	*5*	U	*5*	U	*5*	U	*50*	U
Freon 113	76-13-1	--	5	U	5	U	5	U	5	U	5	U	50	U
1,1,1-Trichloroethane	71-55-6	200	5	U	5	U	5	U	5	U	5	U	50	U
1,1,2-Trichloroethane	79-00-5	5	5	U	5	U	5	U	5	U	5	U	*50*	U
Trichloroethene	79-01-6	5	5	U	5	U	5	U	5	U	5	U	*50*	U
Trichlorofluoromethane	75-69-4	--	5	U	5	U	5	U	5	U	5	U	50	U
1,2,4-Trichlorobenzene	120-82-1	70	5	U	5	U	5	U	5	U	5	U	50	U
Vinyl Chloride	75-01-4	2	1	U	1	U	1	U	1	U	1	U	*10*	U
m,p-Xylene	179601-23-1	--	5	U	9		5	U	5	U	5	U	740	
o-Xylene	95-47-6	--	5	U	8		5	U	5	U	5	U	440	
Xylenes (total)	1330-20-7	10000	ND		17		ND		ND		ND		1180	

Values are reported in micrograms per liter (µg/L)
GWQS = MD Groundwater Quality Standard (GWQS) for Type I Aquifers
Bold indicates concentrations above the MD GWQS
ND = Not Detected
U = Compound not detected above PQL
Values in italics indicate PQL above applicable criterion.

TABLE 3
Soil Analytical Data Summary - Soil Boring Results

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Harford County, Maryland

		Sample No.:	GP-11		GP-12		GP-13		GP-14		GP-16	
		Date Sampled:	7/27/2018		7/27/2018		7/27/2018		7/27/2018		7/27/2018	
		Sample Depth (ft):	10.5-11		7.5-8		10.5-11		9-9.5		9.5-10	
		Lab Sample ID:	18072708-01		8072708-02		18072708-03		18072708-04		18072708-05	
		Lab:	Caliber		Caliber		Caliber		Caliber		Caliber	
Parameter (mg/kg)	***CAS No.***	***MD RCS***										
Acetone	67-64-1	7000	0.058	U	0.083	U	0.055	U	0.077	U	0.064	U
Benzene	71-43-2	12	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Bromodichloromethane	75-27-4	10	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Bromoform	75-25-2	81	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Bromomethane	74-83-9	11	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
2-Butanone (MEK)	78-93-3	4700	0.058	U	0.083	U	0.055	U	0.077	U	0.064	U
Carbon Disulfide	75-15-0	780	0.012	U	0.017	U	0.011	U	0.015	U	0.013	U
Carbon tetrachloride	56-23-5	4.9	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Chlorobenzene	108-90-7	160	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Chloroethane	75-00-3	220	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Chloroform	67-66-3	78	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Chloromethane	74-87-3	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
cis-1,2-Dichloroethene	156-59-2	78	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
cis-1,3-Dichloropropene	10061-01-5	6.4	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Cyclohexane	110-82-7	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,2-Dibromo-3-chloropropane	96-12-8	0.2	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Dibromochloromethane	124-48-1	7.6	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,2-Dibromoethane	106-93-4	0.32	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,2-Dichlorobenzene	95-50-1	700	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,3-Dichlorobenzene	541-73-1	23	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,4-Dichlorobenzene	106-46-7	27	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Dichlorodifluoromethane	75-71-8	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,1-Dichloroethane	75-34-3	1600	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,2-Dichloroethane	107-06-2	7	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,1-Dichloroethene	75-35-4	390	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,2-Dichloropropane	78-87-5	9.4	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,3-Dichloropropene (total)	542-75-6	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Ethylbenzene	100-41-4	780	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
2-Hexanone	591-78-6	--	0.012	U	0.017	U	0.011	U	0.015	U	0.013	U
Isopropyl Ether	108-20-3	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Isopropylbenzene	98-82-8	780	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Methyl Acetate	79-20-9	--	0.029	U	0.042	U	0.027	U	0.039	U	0.032	U
Methyl Tert Butyl Ether (MTBE)	1634-04-4	160	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
4-methyl-2-pentanone (MIBK)	108-10-1	--	0.012	U	0.017	U	0.011	U	0.015	U	0.013	U
Methylcyclohexane	108-87-2	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Methylene chloride	75-09-2	85	0.029	U	0.042	U	0.027	U	0.039	U	0.032	U
Naphthalene	91-20-3	160	0.012	U	0.017	U	0.011	U	0.015	U	0.013	U
Styrene	100-42-5	1600	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
tert-Amyl Alcohol (TAA)	75-85-4	--	0.029	U	0.042	U	0.027	U	0.039	U	0.032	U
tert-Amyl Ethyl Ether (TAEE)	919-94-8	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
tert-Amyl Methyl Ether	994-05-8	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
tert-Butyl Alcohol	75-65-0	--	0.029	U	0.042	U	0.027	U	0.039	U	0.032	U
tert-Butyl Ethyl Ether	637-92-3	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,1,2,2-Tetrachloroethane	79-34-5	3.2	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Tetrachloroethene	127-18-4	1.2	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Toluene	108-88-3	630	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
trans-1,2-Dichloroethene	156-60-5	160	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
trans-1,3-Dichloropropene	10061-02-6	6.4	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Freon 113	76-13-1	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,1,1-Trichloroethane	71-55-6	16000	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,1,2-Trichloroethane	79-00-5	11	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Trichloroethene	79-01-6	1.6	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Trichlorofluoromethane	75-69-4	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
1,2,4-Trichlorobenzene	120-82-1	78	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Vinyl Chloride	75-01-4	0.09	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
m,p-Xylene	179601-23-1	--	0.012	U	0.017	U	0.011	U	0.015	U	0.013	U
o-Xylene	95-47-6	--	0.006	U	0.008	U	0.005	U	0.008	U	0.006	U
Xylenes (total)	1330-20-7	1600	ND		ND		ND		ND		ND	
Parameter (mg/kg)	**CAS No.**	**MD NRCS**										
Diesel Range Organics (DRO)	68476-30-2	620	12	U	15	U	12	U	15	U	13	U
Gasoline Range Organics (GRO)	8006-61-9	620	0.24	U	0.31	U	0.22	U	0.29	U	0.23	U

Values are reported in milligrams per kilogram (mg/kg)
RCS = MD's Residential Clean-up Standard
NRCS = MD's Non-Residential Clean-up Standard
Bold indicates concentrations above the MD RCS or NRCS
ND = Not Detected
U = Compound not detected above PQL

TABLE 4
Soil Analytical Data Summary - Post Excavation Sample Results

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Harford County, Maryland

		Sample No.:	PX-HA3-01		PX-HA3-02		PX-HA3-03		PX-HA3-04		PX-HA3-05		PX-HA3-06		PX-HA3-07	
		Date Sampled:	8/20/2018		8/20/2018		8/21/2018		8/21/2018		8/22/2018		8/23/2018		8/23/2018	
		Sample Depth (ft):	7-7.5		7-7.5		7.5		7.5		7.5		7.5		7.5	
		Lab Sample ID:	18082108-01		18082108-02		18082108-03		18082108-04		18082304-01		18082304-02		18082304-03	
		Lab:	Caliber		Caliber		Caliber		Caliber		Caliber		Caliber		Caliber	
Parameter (mg/kg)	**CAS No.**	**MD RCS**														
Acetone	67-64-1	7000	41	U	8.3	U	0.62	U	73	U	34	U	42	U	38	U
Benzene	71-43-2	12	**15**		3		0.82		**46**		**23**		**22**		**28**	
Bromodichloromethane	75-27-4	10	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Bromoform	75-25-2	81	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Bromomethane	74-83-9	11	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
2-Butanone (MEK)	78-93-3	4700	41	U	8.3	U	0.62	U	73	U	34	U	42	U	38	U
Carbon Disulfide	75-15-0	780	8.2	U	1.7	U	0.12	U	15	U	6.9	U	8.5	U	7.5	U
Carbon tetrachloride	*56-23-5*	*4.9*	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Chlorobenzene	108-90-7	160	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Chloroethane	75-00-3	220	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Chloroform	67-66-3	78	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Chloromethane	74-87-3	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
cis-1,2-Dichloroethene	156-59-2	78	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
cis-1,3-Dichloropropene	*10061-01-5*	*6.4*	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Cyclohexane	110-82-7	--	4.1	U	1.1		0.062	U	11		6.8		4.2	U	7.7	
1,2-Dibromo-3-chloropropane	*96-12-8*	*0.2*	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Dibromochloromethane	124-48-1	7.6	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,2-Dibromoethane	106-93-4	0.32	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,2-Dichlorobenzene	95-50-1	700	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,3-Dichlorobenzene	541-73-1	23	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,4-Dichlorobenzene	106-46-7	27	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Dichlorodifluoromethane	75-71-8	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,1-Dichloroethane	75-34-3	1600	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,2-Dichloroethane	107-06-2	7	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,1-Dichloroethene	75-35-4	390	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,2-Dichloropropane	78-87-5	9.4	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,3-Dichloropropene (total)	542-75-6	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Ethylbenzene	100-41-4	780	27		15		0.079		71		56		45		52	
2-Hexanone	591-78-6	--	8.2	U	1.7	U	0.12	U	15	U	6.9	U	8.5	U	7.5	U
Isopropyl Ether	108-20-3	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Isopropylbenzene	98-82-8	780	4.9		2.2		0.062	U	7.3	U	6.2		5.9		6.2	
Methyl Acetate	79-20-9	--	21	U	4.2	U	0.31	U	36	U	17	U	21	U	19	U
Methyl Tert Butyl Ether (MTBE)	1634-04-4	160	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
4-methyl-2-pentanone (MIBK)	108-10-1	--	4.1	U	1.7	U	0.12	U	15	U	6.9	U	8.5	U	7.5	U
Methylcyclohexane	108-87-2	--	29		7.6		0.062	U	42		35		31		34	
Methylene chloride	75-09-2	85	21	U	4.2	U	0.31	U	36	U	17	U	21	U	19	U
Naphthalene	91-20-3	160	12		5.5		0.12	U	28		17		17		22	
Styrene	100-42-5	1600	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
tert-Amyl Alcohol (TAA)	75-85-4	--	21	U	4.2	U	0.31	U	36	U	17	U	21	U	19	U
tert-Amyl Ethyl Ether (TAEE)	919-94-8	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
tert-Amyl Methyl Ether	994-05-8	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
tert-Butyl Alcohol	75-65-0	--	21	U	4.2	U	0.31	U	36	U	17	U	21	U	19	U
tert-Butyl Ethyl Ether	637-92-3	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,1,2,2-Tetrachloroethane	79-34-5	3.2	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Tetrachloroethene	*127-18-4*	*1.2*	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Toluene	108-88-3	630	100		40		1.4		340		240		200		230	
trans-1,2-Dichloroethene	156-60-5	160	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
trans-1,3-Dichloropropene	*10061-02-6*	*6.4*	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Freon 113	76-13-1	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,1,1-Trichloroethane	71-55-6	16000	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,1,2-Trichloroethane	79-00-5	11	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Trichloroethene	*79-01-6*	*1.6*	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Trichlorofluoromethane	75-69-4	--	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
1,2,4-Trichlorobenzene	120-82-1	78	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
Vinyl Chloride	*75-01-4*	*0.09*	4.1	U	0.83	U	0.062	U	7.3	U	3.4	U	4.2	U	3.8	U
m,p-Xylene	179601-23-1	--	110		58		0.26		270		220		180		200	
o-Xylene	95-47-6	--	43		24		0.14		110		87		72		81	
Xylenes (total)	1330-20-7	1600	153		82		0.4		380		307		252		281	
Parameter (mg/kg)	**CAS No.**	**MD NRCS**														
Diesel Range Organics (DRO)	68476-30-2	620	**1,900**		**3,300**		15	U	**11,000**		**4,700**		**6,700**		**9,800**	
Gasoline Range Organics (GRO)	8006-61-9	620	**4,300**		**1,300**		1.3		**18,000**		**5,800**		**6,000**		**5,200**	

Values are reported in milligrams per kilogram (mg/kg)
RCS = MD's Residential Clean-up Standard
NRCS = MD's Non-Residential Clean-up Standard
Bold indicates concentrations above the MD RCS or NRCS
ND = Not Detected
NA = Not Analyzed
U = Compound not detected above PQL
Values in italics indicate PQL above applicable criterion.
D = Sample results are obtained from a dilution; the surrogate or
matrix spike recoveries reported are calculated from diluted samples.

TABLE 5
Summary of Dewatering Points Liquid Levels

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Hardford County, Maryland

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
DW-1				
8/1/2018	8:30	2.61	2.63	0.02
	11:12	2.77	2.78	0.01
	12:30	3.30	3.31	0.01
	14:20	3.20	3.22	0.02
8/2/2018	8:30	2.25	2.27	0.02
	9:26	2.41	2.45	0.04
	11:35	3.31	3.33	0.02
	13:04	3.14	3.16	0.02
	14:14	3.13	3.14	0.01
8/6/2018	8:28	2.31	2.34	0.03
	10:20	2.91	3.09	0.18
	11:40	2.91	3.20	0.29
	13:01	3.11	3.31	0.20
	14:28	3.01	3.18	0.17
	15:00	3.47	3.56	0.09
8/7/2018	7:42	2.58	2.72	0.14
	9:41	2.79	2.97	0.18
	11:16	3.01	3.17	0.16
	12:38	2.93	3.42	0.49
	13:52	3.72	3.76	0.04
8/8/2018	7:39	2.28	2.61	0.33
	9:34	2.54	2.70	0.16
	10:51	2.64	2.75	0.11
	12:18	2.98	3.11	0.13
	13:30	2.91	3.01	0.10
	14:50	3.09	3.21	0.12
8/9/2018	7:53	1.61	1.75	0.14
	9:34	'--	2.46	'--
	11:28	2.34	2.44	0.10
	12:46	2.31	2.39	0.08
	13:58	2.41	2.46	0.05
	14:30	2.85	2.96	0.11
8/13/2018	8:36	1.46	1.67	0.21
	10:43	--	2.02	--
	12:37	2.13	2.14	0.01
	14:06	2.30	2.31	0.01
8/14/2018	8:17	2.16	2.22	0.06
	10:45	2.46	2.69	0.23
	12:06	2.31	2.53	0.22
	13:23	2.25	2.48	0.23
	14:44	2.42	2.67	0.25
8/15/2018	7:50	2.34	2.57	0.23
	9:33	2.36	2.61	0.25
	11:07	2.61	2.85	0.24
	13:27	2.48	2.72	0.24
	14:22	--	5.71	--
8/16/2018	8:08	2.56	2.83	0.27
	9:37	2.80	3.05	0.25
	11:07	--	5.05	--
	12:39	3.14	3.21	0.07
	13:57	3.08	3.10	0.02
8/20/2018	8:02	2.78	3.34	0.56
	9:54	2.94	3.39	0.45
Well removed during excavation				

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
DW-2				
8/1/2018	8:35	3.38	4.08	0.70
	11:11	3.51	3.75	0.24
	12:32	5.70	5.78	0.08
	14:18	4.13	4.27	0.14
8/2/2018	8:32	2.78	3.72	0.94
	9:25	3.24	3.31	0.07
	11:41	6.23	6.26	0.03
	13:04	--	4.30	--
	14:15	--	3.94	--
8/6/2018	8:29	2.61	3.45	0.84
	10:25	4.74	4.76	0.02
	11:44	'--	3.19	--
	13:03	'--	3.16	--
	14:29	3.00	3.02	0.02
	15:02	3.31	3.32	0.01
8/7/2018	7:44	3.64	3.65	0.01
	9:43	2.74	2.75	0.01
	11:18	2.92	2.93	0.01
	12:41	2.96	2.99	0.03
	13:48	3.13	3.21	0.08
8/8/2018	7:42	2.74	2.83	0.09
	9:36	2.91	2.93	0.02
	10:53	2.98	3.01	0.03
	12:17	3.11	3.15	0.04
	13:33	3.15	3.27	0.12
	14:52	'--	5.98	--
8/9/2018	7:55	2.22	2.25	0.03
	9:32	2.53	2.56	0.03
	11:30	2.69	2.74	0.05
	12:48	2.82	2.86	0.04
	14:00	2.76	2.78	0.02
	14:33	3.00	3.02	0.02
8/13/2018	8:30	2.29	2.53	0.24
	10:47	2.55	2.58	0.03
	12:42	2.51	2.53	0.02
	14:14	2.73	2.74	0.01
8/14/2018	8:12	2.58	2.68	0.10
	10:50	2.88	2.89	0.01
	12:11	2.75	2.76	0.01
	13:27	2.71	2.73	0.02
	14:37	2.77	2.79	0.02
8/15/2018	7:54	2.78	2.86	0.08
	9:37	2.83	2.91	0.08
	11:11	2.85	3.02	0.17
	13:33	2.92	2.99	0.07
	14:25	2.93	3.03	0.10
8/16/2018	8:12	2.99	3.11	0.12
	9:40	--	3.16	--
	11:11	3.39	3.41	0.02
	12:43	3.24	3.26	0.02
	14:01	3.30	3.33	0.03
8/20/2018	8:15	3.24	3.56	0.32
	9:59	3.49	3.53	0.04
	15:06	3.84	4.06	0.22
Well removed during excavation				

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
DW-3				
8/1/2018	8:38	4.10	6.50	2.40
	9:20	5.50	5.75	0.25
	9:50	4.52	5.57	1.05
	11:24	6.87	6.88	0.01
	11:39	6.41	6.43	0.02
	11:54	6.04	6.06	0.02
	12:09	5.77	5.83	0.06
	12:26	5.56	5.67	0.11
8/2/2018	8:20	3.50	5.31	1.81
	11:27	4.98	5.05	0.07
	12:08	5.32	5.43	0.11
	15:44	5.01	5.15	0.14
8/6/2018	8:22	3.55	4.39	0.84
	10:18	5.41	5.47	0.06
	11:45	4.37	4.48	0.11
	13:11	5.73	5.76	0.03
	14:34	4.33	4.39	0.06
	15:04	4.74	4.77	0.03
8/7/2018	7:48	4.01	4.22	0.21
	9:45	4.14	4.21	0.07
	11:21	4.42	4.47	0.05
	12:43	4.31	4.36	0.05
	13:46	4.36	4.41	0.05
8/8/2018	7:45	4.11	4.31	0.20
	9:39	4.27	4.29	0.02
	10:55	4.57	4.61	0.04
	12:16	4.40	4.43	0.03
	13:35	4.68	4.71	0.03
	14:46	4.49	4.52	0.03
8/9/2018	7:57	3.67	3.96	0.29
	9:31	3.89	3.91	0.02
	11:37	4.27	4.29	0.02
	12:52	4.37	4.39	0.02
	14:02	4.19	4.21	0.02
	14:37	4.65	4.67	0.02
8/13/2018	8:41	3.92	4.20	0.28
	10:54	4.11	4.13	0.02
	12:48	4.20	4.20	0.00
	14:20	4.43	4.44	0.01
8/14/2018	8:23	4.06	4.13	0.07
	10:56	--	4.31	--
	12:17	4.46	4.47	0.01
	13:32	4.23	4.24	0.01
	14:53	4.18	4.19	0.01
8/15/2018	8:00	4.23	4.30	0.07
	9:44	4.32	4.37	0.05
	11:17	4.60	4.66	0.06
	13:38	4.64	4.71	0.07
	14:31	--	5.33	--
8/16/2018	8:17	4.43	5.02	0.59
	9:44	4.77	4.79	0.02
	11:17	4.53	4.55	0.02
	12:48	4.72	4.76	0.04
	14:06	--	4.65	--
8/20/2018	8:14	4.53	5.03	0.50
	10:00	4.69	4.96	0.27
	15:00	4.76	5.08	0.32
8/21/2018	11:41	5.02	5.05	0.03
8/22/2018	7:00	3.55	3.69	0.14
Well removed during excavation				

TABLE 5

Summary of Dewatering Points Liquid Levels

Colonial Pipeline Company - Bel Air Pump Station

2942 Charles Street, Fallston, Hardford County, Maryland

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
V-1				
8/1/2018	8:40	3.10	4.89	1.79
	11:08	3.28	4.70	1.42
	12:29	4.10	5.43	1.33
	14:16	3.84	5.02	1.18
8/2/2018	8:28	2.60	5.30	2.70
	9:24	3.05	4.44	1.39
	11:34	4.12	5.54	1.42
	13:03	3.86	4.80	0.94
	13:21	4.30	4.60	0.30
	14:14	4.02	4.31	0.29
8/6/2018	8:27	2.69	5.02	2.33
	10:19	3.76	5.16	1.40
	11:41	3.71	4.43	0.72
	13:02	4.10	4.12	0.02
	14:27	3.77	3.83	0.06
	15:01	4.10	4.14	0.04
8/7/2018	7:42	3.09	4.83	1.74
	9:41	3.57	4.13	0.56
	11:16	3.95	4.01	0.06
	12:39	3.79	4.29	0.50
	13:54	4.61	5.25	0.64
8/8/2018	7:40	3.37	4.44	1.07
	9:34	3.75	4.06	0.31
	10:51	3.83	4.09	0.26
	12:21	4.38	4.39	0.01
	13:31	4.13	4.17	0.04
	14:49	4.60	4.69	0.09
8/9/2018	7:54	2.49	4.82	2.33
	9:35	'--	2.53	--
	11:29	3.62	3.66	0.04
	12:46	3.56	3.68	0.12
	13:58	3.66	3.76	0.10
	14:31	3.91	4.03	0.12
8/13/2018	8:24	2.27	5.09	2.82
	10:44	3.08	3.98	0.90
	12:39	3.25	3.89	0.64
	14:11	3.46	3.86	0.40
8/14/2018	8:07	3.07	4.79	1.72
	10:47	3.66	4.08	0.42
	12:08	3.47	4.13	0.66
	13:25	3.43	4.24	0.81
	14:45	--	3.86	--
8/15/2018	7:51	3.42	4.59	1.17
	9:34	3.44	4.69	1.25
	11:09	4.03	4.09	0.06
	13:30	3.75	4.12	0.37
	14:23	--	5.20	--
8/16/2018	8:09	3.62	4.83	1.21
	9:38	4.00	4.40	0.40
	11:09	5.43	5.44	0.01
	12:40	--	4.37	--
	13:58	--	4.31	--
8/20/2018	8:03	3.74	4.93	1.19
	9:55	4.11	4.63	0.52
8/21/2018	11:41	3.29	3.32	0.03
	7:00	3.15	3.18	0.03
	13:28	3.05	3.07	0.02
8/23/2018	7:00	3.50	3.51	0.01
	13:18	3.61	3.62	0.01
8/24/2018	7:15	3.75	3.76	0.01
	14:00	3.78	3.79	0.01
8/27/2018	7:20	3.97	4.02	0.05
	11:35	4.00	4.01	0.01

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
V-1 (Continued)				
8/27/2018	13:15	--	4.09	--
	14:15	--	4.05	--
8/28/2018	7:30	4.10	4.12	0.02
	10:40	--	4.15	--
	12:00	--	4.13	--
	13:45	--	4.21	--
8/29/2018	7:30	4.20	4.21	0.01
	12:15	--	4.22	--
	14:15	--	4.25	--
8/30/2018	7:30	4.26	4.27	0.01
	14:45	--	4.29	--
8/31/2018	7:30	4.31	4.61	0.30
	11:30	--	4.31	--
V-2				
8/1/2018	8:42	3.65	5.40	1.75
	11:07	3.86	4.72	0.86
	12:28	5.60	7.53	1.93
	14:14	4.33	5.35	1.02
	8:27	2.94	5.57	2.63
8/2/2018	9:23	3.70	4.02	0.32
	11:33	6.00	7.46	1.46
	13:02	4.57	4.90	0.33
	14:13	4.31	4.63	0.32
8/6/2018	8:27	2.77	5.31	2.54
	10:19	5.22	5.37	0.15
	13:03	4.11	4.15	0.04
	14:28	3.98	4.01	0.03
	15:01	4.20	4.23	0.03
8/7/2018	7:43	3.53	3.78	0.25
	9:42	3.76	3.79	0.03
	11:17	3.93	3.98	0.05
	12:30	3.93	3.98	0.05
	13:57	4.21	4.24	0.03
8/8/2018	7:40	3.68	3.82	0.14
	9:35	3.89	3.90	0.01
	10:52	3.95	3.97	0.02
	12:20	4.11	4.13	0.02
	13:32	4.13	4.15	0.02
	14:48	5.95	5.97	0.02
8/9/2018	7:54	3.17	3.28	0.11
	9:34	'--	3.67	--
	11:29	3.68	3.69	0.01
	12:47	3.62	3.64	0.02
	13:59	3.71	3.76	0.05
	14:31	3.94	3.96	0.02
8/13/2018	8:27	3.14	5.09	1.95
	10:46	3.48	3.52	0.04
	12:41	3.56	3.57	0.01
	14:13	--	3.68	--
8/14/2018	8:09	3.53	3.63	0.10
	10:49	--	3.84	--
	12:10	--	3.72	--
	13:26	--	3.67	--
	14:46	3.81	3.83	0.02
8/15/2018	7:52	3.76	3.81	0.05
	9:36	3.79	3.86	0.07
	11:10	4.00	4.07	0.07
	13:31	3.89	3.92	0.03
	14:24	--	5.46	--
8/16/2018	8:11	3.97	4.02	0.05
	9:39	--	4.14	--
	11:10	4.49	4.50	0.01
	12:41	4.26	4.28	0.02
	14:00	--	4.29	--

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
V-2 (Continued)				
8/20/2018	8:04	Dry	Dry	--
	9:56	--	4.30	--
	15:06	4.74	4.76	0.02
Well removed during excavation				
V-3				
8/1/2018	8:44	3.90	5.31	1.41
	11:05	3.95	5.03	1.08
	12:27	6.16	7.64	1.48
	14:12	4.59	5.45	0.86
8/2/2018	8:26	3.17	5.12	1.95
	9:21	3.64	4.57	0.93
	11:32	6.99	7.65	0.66
	13:01	--	4.98	--
	14:13	4.51	4.69	0.18
	15:46	4.45	4.61	0.16
8/6/2018	8:26	2.70	5.69	2.99
	10:18	5.42	6.01	0.59
	11:43	4.25	4.27	0.02
	13:04	4.10	4.24	0.14
	14:30	4.06	4.13	0.07
	15:02	4.35	4.40	0.05
8/7/2018	7:43	3.42	3.47	0.05
	9:42	3.82	3.90	0.08
	11:18	3.89	3.94	0.05
	12:40	3.97	4.22	0.25
	13:50	4.01	4.14	0.13
8/8/2018	7:41	3.56	4.39	0.83
	9:36	3.91	3.98	0.07
	10:54	3.96	4.04	0.08
	12:19	4.02	4.08	0.06
	13:32	4.15	4.18	0.03
	14:48	'--	5.82	--
8/9/2018	7:55	3.17	3.65	0.48
	9:34	3.46	3.69	0.23
	11:30	3.70	3.79	0.09
	12:48	3.61	3.67	0.06
	13:59	3.77	3.83	0.06
	14:33	4.05	4.09	0.04
8/13/2018	8:33	3.08	4.81	1.73
	10:48	3.50	3.96	0.46
	12:43	3.59	3.85	0.26
	14:15	3.72	3.84	0.12
8/14/2018	8:15	3.31	4.77	1.46
	10:52	3.88	3.89	0.01
	12:13	3.72	3.89	0.17
	13:28	3.66	3.94	0.28
	14:48	3.68	4.07	0.39
8/15/2018	7:55	3.62	4.55	0.93
	9:39	3.63	4.63	1.00
	11:13	3.71	4.79	1.08
	13:34	3.94	3.98	0.04
	14:26	--	5.42	--
8/16/2018	8:14	3.84	4.61	--
	9:40	4.16	4.18	0.02
	11:14	4.19	4.26	0.07
	12:44	4.19	4.29	0.10
	14:02	4.28	4.31	0.03
8/20/2018	8:05	Dry	Dry	Dry
	9:57	4.34	4.39	0.05
	15:02	--	5.15	--
Well removed during excavation				

TABLE 5

Summary of Dewatering Points Liquid Levels

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Hardford County, Maryland

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
V-4				
8/1/2018	8:47	4.30	6.20	1.90
	9:50	4.60	5.87	1.27
	10:11	4.57	5.87	1.30
	11:09	--	7.24	--
	14:11	5.53	6.63	1.10
8/2/2018	8:25	3.71	4.98	1.27
	9:19	--	7.24	--
	11:30	4.87	6.95	2.08
	13:00	--	7.24	--
	14:12	5.35	6.94	1.59
	15:45	5.21	5.40	0.19
8/6/2018	8:25	3.65	4.97	1.32
	10:17	5.66	6.29	0.63
	11:46	4.59	4.91	0.32
	13:09	4.48	4.53	0.05
	14:33	4.51	4.54	0.03
	15:03	4.84	4.86	0.02
8/7/2018	7:46	4.18	4.46	0.28
	9:44	4.36	4.39	0.03
	11:20	4.49	4.52	0.03
	12:42	3.49	3.51	0.02
	13:48	4.54	4.56	0.02
8/8/2018	7:44	4.29	4.60	0.31
	9:37	4.46	4.47	0.01
	10:57	'--	4.62	--
	12:26	'--	4.59	--
	13:34	'--	4.71	--
	14:47	'--	4.67	--
8/9/2018	7:56	3.66	4.61	0.95
	9:31	4.01	4.05	0.04
	11:36	4.28	4.30	0.02
	12:51	4.33	4.36	0.03
	14:01	4.33	4.35	0.02
	14:36	--	4.56	--
8/13/2018	8:38	4.90	5.17	0.27
	10:52	4.26	4.28	0.02
	12:47	4.37	4.39	0.02
	14:18	--	4.55	--
8/14/2018	8:22	4.17	4.60	0.43
	10:55	--	4.49	--
	12:16	--	4.52	--
	13:32	4.40	4.42	0.02
	14:51	4.37	4.38	0.01
8/15/2018	7:58	4.36	4.70	0.34
	9:42	4.41	4.78	0.37
	11:16	4.61	4.98	0.37
	13:37	4.94	4.95	0.01
	14:29	--	5.54	--
8/16/2018	8:16	4.57	4.83	0.26
	9:43	--	4.85	--
	11:16	4.71	4.73	0.02
	12:46	4.84	4.86	0.02
	14:05	--	4.84	--
8/20/2018	8:09	4.56	5.99	1.43
	9:58	4.92	4.94	0.02
	14:59	4.96	5.18	0.22
8/21/2018	11:41	5.55	5.59	0.04
8/22/2018	7:00	3.52	4.78	1.26
Well removed during excavation				

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
V-5				
8/1/2018	8:50	4.22	6.86	2.64
	9:50	4.58	6.88	2.30
	10:10	4.69	4.88	0.19
	11:10	5.95	7.24	1.29
	14:10	5.03	7.11	2.08
8/2/2018	8:23	3.52	6.52	3.00
	9:18	6.91	6.97	0.06
	11:29	4.77	5.53	0.76
	12:59	7.06	7.15	0.09
	14:10	5.09	5.82	0.73
	15:43	4.93	5.37	0.44
8/6/2018	8:24	3.48	5.91	2.43
	10:16	5.10	5.57	0.47
	11:47	4.48	4.99	0.51
	13:10	5.22	5.26	0.04
	14:34	4.41	4.86	0.45
	15:04	4.70	4.87	0.17
8/7/2018	7:46	3.84	5.88	2.04
	9:44	4.30	4.79	0.49
	11:20	5.19	5.25	0.06
	12:43	4.44	4.56	0.12
	13:47	4.48	4.84	0.36
8/8/2018	7:46	3.98	6.04	2.06
	9:38	4.40	4.86	0.46
	10:57	5.31	5.35	0.04
	12:16	4.48	5.04	0.56
	13:35	5.23	5.33	0.10
	14:46	4.48	5.07	0.59
8/9/2018	7:57	3.65	5.96	2.31
	9:30	4.04	4.53	0.49
	11:37	5.11	5.26	0.15
	12:51	5.21	5.28	0.07
	14:02	4.30	4.84	0.54
	14:41	5.56	5.60	0.04
8/13/2018	8:43	3.80	5.94	2.14
	10:54	3.91	6.16	2.25
	12:59	4.63	4.95	0.32
	14:22	4.73	4.82	0.09
8/14/2018	8:25	3.95	5.71	1.76
	10:58	4.43	4.90	0.47
	12:19	5.01	5.04	0.03
	13:35	4.37	4.79	0.42
	14:54	4.30	4.93	0.63
8/15/2018	8:02	4.08	4.90	0.82
	9:46	4.16	6.06	1.90
	11:18	5.10	5.18	0.08
	13:34	4.61	5.25	0.64
	14:32	5.43	5.45	0.02
8/16/2018	8:19	4.28	6.10	1.82
	9:45	5.51	5.53	0.02
	11:18	4.69	5.06	0.37
	12:50	5.02	5.10	0.08
	14:07	4.81	5.14	0.33
8/20/2018	8:12	4.39	6.60	2.21
	9:58	4.86	5.28	0.42
	14:57	4.78	6.01	1.23
8/21/2018	11:41	5.28	5.43	0.15
8/22/2018	7:00	3.49	4.91	1.42
Well removed during excavation				

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
V-6				
8/24/2018	14:00	--	8.26	--
8/27/2018	7:20	7.07	7.29	0.22
	11:35	9.19	9.50	0.31
	13:15	--	9.81	--
	14:15	9.56	9.82	0.26
8/28/2018	7:30	6.82	9.13	2.31
	10:40	--	10.17	--
	12:00	9.51	9.95	0.44
	13:45	10.08	10.35	0.27
8/29/2018	7:30	7.00	8.55	1.55
	12:15	8.90	9.35	0.45
	14:15	9.81	9.97	0.16
8/30/2018	7:30	7.20	8.16	0.96
	14:45	8.30	8.69	0.39
8/31/2018	7:30	7.29	7.99	0.70
	11:30	NM	NM	NM
V-7				
8/24/2018	14:00	--	6.82	--
8/27/2018	7:20	--	5.99	--
	11:35	--	7.01	--
	13:15	--	8.38	--
	14:15	--	7.76	--
8/28/2018	7:30	--	6.20	--
	10:40	--	6.23	--
	12:00	--	6.22	--
	13:45	--	7.31	--
8/29/2018	7:30	--	6.41	--
	12:15	--	7.61	--
	14:15	9.17	9.18	0.01
8/30/2018	7:30	--	6.53	--
	14:45	--	7.21	--
8/31/2018	7:30	--	6.75	--
	11:30	NM	NM	NM
V-8				
8/24/2018	14:00	6.17	6.63	0.46
8/27/2018	7:20	6.15	6.46	0.31
	11:35	6.65	6.75	0.10
	13:15	7.70	7.99	0.29
	14:15	NM	NM	NM
8/28/2018	7:30	6.41	6.56	0.15
	10:40	7.55	7.63	0.08
	12:00	6.89	6.99	0.10
	13:45	7.89	8.01	0.12
8/29/2018	7:30	7.50	7.61	0.11
	12:15	6.99	7.08	0.09
	14:15	8.50	8.60	0.10
8/30/2018	7:30	6.64	6.71	0.07
	14:45	6.81	6.89	0.08
8/31/2018	7:30	6.79	6.88	0.09
	11:30	7.57	7.65	0.08

TABLE 5

Summary of Dewatering Points Liquid Levels

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Hardford County, Maryland

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
		V-9		
8/24/2018	14:00	6.12	6.39	0.27
8/27/2018	7:20	6.09	6.90	0.81
	11:35	6.20	6.71	0.51
	13:15	6.42	6.91	0.49
	14:15	6.25	6.39	0.14
8/28/2018	7:30	6.28	6.46	0.18
	10:40	6.41	6.62	0.21
	12:00	6.41	6.43	0.02
	13:45	6.59	6.60	0.01
8/29/2018	7:30	--	6.39	--
	12:15	6.51	6.52	0.01
	14:15	6.69	6.83	0.14
8/30/2018	7:30	6.47	6.53	0.06
	14:45	6.50	6.59	0.09
8/31/2018	7:30	6.54	6.61	0.07
	11:30	6.56	6.67	0.11
		V-10		
8/24/2018	14:00	6.55	7.31	0.76
8/27/2018	7:20	6.62	6.95	0.33
	11:35	6.61	7.02	0.41
	13:15	8.59	10.59	2.00
	14:15	7.34	7.35	0.01
8/28/2018	7:30	6.69	7.11	0.42
	10:40	6.91	6.92	0.01
	12:00	6.87	7.00	0.13
	13:45	7.18	7.19	0.01
8/29/2018	7:30	6.82	7.00	0.18
	12:15	6.90	6.95	0.05
	14:15	--	7.44	--
8/30/2018	7:30	6.95	7.04	0.09
	12:15	6.90	6.95	0.05
	14:45	--	7.01	--
8/31/2018	7:30	7.00	7.09	0.09
	11:30	7.05	7.07	0.02
		V-11		
8/24/2018	14:00	6.34	8.12	1.78
8/27/2018	7:20	6.50	8.11	1.61
	11:35	6.54	8.19	1.65
	13:15	6.69	6.92	0.23
	14:15	6.62	7.91	1.29
8/28/2018	7:30	6.62	8.22	1.60
	10:40	6.51	8.17	1.66
	12:00	NM	NM	NM
	13:45	7.39	7.43	0.04
8/29/2018	7:30	6.80	8.02	1.22
	12:15	6.87	7.84	0.97
	14:15	NM	NM	NM
8/30/2018	7:30	7.05	7.62	0.57
	14:45	7.35	7.49	0.14
8/31/2018	7:30	7.18	7.46	0.28
	11:30	7.15	7.44	0.29
		V-12		
8/24/2018	14:00	7.29	7.30	0.01
8/27/2018	7:20	7.05	8.10	1.05
	11:35	7.31	7.39	0.08
	13:15	7.31	7.37	0.06
	14:15	7.31	7.36	0.05
8/28/2018	7:30	7.32	7.70	0.38
	10:40	7.31	7.61	0.30
	12:00	7.32	7.80	0.48
	13:45	7.49	7.51	0.02
8/29/2018	7:30	7.48	7.78	0.30
	12:15	7.51	7.53	0.02
	14:15	--	7.61	--
8/30/2018	7:30	7.59	7.65	0.06
	14:45	NM	NM	--
8/31/2018	7:30	7.61	7.73	0.12
	11:30	7.61	7.65	0.04

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
		HA-20		
8/24/2018	14:00	8.33	8.50	0.17
8/27/2018	7:20	8.46	8.99	0.53
	11:35	8.60	8.63	0.03
	13:15	--	8.69	--
	14:15	8.61	8.66	0.05
8/28/2018	7:30	8.69	8.81	0.12
	10:40	NM	NM	NM
	12:00	--	8.75	--
	13:45	--	8.75	--
8/29/2018	7:30	8.00	8.01	0.01
	12:15	8.81	8.83	0.02
	14:15	--	8.90	--
8/30/2018	7:30	8.87	8.88	0.01
	14:45	9.61	9.62	0.01
8/31/2018	7:30	8.90	8.95	0.05
	11:30	8.93	8.94	0.01
		HA-X		
8/1/2018	10:00	2.44	5.27	2.83
	11:28	2.88	3.54	0.66
	12:40	2.89	3.83	0.94
8/2/2018	8:33	2.08	3.71	1.63
	9:27	3.07	3.24	0.17
	11:36	2.84	3.00	0.16
	13:05	3.08	3.23	0.15
	14:16	3.22	3.41	0.19
	15:38	4.35	4.50	0.15
8/6/2018	8:30	2.05	2.70	0.65
	10:21	2.81	2.89	0.08
	11:44	3.12	3.28	0.16
	13:05	3.33	3.41	0.08
	14:32	3.37	3.41	0.04
	15:05	4.83	4.88	0.05
8/7/2018	7:45	2.43	2.62	0.19
	9:43	3.37	3.43	0.06
	11:19	3.37	3.49	0.12
	12:42	3.61	3.74	0.13
	13:49	3.83	3.92	0.09
8/8/2018	7:44	2.53	2.92	0.39
	9:37	3.56	3.68	0.12
	10:54	3.48	3.59	0.11
	12:18	3.63	3.74	0.11
	13:33	4.10	4.17	0.07
	14:52	3.85	3.93	0.08
8/9/2018	7:58	2.02	2.29	0.27
	9:32	2.67	2.72	0.05
	11:31	3.13	3.18	0.05
	12:50	3.24	3.29	0.05
	14:01	3.51	3.55	0.04
	14:35	4.96	4.98	0.02
8/13/2018	9:12	2.10	2.88	0.78
	10:50	2.74	2.82	0.08
	12:46	2.81	2.88	0.07
	14:17	3.27	3.35	0.08
8/14/2018	8:20	2.43	2.64	0.21
	10:54	3.89	3.96	0.07
	12:15	2.85	2.94	0.09
	13:30	2.63	2.74	0.11
	14:50	2.60	2.72	0.12
8/15/2018	7:51	2.67	2.86	0.19
	9:40	2.69	2.88	0.19
	11:14	2.75	2.95	0.20
	13:35	2.80	2.98	0.18
	14:28	5.81	5.82	0.01
8/16/2018	8:15	2.90	3.02	0.12
	9:42	3.90	3.94	0.04
	11:14	3.18	3.26	0.08
	12:45	3.10	3.18	0.08
	14:04	3.89	3.90	0.01

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
		HA-X (Continued)		
8/20/2018	8:07	2.99	3.26	0.27
	9:59	3.97	4.01	0.04
	15:01	3.73	3.81	0.08
8/21/2018	11:41	3.20	3.24	0.04
8/22/2018	7:00	1.50	1.91	0.41
	13:28	2.14	2.16	0.02
8/23/2018	7:00	--	2.58	--
	13:18	--	2.76	--
8/24/2018	7:15	--	2.83	--
	14:00	--	2.93	--
8/27/2018	7:20	--	3.10	--
	11:35	3.30	3.35	0.05
	13:15	4.24	4.26	0.02
	14:15	--	4.70	--
8/28/2018	7:30	--	3.19	--
	10:40	--	3.82	--
	12:00	--	3.45	--
	13:45	--	4.03	--
8/29/2018	7:30	--	3.30	--
	12:15	3.50	3.51	0.01
	14:15	--	4.41	--
8/30/2018	7:30	3.40	3.41	0.01
	14:45	3.43	3.44	0.01
8/31/2018	7:30	3.44	3.65	0.21
	11:30	3.63	3.64	0.01
		HA-Y		
8/2/2018	8:35	3.51	7.02	3.51
	9:29	4.05	5.37	1.32
	11:38	4.09	5.34	1.25
	12:55	4.17	5.30	1.13
	14:17	4.94	5.38	0.44
	15:42	4.53	4.83	0.30
8/6/2018	8:19	3.02	7.16	4.14
	10:15	3.54	5.42	1.88
	11:48	4.16	5.22	1.06
	13:06	3.87	4.32	0.45
	14:35	5.71	5.73	0.02
	15:03	4.42	5.26	0.84
8/7/2018	7:48	3.89	6.82	2.93
	9:46	5.67	5.74	0.07
	11:15	4.13	5.18	1.05
	12:44	4.69	5.04	0.35
	13:45	4.22	5.09	0.87
8/8/2018	7:46	3.56	6.81	3.25
	9:40	4.56	5.07	0.51
	10:56	5.01	5.13	0.12
	12:15	4.39	4.96	0.57
	13:36	5.07	5.18	0.11
	14:45	4.52	4.85	0.33
8/9/2018	7:58	3.61	6.27	2.66
	9:29	4.81	5.03	0.22
	11:38	4.08	5.03	0.95
	12:53	4.93	5.06	0.13
	14:03	6.34	6.36	0.02
	14:37	5.06	5.11	0.05
8/13/2018	8:56	3.69	6.74	3.05
	10:58	4.66	4.85	0.19
	12:51	4.31	5.01	0.70
	14:23	4.74	4.83	0.09
8/14/2018	8:26	3.83	6.06	2.23
	10:59	4.26	4.97	0.71
	12:22	4.62	4.82	0.20
	13:38	4.28	4.97	0.69
	14:55	4.15	4.29	0.14

(Continued on next page)

TABLE 5
Summary of Dewatering Points Liquid Levels

Colonial Pipeline Company - Bel Air Pump Station
2942 Charles Street, Fallston, Hardford County, Maryland

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
HA-Y (Continued)				
8/15/2018	8:53	3.82	6.58	2.76
	9:47	--	6.25	--
	11:19	4.59	4.90	0.31
	13:40	4.41	5.10	0.69
	14:33	--	6.37	--
8/16/2018	8:21	4.07	6.58	2.51
	9:48	5.25	5.27	0.02
	11:20	4.62	5.07	0.45
	12:52	5.06	5.12	0.06
	14:08	4.71	5.11	0.40
8/20/2018	8:16	4.16	7.18	3.02
	10:01	4.82	4.99	0.17
	14:56	4.83	5.17	0.34
8/21/2018	11:41	4.84	4.87	0.03
8/22/2018	7:00	3.74	5.41	1.67
	13:28	3.66	5.68	2.02
8/23/2018	7:00	3.52	6.30	2.78
Well removed during excavation				
HA-Z				
8/2/2018	8:36	3.50	6.00	2.50
	9:30	3.70	5.24	1.54
	11:20	3.74	5.40	1.66
	12:57	3.79	5.41	1.62
	15:40	4.63	5.05	0.42
8/6/2018	8:20	3.13	6.10	2.97
	10:14	3.40	5.41	2.01
	11:50	5.42	5.47	0.05
	13:06	3.86	4.64	0.78
	14:35	4.09	4.71	0.62
	15:06	4.73	4.86	0.13
8/7/2018	7:49	3.40	6.22	2.82
	9:45	4.41	4.69	0.28
	11:15	3.94	4.67	0.73
	12:44	5.51	5.65	0.14
	13:45	4.23	4.62	0.39
8/8/2018	7:47	3.57	6.17	2.60
	9:41	5.81	5.89	0.08
	10:56	3.98	5.06	1.08
	12:15	4.67	4.79	0.12
	13:36	4.23	4.58	0.35
	14:45	5.11	5.16	0.05
8/9/2018	7:59	3.63	5.16	1.53
	9:30	3.78	4.88	1.10
	11:38	4.13	4.58	0.45
	12:53	3.97	4.67	0.70
	14:07	4.82	4.93	0.11
	14:38	4.79	4.84	0.05
8/13/2018	9:04	3.52	6.11	2.59
	10:59	--	5.95	--
	12:52	4.27	4.55	0.28
	14:09	4.34	4.46	0.12
8/14/2018	8:29	3.84	5.30	1.46
	11:00	4.14	4.49	0.35
	12:24	4.08	4.70	0.62
	13:40	4.04	4.80	0.76
	14:56	4.82	4.99	0.17

Date	Time	Depth to Product	Depth to Water	Apparent Product Thickness
HA-Z (Continued)				
8/15/2018	8:55	3.85	5.77	1.92
	9:48	4.64	4.78	0.14
	13:42	4.34	4.71	0.37
	14:35	--	6.07	--
8/16/2018	8:22	4.32	5.02	0.70
	9:50	4.48	4.68	0.20
	11:21	4.43	4.78	0.35
	12:54	4.60	4.91	0.31
	14:10	4.81	4.92	0.11
8/20/2018	8:17	4.22	6.29	2.07
	10:03	4.64	4.76	0.12
	14:54	4.62	5.14	0.52
8/21/2018	11:41	4.86	5.16	0.30
8/22/2018	7:00	2.91	3.30	0.39
	13:28	3.58	4.25	0.67
8/23/2018	7:00	3.92	5.08	1.16
Well removed during excavation				

-- = Product not present
NM = Not Measured, well being used as a recovery well
TOC = Top of Casing
Depth to Product = Depth to Product measured in feet below TOC
Depth to Water = Depth to Water measured in feet below TOC

APPENDIX A

Maryland Department of Environment Report of Observations:
July 27, 2018

APPENDIX B

Soil Boring Permits and Documentation

APPENDIX C

Soil Boring Logs

APPENDIX D

Laboratory Analytical Reports

APPENDIX E

Soil Disposal Manifests

APPENDIX F

Groundwater Disposal Manifests