Chesapeake GeoSciences, Inc.
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August 1, 2018

Mr. Justin Seffens
Corporate Facility Manager
Armed Forces Retirement Home
3700 N. Capital Street, NW
Washington, DC 20011

RE: Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW
Washington, DC 20011
CGS Project No. CG-17-1111
Building 46: FACILITY ID #: 4010007/LUSTCASE #: 2018010
Building 76: FACILITY ID #: 4010008/LUSTCASE #: 2018011

Dear Mr. Seffens:

Chesapeake GeoSciences, Inc. (CGS) is pleased to present the enclosed report of the Additional Phase II ESA performed at Buildings 46 and 76 at the Armed Forces Retirement Home (AFRH) facility located at 3700 N. Capital Street, NW in Washington, DC. The enclosed report includes information regarding the field methodologies utilized during the investigation and the results of the investigation.

CGS recommends that this report be submitted to the District of Columbia Department of Energy & Environment (DOEE) (Remediation & Site Response Program and Underground Storage Tanks Branch) for its review.

CGS is pleased to have had the opportunity to prepare this report for the Armed Forces Retirement Home. If there are any questions, please contact our office in Columbia, Maryland at (410) 740-1911 or via email. The undersigned can be reached at extension 106 or nlove@cgs.us.com or at extension 103 or khoward@cgs.us.com.

Sincerely,
Chesapeake GeoSciences, Inc.

Nancy D. Love, PG
Principal

Kevin W. Howard, PG
President

Enclosures: Additional Phase II ESA Report (3 copies)

cc: Tim Sheckler, General Services Administration (By email and U.S. mail with enclosure)
Chafula Abdullah, General Services Administration (By email)
Martine Combal, JLL | Public Institutions (By email)
Brian Brussel, JLL | Public Institutions (By email)
Liz Estes, Stantec, Inc. (By email)
Project File

Additional Phase II
Environmental Site Assessment (ESA)
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Main Campus
3700 N. Capital Street, NW
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August 2018

Prepared for:
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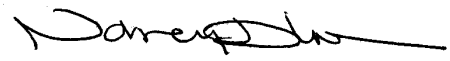
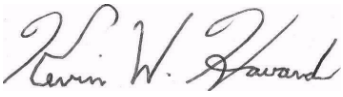
CGS Proposal Nos. CG-P15-1973R, CG-P15-1999R, CG-P18-2271, and CG-P18-2287

CGS Project No. CG-17-1111



Nancy D. Love, PG
Principal



Kevin W. Howard, PG
President

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EXECUTIVE SUMMARY

Chesapeake GeoSciences, Inc. (CGS) has performed an Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76 at the Armed Forces Retirement Home (AFRH) facility located at 3700 N. Capital Street, NW in Washington, DC. This work was performed on behalf of AFRH.

AFRH has issued a competitive Request for Proposal (RFP) to private developers to re-develop an approximate 80-acre area on the AFRH campus. This area includes Buildings 46 and 76. The Additional Phase II ESA was performed at Buildings 46 and 76 to investigate environmental conditions in these two areas, relative to the findings presented in the April 10, 2007 Phase II ESA Report generated by MACTEC Engineering and Consulting, Inc. (MACTEC), so that the need for additional investigation and/or corrective action, if any, can be determined and to inform prospective re-development bidders. CGS understands that any additional investigation and/or corrective action that may be needed would be performed by the chosen development partner.

The investigation activities performed at Building 46 centered on the prior presence of a laundry and dry cleaning plant in the southern portion of this building and the presumption that the plant utilized Stoddard solvent as its dry cleaning solvent in its early days of operation and tetrachloroethene (also known as perchloroethene or PCE) as its dry cleaning solvent in the later years. In its April 10, 2007 Phase II ESA Report, MACTEC reported a naphthalene concentration in soil and dry cleaning related chlorinated hydrocarbon concentrations in groundwater. MACTEC speculated that these findings might be associated with spills/releases from the former dry cleaning plant at Building 46. MACTEC also identified the presence of two underground storage tanks (USTs) immediately south of Building 46.

Building 76 was formerly used as a large-vehicle maintenance garage at AFRH. The southern portion of the building contains three large hydraulic lifts. In its April 10, 2007 Phase II ESA Report, MACTEC reported total petroleum hydrocarbon (TPH) concentrations in soil. MACTEC concluded that the soil contamination resulted from hydraulic oil leaks from the lifts at Building 76.

Among other activities, the Additional Phase II ESA included a passive subsurface vapor survey, a UST evaluation, advancement of 14 soil borings and soil sampling at Building 46, advancement of 10 soil borings and soil sampling at Building 76, installation of three two-inch diameter groundwater monitoring wells at/near Building 46, installation and sampling of six subsurface vapor monitoring points (VMPs) at Building 46, groundwater sampling of two previously existing monitoring wells and the three new monitoring wells, and sampling and off-site disposal of previously existing waste and investigation derived waste (IDW) generated during the Additional Phase II ESA. The fieldwork for these activities was initiated on October 17, 2017 and was completed on July 10, 2018.

The Work Plan for the Additional Phase II ESA (dated March 15, 2018) was approved by the District of Columbia Department of Energy & Environment (DOEE) (Remediation & Site Response Program and Underground Storage Tanks Branch) on March 29, 2018. The District of Columbia Department of Consumer and Regulatory Affairs (DCRA) permit for the Additional Phase II ESA was issued on April 11, 2018. Because two small USTs are present immediately south of Building 46 and because MACTEC had detected TPH in soil at Building 76 at concentrations above DOEE's Tier 0 Soil Standard [i.e., 100

milligrams per kilogram (mg/kg)], DOEE (Underground Storage Tanks Branch) issued Directive Letters, which assigned the Facility Identification Numbers and Leaking Underground Storage Tank (LUST) Case Numbers listed below to the buildings.

- Building 46: FACILITY ID #: 4010007/LUSTCASE #: 2018010
- Building 76: FACILITY ID #: 4010008/LUSTCASE #: 2018011

Site conditions at Building 46 differed from those anticipated based on data presented in MACTEC's Phase II ESA report. These differing site conditions resulted in departures from the Work Plan and from information contained in the DCRA permit application. These departures and the rationale for the departures are noted in the full text of the report.

Hydrogeologic Site Characterization Summary

The AFRH facility is situated within the Atlantic Coastal Plain Physiographic Province and is underlain by the unconsolidated Patuxent Formation. The stratigraphy encountered in the borings advanced during the Additional Phase II ESA is comprised of fill and native soil. The fill is comprised of silty clay, clayey silt, sand, gravel, and mixed debris and was encountered to depths ranging from approximately 4 to 13 feet below grade (BG) at Building 46 and from approximately 3 to 6 feet BG at Building 76. The native soil below the fill consists of a clayey unit which is underlain by a sandy unit. The clayey unit is comprised of inter-layered sequences of silty clay/clayey silt and sandy clay/clayey sand which contains occasional layers of silty sand, sand, clayey gravel, or gravel and extends to depths ranging from approximately 38 to 47 feet BG at Building 46. The sandy unit, is predominantly comprised of silty sand and sand, also contains occasional layers of gravel, clayey silt, silty clay, and/or clayey sand.

According to information contained in MACTEC's April 10, 2007 Phase II ESA Report, CGS had anticipated encountering a perched silty sand and sand groundwater zone within a depth of 55 feet BG at Building 46. However, a continuous perched groundwater zone was not encountered in the borings advanced at Building 46. CGS encountered occasional discontinuous wet zones in the clayey unit in some of the borings advanced at Building 46. Wet zones were not observed in the clayey unit in three of the borings advanced at Building 46. The occasional discontinuous wet zones observed in the clayey unit generally occurred in layers that were more permeable (i.e., higher sand content) or where the clayey matrix was less compact. The sandy unit, beneath the clayey unit, was dry to damp until the groundwater table was reached.

The depth to groundwater in the five wells located at/near Building 46 ranged from 90.00 feet BG to 106.73 feet BG. Calculated groundwater elevations in the wells ranged from 150.19 feet AMSL to 150.50 feet above mean see level (AMSL). The direction of groundwater flow is toward the south-southeast.

Building 46 Contaminant Site Characterization Summary

The investigation activities performed at Building 46 included a passive subsurface vapor survey, a UST evaluation, advancement of 14 soil borings and soil sampling, installation of three groundwater monitoring wells, installation and sampling of six VMPs, and collection of five groundwater samples. The passive subsurface vapor survey was performed to identify areas inside and around Building 46 that may have been impacted by dry cleaning operations. The results of the survey were utilized to plan the locations of the soil borings and new monitoring wells. The UST evaluation was performed to determine the size and orientation of the USTs. The USTs were determined to have a capacity of 275-gallons each and were found to extend beneath a retaining wall. A DC licensed structural engineer concluded that the USTs could not be safely removed, because the foundation of the retaining wall would be undermined and that the tanks should be abandoned in place.

The results of soil, subsurface vapor, and groundwater sampling identified a limited number of areas that may be of concern at Building 46.

Polycyclic aromatic hydrocarbons (PAHs) were detected, in a sample of a tar like material that was obtained immediately below the asphalt roadway located adjacent to the western side of Building 46, at concentrations that exceeded the risk-based screening levels (RBSLs) used in their evaluation. It was determined that the naphthalene detected in soil by MACTEC was from this tar base layer and not related to the former dry cleaning operations. The PAHs do not present a concern for the direct contact exposure pathways if this layer remains covered by asphalt and do not appear to present a concern for the vapor intrusion/indoor inhalation exposure pathway due to their presence with a limited thickness adjacent to one side of the building (as opposed to widespread beneath the building).

Stoddard solvent range hydrocarbons (hydrocarbons with seven to 12 carbon atoms and identified herein as TPH-C7-C12) and PCE were detected in soil samples collected from some of the soil borings. PCE was detected in subsurface vapor samples collected from the VMPs. The patterns of the detections suggest releases from the dry cleaning facility waste water discharge piping and the sanitary sewer line, as opposed to a release from the USTs, as the more likely source of the TPH-C7-C12 and PCE detections that exceeded the RBSLs. Detections in soil that exceeded the RBSLs were limited to a sample collected from a depth of 7 feet BG from one soil boring that was advanced exterior to the building. These detections do not present a concern for the direct contact exposure pathways if this soil remains buried. Because the TPH-C7-C12 concentration exceeds DOEE's Tier 0 Standard, this soil, if excavated, would needed to be transported for off-site disposal. Given the limited extent of soil that exceeds the RBSLs, these concentrations do not appear to present a concern for the vapor intrusion/indoor inhalation exposure pathway. Detections in subsurface vapor that exceeded the RBSLs were reported in samples collected from two VMPs that were installed inside the building. CGS understands that Building 46 will be re-purposed as part of the re-development. These concentrations may present a concern for the vapor intrusion/indoor inhalation exposure pathway if the first floor of this building is re-developed for commercial or residential use. A vapor intrusion mitigation system may be necessary for the re-purposed space.

No dry cleaning related analytes (TPH-C7-C12, PCE, or PCE degradation products) were detected in the groundwater samples at concentrations that exceeded the RBSLs used in their evaluation. Two petroleum hydrocarbon analytes, not associated with dry cleaning operations, were detected in one of the groundwater samples at concentrations that exceeded the RBSLs. The source of these analytes is unknown; however, these analytes do not present a concern for the domestic use of groundwater exposure pathways given that drinking water is municipally supplied to AFRH and the surrounding areas nor do they present a concern for the vapor intrusion/indoor inhalation exposure pathway given the depth of this sample and the limited extent of the detections.

Building 76 Contaminant Site Characterization Summary

Ten (10) soil borings were advanced at Building 76. A total of 37 soil samples were obtained from the borings at varying depths and analyzed for TPH-diesel range organics (TPH-DRO) and TPH-oil range organics (TPH -ORO). TPH-DRO and TPH-ORO were detected in soil from seven of the borings at concentrations that exceed DOEE's Tier 0 Standard. TPH-DRO was detected in subsurface soil from five of the borings at concentrations that exceed DOEE's residential subsurface soil Tier 1 RBSL.

The vertical extent of the TPH-DRO and TPH-ORO impact to the soil has been defined. However, the lateral extent of the TPH-DRO and TPH-ORO impact to the soil has not yet been defined.

CGS understands that demolition of Building 76 is planned as part of the re-development. Any soil, with TPH-DRO and/or TPH-ORO concentrations that exceed the Tier 0 Standard and that is excavated, will need to be transported for off-site disposal. The TPH-DRO concentrations detected in subsurface soil at five of the borings may present a concern for the vapor intrusion/indoor inhalation exposure pathway if this area is re-developed for residential use and this soil is not removed. In this case, the new residential building(s) in this area may need to be constructed with a vapor barrier to mitigate vapor intrusion.

Additional Phase II
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1.0 INTRODUCTION AND BACKGROUND

This report documents the methodology and results of an Additional Phase II ESA performed by Chesapeake GeoSciences, Inc. (CGS) at Buildings 46 and 76 at the Armed Forces Retirement Home (AFRH) facility located at 3700 N. Capital Street, NW in Washington, DC (Site). This work was performed on behalf of Stantec, Inc. (Stantec), Jones Lang LaSalle Americas, Inc. (JLL), and the U.S. General Services Administration (GSA) (CGS' Client Team) and AFRH. The location of the Site is shown on **Figure 1**.

AFRH has issued a competitive Request for Proposal (RFP) to private developers to re-develop the approximate 80-acre area on the AFRH campus shown by red shading on **Figure 2** and referred to herein as the "development parcel". As shown on **Figure 2**, the development parcel includes Buildings 46 and 76 where the additional Phase II ESA was performed.

1.1 Prior Investigations and Purpose of Investigation

Greenhorn & O'Mara (G&O) (now part of Stantec) performed a Phase I ESA of the Site and reported its findings in a Phase I ESA Report dated January 2005. MACTEC Engineering and Consulting, Inc. (MACTEC) performed a Phase II ESA at the Site in 2006 and 2007 and reported its findings in a Phase II ESA Report dated April 10, 2007 (MACTEC, 2007). MACTEC's Phase II ESA was performed "to evaluate the presence or absence of contaminants of concern and related recognized environmental conditions (RECs) identified at the" Site in G&O's 2005 Phase I ESA Report.

Stantec performed a Phase I ESA of the development parcel and reported its findings in a Phase I ESA Report dated August 14, 2015 (Stantec, 2015). The Additional Phase II ESA, reported herein, was performed to evaluate the RECs identified in Stantec's Phase I ESA Report, specific to data collected by MACTEC at Buildings 46 and 76 as discussed below in Section 1.2, so that the need for additional investigation and/or corrective action in the areas of these two buildings, if any, can be determined. AFRH will provide prospective bidders with this Additional Phase II ESA Report. CGS understands that any additional investigation and/or corrective action that may be needed would be performed by the chosen development partner.

In addition to the Phase II ESA activities, CGS also disposed of drums of liquid and solid waste that had been identified as a REC in Stantec's 2015 Phase I ESA Report.

The scopes of work for the Additional Phase II ESA and the Waste Characterization/Waste Disposal are outlined in CGS Proposal Nos. CG-P15-1973R (dated April 19, 2017), CG-P15-1999R (dated April 19, 2017), CG-P18-2271 (dated March 9, 2018), and CG-P18-2287 (dated May 21, 2018).

1.2 Buildings 46 and 76 Background

Figures 3 and 4 provide layout maps of Buildings 46 and 76, respectively. **Figures 3A and 4A** present the same layout maps as **Figures 3 and 4** and also show the subsurface utilities as presented in the Composite Topographic/Utility Map prepared by Rhodeside and Harwell Inc. in January 1994 (Rhodeside

and Harwell, 1994). **Figure 3B** presents select locations in the vicinity of Building 46 where MACTEC collected data during its Phase II ESA that are relevant to the Additional Phase II ESA reported herein.

1.2.1 Building 46 Background

Building 46 housed the former heating plant for AFRH. The former laundry and dry cleaning plant for AFRH occupied the second floor of Building 46A and the second floor of the southeastern portion of Building 46. It should be noted that the second floor of Buildings 46 and 46A are at grade on the northern and western sides of the building and are at one level above grade on the southern and eastern sides of the building. Because the level of the building below the second floor of the southeastern portion of Building 46 is at grade, this level is referred to herein as the first floor of Buildings 46 and 46A. The first floor of Buildings 46 and 46A was referred to as the basement of Buildings 46 and 46A in the Work Plan.

The Heating Plant portion of the building is currently vacant. The heating plant operations were taken out of service in 2013. The portions of the building, formerly used for laundry and dry cleaning operations, are also currently vacant. The on-site laundry and dry cleaning operations were discontinued in the late 1970s. All equipment used in these operations was removed after that time.

From the late 1920s until the late 1950s, Stoddard solvent was the predominant dry cleaning solvent in the United States. Stoddard solvent is a petroleum distillate of C7-C12 hydrocarbons.

Tetrachloroethene (also known as perchloroethene or PCE) began to be widely used as a dry cleaning solvent in 1948 and became the dry cleaning solvent of choice in the United States in 1962. In the 1980s, PCE was the most widely used solvent for dry cleaning. In recent years its use has declined largely due to the implementation of air emission regulations.

Building 46 was altered in 1948 and again in 1951 to accommodate the dry cleaning plant. Since the dry cleaning plant has presumably operated since 1948, it is likely that it used Stoddard solvent in the early days and then PCE in the later years.

In its April 10, 2007 Phase II ESA Report, MACTEC reported naphthalene at a concentration of 1.82 milligrams per kilogram (mg/kg) in a soil sample collected from a depth of 10.5 to 12 feet below grade (BG) its soil boring G46-1. G46-1 was advanced west of Building 46 at the location shown on **Figure 3B**. MACTEC also reported chlorinated hydrocarbons in groundwater sampled from monitoring well W72-1 [PCE at a concentration of 44.5 micrograms per liter (µg/L), trichloroethene (TCE) at a concentration of 4.47 µg/L, and cis-1,2-dichloroethene (cis-1,2-DCE) at a concentration of 3.84 µg/L]. As shown on **Figure 3B**, monitoring well W72-1 is located approximately 195 feet south of Building 46. MACTEC speculated that these findings might be associated with spills/releases from the former dry cleaning plant at Building 46.

PCE, TCE, and cis-1,2-DCE were not detected in the groundwater sample collected by MACTEC from monitoring well W46-1, which is located approximately 27 feet south of Building 46 as shown on **Figure 3B**.

1.2.2 Building 76 Background

Building 76 was formerly used as a large-vehicle maintenance garage at AFRH. This building is currently vacant and is being used as storage space. The southern portion of the building contains three large hydraulic lifts. MACTEC's Phase II ESA included three soil borings that were advanced near the hydraulic lifts. Total petroleum hydrocarbons (TPH) was detected in soil samples from these borings at concentrations ranging from 5.73 to 1,420 mg/kg. MACTEC concluded that this soil contamination resulted from hydraulic oil leaks from the lifts.

1.3 Physiographic Setting

Figure 1 shows the regional topography and surface water hydrology of the Site and surrounding area as depicted on the United States Geological Survey (USGS) 7.5-minute-series Washington West Quadrangle Topographic Map (National Geographic Topographic Mapping Software, 2008). According to Stantec's 2015 Phase I ESA Report, "[e]levations range from approximately 280 ft above [mean sea level (msl)] in the northeastern portion of the [development parcel] to approximately 200 ft above msl in the southwestern portion of the [development parcel]. The [development parcel] slopes moderately to the south and southwest." Stantec reported the following:

> "A ridgeline and drainage divide extends north-south, [in the vicinity of Buildings 51 though 58 as shown on **Figure 2**] and directs surface flow to the east or west. Surface water on the [development parcel] infiltrates the ground surface or flows to the storm sewer system. The western portion of the [development parcel] drains to a combined sanitary and storm drain sewer system that runs down the center of the AFRH campus. The combined sewer system connects to the District of Columbia's system at Irving Street and flows to the Blue Plains wastewater treatment plant. Some storm water is also collected in an on-site storm water management pond located southwest of Building 65. The eastern portion of the [development parcel] drains to a storm drain system, which flows south and connects to a 30-inch pipe under Irving Street near the North Capitol Street interchange. This pipe is part of the District of Columbia's storm drain system."

In its April 10, 2007 Phase II ESA Report, MACTEC reported that the depth to groundwater in W72-1 was approximately 87 feet below grade (BG), and that the depth to groundwater near Building 76 was approximately 80 feet BG. MACTEC reported the presence of a perched groundwater zone at W46-1 where the depth to groundwater was reported to be approximately 45 feet BG.

Additional information regarding the hydrogeologic setting of the investigation areas is discussed below in Sections 2.4, 2.5, 2.7, and 4.1.

1.4 Scope of Investigation, Work Plan Development/Approval, and DCRA Permitting

This report documents the Additional Phase II ESA activities performed at Buildings 46 and 76 between October 17, 2017 and June 13, 2018. These activities included a series of site visits, various phases of public and private utility clearance, a passive subsurface vapor survey, an underground storage tank (UST) evaluation, concrete coring, advancement of 24 soil borings with soil sampling, installation of three two-inch diameter groundwater monitoring wells, installation and sampling of six subsurface vapor monitoring points (VMPs), groundwater sampling of two previously existing monitoring wells and the three new monitoring wells, and handling of investigation derived waste (IDW).

This report also documents Waste Characterization/Waste Disposal activities performed within the development parcel between October 20, 2017 and July 10, 2018. These activities included waste characterization sampling and off-site disposal of previously existing waste and IDW generated during the Additional Phase II ESA.

CGS submitted a Work Plan for the Additional Phase II ESA to the District of Columbia Department of Energy & Environment (DOEE) on December 11, 2017. CGS submitted a revised Work Plan on March 15, 2018 following a collaborative effort between DOEE (Remediation & Site Response Program and Underground Storage Tanks Branch), CGS, and CGS' Client Team to refine the scope of work presented in the December 11, 2017 Work Plan. The revised Work Plan was approved by DOEE on March 29, 2018. Unless stated otherwise below, the field investigation for the Additional Phase II ESA was performed according to the scope of work presented in the March 15, 2018 Work Plan.

Because two small USTs are present immediately south of Building 46A and because MACTEC had detected TPH in soil at Building 76 at concentrations above DOEE's Tier 0 Soil Standard (i.e., 100 mg/kg), DOEE (Underground Storage Tanks Branch) issued Directive Letters, which assigned the Facility Identification Numbers and Leaking Underground Storage Tank (LUST) Case Numbers listed below to the buildings.

- Building 46: FACILITY ID #: 4010007/LUSTCASE #: 2018010
- Building 76: FACILITY ID #: 4010008/LUSTCASE #: 2018011

CGS submitted a permit application for the Additional Phase II ESA to the District of Columbia Department of Consumer and Regulatory Affairs (DCRA) on March 30, 2018. CGS received comments on the permit application from DCRA on April 2, 2018. CGS submitted a revised permit application on April 5, 2018 which addressed DCRA's comments. The revised permit application was approved by DCRA on April 5, 2018, and the permit was issued on April 11, 2018. The field investigation for the Additional Phase II ESA was performed in accordance with the information presented in the April 5, 2018 permit application with two exceptions. As discussed in more detail below in Section 2.7, three new monitoring wells were installed instead of the planned four new monitoring wells, and the method for drilling one of the borings for the well installations was changed from hollow-stem auger (HSA) to spin casing.

1.5 Report Organization

This report consists of seven sections. Brief summaries of Sections 2.0 through 7.0 are provided below:

- Section 2.0 presents the methodology of the field investigation and observations made during that time.
- Section 3.0 summarizes the laboratory analytical data generated from the analysis of samples obtained during the field investigation and the results of a generic risk-based screening analysis.
- Section 4.0 presents a site characterization discussion.
- Section 5.0 presents the conclusions made based upon the data analysis and site characterization.
- Sections 6.0 and 7.0 present the limitations to this report and the references used in developing this report.

In addition to the text sections described above, this report includes a series of figures, tables, and appendices. **Figures 1 through 14** illustrate the setting of the investigation areas, the sampling point locations, and data presentation maps. Note that **Figures 2 through 14** are designed to print on 11 x 17-inch paper. **Tables A and B**, embedded within the text of this report, and **Tables 1 through 7**, attached to this report, present data and information utilized/gathered/evaluated during the investigation. **Appendices A through O** present supporting documents generated/utilized during the investigation.

2.0 FIELD INVESTIGATION - METHODOLOGY AND FIELD OBSERVATIONS

As discussed above, the fieldwork for the Additional Phase II ESA was initiated on October 17, 2017 and was completed on June 13, 2018. The fieldwork for the Waste Characterization/Waste Disposal activities was initiated on October 20, 2017 and was completed on July 10, 2018. All IDW generated during the Additional Phase II ESA (i.e., drill cuttings from the soil and well borings and liquids generated during equipment decontamination, well development, and well sampling) were contained in DOT approved, 55-gallon steel drums which were temporarily staged at Building 46. The drums were appropriately labeled with respect to their contents as they were being generated. Waste characterization sampling and disposal of this IDW is discussed below in Section 2.11. A site specific Health & Safety Plan (HASP) was

developed for the field tasks discussed below. Brief discussions of the field investigation methodologies and observations for these two scopes of work will be discussed below generally in chronological order.

2.1 Building 46 - Passive Subsurface Vapor Survey

2.1.1 Public and Private Utility Clearances

On October 17, 2017, CGS met on-site with representatives of Miss Utility and discussed the overall areas at/near both Building 46 and Building 76 where subsurface sampling activities were planned. Miss Utility marked subsurface public utilities in these areas.

On October 20, 2017, CGS met on-site with a representative of Utilities Search, Inc. (Utilities Search), a subsurface private utility locating firm, of Manassas, Virginia. Utilities Search marked other subsurface utilities located in the immediate vicinity of the proposed passive subsurface vapor survey locations at Building 46. In addition to Utilities Search's sensing equipment, the subsurface utility mapping presented in Rhodeside and Harwell, 1994, as shown on Figure **3A**, was utilized to assist identifying the locations of subsurface utilities.

2.1.2 Methodology

CGS conducted a passive subsurface vapor survey at Building 46 from October 23, 2017 to November 8, 2017 according to Beacon Environmental Services, Inc.'s (Beacon's) "Passive Soil Gas Testing: Standard for Site Characterization" procedures. Based on the size of Building 46, CGS used 40 Beacon absorbent cartridges to provide a sufficiently close spacing for the purpose of identifying a possible source area "hot spot" for dry cleaning solvent contamination at the locations shown on **Figure 5**.

The absorbent cartridges were installed in holes that were drilled to a depth of 2 to 3 feet through ground-floor slab of Building 46 and into the ground surrounding Building 46. The adsorbent cartridges were sealed in the holes and exposed to subsurface vapor for approximately 14 days and then retrieved and shipped to Beacon's laboratory for analysis.

Laboratory analyses were performed by Beacon via United States Environmental Protection Agency (EPA) Method 8260C and included 35 volatile organic compounds (VOCs) (including naphthalene), TPH carbon ranges C4-C9, and TPH carbon ranges C10-C15.

2.1.3 Brief Discussion of Results

Beacon's report, dated November 22, 2017 and included in **Appendix A**, discusses the survey methodology, presents the results of the laboratory analyses, and provides isoconcentration maps for PCE, naphthalene, TPH-C4-C9, and TPH-C10-C15.

As mentioned above in Section 1.2.1, the former laundry and dry cleaning plant was located on the second floor of Building 46A and the second floor of the southeastern portion of Building 46. Waste water discharge from the former plant was via piping that was hung from the ceiling of the first floor in the southeastern portion of Building 46. A portion of the discharge piping, which has for the most part has been removed, is still present below the ceiling above SV-26 (**Figure 5**). CGS had been informed that the path of the waste water discharge went from the area of SV-26 (near where the manifolded line from the second floor drains traveled vertically downward into the first floor boiler room) to below the ground-floor slab in the area of SV-24, to the area of SV-23 (where a floor drain is present in the basement of the building), to the area of SV-12 (where the manhole where waste water discharge from the former plant entered the sanitary sewer line). The base of the manhole located near SV-12 is at a depth of approximately 10 feet BG. It should be noted that uncertainty exists regarding the actual path of the waste water discharge piping between the area of SV-26 and the manhole near SV-12.

The location of the manhole near SV-12 and the sanitary sewer line which travels southwest from this manhole, as depicted in Rhodeside and Harwell, 1994, are shown on **Figure 5**. **Figure 5** also presents an alternative path of the sanitary sewer line which travels southwest from the manhole near SV-12, as depicted in a sanitary sewer line map that was prepared by Hayes, Seay, Mattern and Mattern in September 1967 and which was shown to CGS by a representative of AFRH during a site visit. Accordingly, uncertainty also exists regarding the actual path of the sanitary sewer line south of the manhole near SV-12. Because Building 46A and the USTs located immediately south of Building 46A were constructed as additions to Building 46 and given the depth of the bottom of the USTs (8 feet BG) and the depth of the sanitary sewer line, it is possible that the sanitary sewer line extends under Building 46A and the USTs as depicted in Rhodeside and Harwell, 1994. However, given the orientation of the piping inside this manhole (as observed by CGS after removing the manhole cover), it is more likely that the path of the sanitary sewer line travels as depicted in the September 1967 map.

Based on passive subsurface vapor sampling results, PCE was detected at elevated levels at four sampling locations (SV-12, SV-26, SV-28, and SV-29) (**Appendix A**, **Figure 2**). As discussed above, SV-12 and SV-26 are located along the path of the waste water discharge piping/sanitary sewer line that serviced the former laundry and dry cleaning plant. SV-28 and SV-29 are located at the southwest corner of Building 46A.

Elevated levels of naphthalene were detected in subsurface vapor samples collected along the west side of the building (**Appendix A**, **Figure 3**). These sampling points (SV-28 through SV-36) were all installed through the asphalt roadway. This asphalt had a tar base layer that was aromatic with elevated photo-ionization detector (PID) readings. According to Wikipedia, "Naphthalene is the most abundant single component of coal tar. Although the composition of coal tar varies with the coal from which it is produced, typical coal tar is about 10% naphthalene by weight."

Isoconcentration maps for TPH-C4-C9 and TPH-C10-C15 are included in **Appendix A, Figures 4 and 5**, respectively. Fractions of Stoddard solvent C7-C12 could be represented on both of these maps. As shown in **Appendix A, Figure 4**, the lighter TPH fraction was detected at elevated concentrations at SV-15 and SV-20 located south and north of the USTs, respectively. SV-35 located along the western wall of Building 46 also had an elevated TPH-C4-C9 concentration. As shown in **Appendix A, Figure 5**, the heavier TPH fraction was detected at an elevated concentration again at SV-20, just north of the USTs, and along the western wall of Building 46 in SV-28 through SV-36. SV-06 located near the southeast corner of Building 46 also had an elevated TPH-C10-C15 concentration. SV-35 had the highest TPH-C10-C15 vapor concentration.

MACTEC soil boring G46-1 (**Figure 3B**), where the naphthalene concentration was detected in soil, was advanced in the vicinity of SV-34 and SV-35 (**Figure 5**). Since sampling points SV-28 through SV-36 were all installed through the asphalt roadway, CGS believes that the source of the elevated naphthalene and TPH-C10-C15 in the subsurface vapor at these sampling points, as well as the naphthalene detected at G46-1, are from the tar base layer in the asphalt rather than Stoddard solvent. According to the Toxicological Profile for Stoddard Solvent issued by the Agency for Toxic Substances and Disease Registry (ATSDR, 1995), Stoddard solvent contains only 0.2% naphthalene.

2.2 Building 46 - UST Evaluation, Waste Characterization, and Water Disposal

Two small USTs are present between the southern wall of Building 46A and a retaining wall for a ramp that provides access to the rear of Building 46 (**Figure 3**). On October 20, 2017, CGS inspected the UST interiors by opening the manholes of the tanks. The USTs were filled with water. CGS sampled the water in each tank for waste characterization analysis.

The waste characterization water samples were preserved on ice and delivered with accompanying Chain-of-Custody (COC) to Maryland Spectral Services (MSS) in Baltimore, Maryland, for analysis of VOCs

via EPA Method 8260, and TPH-gasoline range organics (-GRO) and diesel range organics (-DRO) via USEPA Method 8015M. The waste characterization analytical laboratory report is included in **Appendix B.** Based on the results of the analyses, the water characterized as a non-hazardous waste. Neither PCE nor any of its degradation products were detected in the sampled water. Minor concentrations of hydrocarbons were detected in the sample from the easternmost UST. Discussion of these hydrocarbon detections is presented below in Section 3.2.

CGS retained ACVEnviro (ACV) of Baltimore, Maryland to pump out the USTs and dispose of the water. A total of 530 gallon of water was removed from the tanks using a vacuum tanker truck on November 6, 2017 and disposed off-site. A representative of AFRH signed the waste profile and manifest. A copy of the manifest is included in **Appendix C**.

Based on the volume of water removed, the USTs were determined to have a capacity of 275-gallons each. On November 9, 2017, five air extraction test pits were advanced around the USTs to clear underground utilities and to map out the foundations of the building wall and the retaining wall located on either side of the tanks (**Figure 6**).

CGS used the services of Mr. Carson E. Mok, a licensed structural engineer in DC, to inspect the USTs and surrounding structures to determine if the USTs could safely be removed. The findings from advancing the five air extraction test pits were provided to Mr. Mok. He concluded that the two USTs could not be safely removed, because the foundation of the retaining wall would be undermined and that the tanks should be abandoned in place. Mr. Mok's report and foundation drawings are included in **Appendix D**.

2.3 Building 46 and Building 76 – Public and Private Utility Clearances and Concrete Coring

The information gained from the initial utility clearance and the passive subsurface vapor survey, discussed above in Section 2.1, and the UST evaluation, discussed above in Section 2.2, was used during development of the Work Plan for the remaining Additional Phase II ESA field investigation activities. As mentioned above in Section 1.4, the DOEE approved Work Plan and DCRA permit for the Additional Phase II ESA were both in place on April 11, 2018.

Miss Utility was contacted prior to this phase of the field investigation to mark the locations of subsurface public utilities at/near both Building 46 and Building 76. Updates to the Miss Utility clearances were requested as necessary as the field investigation progressed.

On April 20, 2018, CGS met on-site with a representative of Utilities Search who marked other subsurface utilities located in the immediate vicinity of each proposed soil boring, monitoring well, and VMP at both Building 46 and Building 76. The subsurface utility mapping presented in Rhodeside and Harwell, 1994, as shown on **Figures 3A and 4A**, as well as the sanitary sewer line mapping presented in the September 1967 map, as shown on **Figure 6**, were utilized to assist identifying the locations of subsurface utilities. The locations where soil borings, monitoring wells, and VMPs were advanced/installed are shown on **Figures 7, 7A, and 8**. In some instances, the planned sampling locations were slightly modified from the locations shown in the Work Plan due to utility conflicts, to refine the sampling location, and/or to improve access of the Geoprobe® or drilling rig.

CGS retained Diamond Core Drilling & Sawing Co. of Riverdale Park, Maryland to perform concrete coring at the soil boring locations inside Building 46 and Building 76. The concrete coring was performed on April 24, 2018. Two six-inch diameter core holes were drilled at each soil boring location in the event that an additional core hole would be needed for the soil boring advancements. Prior to concrete coring at Building 76, the floor was inspected for cracks and oil staining at the proposed boring locations. Concrete coring was preferentially performed in areas where staining on/cracks in the concrete slab and/or evidence of surface soil contamination were observed.

2.4 Building 46 – Advancement of Soil Borings

CGS retained Tidewater, Inc. (Tidewater) of Elkridge, Maryland to advance the soil borings at Building 46, as discussed in this section, and at Building 76, as discussed below in Section 2.5.

The Building 46 soil borings were advanced at the locations shown on **Figure 7** between April 23 and 26, 2018 and on May 1, 2018. As shown on **Figure 7** (relative to **Figure 5**), borings were advanced at SV-12 (SB-03) and at SV-26 (SB-02-1 through SB-02-4) along the path of the waste water discharge piping/sanitary sewer line that serviced the former laundry and dry cleaning plant. Four borings (SB-04 through SB-07) were advanced at the southwest corner of the building where the highest levels of PCE vapor were detected in SV-28 and SV-29. SB-08 through SB-011 were advanced near the USTs and SV-15 where elevated TPH concentrations were detected. SB-14 was advanced near SV-06, and SB-01 was advanced at SV-35 where the second highest naphthalene and the highest TPH-C10-C15 concentrations were found and near the location of MACTEC soil boring G46-1. SB-01 was located to provide confirmation that the presumption that the source of the elevated naphthalene and TPH-C10-C15 vapors were from the tar base layer in the asphalt roadway. SB-12 and SB-13 were advanced south of Building 76 at locations where the installation of monitoring wells was planned. Additional information regarding the rationale for each soil boring location and the rationale for collecting soil samples from each boring are listed in **Appendix E, Table 1** as included in the March 15, 2018 Work Plan for the Additional Phase II ESA.

The 13 exterior soil borings (SB-01 and SB-03 through SB-14) were advanced by Tidewater, using a track-mounted Geoprobe® 7822DT direct-push technology (DPT) rig. The interior soil borings (SB-02-1 through SB-02-4) were advanced by Tidewater, using a track-mounted Geoprobe® 54LT DPT rig which was mobilized to the Site on May 1. An exhaust ventilation system was utilized during advancement of the interior soil borings to move fumes from the Geoprobe® rig to the outside using a ventilation duct and a booster fan. All borings were two-inch diameter. All down-hole equipment was cleaned and rinsed prior to use and between each boring location using a non-phosphate detergent and water. Continuous soil core was collected to the completion depth of each boring using a stainless steel Macrocore soil sampler. A CGS geologist supervised boring advancement activities, logged soil core from each boring using the Unified Soil Classification System (USCS), and screened the soil core for VOCs using a handheld PID at approximate 6-inch intervals. The Building 46 soil boring logs are included in **Appendix F**.

As included in the Work Plan, CGS had planned to advance SB-01 through SB-07 and SB-11 through SB-14 to the target depth of 50 feet BG or to refusal of the rig and SB-08 through SB-10 to the target depth of 25 feet BG or to refusal of the rig. However, during development of the DCRA permit application, CGS updated the target depth for SB-01 through SB-07 and SB-11 through SB-14 to be 50 feet BG or to the depth of the first water bearing zone. This update was made to address a DCRA permit requirement and also better fit the purpose of these borings (i.e., soil sampling in the unsaturated zone for potential contaminant source area identification).

Interior soil boring SB-02 was the only boring that was advanced to the depth of refusal. Refusal was encountered at a depth of 8 feet BG in the original boring at SB-02 (i.e., SB-02-1). Three additional borings were advanced in the vicinity of SB-02-1 at the locations shown on **Figure 7**. Refusal was encountered at depths ranging from 6.5 to 9.5 feet BG in SB-02-2 through SB-02-4.

SB-03, SB-05, and SB-13 were advanced to depths ranging from 50 to 52 feet BG consistent with the approximate target depth of 50 feet BG. SB-01, SB-04, SB-06, SB-07, SB-11, SB-12, and SB-14 were advanced to depths ranging from 20 to 40 feet BG. SB-08 through SB-10 were advanced to depths ranging from 26 to 28 feet BG consistent with the approximate target depth of 25 feet BG for these borings.

As shown in the soil boring logs (**Appendix F**), fill/reworked materials were encountered in the soil borings above native soil. The depth to the bottom of the fill ranged from approximately 4 to 13 feet BG.

The fill is comprised of silty clay, clayey silt, sand, gravel, brick fragments, rubble, debris, and burned material. The native soil below the fill to depths ranging from 38 to 47 feet BG is comprised of inter-layered sequences of silty clay, clayey silt, sandy clay, and clayey sand which contains occasional layers of silty sand, sand, clayey gravel, or gravel. The native soil below depths ranging from 38 to 47 feet BG is comprised of silty sand and sand. These sequences are indentified in this report as the "clayey unit" and the "sandy unit," respectively.

For the most part, the stratigraphy to the boring completion depths was dry, damp, or moist. Occasional discrete wet zones were observed in the clayey unit in some of the borings where more permeable (i.e., higher sand content) layers were encountered or where the clayey matrix was less compact. Wet conditions were not observed in the clayey unit in SB-03, SB-05, or SB-13. The sandy unit beneath the clayey unit was damp.

PID readings in the soil core ranged from background levels to a high of 618.4 parts per million (ppm) at a depth of 6.75 feet BG in soil boring SB-02-1.

Soil samples were collected from the soil core from each boring for laboratory analysis consistent with the rational for sample collection as specified in **Appendix E, Table 1**. One soil sample from each boring was submitted for laboratory analysis of VOCs via EPA Method 8260. The soil samples were either collected where highest PID reading was detected or from the pre-determined depth as specified in **Appendix E, Table 1**, in instances where PID readings above background levels were not detected.

Duplicate samples were collected for VOC analysis from SB-06 and SB-10 for Quality Assurance/Quality Control (QA/QC). The Work Plan specified that duplicate samples would be collected from SB-06 and SB-09. However, the duplicate sample from SB-09 was changed to SB-10 due to the elevated PID reading (603.3 ppm) detected at 7.25 feet BG in this boring.

The soil samples collected for VOC analysis were collected using Terra Core® samplers according to EPA Method 5035. Three Volatile Organic Analysis (VOA) vials (two preserved with sodium bisulfate solution and one preserved with methanol) and one (unpreserved) 2-ounce jar, for percent moisture analysis, were collected per sample.

The soil samples from SB-01, SB-14, and SB-08 through SB-11 were also analyzed for TPH-C7-C12 via EPA Method 8015M (Stoddard Solvent Range Organics) to investigate the TPH detections in SV-35 and SV-06 and in the vicinity of the USTs, respectively.

Three additional samples were collected for laboratory analysis of polycyclic aromatic hydrocarbons (PAHs) via EPA Method 8270. Soil samples were collected from a depth of approximately 3 feet BG from SB-01 and SB-07, and one tar base layer sample was collected from SB-01.

The samples were preserved on ice and delivered with accompanying COC to MSS.

Following the completion of sampling, the borings were abandoned using 60:40 bentonite cement grout (mixed using 2 pounds of solid to 1 gallon of water) which was introduced at the bottom of each borehole and placed progressively upward using a tremie pipe consistent with the DCRA permit.

2.5 Building 76 – Advancement of Soil Borings

The Building 76 soil borings (SB-76-01 through SB-76-10) were advanced at the locations shown on **Figure 8** on April 27 and 30, 2018. Information regarding the rationale for each soil boring location and the rationale for collecting soil samples from each boring are listed in **Appendix E, Table 1**. Staining on/cracks in the concrete slab and/or evidence of surface soil contamination was observed at SB-76-01, SB-76-03, SB-76-06, SB-76-09, and SB-76-10. As discussed above in Section 2.3, concrete coring for these borings was performed in areas where these observations were made.

The soil borings were advanced by Tidewater using the Geoprobe® 7822DT DPT rig. An exhaust ventilation system was available for use during advancement of these soil borings; however, it was not needed because the open bay doors in the garage provided sufficient ventilation. The methodologies used during boring advancement and collection and screening/logging of the continuous soil core are consistent with those described above in Section 2.4. The borings were advanced to depth of 25 to 26 feet BG consistent with the approximate target depth of 25 feet BG. The Building 76 soil boring logs are included in **Appendix G**.

As shown in the soil boring logs (**Appendix G**), fill/reworked materials were encountered in the soil borings below the concrete slab and underlying gravel layer and above native soil. The depth to the bottom of the fill ranged from approximately 3 to 6 feet BG. The fill is comprised of silty clay, clayey silt, silty sand, and burned material. The native soil below the fill is comprised of inter-layered sequences of silty clay and clayey silt, and which contains occasional layers of clayey sand, silty sand, sand, or gravel consistent with the clayey unit described above in Section 2.4. Silty sand or sand was encountered at the bottom of six of the ten borings at depths ranging from 22 to 25 feet BG. These intervals may be sandy intervals contained within the clayey unit or may be the top of the sandy unit. According to boring logs for wells installed by MACTEC at/near Building 76, the top of the sandy unit in this area occurs at depths ranging from approximately 25 to 50 feet BG.

The stratigraphy to the boring completion depths was dry or damp. No moist or wet zones were observed in the borings.

As shown in the soil boring logs (**Appendix G**), PID readings in the soil core for the most part ranged from background levels to a high of 92.6 ppm at a depth of 15.75 feet BG in soil boring SB-76-05. Due to the low volatility of hydraulic oil, the PID readings were slow to equilibrate. PID readings of 4,159 and 211 ppm were detected in the soil core collected from SB-76-09 immediately below the concrete slab and underlying gravel layer (i.e., surface soil sample) and at 0.5 feet below the top of the soil, respectively.

Soil samples were collected from the soil core from each boring for laboratory analysis consistent with the rational for sample collection as specified in **Appendix E, Table 1**.

Surface soil samples were collected below the concrete slab and underlying gravel layer from SB-76-01, SB-76-03, SB-76-06, and SB-76-09. These samples were collected to evaluate surface soil contamination which may have been caused by surface spills which occurred above the concrete slab. As discussed above, these four borings are among the set of borings that were positioned to intercept areas where staining on/cracks in the concrete slab and/or evidence of surface soil contamination was observed. The surface soil samples were submitted for laboratory analysis of PAHs via EPA Method 8270, TPH-DRO and TPH-oil range organics (-ORO) via EPA Method 8015M, and polychlorinated biphenyls (PCBs) via EPA Method 8082.

Three soil samples of varying depths were obtained from each boring to delineate the extent of hydraulic fluid contamination. The goal of this soil sampling was to gain information so that the extent of soil contaminated with hydraulic oil that may need to be excavated and disposed off-site following the planned demolition of Building 76 could be determined. The soil sample in each boring where the highest PID reading was detected was submitted for laboratory analysis of TPH-DRO and TPH-ORO and of RCRA 8 Metals via EPA Method 6020. In the case of SB-76-09, the sample with the second highest PID reading was submitted for these analyses because the sample with the highest PID reading was submitted as a surface soil sample as described above.

Two additional samples were collected from each boring and submitted for laboratory analysis of TPH-DRO and TPH-ORO. In most of the borings, these samples were collected immediately above where evidence of contamination was first encountered (identified as “Top” samples) and immediately below where evidence of contamination was last seen (identified as “Bottom” samples). However, because the “top” of contamination in SB-76-09 was observed immediately below the concrete slab (which was

sampled as a surface soil sample and as the second highest PID reading sample), a sample from the "middle" of contamination was collected from a depth of 5 feet BG in SB-76-09. A "middle" of contamination sample was also collected from SB-76-07 at a depth of 12 feet BG because the highest PID reading sample was collected from a depth of 1 foot below the top of the soil in this boring. Because evidence of contamination extended to the bottom of the borings at SB-76-04 and SB-76-08, samples were obtained at a depth of 25 feet BG in these borings.

Duplicate samples were collected for TPH-DRO and TPH-ORO analysis from SB-76-03 (3') (SB-76-D1), SB-76-06 (12') (SB-76-D2), SB-76-09 (0.5') (SB-76-D3) for QA/QC.

The samples were preserved on ice and delivered with accompanying COC to MSS.

Following the completion of sampling, the borings were abandoned using 60:40 bentonite cement grout (mixed using 2 pounds of solid to 1 gallon of water) which was introduced at the bottom of each borehole and placed progressively upward using a tremie pipe consistent with the DCRA permit.

2.6 Building 46 – Installation of Vapor Monitoring Points

Six VMPs were installed at Building 46 so that sub-slab/soil vapor samples could be collected for the purpose of assessing the potential for vapor intrusion into Building 46. Four sub-slab VMPs (VMP-01, VMP-04, VMP-05, and VMP-06) were installed inside the building, and two soil VMPs (VMP-02 and VMP-03) were installed outside of the building at the locations shown on **Figure 7** on May 2, 2018. The rational for each VMP location is presented in **Appendix E, Table 1**. The VMPs were installed according to the methodologies specified below.

2.6.1 Sub-Slab VMP Installation Methodology

The sub-slab VMPs were installed based on the methodology included in the SERAS March 2007 Standard Operating Procedures (SOP) for "Construction and Installation of Permanent Sub-Slab Soil Gas Wells" (SERAS, March 2007). A hammer drill was used to drill a 3/8-inch hole through the concrete floor slab of the building in which to install a VMP. The hole was extended approximately 2-inches below the base of the concrete slab into the underlying sub-base in preparation for construction of the VMP. The VMPs were constructed using ¼-inch OD stainless steel tubing, and Swagelok® fittings. Modeling clay and anchoring cement was used to seal the VMPs into the concrete floor and approximately flush with the top of the floor. The completed VMPs were sealed following installation.

2.6.2 Soil VMP Installation Methodology

The soil VMPs were installed in borings that had been advanced to a depth of 3 feet BG using a 2-inch diameter hand auger and/or the hammer drill. Each VMP was installed at the bottom of its boring using a stainless steel screen implant (¼-inch x 6-inch) and Teflon tubing. #1 Silica Sand was placed in the annular space along the length of the screen point, and hydrated bentonite was placed above the screen point along the length of the Teflon tubing. The Teflon tubing was left extending above the ground surface. The completed VMPs were sealed following installation. The soil VMPs are considered temporary. Flush-mounted covers were not installed.

2.6.3 VMP Monitoring and Interior Space Survey

Inert tracer gas monitoring was performed on May 3, 2018 to monitor for leaks around the surface seal of each VMP. The monitoring was performed using the methodology described in Section 2.7.5 of the New York State Department of Health, Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOE, 2006) (NYSDOH Guidance Document). Helium was utilized as the inert tracer gas for the monitoring. The helium monitoring was performed using a Ion Science GasCheck Helium Leak Detector. For each test, a plastic container, with a foam gasket on its open end, was placed over each VMP. VMP

tubing was then extended through a small hole that had been drilled through the container, and the interior space of the container was enriched with helium through a second small hole in the container. Three liters of soil/sub-slab vapor were then purged from each VMP using a peristaltic pump. Monitoring was performed to determine pre-test background helium readings in ambient air, pre-test readings in each VMP, the enriched container readings, and post-purge readings in each VMP.

Background helium readings in ambient air ranged from 0 to 0.02%. Pre-test helium readings in the VMPs ranged from 0 to 0.04%. The helium reading in the enriched container exceeded the range of the helium detector at 99.99% during each test. According to the NYSDOH Guidance Document, post-purge helium readings in the VMPs of less than 10% of that in the enriched container demonstrate surface seal integrity. Post-purge helium readings in the monitored VMPs ranged from 0.003 to 0.087%, thereby demonstrating surface seal integrity at each VMP.

A survey was performed inside the building, prior to sampling, to inventory items of concern as potential VOC sources. A PID, capable of responding to VOC concentrations in the parts per billion (ppb) range, was used to screen visible stored items that may be of potential concern. No items of concern as potential VOC sources were identified inside Building 46 near the sub-slab VMPs (VMP-01, VMP-04, VMP-05, and VMP-06).

2.7 Building 46 – Installation of Groundwater Monitoring Wells

CGS retained Allied Well Drilling (Allied) of Sinking Spring, Pennsylvania to install the groundwater monitoring wells. The monitoring well installations were performed between May 8 and May 25, 2018. A CGS geologist supervised the boring advancement activities and logged and screened retrieved soil core using the same methodologies discussed above in Section 2.5.

2.7.1 Revision to Well Installation Scope of Work

As included in the Work Plan, CGS had planned to install four groundwater monitoring wells to depths of up to 65 feet BG at/near Building 46 co-located with soil borings SB-07, SB-11, SB-12, and SB-13. The scope of work that was performed was revised to the installation of three groundwater monitoring wells (W46-2, W46-3, and W71-2), to depths ranging from approximately 109 to 114 feet BG. The wells were installed at the locations shown on **Figure 7**.

As mentioned above in Section 1.3, MACTEC reported that the depth to groundwater in W72-1 was approximately 87 feet BG, that the depth to groundwater in W46-1 was approximately 45 feet BG, and that a perched groundwater zone was present at W46-1 and was the reason for the variation in the groundwater level in these two wells.

CGS gauged both W72-1 and W46-1 on April 23, 2018 (the first day of soil boring advancements at Building 46). The depth to groundwater in W72-1 was approximately 90 feet BG, and the depth to groundwater in W46-1 was approximately 45.5 feet BG. Both of these results are similar to the gauging results reported by MACTEC. CGS also gauged the depth to the bottom of the wells and calculated the height of the water column in each well. The depth to the bottom of W72-1 was approximately 103 feet BG (resulting in a water column of approximately 13 feet), and the depth to the bottom of W46-1 was approximately 46 feet BG (resulting in a water column of approximately 0.5 foot). CGS was concerned that W46-1 may be a dry well and that the water detected in the well had been trapped in the bottom cap of the well. CGS later bailed water from W46-1. When the water level did not recover, it was confirmed that W46-1 was a dry well.

In its boring log for W46-1, MACTEC described dry clay, silty clay, silty sand, and sandy clay units (clayey unit) to a depth of 35 feet BG and a wet silty sand and sand unit (sandy unit) to a depth of at least 45 feet BG. The boring log also reported a depth to groundwater in W46-1 of approximately 38 feet BG. Accordingly, CGS had anticipated encountering a perched silty sand and sand groundwater zone within a

depth equivalent to a depth of 35 to 45 feet BG as reported at W46-1, which is why well depths of up to 65 feet BG had been included in the Work Plan. As discussed above in Section 2.4, CGS encountered the same clayey unit in the Building 46 soil borings. In some of these borings, the clayey unit was dry and in other borings it contains thin discontinuous zones that were wet. CGS also encountered the same sandy unit below the clayey unit; however it was dry. Similar dry conditions were observed in the clayey unit and the upper portion of the sandy unit in the first well boring (W46-2) that was advanced during the well installation phase of work.

Simultaneous to this work, CGS discovered a pre-existing well that pre-dates the MACTEC Phase II ESA. MACTEC had been aware of this well, but did not find it during its investigation. It was hiding in plain sight beneath a manhole cover marked as being a water line manhole. This pre-existing well (which CGS named W71-1) is located 9 feet northeast of SB-12 where CGS had intended to install W71-1. CGS gauged the depth to groundwater in W71-1 at approximately 104 feet BG and the depth to the bottom of W71-1 at approximately 114 feet BG (resulting in a water column of approximately 10 feet).

Based on these data, CGS recommended that wells be installed to deeper depths that would intercept the (non-perched) groundwater table, to install only three wells, and to use the newly discovered pre-existing well as the fourth "new" well for this investigation. CGS' recommendations were accepted by GSA during email and telephone correspondence that occurred between May 9 and 14, 2018.

2.7.2 Well Installation Methodology

The well borings for the first two wells (W46-2 and W46-3) were advanced by Allied using a hollow stem auger (HSA) drilling rig and 4-1/4-inch inner diameter (ID)/8-inch outer diameter (OD) augers.

Because the well borings were co-located with Geoprobe® soil borings, split-spoon soil samples were retrieved from the borings for W46-2 and W46-3 starting at a depth of 20 or 24 feet BG, respectively. Split-spoon soil samples were retrieved from these borings on an as-needed basis to log stratigraphy and to identify potential perched groundwater zones. As discussed above, dry conditions were observed to a depth of 65 feet BG in the boring for W46-2. The decision was made at this point (on May 9 with client consultation) to advance the boring for W46-2 to a depth that would intercept the (non-perched) groundwater table.

Discrete thin moist intervals were observed in the clayey unit in the boring for W46-3 between the depths of 23 and 28 feet BG. A temporary well was placed in this boring for the weekend. The temporary well was gauged 3 hours after installation (dry), approximately 24 hours after installation (0.66 feet of water), approximately 48 hours after installation (1.12 feet of water), and approximately 60 hours after installation (1.45 feet of water). Given the limited water that accumulated in the temporary well and the slow rate at which it accumulated, the decision was made on May 14 (with client consultation) to advance the boring for W46-3 to a similar depth as W46-2.

A grab sample of the groundwater in the temporary well was collected using a bailer before drilling operations recommenced. The grab-groundwater sample was collected in hydrochloric acid (HCl)-preserved 40-milliliter Volatile Organic Analysis (VOA) vials with no headspace or air bubbles. The sample was immediately placed in an iced cooler. The sample was shipped via overnight carrier with accompanying COC to MSS for analysis of VOCs via EPA Method 8260 and for TPH-C7-C12 via EPA Method 8015M.

Groundwater was encountered during drilling at W46-2 and W46-3 at depths of 106 and 103 feet BG. Running sand conditions were encountered in both of these well borings below the water table. Running sands result when drilling in saturated formations comprised of uniformly-sized sand with a low proportion of silt and/or clay. Drilling operations can cause the sand in a formation to "liquefy" and flow into the boring. In instances where running sands were encountered during drilling for this investigation, water, obtained from an on-site fire hydrant, was added to the boring to pressurize the boring and counter

the hydrostatic pressure in the aquifer. Allied struggled to overcome the running sand conditions, even with the addition of water and over-drilling the second boring, and the bottom of both borings filled with sand before the wells were installed. These wells, though installed below the water table, did not reach the desired target depth of 10 feet below the water table.

Given that SB-13 (the Geoprobe® soil boring co-located with W71-2) was dry and the experience with W46-2 and W46-3, CGS (with client consultation) had already planned to advance the well boring for W71-2 to a depth similar to W46-2 and W46-3. This well boring was advanced by Allied using spin casing and a roller bit. Allied thought that this drilling method would better combat the running sands that had been encountered in the borings for W46-2 and W46-3. Water was circulated in the borehole during drilling to keep the borehole open and to bring cuttings up. Drilling mud was not used during the advancement of the boring for W71-2.

Since SB-13 had been advanced to a depth of 50 feet BG, split-spoon soil samples were retrieved from the W71-2 boring starting at a depth of 60 feet BG. Split-spoon soil samples were retrieved from this boring once every 10 feet to log stratigraphy. Groundwater was anticipated at a depth of 101 feet BG, and the boring was advanced to a depth of 116 feet BG (5 feet past the target depth of 111 feet BG). Running sands were also encountered in this boring; however, the target well depth was achieved at this location.

In progress borings were covered with plastic sheeting and sandbagged, and auger flights were left in place during overnight hours to keep surface water runoff from entering the borings.

The Building 46 soil boring/well construction logs are included in **Appendix H**. The stratigraphy observed in the well borings was consistent with that observed in the Building 46 Geoprobe® soil borings. The clayey unit was observed to depths ranging from approximately 41.5 feet to 44 feet BG in the well borings. The sandy unit, is predominantly comprised of silty sand and sand, also contains occasional layers of gravel, clayey silt, silty clay, and/or clayey sand.

PID readings in the split-spoon soil samples ranged from background levels to a high of 164.4 ppm at a depth of 25 feet BG in the boring for W46-2. No soil samples were collected from the monitoring well borings for laboratory analysis.

The wells were constructed with 2-inch ID Schedule 40 PVC and 20 feet of 2-inch ID 0.020-inch slotted Schedule 40 PVC well screen. A #2 sand filter pack was placed in the annular space around each well screen to a depth of approximately 3 feet above the well screen. A 2-foot thick bentonite seal was placed in the annular space above each sand filter pack. The remainder of the annular space, to a depth of approximately 0.5 foot BG, was filled with 60:40 bentonite cement grout (mixed using 2 pounds of solid to 1 gallon of water) which was introduced above the bentonite seal and placed progressively upward using a tremie pipe consistent with the DCRA permit. Each well was finished using a flush-mounted well cover in a concrete pad. The wells were developed following installation. Development occurred by pumping and surging using air-lift method, a submersible pump, and bailers. Development progressed on W46-2 and W46-3 until the visual appearance of the discharge stream improved from muddy to clear. A total of 45 and 44 well volumes of water was removed from these wells, respectively. Development progressed on W71-2 until the visual appearance of the discharge stream improved from muddy to slightly cloudy. A total of 24 well volumes of water was removed from this well. Previously existing wells W72-1 were W71-1 were re-developed using the same methods. Development progressed on these wells until the visual appearance of the discharge stream improved from very silty to very cloudy. A total of 10 and 8 well volumes of water was removed from these wells, respectively.

A top-of-casing (TOC) measuring point (MP) was marked at each well. The well construction data are summarized in **Table 1**.

2.8 Building 46 – Vapor Monitoring Point Sampling

The VMP sampling was performed on May 24, 2018. The VMPs were purged of three liters of soil/sub-slab vapor, using a peristaltic pump, prior to sampling. A Swagelok® valve, which had been connected to the Teflon tubing at each VMP, was utilized to ensure that ambient air did not re-enter the VMP following purging. Purged soil/sub-slab vapor was collected in a 3-liter Tedlar® bag to monitor the volume purged.

The vapor samples were collected in pre-evacuated, pre-cleaned 6-liter Summa canisters. The Summa canister regulators were calibrated to collect vapor over an approximate 8-hour period at an average rate of 12.5 milliliters per minute (mL/min).

The VMP canisters were connected to the Swagelok® valve at each VMP using additional Teflon tubing and a Swagelok® fitting. A new pair of nitrile sampling gloves was donned prior to each sample setup. The Summa canisters were set up between 7:09 am and 9:15 am and were retrieved between 3:30 pm and 5:50 pm. The vacuum gauges on the Summa canisters were monitored during the course of the day to confirm that the vacuums on the canisters were decreasing at an anticipated rate. The vacuum readings were recorded on the sample setup and retrieval forms. Higher than desired residual vacuums, indicating lower than desired rates of sample collection, were recorded at the planned time of sample retrieval for the canisters at VMP-01, VMP-02, VMP-04, and VMP-05. The regulators were removed from these canisters, and partial grab samples were collected at these locations. The pre-sample and post-sample vacuum readings are summarized below in **Table A**.

A duplicate sample had been planned at VMP-03; however, water from the VMP was drawn into the tubing and duplicate tubing at this location and the sample collection on May 24 was terminated. A second attempt to collect a sample and duplicate sample from VMP-03 was performed on June 13 using the same methodology described above. A sample was collected from VMP-03; however, the duplicate canister did not fill. Accordingly, a duplicate sample of sufficient volume for analysis was not collected.

Table A
Pre-sample and Post-sample Vacuum Readings (inches of Mercury)

Date	Sample	Pre-sample vacuum reading	Post-sample vacuum reading
May 24	**VMP-01**	37.0	5.0
	VMP-02	32.0	5.0
	VMP-04	31.0	2.5
	VMP-05	32.0	4.5
	VMP-06	32.0	5.0
June 13	**VMP-03**	31.0	7.0

The soil/sub-slab vapor samples were delivered with accompanying COCs to MSS for laboratory analysis of VOC analysis via EPA Method TO-15 Low Level. Pending the results of this investigation, the VMPs were left in place, each sealed with a plastic cap. The exterior soil vapor VMPs (VMP-02 and VMP-03) were staked and marked with orange flagging or coned and marked with paint, respectively. It should be noted that a landscaping crew inadvertently removed VMP-02 from the ground during landscaping operations after the VMP sampling event had been completed.

2.9 Well Gauging and Survey

The monitoring wells were gauged on June 5, 2018 prior to sampling, using a water level meter, relative to the TOC MP. The gauging data are presented in **Table 1**. The depth to groundwater in the five wells ranged from 90.00 feet BG at W72-1 to 106.73 feet BG at W46-2. Dry well W46-1 was also gauged. The depth to groundwater in this well was 45.29 feet BG. Consistent with prior gauging performed during the Additional Phase II ESA, this water level was approximately 0.5 feet above the bottom of the well.

Stantec surveyed the horizontal positions of the soil borings and VMPs on June 5, 2018 and the horizontal positions and top of casing and grade elevations of the monitoring wells on June 13, 2018. The survey data for the monitoring wells are presented in **Table 1**.

2.10 Building 46 – Groundwater Monitoring Well Sampling

The groundwater sampling event was performed on June 6 and 7, 2018. The four of the five wells (all wells except W46-2) were purged prior to sampling according to low-flow methodology using a Grundfos variable speed submersible pump and disposable tubing until stabilization of the monitored field parameters was achieved. Field parameters recorded during well purging included DO, oxidation-reduction potential, conductivity, pH, turbidity, and temperature. These field parameters were measured with a YSI Model 556 water quality meter and a HF Scientific MicroTPW Turbidity Meter using a flow-through cell. Samples were then collected from the submersible pump discharge stream. W46-2 was purged of three volumes of water and sampled using bailers. Bailers were used to purge and sample this well due to high sediment content in the water, which had re-entered the well following development, and which clogged the Grundfos pump. All non-dedicated down-well equipment and supplies were decontaminated prior to and after use. Groundwater sampling logs were generated.

The groundwater samples were collected in HCl-preserved 40-milliliter VOA vials with no headspace or air bubbles. The samples were immediately placed in an iced cooler. A total of five groundwater samples, one duplicate groundwater sample, one field equipment rinseate blank, and one trip blank were collected for laboratory analysis. The duplicate groundwater sample (MW-D) was collected from monitoring well W46-2. A pre-made trip blank was prepared by the laboratory and kept with the samples throughout the event. The equipment rinseate blank was prepared by placing the Grundfos pump and a segment of tubing into a five-gallon container of distilled water, circulating the water through the pump for approximately 10 minutes and pumping the distilled water into VOA vials.

The samples were delivered with accompanying COC to MSS for analysis of VOCs via EPA Method 8260 and for TPH-C7-C12 via EPA Method 8015M.

2.11 Waste Characterization and Drum Disposal

2.11.1 Buildings 46 and 76 – Waste Characterization Sampling of IDW Generated during the Additional Phase II ESA

A total of 15 drums of soil IDW, eight drums of water IDW, and three drums of mixed soil and water IDW were generated during the Additional Phase II ESA performed at Buildings 46 and 76. As mentioned above in Section 2.0, all of these drums were temporarily staged at Building 46 to await waste characterization sampling and pick up for disposal. Waste characterization sampling of the contents these drums was performed on June 12, 2018. A total of four composited waste characterization soil samples and three composited waste characterization water samples were collected from the drums. The samples were preserved on ice and delivered with accompanying COC to MSS.

The waste characterization water samples were analyzed for VOCs via EPA Method 8260 and for RCRA 8 Metals via EPA Method 6020. The waste characterization soil samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP)-VOCs and TCLP-RCRA 8 Metals via EPA Methods 1311/8260/6010/7470. The waste characterization analytical laboratory report is included in **Appendix I.** Based on the results of the analyses, the IDW characterized as a non-hazardous waste.

2.11.2 Buildings 72, 73, 74, 76, and 77 – Inventory of Previously Existing Drums and Waste Characterization Sampling

CGS repeated the inventory of previously existing drums that had originally been performed in December 2015. The original and repeat drum inventories are summarized below in **Table B**. Waste characterization sampling of the contents these drums was performed on June 12 through June 14, 2018. As detailed below in **Table B**, two the drums that had been inventoried in December 2015 were not found during the repeat inventory. Because the contents of three of the drums were unknown, sampling of these drums was performed using Level C personal protective equipment (PPE). Two of these drums were found to contain water. Each of these drums was individually sampled. The third drum was found to contain four yellow bags of material that were labeled as containing asbestos fiber. The material in this drum was characterized as asbestos waste; accordingly waste characterization sampling of the material in this drum was not required for disposal.

Table B
Inventory of Previously Existing Drums

Building	Drum Size (gal)	Drum Contents	Waste Characterization Sampling PPE Level	Number (December 2015)	Number (May 2018)	Change between December 2015 and May 2018	Condition	Storage	Number of Drums Requiring Overpacking
72	55	Water IDW	C (unknown prior to sampling)	1	1	No Change	Drum had begun to deteriorate	Outside on pavement	1
73	55	Soil IDW	D	4	4	No Change	Weathered and Deteriorated	Outside on pavement	4
73	30	Water	C (unknown prior to sampling)	2	1	The drum that did not appear to be empty in December 2015 was no longer present. The drum that appeared to be empty in December 2015 contained water.	Drum had begun to deteriorate	Outside on pavement	1
74	55	Asbestos fiber	C (unknown prior to sampling)	1	1	No Change	Intact	Outside on pavement	0
76 and 77	55	Soil IDW	D	29	29	Some of the drums that had been in Bldg 76 had been moved to Bldg 77. The closed-top drum that had been in Bldg 76 in December 2015 was no longer present. Another soil drum was found outside of Bldg 76.	Some were intact. Some had begun to deteriorate.	Inside on concrete floor	9

A total of six composited waste characterization soil samples and two waste characterization water samples were collected from the previously existing drums. The samples were preserved on ice and delivered with accompanying COC to MSS. The waste characterization water samples were analyzed for the same analyses discussed above in Section 2.11.1. The waste characterization analytical laboratory reports are included in **Appendix I.** Based on the results of the analyses, the sampled drums characterized as a non-hazardous waste.

2.11.3 Drum Pickup and Disposal

ACV overpacked the number of drums detailed above in **Table B** and picked up all of the drums on July 6 and 10, 2018. One asbestos drum and 61 drums of non-hazardous waste (soil, soil/water mix, and water) were picked up. A representative of AFRH signed the waste profiles and manifests. The IDW drums were transported to ACV's Treatment, Storage, and Disposal Facility (TSDF) facility in Lewisberry, PA. Copies of the manifest are included in **Appendix J**.

3.0 LABORATORY ANALYTICAL RESULTS

The analytical results for the detected analytes in the UST contents samples, the soil samples, the subsurface vapor samples, and the groundwater samples are presented in **Table 2**, **Tables 3 through 5**, **Table 6**, and **Table 7,** respectively. Full analytical results for each set of samples are presented in **Tables K-1 through K-5** in **Appendix K**. The laboratory reports and COC documentation are included in **Appendices B and L through O.**

The results are reported in the data tables in mg/kg (or ppm) for the soil samples, in micrograms per cubic meter ($\mu g/m^3$) for the vapor samples, and in µg/L (or ppb) for the water/groundwater samples.

Concentrations for detected analytes are shown on the tables in bold text. Method Reporting Limits (MRLs) for analytes that were not detected in a particular sample are shown in the tables in gray text and qualified with a "U". Any analyte detected in a sample at a concentration above the Method Detection Limit (MDL), but below the MRL is presented in the tables with a "J" qualifier, indicating that the result is considered an estimated concentration.

Duplicate samples were collected during the Additional Phase II ESA. These data will be discussed below collectively using the parent sample identification and the higher analyte concentration.

3.1 Analytical Laboratory Results Screening Methodology

The analytical results were compared to generic human health risk-based screening levels (RBSLs) to preliminarily identify analytes and associated concentrations that may be of potential concern for the investigation areas. The laboratory analytical results were compared to two different sets of RBSLs depending on the analytical suite.

- TPH data (C7-C12, GRO, DRO, and ORO) were compared to DOEE RBSLs presented in its Risk-Based Corrective Action (RBCA) Technical Guidance Document (DOEE, June 2011). TPH concentrations in soil were compared to DOEE's Tier 0 Soil Standard (100 mg/kg) in the event that soil excavation activities occur in TPH impacted areas. Because mixed use develop is proposed for the development parcel, both residential and commercial/industrial Tier 1 RBSLs were also used in the screening process. TPH-GRO RBSLs were used for TPH-C7-C12 due to the higher degree of carbon range overlap for these analytes.
- VOC, PAH, PCB, and Metals data were compared to residential and commercial/industrial EPA RBSLs presented in its Regional Screening Level (RSL) table (EPA, May 2018a) and Vapor Intrusion Screening Level (VISL) table (EPA, May 2018b). The EPA RSLs and VISLs utilized in

this evaluation are the lower of those corresponding to a cancer risk of $1x10^{-6}$ or a Hazard Index of 1.0 consistent with DOEE guidance.

The analytical data were compared to the RBSLs according to the methodologies listed below.

TPH Data

Primary RBSLs:

- The soil data were compared to DOEE's Tier 0 Soil Standard.
- The water/groundwater data were compared to DOEE's Tier 1 RBSL - Protection of Groundwater: Domestic Use of Water (Ingestion and Inhalation) Exposure Pathway.

Secondary RBSLs:

- The surface soil data (i.e., 0 to 1 foot BG) were compared to DOEE's Residential Surface Soil Tier 1 RBSL - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways
- The subsurface soil data (i.e., below 1 foot BG) were compared to DOEE's Residential Subsurface Soil Tier 1 RBSL - Resident Child or Resident Adult (whichever was lower) - Indoor Inhalation Exposure Pathway

Tertiary RBSLs:

- The surface soil data (i.e., 0 to 1 foot BG) were compared to DOEE's Commercial Surface Soil Tier 1 RBSL - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways
- The subsurface soil data (i.e., below 1 foot BG) were compared to DOEE's Commercial Subsurface Soil Tier 1 RBSL - Commercial Worker - Indoor Inhalation Exposure Pathway

VOC, PAH, PCB, and Metals data

Primary RBSLs:

- The soil data were compared to EPA's Residential Soil RSLs.
- The subsurface vapor data were compared to EPA's Residential Soil Vapor VISLs.
- The water/groundwater data were compared to EPA's Tapwater RSLs.

Secondary RBSLs:

- The soil data were compared to EPA's Industrial Soil RSLs.
- The subsurface vapor data were compared to EPA's Commercial Soil Vapor VISLs.

The results of the screening are shown in **Tables 2 through 7** and in **Tables K-1 through K-5** in **Appendix K**. As described in the table notes at the end of each table, detected analyte concentrations or MRLs which exceed the respective primary RBSLs are underlined. Red text is used to highlight detected analyte concentrations which exceed the respective primary RBSLs. One asterisk (*) is used to denote detected analyte concentrations which exceed the respective secondary RBSLs. Two asterisks (**) are used to denote detected analyte concentrations which exceed the respective tertiary RBSLs.

Brief summaries of the analytical results and the results of the screening are included below in Sections 3.2 through 3.6. Additional interpretation of the analytical results is included below in Sections 4.2 and 4.3.

3.2 UST Contents Sample Analytical Results

The analytical results for the UST contents samples are presented in **Table 2** (detected analytes) and in **Table K-1 in Appendix K** (full data table). The laboratory report is included in **Appendix B**.

As discussed above in Section 2.2, neither PCE nor any of its degradation products were detected in the sampled water. Minor concentrations of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and TPH-DRO were detected in the sample from the easternmost UST. No analytes were detected in the sampled water at concentrations that exceed the RBSLs.

3.3 Building 46 Soil Sample Analytical Laboratory Results

3.3.1 PAH Analytical Laboratory Results

The analytical results for the Building 46 samples that were analyzed for PAHs are presented in **Table 3**. Note that a Full Laboratory Analytical Data Table that corresponds to **Table 3** was not generated for this data set because all of the analytes in this analytical suite were detected. The laboratory report is included in **Appendix L**.

The full suite of PAHs was detected in the Tar Base Layer sample. Benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, chrysene, dibenzo[a,h]anthracene, indeno[1,2,3-cd]pyrene, and naphthalene were detected in the Tar Base Layer sample at concentrations that exceed the EPA Residential Soil RSLs. Most of these analyte concentrations (excluding benzo[k]fluoranthene and chrysene) also exceed the EPA Industrial Soil RSLs.

No PAHs were detected in either of the soil samples collected from a depth of 3 feet BG in SB-01 or SB-07. Additional discussion of these data is included below in Section 4.2.

3.3.2 VOCs and TPH-C7-C12 Analytical Laboratory Results

The analytical results for the Building 46 samples that were analyzed for VOCs and TPH-C7-C12 are presented in **Table 4** (detected analytes) and in **Table K-2 in Appendix K** (full data table). The laboratory report is included in **Appendix L**.

Sixteen (16) VOCs were detected in the soil samples. 1,2,4-Trichlorobenzene and 1,4-dichlorobenzene were detected in the sample from SB-10 (7') at concentrations that exceed the EPA Residential Soil RSLs. No VOCs were detected in the soil samples from Building 46 that exceed the EPA Industrial Soil RSLs.

TPH-C7-C12 was detected in three of the seven samples analyzed for TPH-C7-C12. TPH-C7-C12 was detected in the sample from SB-10 (7') at a concentration that exceeded the DOEE Tier 0 Soil Standard, the DOEE Residential Subsurface Soil Tier 1 RBSL, and the DOEE Commercial Subsurface Soil Tier 1 RBSL.

Additional discussion of these data is included below in Section 4.2.

3.4 Building 76 Soil Sample Analytical Laboratory Results

The analytical results for the Building 76 soil samples are presented in **Table 5** (detected analytes) and in **Table K-3 in Appendix K** (full data table). The laboratory report is included in **Appendix M**.

All 34 samples were analyzed for TPH-DRO and TPH-ORO.

- TPH-DRO was detected in 12 of these samples. TPH-DRO was detected in 10 of the samples at concentrations that exceed the DOEE Tier 0 Soil Standard and in five of the samples at concentrations that exceed the DOEE Residential Surface Soil or Subsurface Soil Tier 1 RBSLs.

No TPH-DRO concentrations exceed the DOEE Commercial Surface Soil or Subsurface Soil Tier 1 RBSLs.

- TPH-ORO was detected in 11 of these samples. TPH-ORO was detected in 10 of the samples at concentrations that exceed the DOEE Tier 0 Soil Standard. No TPH-ORO concentrations exceed the DOEE Residential Surface Soil or Subsurface Soil Tier 1 RBSLs or the DOEE Commercial Surface Soil or Subsurface Soil Tier 1 RBSLs.

Additional discussion of the TPH-DRO and TPH-ORO data is included below in Section 4.3.

The four surface soil samples were also analyzed for PAHs and PCBs. PAHs and PCBs were not detected in any of the surface soil samples.

The 10 highest PID reading samples were also analyzed for RCRA 8 Metals. Metals were detected in all 10 of the samples. Metals are naturally occurring elements in the environment, so their presence in the soil samples is expected.

Arsenic was the only metal detected at concentrations above the RBSLs. The detected arsenic concentrations ranged from 0.816 to 7.80 mg/kg. These concentrations were compared to published background soil concentration data compiled for Maryland by the Maryland Department of the Environment (MDE) (MDE, June 2008) and for Virginia by ICF Kaiser Engineers and Constructors, Inc. (ICF) (ICF, February 1998). Reported background arsenic concentrations in soil range from non-detect to 27 mg/kg in Maryland and from non-detect to 18 mg/kg for the Virginia counties included in the ICF study. All of the detected arsenic concentrations fall within this range of normal background, therefore the detected arsenic concentrations will not be further discussed in this report.

3.5 Building 46 Subsurface Vapor Sample Analytical Laboratory Results

The analytical results for the Building 46 subsurface vapor samples are presented in **Table 6** (detected analytes) and in **Table K-4 in Appendix K** (full data table). The laboratory report is included in **Appendix N**.

Fourteen (14) VOCs were detected in the subsurface vapor samples. Bromodichloromethane, chloroform, and PCE were detected in subsurface vapor samples at concentrations that exceed the EPA Residential Soil Vapor VISLs, and chloroform and PCE were detected at concentrations that exceed the EPA Commercial Soil Vapor VISLs.

- The bromodichloromethane and chloroform concentrations that exceeded the VISLs were detected at VMP-01 and VMP-02 which were installed along the path of the waste water discharge piping/sanitary sewer line. These analytes are often associated with chlorinated drinking water supplies (i.e., byproducts of drinking water disinfection) and are often found in the vicinity of water and sanitary sewer lines. These concentrations are likely within the range of normal background concentrations found in this developed area and do not appear to present a concern for the investigation area, and therefore will not be discussed further in this report.
- The PCE concentrations that exceed the EPA Residential Soil Vapor VISL were detected at VMP-01 and VMP-06. The PCE concentration at VMP-06 also exceeded the EPA Commercial Soil Vapor VISL. Additional discussion of these PCE data is included below in Section 4.2.

3.6 Building 46 Groundwater Sample Analytical Laboratory Results

The analytical results for the Building 46 groundwater samples are presented in **Table 7** (detected analytes) and in **Table K-5 in Appendix K** (full data table). The laboratory report is included in **Appendix O**.

Nine VOCs were detected in the groundwater samples.

- Two VOCs (PCE and cis-1,2-DCE) were detected in the grab-groundwater sample collected from the depths of 23 to 28 from the W46-3 well boring. Neither of these concentrations exceeded the EPA Tapwater RSLs.
- Eight VOCs (acetone, benzene, 2-butanone, chloroform, naphthalene, PCE, toluene, and m- & p-xylenes) were detected in the groundwater samples collected from the monitoring wells.
    - Chloroform was detected in the groundwater sample from W46-2 at a concentration that exceeded the EPA Tapwater RSL. As mentioned above, chloroform is a byproduct of drinking water disinfection and is often found in the vicinity of water and sanitary sewer lines. This concentration is likely within the range of normal background concentrations found in this developed area and does not appear to present a concern for the investigation area, and therefore will not be discussed further in this report.
    - Benzene and naphthalene were detected in the groundwater sample from W46-3 at concentrations that exceed the EPA Tapwater RSLs. No other analytes, including PCE, were detected in the groundwater samples at concentrations that exceed the EPA Tapwater RSLs. Additional discussion of these data is included below in Section 4.2.

TPH-C7-C12 was not detected in any of the groundwater samples.

4.0 SITE CHARACTERIZATION DISCUSSION

Discussion of the hydrogeologic and contaminant conditions within the investigation areas is presented below in Sections 4.1 through 4.3. **Figures 9 through 14** were generated to present site characterization data.

4.1 Hydrogeologic Site Characterization

4.1.1 Geologic Setting

The AFRH facility is situated within the Atlantic Coastal Plain Physiographic Province, which is characterized by flat to gently sloping topography and horizontal unconsolidated sediment layers thickening toward the east.

The Patuxent Formation (part of the Cretaceous age Potomac Group) is mapped at the AFRH facility (USGS, 1964). The Patuxent Formation is described as containing large amounts of sand, commonly mixed with clay, with well-rounded gravel pebbles and containing lenses of massive clay.

As discussed above in Sections 2.4, 2.5, and 2.7, fill, comprised of silty clay, clayey silt, sand, gravel, and mixed debris, was encountered in the soil borings above native soil. The depth to the bottom of the fill ranges from approximately 4 to 13 feet BG at Building 46 and from approximately 3 to 6 feet BG at Building 76. The native soil below the fill consists of a clayey unit which is underlain by a sandy unit. The clayey unit is comprised of inter-layered sequences of silty clay/clayey silt and sandy clay/clayey sand which contains occasional layers of silty sand, sand, clayey gravel, or gravel and extends to depths ranging from approximately 38 to 47 feet BG at Building 46. The sandy unit, is predominantly comprised of silty sand and sand, also contains occasional layers of gravel, clayey silt, silty clay, and/or clayey sand.

4.1.2 Hydrogeologic Setting

Occasional discrete wet zones were observed in the clayey unit in some of the borings advanced at Building 46. Wet zones were not observed in the clayey unit in three of the borings advanced at Building 46 or in any of the borings advanced at Building 76. The sandy unit was dry to damp until the

groundwater table was reached. The occasional discontinuous wet zones observed in the clayey unit generally occurred in layers that were more permeable (i.e., higher sand content) or where the clayey matrix was less compact. A widespread perched groundwater zone was not encountered at Building 46.

The well gauging and survey data and the calculated groundwater elevation data are presented in **Table 1**. The depth to groundwater in the five wells ranged from 90.00 feet BG at W72-1 to 106.73 feet BG at W46-2. Calculated groundwater elevations in the wells ranged from 150.19 feet above mean see level (AMSL) at W72-1 to 150.50 feet AMSL at W46-2.

A groundwater contour map was generated using the June 5, 2018 gauging data (**Figure 9**). The direction of groundwater flow determined from this mapping is toward the south-southeast. The groundwater flow gradient was calculated to be approximately 0.0015 to 0.0025.

4.2 Contaminant Site Characterization – Building 46

Figures 10 through 13 were generated to illustrate contaminant conditions at Building 46 as defined during this investigation. As demonstrated in **Tables 2, 3, 4, 6, and 7** and on **Figures 10 through 13**, a limited number of areas that may be of concern were identified as a result of the investigation activities performed at Building 46. Discussion of the petroleum hydrocarbon and PAH analytical data and of the chlorinated hydrocarbon data is presented below in Sections 4.2.1 and 4.2.2, respectively. Information that joins portions of these two discussions is presented below in Section 4.2.3.

4.2.1 Petroleum Hydrocarbons and PAHs

As discussed above in Section 3.2 and shown in **Table 2**, minor concentrations of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and TPH-DRO were detected in the sample from the easternmost UST. The origin of these hydrocarbons is unknown. These analytes may be a result of surface water runoff or may suggest that the USTs had been used to store Stoddard solvent or some other petroleum product.

As discussed above in Section 3.3 and shown in **Table 3**, the full suite of PAHs was detected in the Tar Base Layer sample. Many of these analytes were detected at concentrations that exceed the EPA Residential Soil RSLs and the EPA Industrial Soil RSLs. As discussed above in Section 2.1.3, the tar base layer was aromatic and had elevated PID readings. The source of the elevated naphthalene and TPH-C10-C15 in the passive subsurface vapor samples collected in the roadway west of Building 46, as well as the naphthalene detected at MACTEC boring G46-1, is from the tar base layer in the asphalt rather than Stoddard solvent.

As discussed above in Section 2.1.3 and shown in **Appendix A, Figure 4**, elevated levels of TPH-C4-C9 were detected in the passive subsurface vapor samples collected at SV-15 and SV-20 located south and north of the USTs, respectively. As shown in **Table 4** and on **Figure 10**, TPH-C7-C12 was detected in soil at SB-09, SB-02-1, and SB-10. TPH-C7-C12 was not detected in soil at SB-08 or SB-11. The TPH-C7-C12 concentration detected in the sample collected from SB-10 at a depth of 7 feet BG exceeds the Tier 0 Standard and the residential and commercial Tier 1 RBSLs. SB-10 is located east of the eastern UST and adjacent to the likely path of the sanitary sewer line. TPH-C7-C12 was not detected in the grab-groundwater sample collected from the boring at W46-3 between the depths of 23 and 28 feet BG or in any of the groundwater samples collected from the wells. Additional discussion of the TPH-C7-C12 detections is included below in Section 4.2.3.

Benzene and naphthalene were detected in the groundwater sample from W46-3 at concentrations that exceed the EPA Tapwater RLS. These analytes were not detected in the grab-groundwater sample collected from the boring at W46-3 between the depths of 23 and 28 feet BG or in any of the other groundwater samples collected from the wells. As discussed above in Section 2.1.3, Stoddard solvent contains only 0.2% naphthalene. According to the same reference, Stoddard solvent contains only 0.07 to

0.1% benzene (ATSDR, 1995). The source of the benzene and naphthalene in the groundwater sample from W46-3 is unknown.

4.2.2 Chlorinated Hydrocarbons

Figures 11 through 13 were generated to illustrate the distribution of PCE in soil, subsurface vapor, and groundwater at Building 46 as defined during this investigation.

As shown in **Table 4** and on **Figure 11**, PCE was detected in soil at SB-03, SB-04, SB-09, SB-10, SB-11, and SB-13. PCE was not detected in any of these samples at concentrations that exceed the EPA Residential Soil RSL or EPA Industrial Soil RSL. PCE was not detected in soil samples collected from the remaining eight soil borings. The highest PCE concentration (13.1 mg/kg) was detected in SB-10 (7‘). The second highest PCE concentration (1.25 mg/kg) was detected in SB-03 (17‘). SB-10 is located east of the eastern UST and adjacent to the likely path of the sanitary sewer line, and SB-03 is located adjacent to the manhole where waste water discharge from the former plant entered the sanitary sewer line. Minor PCE concentrations were detected in SB-04 (29.5’) (up-gradient of the USTs and sanitary sewer line), in SB-09 (14’) and SB-11 (21.5’) (in proximity to the USTs and sanitary sewer line), and in SB-13 (36’) (down-gradient of the USTs and sanitary sewer line). Additional discussion of the PCE detections in soil is included below in Section 4.2.3.

The distribution of PCE in the passive subsurface vapor samples and in the “active” subsurface vapor samples are shown in **Appendix A, Figure 4** and on **Figure 12**, respectively. As discussed above in Section 2.1.3, PCE was detected at elevated levels at SV-12, SV-26, SV-28, and SV-29. As shown in **Table 6** and on **Figure 12**, PCE was detected in subsurface vapor samples collected from all six VMPs. The highest PCE concentration (3,350 µg/m^3) was detected in the sub-slab vapor from VMP-06. The second highest PCE concentration (691 µg/m^3) was detected in the sub-slab vapor from VMP-01. Both of these PCE concentrations exceed the EPA Residential Soil Vapor VISL. The PCE concentration at VMP-06 also exceeded the EPA Commercial Soil Vapor VISL. VMP-01 is located along the path of the waste water discharge piping/sanitary sewer line. Since there is uncertainty regarding the actual pathway of the piping/line between SV-26 and SV-12, VMP-06 may be located along this pathway as well. Lower PCE concentrations, below the EPA Residential Soil Vapor VISL, were detected in soil vapor from VMP-03 (located near the southwestern corner of the building) and VMP-02 (located adjacent to the manhole where waste water discharge from the former plant entered the sanitary sewer line). Still lower PCE concentrations were detected in sub-slab vapor from VMP-05 (inside and one level lower than VMP-03) and VMP-04 (inside and near VMP-02). Additional discussion of the PCE detections in subsurface vapor is included below in Section 4.2.3.

As shown in **Table 7** and on **Figure 13**, PCE was detected in the grab-groundwater sample and in the groundwater samples collected from four of the five wells. PCE was not detected in any of these samples at concentrations that exceed the EPA Tapwater RSL. PCE was not detected in the groundwater sample from W46-3. The highest PCE concentration (10.7 µg/L) was detected in the grab-groundwater sample collected from the depths of 23 to 28 from the W46-3 well boring. Minor PCE concentrations were detected in W46-2 (up-gradient of the USTs and sanitary sewer line), in W71-1 (down-gradient of the sanitary sewer line), and in W71-2 and W72-1 (down-gradient of the USTs and sanitary sewer line). The estimated PCE concentration detected in W72-1 in June 2018 (2.4J µg/L) was lower than the PCE concentration detected in W72-1 by MACTEC in August 2006 (44.5 µg/L).

As shown in **Table 4,** 1,2,4-trichlorobenzene and 1,4-dichlorobenzene were detected in the soil sample from SB-10 (7’) at concentrations that exceed the EPA Residential Soil RSLs. According to ASTDR, 1,2,4-trichlorobenzene “is used as a solvent to dissolve such special materials as oils, waxes, resins, greases, and rubber. It is also frequently used to produce dyes and textiles (ASTDR, 2014).” 1,4-Dichlorobenzene “is used in mothballs and in toilet-deodorizer blocks (ASTDR, 2006).” Additional

discussion of the 1,2,4-trichlorobenzene and 1,4-dichlorobenzene detections is included below in Section 4.2.3.

4.2.3 Building 46 Contaminant Site Characterization Summary

The collective data were reviewed to evaluate the source(s) of the TPH-C7-C12 and PCE detections.

These data suggest releases from the waste water discharge piping/sanitary sewer line, as opposed to a release from the USTs, as the more likely source of the TPH-C7-C12 and PCE detections. Data that support this most directly include the TPH-C7-C12 detection in soil at SB-02-1, the PCE detection in soil at SB-03, and the PCE detections in subsurface vapor from SV-12, SV-26, VMP-01, VMP-02, and VMP-06. Given that TPH-C7-C12, 1,2,4-trichlorobenzene, and 1,4-dichlorobenzene were detected in the soil sample from SB-10 (7'), that it is unlikely that a release from the USTs was the source of the 1,2,4-trichlorobenzene and 1,4-dichlorobenzene, that a high concentration of TPH-C7-C12 was not detected in the soil sample from SB-09, and that the USTs held water, it appears likely that a releases from the sanitary sewer line is the source of these detections as well.

As discussed above in Section 2.2, the USTs were determined to have a capacity of 275-gallons each and were found to extend beneath a retaining wall. A DC licensed structural engineer concluded that the USTs could not be safely removed, because the foundation of the retaining wall would be undermined and that the tanks should be abandoned in place. As specified in the Work Plan, District of Columbia Risk-Based Corrective Action (DCRBCA) Report Forms 1 through 11, and 13 and 14 were prepared to present information related to the USTs. The DCRBCA Report Forms are presented in **Appendix P** and for the most part summarize information contained elsewhere in this report.

Shallow soil contamination related to the PCE detections in the passive subsurface vapor samples collected at SV-28 and SV-29 and in the soil vapor sample collected from VMP-03 (located near the southwestern corner of the building where grade is one level above the level of the USTs) was not found in the soil borings advanced in this area (SB-04 through SB-07). The source of this minor contamination is unknown.

CGS understands that Building 46 will be re-purposed as part of the re-development. Accordingly, the data were also reviewed to evaluate concentrations that exceed the RBSLs with respect to the planned re-use of Building 46.

The PAHs that were detected in the tar base layer (**Table 3**) do not present a concern for the direct contact exposure pathways if this layer remains covered by asphalt. The PAHs in the tar base layer do not appear to present a concern for the vapor intrusion/indoor inhalation exposure pathway due to their presence with a limited thickness adjacent to one side of the building (as opposed to widespread beneath the building).

The TPH-C7-C12, 1,2,4-trichlorobenzene, and 1,4-dichlorobenzene concentrations detected in SB-10 (7') (**Table 4**) do not present a concern for the direct contact exposure pathways if this soil remains buried. Because the TPH-C7-C12 concentration exceeds the Tier 0 Standard, this soil, if excavated, would needed to be transported for off-site disposal. Given the limited extent of soil that exceeds the RBSLs, these concentrations do not appear to present a concern for the vapor intrusion/indoor inhalation exposure pathway.

The PCE concentrations detected in VMP-01 and VMP-06 (**Table 6**) may present a concern for the vapor intrusion/indoor inhalation exposure pathway if the first floor of this building is re-developed for commercial or residential use. A vapor intrusion mitigation system may be necessary for the re-purposed space.

The benzene and naphthalene concentrations detected in the groundwater sample from W46-3 (**Table 7**) do not present a concern for the domestic use of groundwater exposure pathways given that drinking water is municipally supplied to AFRH and the surrounding areas. These concentrations do not present a

concern for the vapor intrusion/indoor inhalation exposure pathway given the depth of this sample and limited extent of the detections.

4.3 Contaminant Site Characterization – Building 76

Figure 14 presents the distribution of TPH-DRO and TPH-ORO detected in soil at Building 76. As shown in **Table 5** and on **Figure 14**, TPH-DRO and TPH-ORO were detected in subsurface soil at SB-76-01, SB-76-02, SB-76-03, SB-76-04, SB-76-06, SB-76-07, and SB-76-10 at concentrations that exceed the Tier 0 Standard. TPH-DRO and TPH-ORO were detected in surface soil at SB-76-06 at concentrations that exceed the Tier 0 Standard. SB-76-06 was one of the borings positioned to intercept an area where staining on/cracks in the concrete slab and/or evidence of surface soil contamination were observed.

TPH-DRO concentrations in subsurface soil at SB-76-01, SB-76-04, SB-76-06, SB-76-07, and SB-76-10 also exceed the residential subsurface soil Tier 1 RBSL. TPH-DRO was not detected in any of the soil samples at concentrations that exceed the residential surface soil Tier 1 RBSL or the commercial Tier 1 RBSLs. TPH-ORO was not detected in any of the soil samples at concentrations that exceed the residential or commercial surface soil Tier 1 RBSLs. [Note: Residential and commercial subsurface soil Tier 1 RBSLs were not developed for TPH-ORO due to its low volatility.]

TPH-DRO and TPH-ORO were not detected in subsurface soil at SB-76-05, SB-76-08, or SB-76-09. TPH-DRO was detected in the surface soil samples from SB-76-09 at a concentration below the Tier 0 Standard. TPH-ORO was not detected in this sample. As discussed above in Section 2.5 and shown on the boring log for SB-76-09 (**Appendix G**), PID readings of 4,159 and 211 ppm were detected in the soil core collected from SB-76-09 immediately below the concrete slab and underlying gravel layer and at 0.5 feet below the top of the soil, respectively. SB-76-09 was one of the borings positioned to intercept an area where staining on/cracks in the concrete slab and/or evidence of surface soil contamination were observed. The cause of the elevated PID readings at these depths was not revealed as a result of the laboratory analyses that were performed.

TPH-DRO and TPH-ORO were detected in subsurface soil in all three borings around the northern lift (SB-76-01, SB-76-02, and SB-76-03) at concentrations that exceed the Tier 0 Standard. The top of contamination is present above depths of 8, 10, and 3 feet BG, respectively. The bottom of contamination was found by the depths of 13, 14, and 18 feet BG, respectively.

TPH-DRO and TPH-ORO were detected in subsurface soil in three of the four borings around the central lift (SB-76-04, SB-76-06, and SB-76-07) at concentrations that exceed the Tier 0 Standard. The top of contamination is present above depths of 10.5, 12, and 12 feet BG, respectively. The bottom of contamination was found by the depths of 25, 19, and 23 feet BG, respectively. As mentioned previously, TPH-DRO and TPH-ORO were also detected in surface soil at SB-76-06 at concentrations that exceed the Tier 0 Standard.

TPH-DRO and TPH-ORO were detected in subsurface soil in one of the borings around the southern lift (SB-76-10) at concentrations that exceed the Tier 0 Standard. The top of contamination is present above a depth of 8.5 feet BG, and the bottom of contamination was found by the depth 19.5 feet BG.

The bottom samples demonstrate that the vertical extent of the TPH-DRO and TPH-ORO impact to the soil has been defined. However, the lateral extent of the TPH-DRO and TPH-ORO impact to the soil has not yet been defined.

CGS understands that demolition of Building 76 is planned as part of the re-development. Any soil, with TPH-DRO and TPH-ORO concentrations that exceed the Tier 0 Standard and that is excavated, will need to be transported for off-site disposal. The TPH-DRO concentrations detected in subsurface soil at SB-76-01, SB-76-04, SB-76-06, SB-76-07, and SB-76-10 may present a concern for the vapor intrusion/indoor

inhalation exposure pathway if this area is re-developed for residential use and this soil is not removed. In this case, the new residential building(s) in this area may need to be constructed with a vapor barrier to mitigate vapor intrusion.

5.0 CONCLUSIONS

CGS has performed an Additional Phase II ESA at Buildings 46 and 76 at the AFRH facility located at 3700 N. Capital Street, NW in Washington, DC. The Additional Phase II ESA was performed at Buildings 46 and 76 to investigate environmental conditions in these two areas, relative to the findings presented in MACTEC's April 10, 2007 Phase II ESA Report, so that the need for additional investigation and/or corrective action, if any, can be determined and to inform prospective re-development bidders of this information. Among other activities, the Additional Phase II ESA included a passive subsurface vapor survey, a UST evaluation, advancement of 14 soil borings and soil sampling at Building 46, advancement of 10 soil borings and soil sampling at Building 76, installation of three two-inch diameter groundwater monitoring wells at/near Building 46, installation and sampling of six VMPs at Building 46, groundwater sampling of two previously existing monitoring wells and the three new monitoring wells, and sampling and off-site disposal of previously existing waste and IDW generated during the Additional Phase II ESA. Based on data obtained during this investigation, CGS summarizes/concludes the following:

Hydrogeologic Site Characterization Summary

- The AFRH facility is situated within the Atlantic Coastal Plain Physiographic Province and is underlain by the unconsolidated Patuxent Formation. The stratigraphy encountered in the borings advanced during the Additional Phase II ESA is comprised of fill and native soil. The fill is comprised of silty clay, clayey silt, sand, gravel, and mixed debris and was encountered to depths ranging from approximately 4 to 13 feet BG at Building 46 and from approximately 3 to 6 feet BG at Building 76. The native soil below the fill consists of a clayey unit which is underlain by a sandy unit. The clayey unit is comprised of inter-layered sequences of silty clay/clayey silt and sandy clay/clayey sand which contains occasional layers of silty sand, sand, clayey gravel, or gravel and extends to depths ranging from approximately 38 to 47 feet BG at Building 46. The sandy unit, is predominantly comprised of silty sand and sand, also contains occasional layers of gravel, clayey silt, silty clay, and/or clayey sand.
- A continuous perched silty sand and sand groundwater zone, as described by MACTEC in its April 10, 2007 Phase II ESA Report, is not present in the vicinity of Building 46. Occasional discontinuous wet zones were present in the clayey unit in some of the borings advanced at Building 46. Wet zones were not observed in the clayey unit in three of the borings advanced at Building 46. The occasional discontinuous wet zones observed in the clayey unit generally occurred in layers that were more permeable (i.e., higher sand content) or where the clayey matrix was less compact. The sandy unit, beneath the clayey unit, was dry to damp until the groundwater table was reached.
- The depth to groundwater in the five wells located at/near Building 46 ranged from 90.00 feet BG to 106.73 feet BG. Calculated groundwater elevations in the wells ranged from 150.19 feet AMSL to 150.50 feet AMSL. The direction of groundwater flow is toward the south-southeast.

Building 46 Contaminant Site Characterization Summary

- The USTs, located immediately south of Building 46A, were determined to have a capacity of 275-gallons each and were found to extend beneath a retaining wall. A DC licensed structural engineer concluded that the USTs could not be safely removed, because the foundation of the retaining wall would be undermined and that the tanks should be abandoned in place.

- The results of soil, subsurface vapor, and groundwater sampling identified a limited number of areas that may be of concern at Building 46.
    - PAHs were detected in the tar base layer sample, that was obtained immediately below the asphalt roadway located adjacent to the western side of Building 46, at concentrations that exceeded the RBSLs. It was determined that the naphthalene detected in soil by MACTEC was from this tar base layer and not related to the former dry cleaning operations. The PAHs do not present a concern for the direct contact exposure pathways if this layer remains covered by asphalt and do not appear to present a concern for the vapor intrusion/indoor inhalation exposure pathway due to their presence with a limited thickness adjacent to one side of the building (as opposed to a widespread beneath the building).
    - TPH-C7-C12 and PCE were detected in soil samples collected from some of the soil borings. PCE was detected in subsurface vapor samples collected from the VMPs. The patterns of the detections suggest releases from the waste water discharge piping and the sanitary sewer line, as opposed to a release from the USTs, as the more likely source of the TPH-C7-C12 and PCE detections that exceeded the RBSLs.
    - Detections in soil that exceeded the RBSLs were limited SB-10 (7'). These detections do not present a concern for the direct contact exposure pathways if this soil remains buried. Because the TPH-C7-C12 concentration exceeds DOEE's Tier 0 Standard, this soil, if excavated, would needed to be transported for off-site disposal. Given the limited extent of soil that exceeds the RBSLs, these concentrations do not appear to present a concern for the vapor intrusion/indoor inhalation exposure pathway.
    - Detections in subsurface vapor that exceeded the RBSLs were reported in samples collected from VMP-01 and VMP-06. CGS understands that Building 46 will be re-purposed as part of the re-development. These concentrations may present a concern for the vapor intrusion/indoor inhalation exposure pathway if the first floor of this building is re-developed for commercial or residential use. A vapor intrusion mitigation system may be necessary for the re-purposed space.
    - No dry cleaning related analytes (TPH-C7-C12, PCE, or PCE degradation products) were detected in the groundwater samples at concentrations that exceeded the RBSLs used in their evaluation.
    - Benzene and naphthalene, not associated with dry cleaning operations, were detected in the groundwater sample collected from W46-3 at concentrations that exceeded the RBSLs. The source of these analytes is unknown; however, these analytes do not present a concern for the domestic use of groundwater exposure pathways given that drinking water is municipally supplied to AFRH and the surrounding areas nor do they present a concern for the vapor intrusion/indoor inhalation exposure pathway given the depth of this sample and the limited extent of the detections.

Building 76 Contaminant Site Characterization Summary

- Ten (10) soil borings were advanced at Building 76. A total of 37 soil samples were obtained from the borings at varying depths and analyzed for TPH-diesel range organics (TPH-DRO) and TPH-oil range organics (TPH -ORO). TPH-DRO and TPH-ORO were detected in soil from seven of the borings at concentrations that exceed DOEE's Tier 0 Standard. TPH-DRO was detected in subsurface soil from five of the borings at concentrations that exceed DOEE's residential subsurface soil Tier 1 risk-based screening level (RBSL).

- The vertical extent of the TPH-DRO and TPH-ORO impact to the soil has been defined. However, the lateral extent of the TPH-DRO and TPH-ORO impact to the soil has not yet been defined.
- CGS understands that demolition of Building 76 is planned as part of the re-development. Any soil, with TPH-DRO and TPH-ORO concentration that exceed the Tier 0 Standard and that is excavated, will need to be transported for off-site disposal. The TPH-DRO concentrations detected in subsurface soil at five of the borings may present a concern for the vapor intrusion/indoor inhalation exposure pathway if this area is re-developed for residential use and this soil is not removed. In this case, the new residential building(s) in this area may need to be constructed with a vapor barrier to mitigate vapor intrusion.

6.0 LIMITATIONS

The work performed in conjunction with this project, and that data developed, are intended as a description of available information at the sample locations indicated and the dates specified. Generally accepted industry standards were used in the preparation of this report.

Laboratory data are intended to approximate actual conditions at the time of sampling. Results from future sampling and testing may vary significantly as a result of natural conditions, a changing environment, or the limits of analytical capabilities. This report does not warrant against future operations or conditions, nor does it warrant against operations or conditions present of a type or at a specific location not investigated. The limited sampling conducted is intended to approximate subsurface conditions by extrapolation between data points. Actual subsurface conditions may vary.

CGS has based its characterization on observable conditions and analytical results from independent analytical laboratories that are solely responsible for the accuracy of their methods and results.

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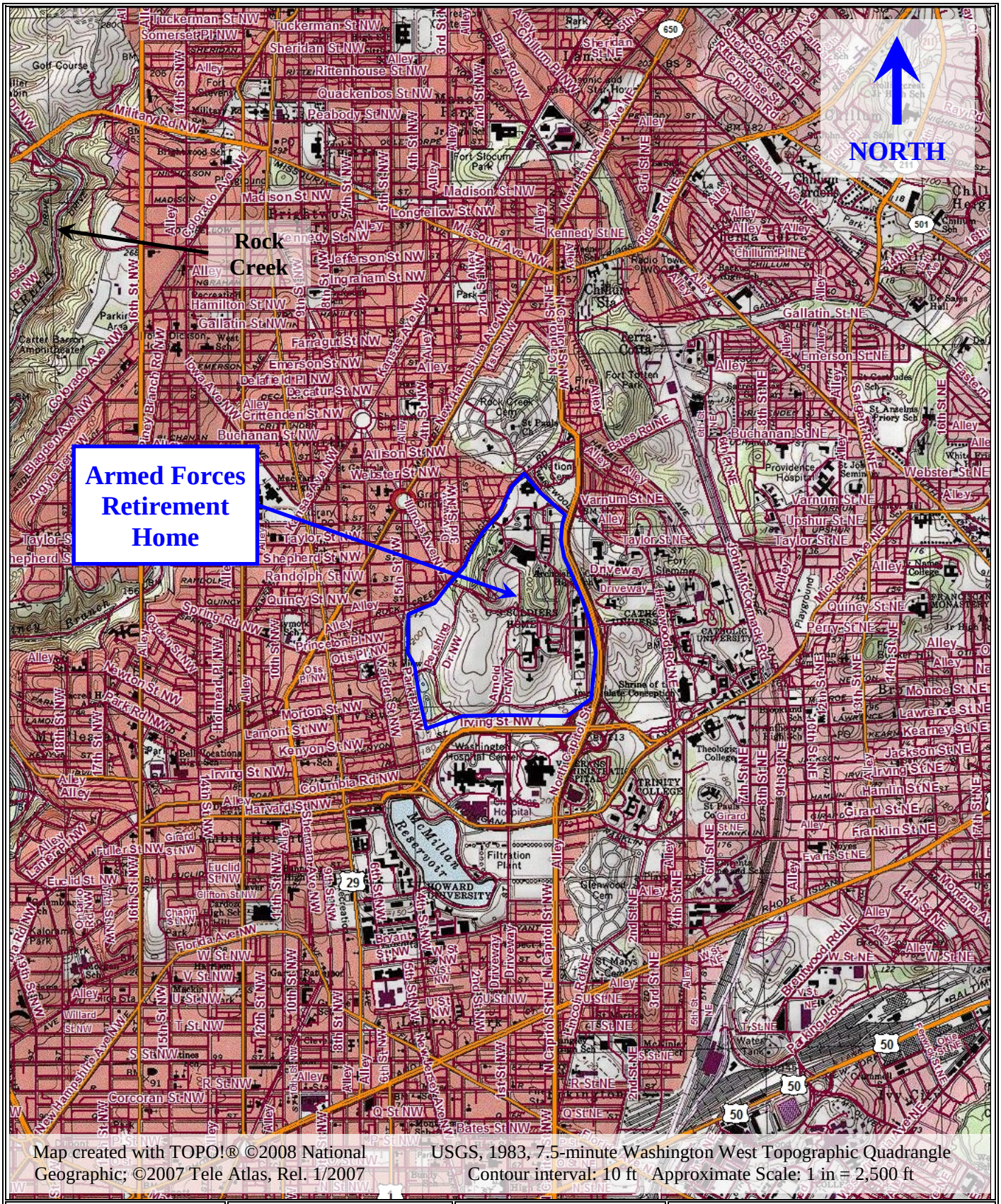
FIGURES



Map created with TOPO!® ©2008 National Geographic; ©2007 Tele Atlas, Rel. 1/2007

USGS, 1983, 7.5-minute Washington West Topographic Quadrangle
Contour interval: 10 ft Approximate Scale: 1 in = 2,500 ft

CGS Project #: CG-17-1111

Project Mgr: Nancy Love

Drawn By: Meg Staines

Date: July 12, 2018

Chesapeake GeoSciences, Inc.

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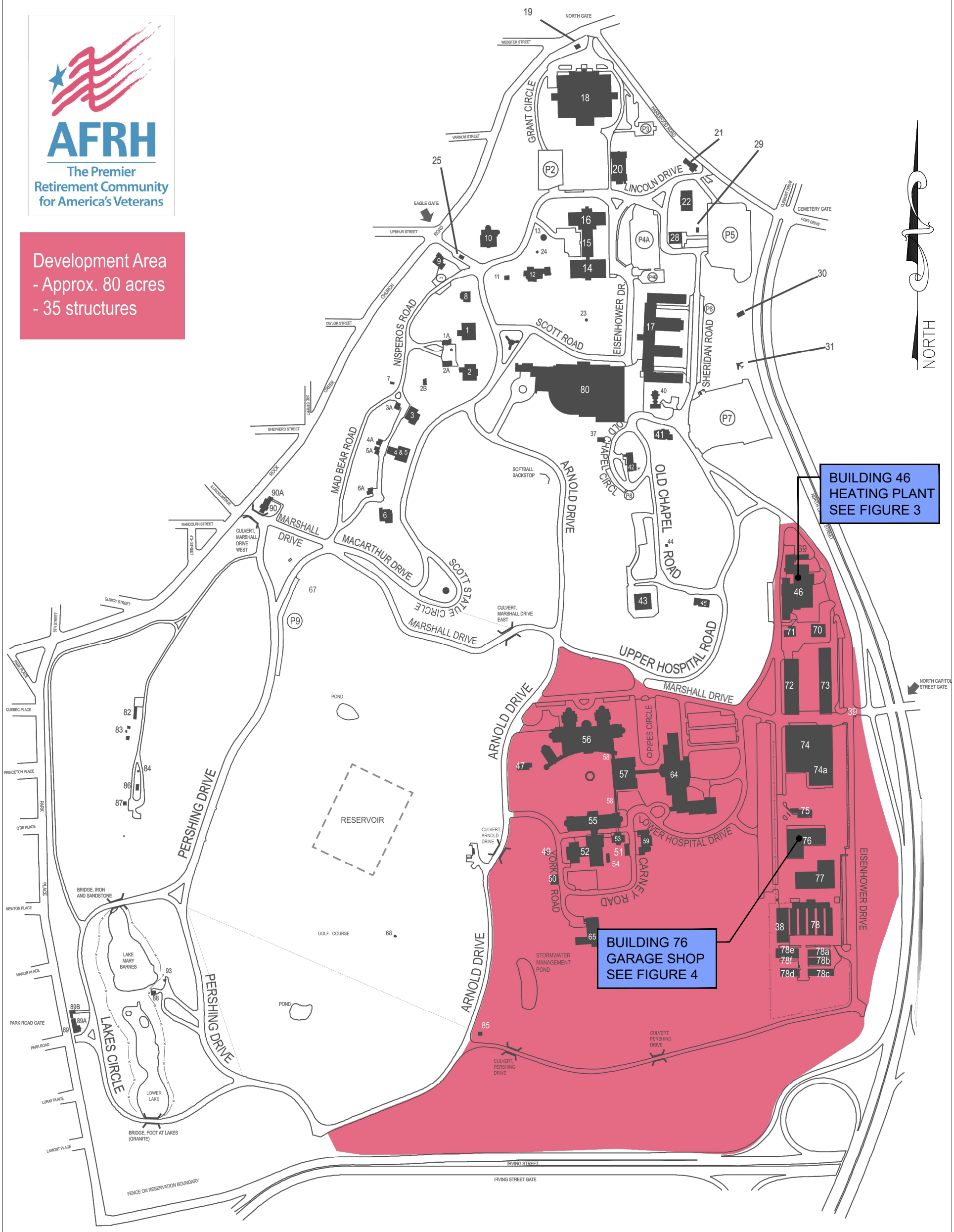
Figure 1
Site Location Map
Armed Forces Retirement Home
3700 North Capitol St NW
Washington, DC 20011

AFRH
The Premier Retirement Community for America's Veterans

Development Area
- Approx. 80 acres
- 35 structures



0 0.05 0.1 0.2 Miles

Updated 2013
EHT Traceries

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: Approx. 1" = 400'	

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Site Layout Map

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 2

EISENHOWER DRIVE

NORTH CAPITOL STREET NW

NORTH CAPITOL STREET NE

NORTH

BLDG 69
STORAGE

SMOKE
STACK

FIRE
ALARM B

FORMER
SMOKE
STACK

BUILDING 46
HEATING
PLANT

SMOKE STACK

BLDG
46A
LAUNDRY

2 UST
MANHOLES

GATE

GATE

GATE

RAMP

BUILDING 71
MAIN
SUBSTATION

SIDEWALK

BUILDING 70
SUPPORT
DIRECTORATE
HEADQUARTERS

GATE

GATE

BUILDING 72
SHOP
BUILDING

BUILDING
73
SHOP
BUILDING

275 280 270 265 260 255 250 240

GRAPHIC SCALE
0 30 60
1" = 60'

LEGEND

- Existing Building
- Existing Steam Tunnel
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 60'	

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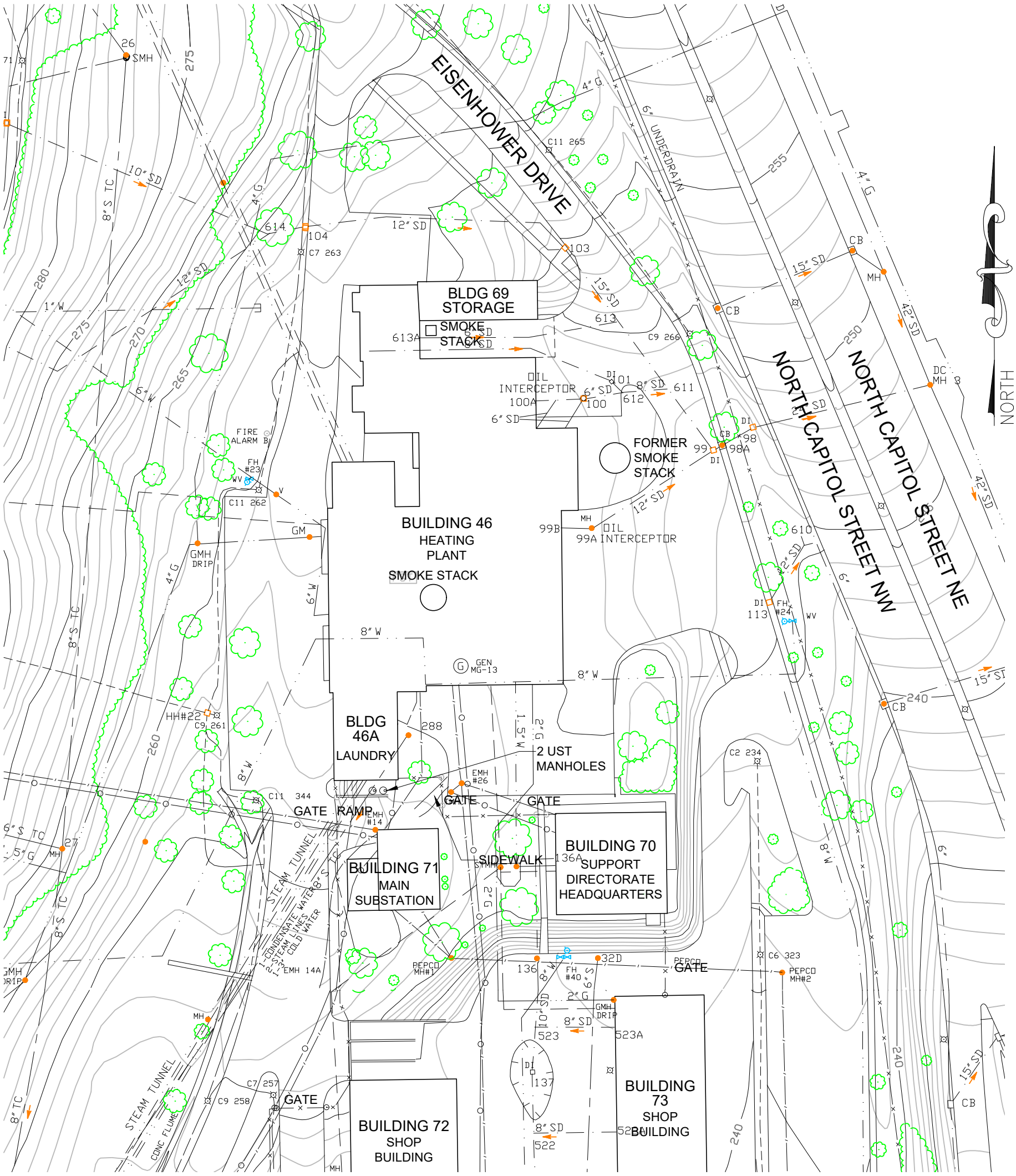
Building 46 Layout Map

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 3



LEGEND

- Existing Building
- Existing Steam Tunnel
- Existing Storm Drain
- Existing Water Line
- Existing Gas Line
- Existing Electric Line
- Existing Telecom Line
- Existing Sanitary Line
- Existing Manhole
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 60'	

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Building 46 Layout Map with Utilities

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
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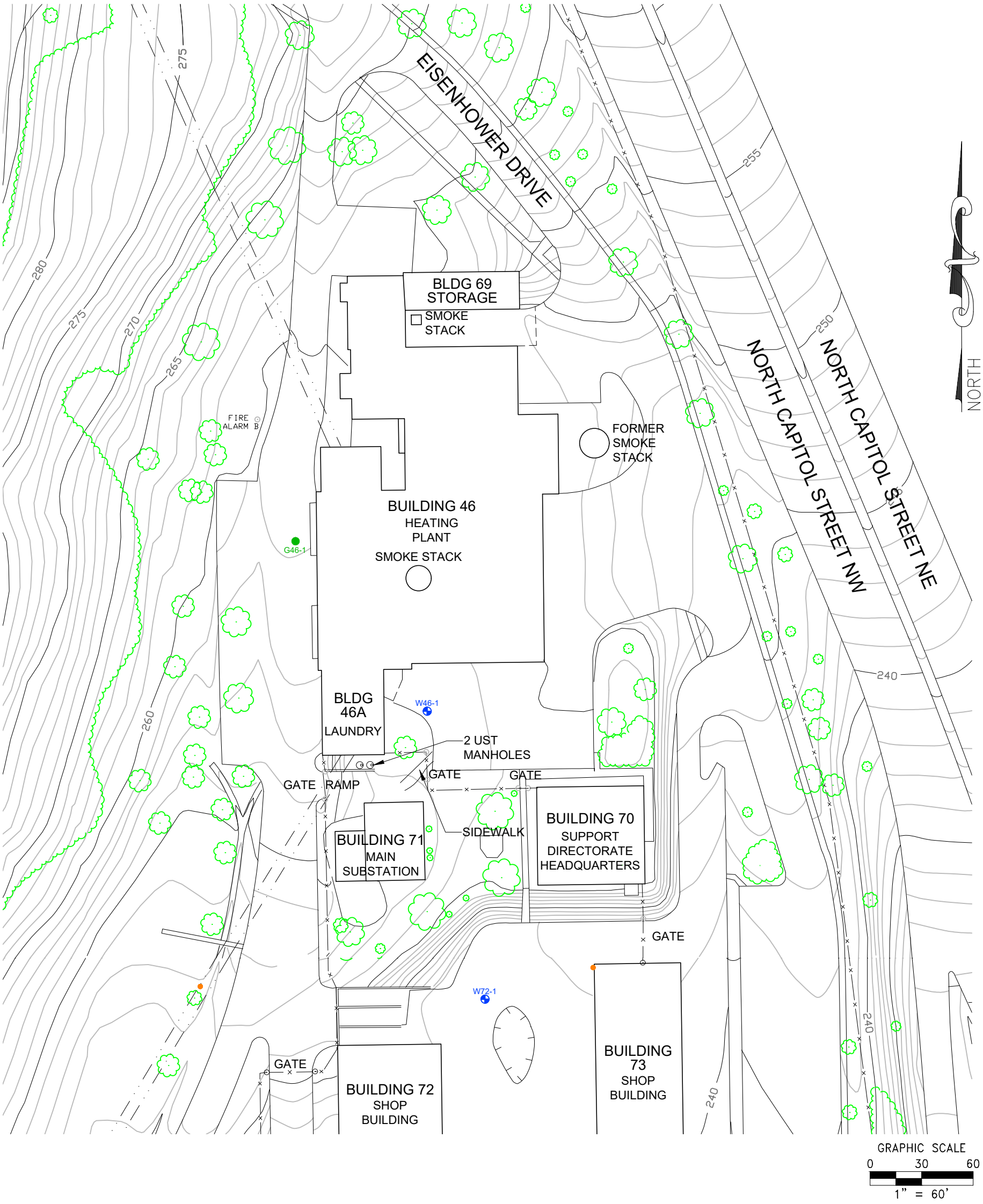
Figure 3A



LEGEND

- Existing Building
- Existing Steam Tunnel
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression
- W72-1 Previously Existing Monitoring Well
- G46-1 MACTEC Soil Boring

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 60'	

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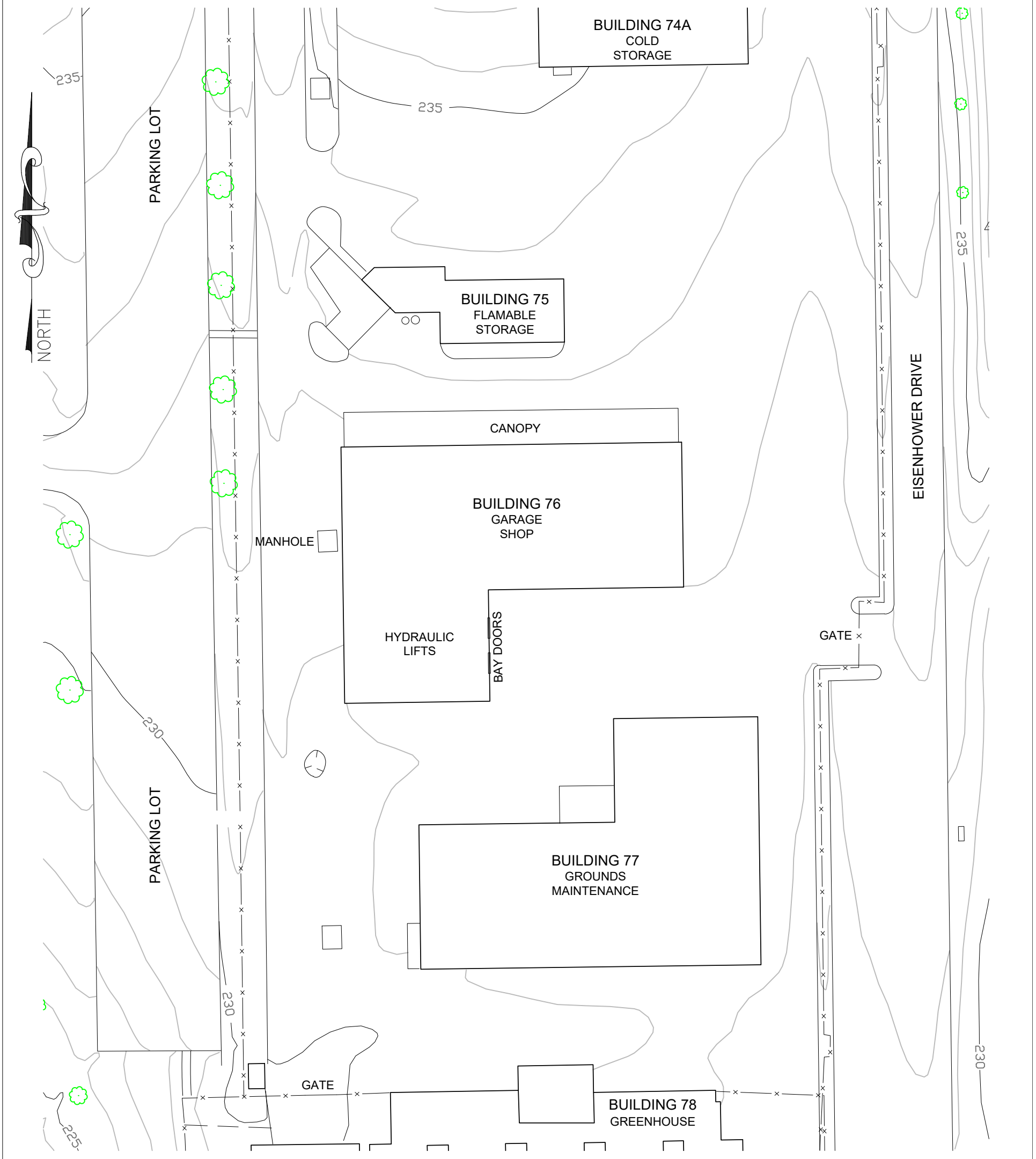
Building 46 Layout Map with MACTEC Locations of Interest

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 3B



LEGEND

- Existing Building
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression

GRAPHIC SCALE
0 25 50
1" = 50'

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 50'	

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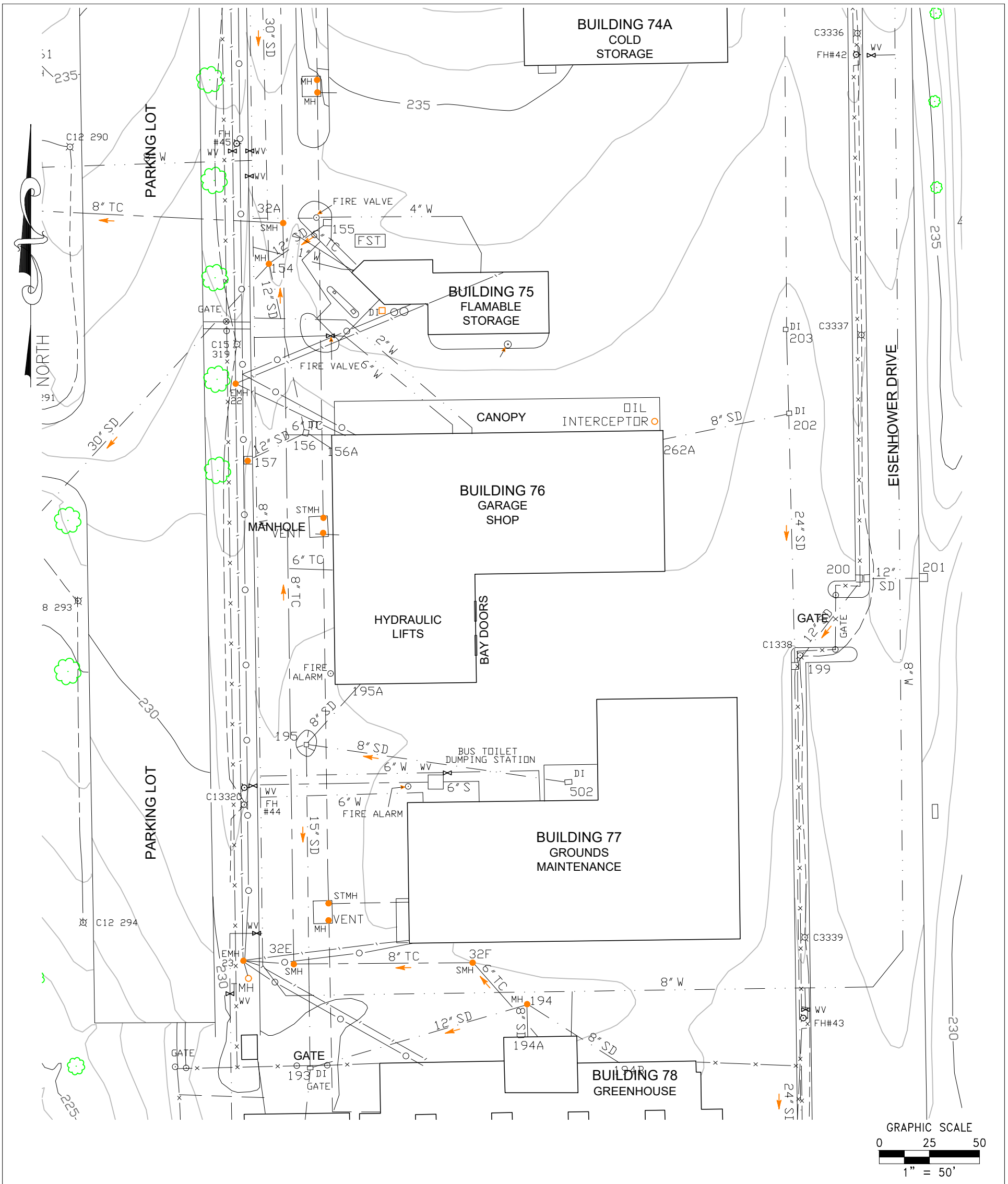
Building 76 Layout Map

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 4



LEGEND

- Existing Building
- Existing Storm Drain
- Existing Water Line
- Existing Gas Line
- Existing Electric Line
- Existing Telecom Line
- Existing Sanitary Line
- Existing Manhole
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 50'	

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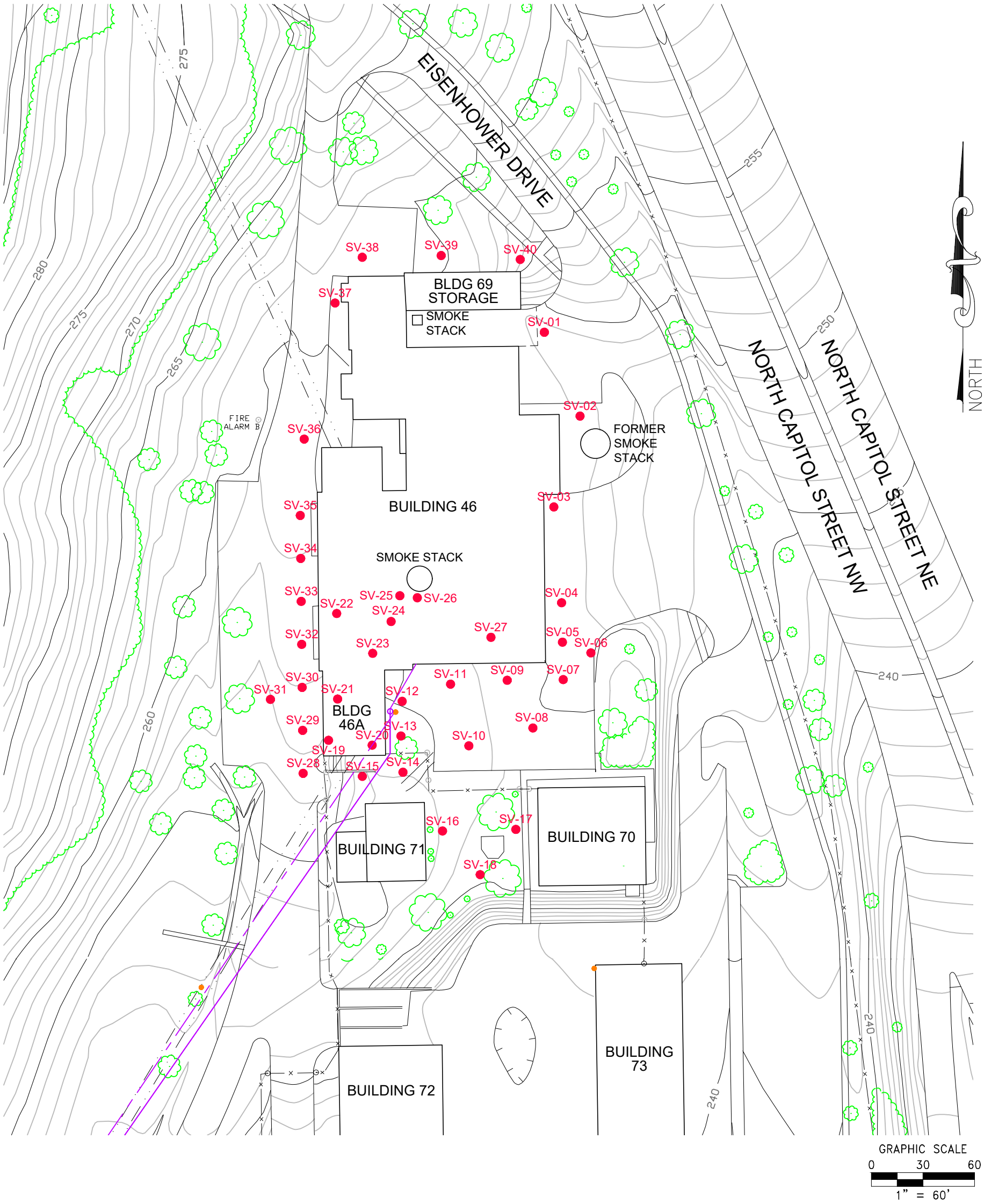
Building 76 Layout Map with Utilities

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 4A



LEGEND

- Existing Building
- Existing Steam Tunnel
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression
- SV-01 Subsurface Vapor Sample Location
- Sanitary Sewer Line (January 1994 Map)
- Existing Manhole (January 1994 Map)
- Sanitary Sewer Line (September 1967 Map)
- Existing Manhole (September 1967 Map)

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 60'	

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Building 46 Passive Subsurface Vapor Sample Location Map

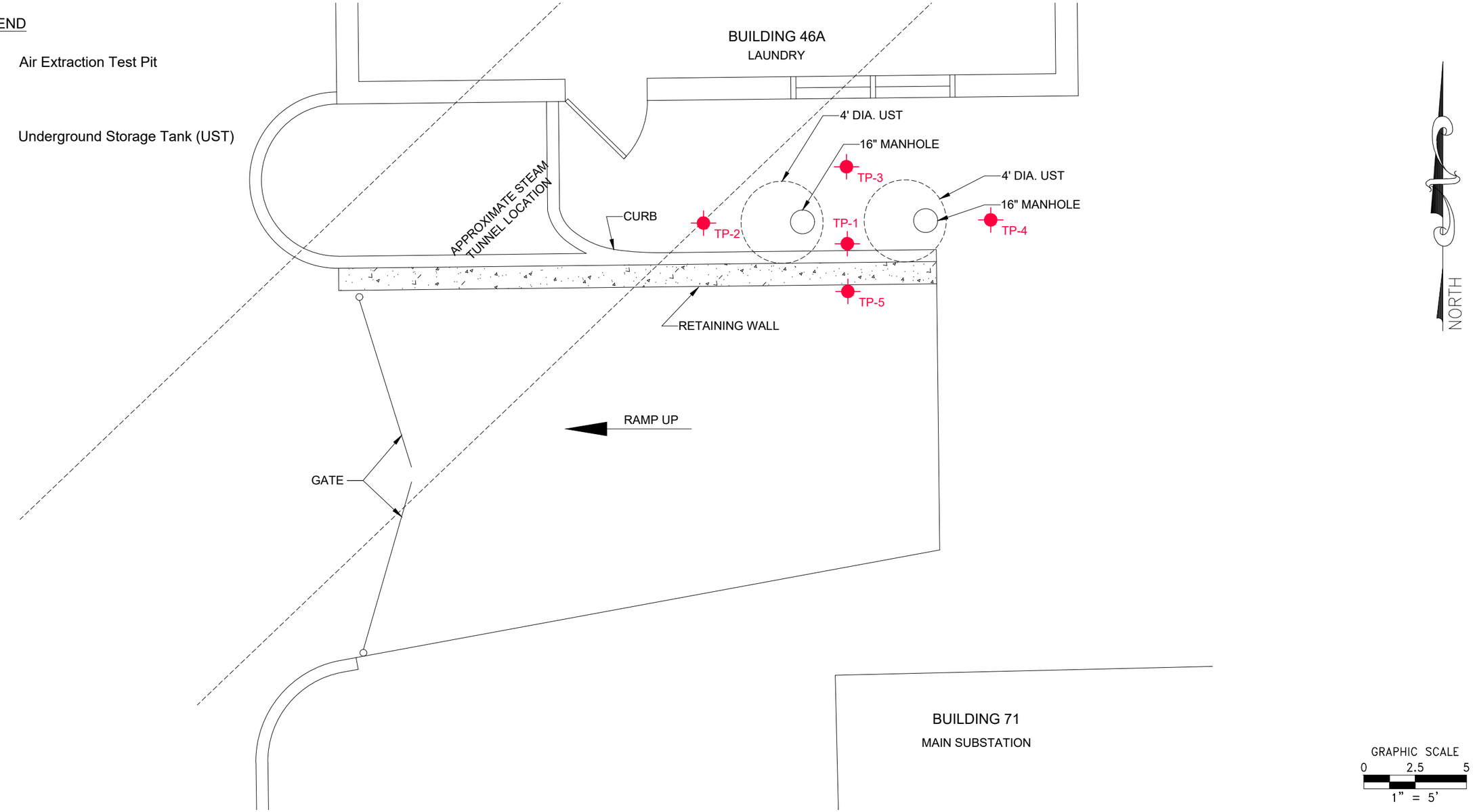
Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 5

LEGEND

TP-1 Air Extraction Test Pit

Underground Storage Tank (UST)



Drawn By:	Date:
Mike Walsh	07/12/2018
Job #:	Proj. Manager:
CG-17-1111	Nancy Love
Scale: 1" = 5'	

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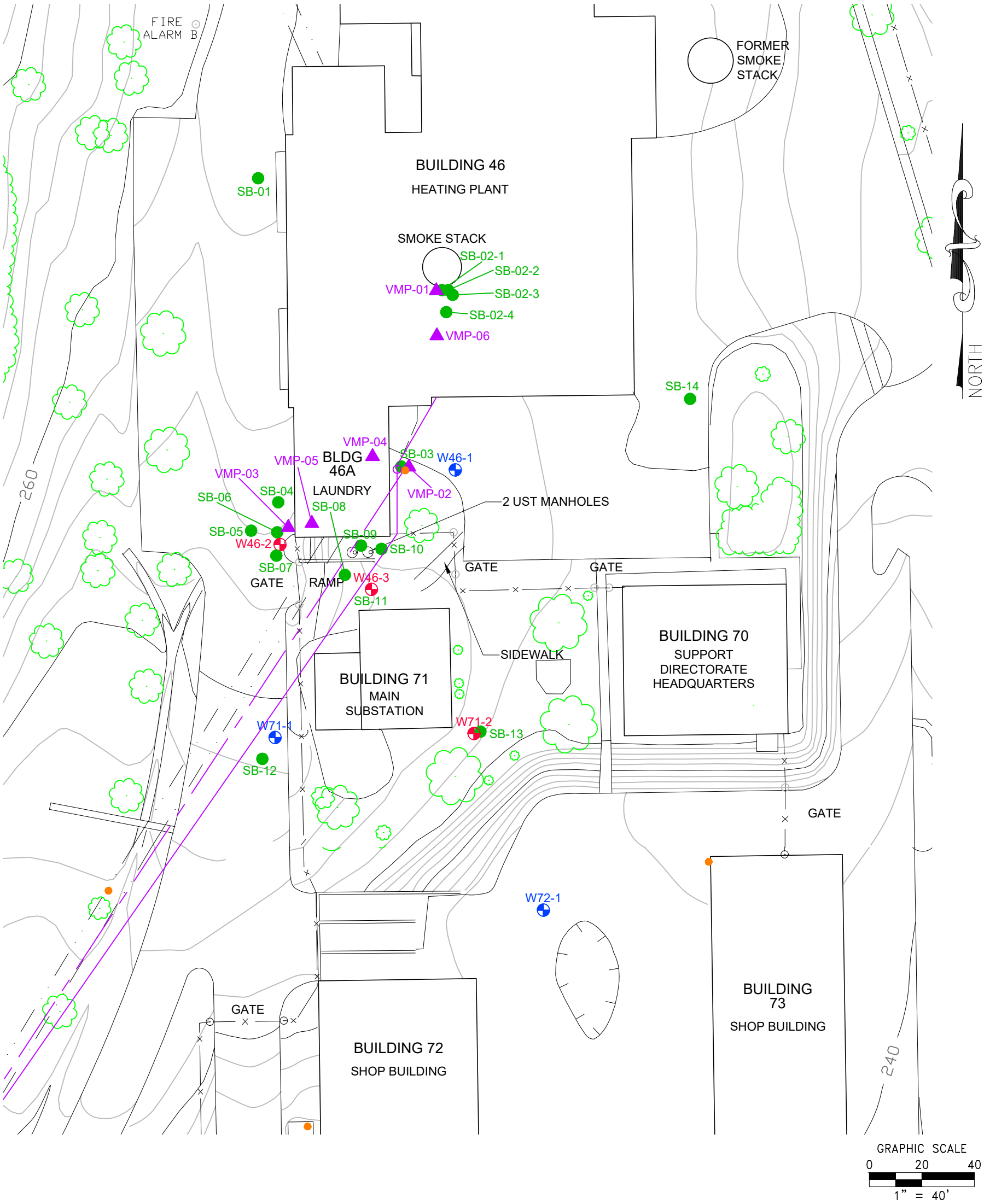
Building 46 Air Extraction Test Pit Location Map

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 6



LEGEND

- Existing Building
- Existing Steam Tunnel
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression
- W72-1 Previously Existing Monitoring Well
- W46-2 / SB-01 Soil Boring and Monitoring Well Location
- SB-02 Soil Boring Location
- VMP-01 Subsurface Vapor Monitoring Point
- Sanitary Sewer Line (January 1994 Map)
- Existing Manhole (January 1994 Map)
- Existing Manhole (September 1967 Map)
- Sanitary Sewer Line (September 1967 Map)

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 40'	

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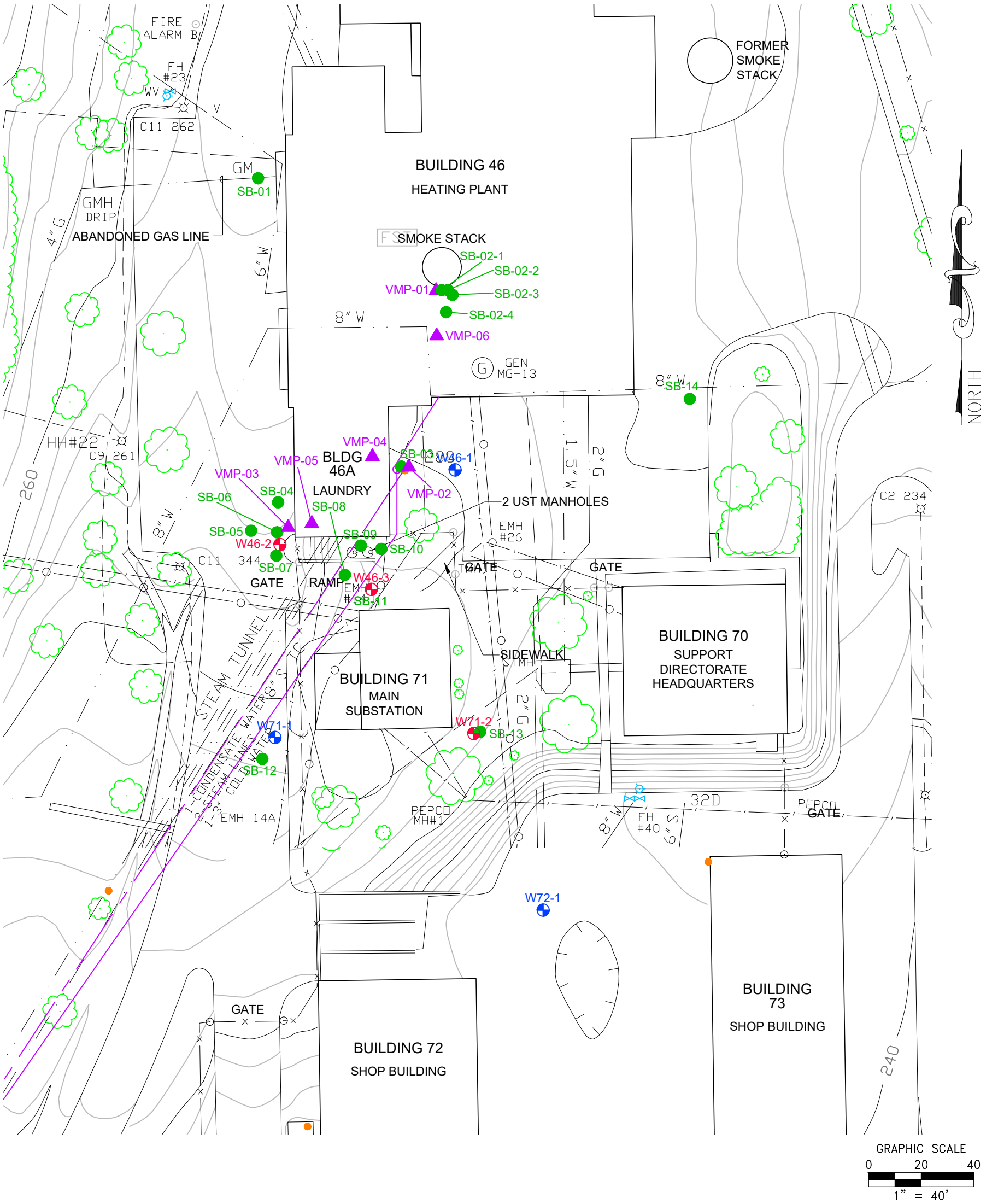
Building 46 Soil Boring, Monitoring Well, and Vapor Monitoring Point Location Map

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 7



LEGEND

- Existing Building
- Existing Steam Tunnel
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Existing Storm Drain
- Existing Water Line
- Existing Gas Line
- Existing Electric Line
- Existing Telecom Line
- Existing Sanitary Line
- Fences
- Topographic Depression
- W72-1 Previously Existing Monitoring Well
- W46-2 / SB-01 Soil Boring and Monitoring Well Location
- SB-02 Soil Boring Location
- VMP-01 Subsurface Vapor Monitoring Point
- Sanitary Sewer Line (January 1994 Map)
- Existing Manhole (January 1994 Map)
- Existing Manhole (September 1967 Map)
- Sanitary Sewer Line (September 1967 Map)

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 40'	

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Building 46 Soil Boring, Monitoring Well, and Vapor Monitoring Point Location Map with Utilities

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 7A

UTILITY MANHOLE

BUILDING 76

GARAGE SHOP

NORTH

SB-76-01

SB-76-02

GLOBE

SB-76-03

HYDRAULIC LIFTS

SB-76-04

SB-76-05

SB-76-06

SB-76-07

231

BAY DOORS

SB-76-08

SB-76-09

SB-76-10

231

GRAPHIC SCALE

0 5 10

1" = 10'

LEGEND

Existing Building

231 Topographic Contour Lines (1' Interval)

Hydraulic Lift System Features

Unidentified Hydraulic Pipes (Cut)

SB-76-01 Soil Boring Location

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 10'	

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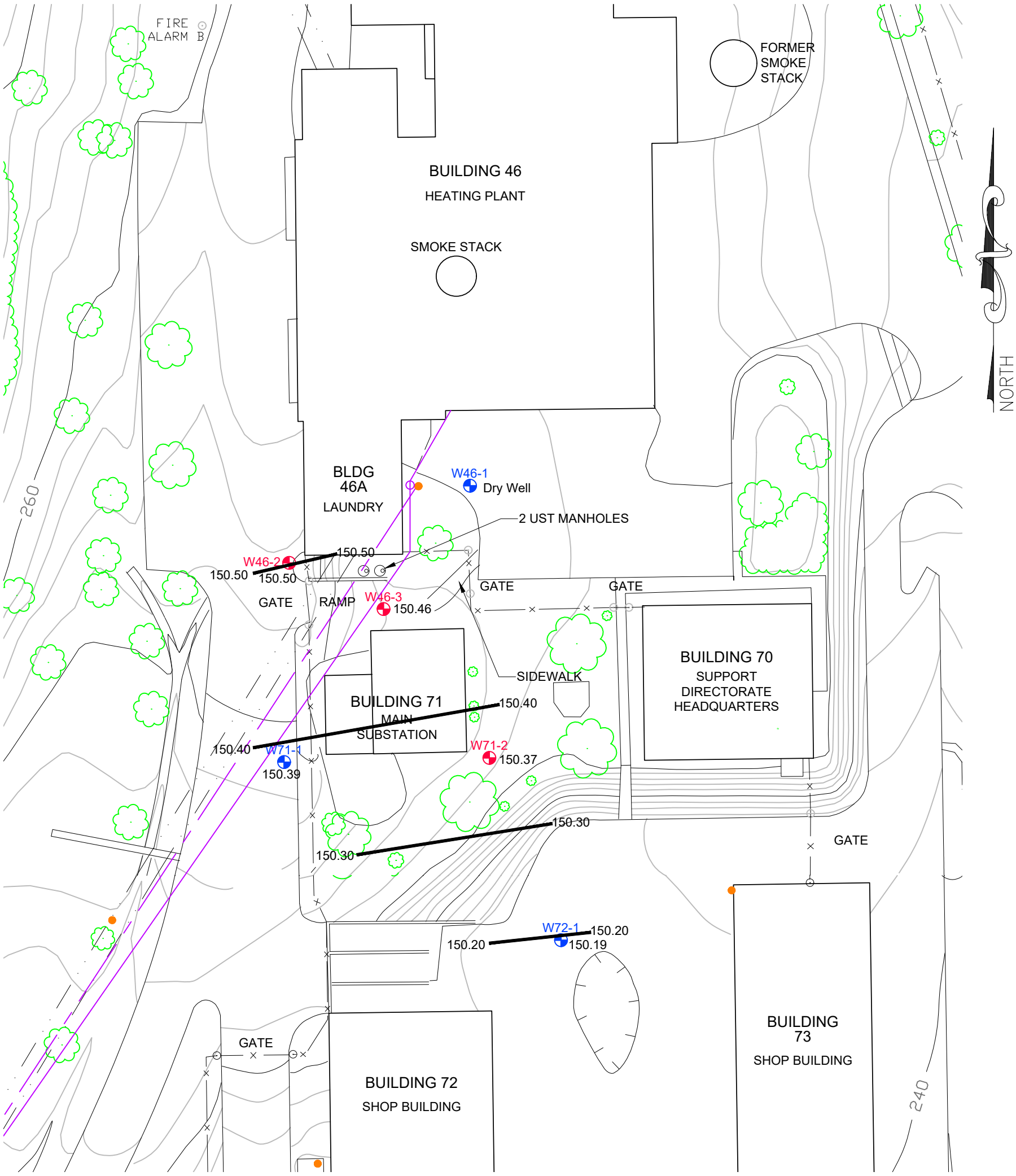
Building 76 Soil Boring Location Map

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 8



LEGEND

- Existing Building
- Existing Steam Tunnel
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression
- W72-1 Previously Existing Monitoring Well
- W46-2 Monitoring Well
- 150.50 Groundwater Elevation (ft ASML) (Gauging Date: June 5, 2018)
- Groundwater Elevation Contour (Dashed where Inferred)
- Sanitary Sewer Line (January 1994 Map)
- Existing Manhole (January 1994 Map)
- Existing Manhole (September 1967 Map)
- Sanitary Sewer Line (September 1967 Map)

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 40'	

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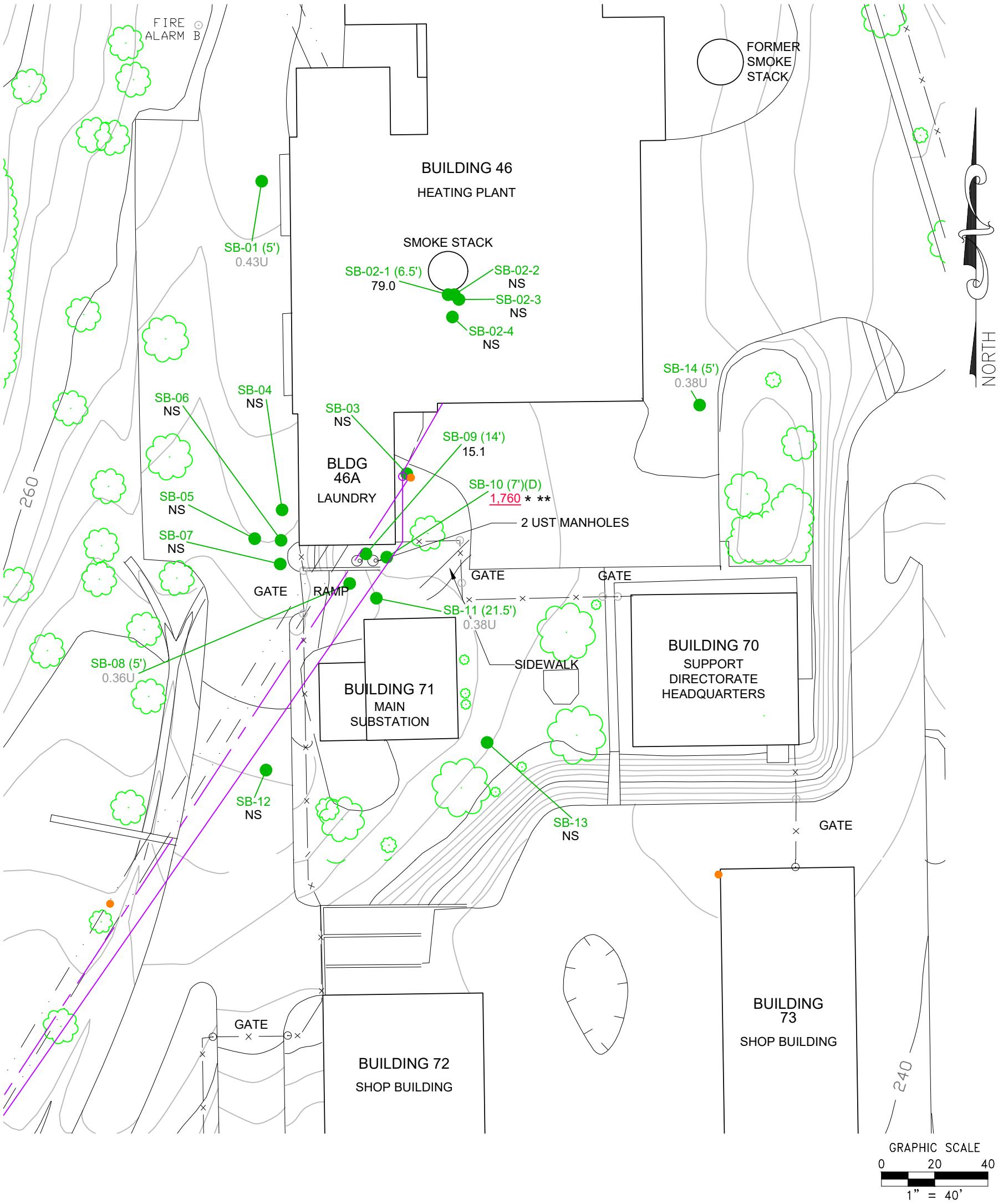
Building 46 Groundwater Contour Map

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 9



LEGEND

Existing Building	SB-01	Soil boring Location	(D) Duplicate Sample Collected - Higher concentration reported.
Existing Steam Tunnel		Sanitary Sewer Line (January 1994 Map)	NS Not Sampled
Topographic Contour Lines (1' Interval)		Existing Manhole (January 1994 Map)	1,760 Detected concentration exceeds the DOEE Tier 0 Soil Standard. (Red, bold, and underlined)
265 Topographic Contour Lines (5' Interval)		Existing Manhole (September 1967 Map)	* Detected concentration also exceeds the DDOE Residential Subsurface Soil Tier 1 RBSL.
Trees and Treelines		Sanitary Sewer Line (September 1967 Map)	** Detected concentration also exceeds the DDOE Commercial Subsurface Soil Tier 1 RBSL.
Fences	TPH-C7-C12	Stoddard Solvent Hydrocarbon Range	
Topographic Depression	15.1	Detected concentration (mg/kg)	
	U	Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone)	

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 40'	

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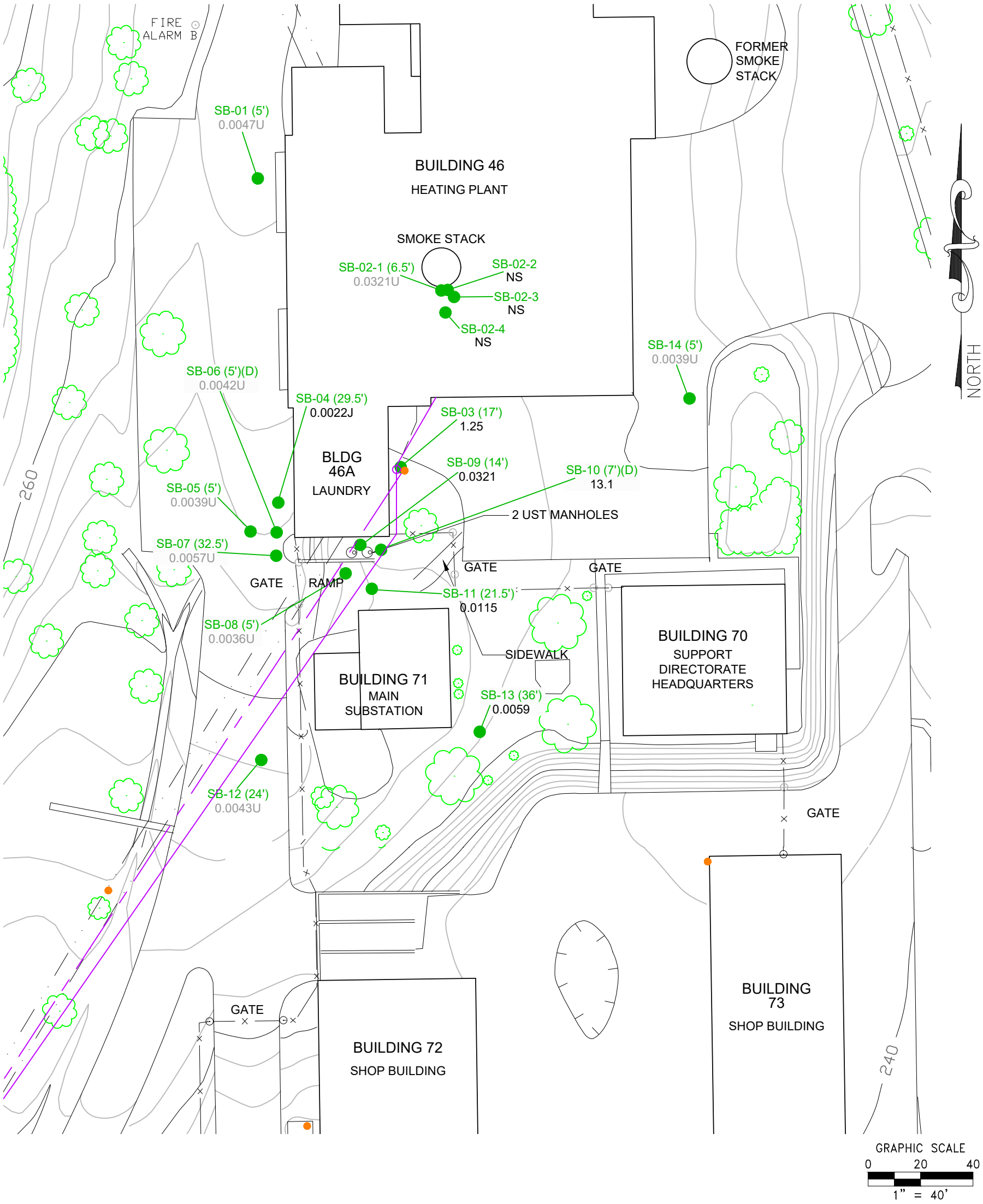
Building 46 Contaminant Distribution Map TPH-C7-C12 in Soil

Armed Forces Retirement Home Additional Phase II Environmental Site Assessment 3700 N Capitol St, NW Washington, DC 20011

Figure 10



LEGEND

Existing Building	Topographic Depression	13.1	Detected concentration (mg/kg)
Existing Steam Tunnel	SB-01 Soil Boring Location	U	Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone)
Topographic Contour Lines (1' Interval)	Sanitary Sewer Line (January 1994 Map)	J	Estimated concentration below the MRL
265 Topographic Contour Lines (5' Interval)	Existing Manhole (January 1994 Map)	(D)	Duplicate Sample Collected - Higher or lower concentration reported.
Trees and Treelines	Existing Manhole (September 1967 Map)	NS	Not Sampled
Fences	Sanitary Sewer Line (September 1967 Map)		
	PCE Tetrachloroethene		

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 40'	

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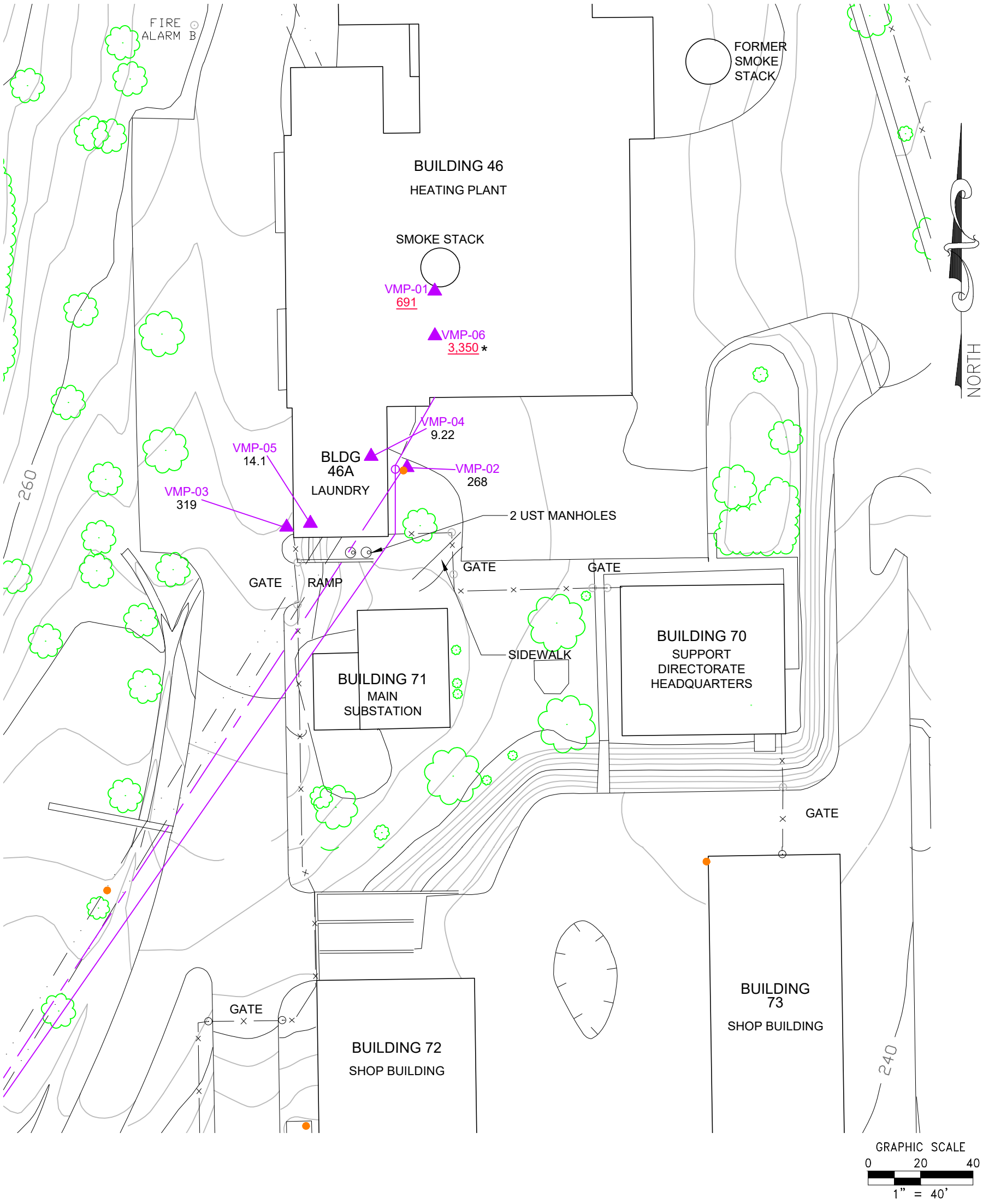
Building 46 Contaminant Distribution Map PCE in Soil

Armed Forces Retirement Home Additional Phase II Environmental Site Assessment 3700 N Capitol St, NW Washington, DC 20011

Figure 11



LEGEND

- Existing Building
- Existing Steam Tunnel
- Topographic Contour Lines (1' Interval)
- 265 Topographic Contour Lines (5' Interval)
- Trees and Treelines
- Fences
- Topographic Depression
- VMP-01 Subsurface Vapor Monitoring Point
- Sanitary Sewer Line (January 1994 Map)
- Existing Manhole (January 1994 Map)
- Existing Manhole (September 1967 Map)
- Sanitary Sewer Line (September 1967 Map)

PCE	Tetrachloroethene
268	Detected concentration (ug/m^3)
3,350	Detected concentration exceeds the EPA Residential Soil Vapor VISL (Red, bold, and underlined)
*	Detected concentration also exceeds the EPA Commercial Soil Vapor VISL

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 40'	

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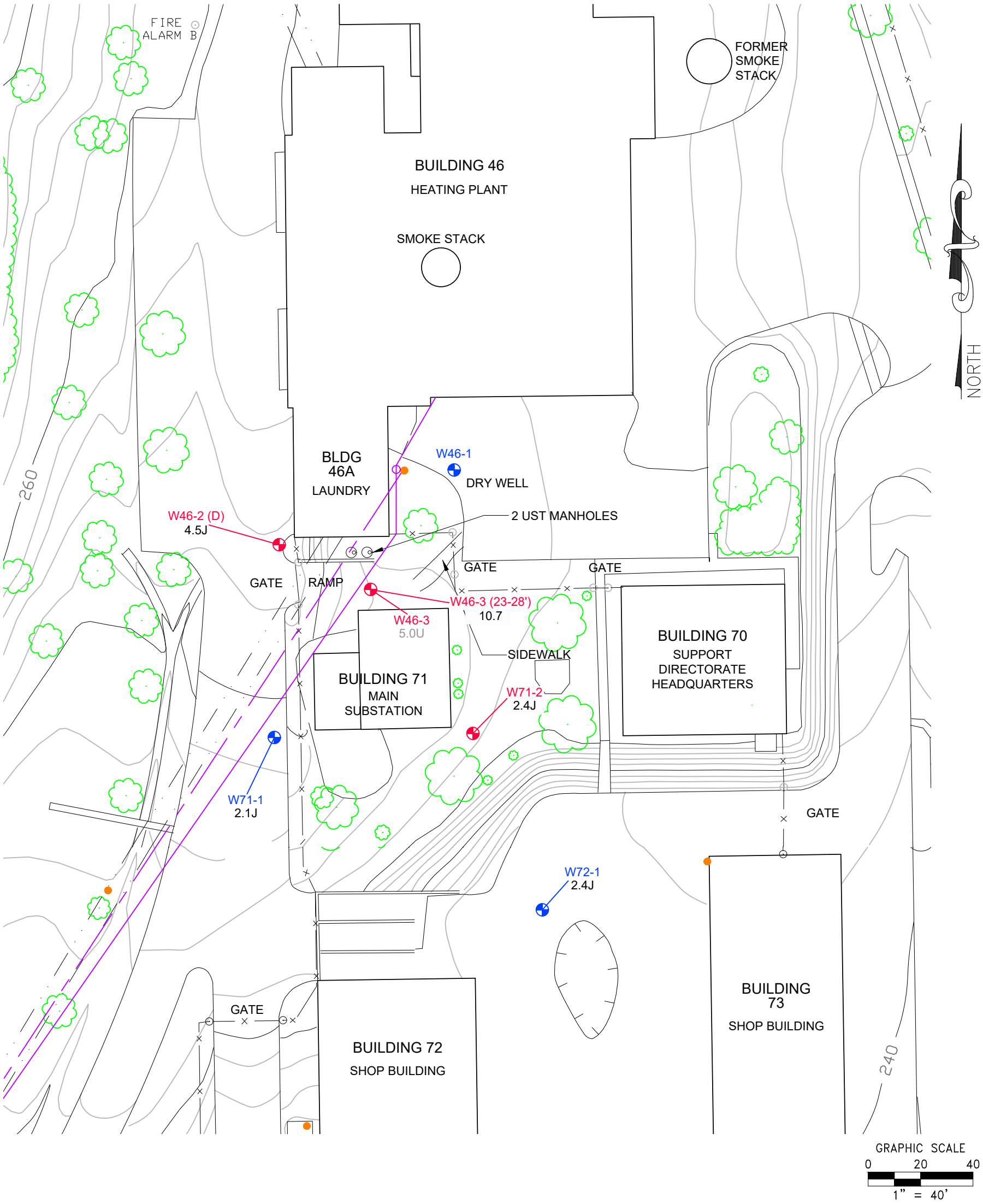
Building 46 Contaminant Distribution Map PCE in Subsurface Vapor

Armed Forces Retirement Home Additional Phase II Environmental Site Assessment 3700 N Capitol St, NW Washington, DC 20011

Figure 12



LEGEND

Existing Building	Topographic Depression	PCE	Tetrachloroethene
Existing Steam Tunnel	W72-1 Previously Existing Monitoring Well	4.5	Detected concentration (ug/L)
Topographic Contour Lines (1' Interval)	W46-2 Monitoring Well Location	U	Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone)
265 Topographic Contour Lines (5' Interval)	Sanitary Sewer Line (January 1994 Map)	J	Estimated concentration below the MRL
Trees and Treelines	Existing Manhole (January 1994 Map)	(D)	Duplicate Sample Collected - Higher concentration reported.
Fences	Existing Manhole (September 1967 Map)		
	Sanitary Sewer Line (September 1967 Map)		

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 40'	

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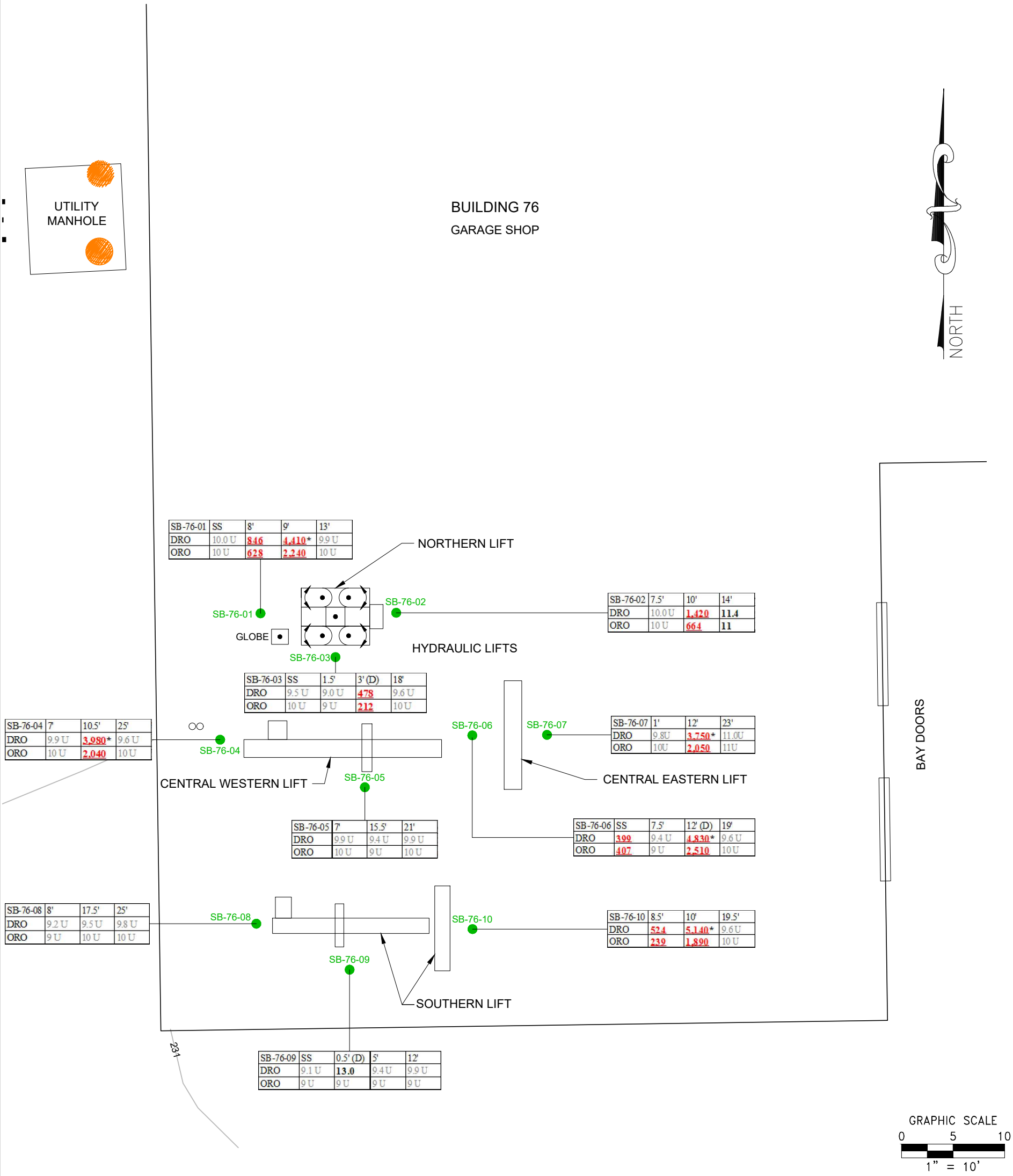
Building 46 Contaminant Distribution Map PCE in Groundwater

Armed Forces Retirement Home Additional Phase II Environmental Site Assessment 3700 N Capitol St, NW Washington, DC 20011

Figure 13



LEGEND

	Existing Building	DRO	Diesel Range Organics	(D)	Duplicate Sample Collected - Higher concentration reported.
231	Topographic Contour Lines (1' Interval)	ORO	Oil Range Organics		
	Hydraulic Lift System Features	11.4	Detected concentration (mg/kg)	1,420	Detected concentration exceeds the DOEE Tier 0 Soil Standard. (Red, bold, and underlined)
	Unidentified Hydraulic Pipes (Cut)	U	Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone)	*	Detected concentration also exceeds the DDOE Residential Subsurface Soil Tier 1 RBSL.
SB-76-01	Soil Boring Location				

Drawn By: Mike Walsh	Date: 07/12/2018
Job #: CG-17-1111	Proj. Manager: Nancy Love
Scale: 1" = 10'	

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Building 76 Contaminant Distribution Map
TPH-DRO and TPH-ORO in Soil

Armed Forces Retirement Home
Additional Phase II Environmental Site Assessment
3700 N Capitol St, NW Washington, DC 20011

Figure 14

TABLES

Table 1
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Groundwater Monitoring Well Construction, Survey, and Gauging Data

Well ID	Date of Installation	Well Construction Data		Survey Data June 13, 2018[1]				Gauging Data June 5, 2018[2]		Calculated Data		
		Approximate Screened Interval (ft BG)	Diameter (in)	Northing	Easting	Elevation at Grade (ft AMSL)	Elevation at TOC MP (ft AMSL)	Depth to Water (ft BTOC)	Total Depth of Well (ft BTOC)	Depth to Water (ft BG)	Total Depth of Well (ft BG)	Groundwater Elevation (ft AMSL)
W46-1	August 2006	24.5-44.5[3]	2	462894.28	1310102.16	251.16	250.45	44.58	45.14	45.29	45.85	Dry Well [4]
W46-2	May 2018	94-114	2	462865.88	1310033.13	257.23	256.71	106.21	113.81	106.73	114.33	150.50
W46-3	May 2018	89-109	2	462847.11	1310067.58	253.16	252.88	102.42	108.40	102.70	108.68	150.46
W71-1	1990	Unknown	2	462791.18	1310032.00	254.60	254.50	104.11	114.09	104.21	114.19	150.39
W71-2	May 2018	93-113	2	462790.93	1310108.86	251.40	250.94	100.57	111.02	101.03	111.48	150.37
W72-1	1990	Unknown	2	462725.69	1310135.49	240.19	240.05	89.86	103.18	90.00	103.32	150.19

Table Notes:

BG - Below Grade
MP - Measuring Point
TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
BTOC - Below TOC

[1] Horizontal Datum is Maryland State Plane NAD83(2011). Vertical Datum is NGVD29. Local benchmarks were established in NAVD88 vertical datum and converted to NGVD29 (NAVD88 + 0.75'). Elevations shown were determined by differential levels from the established benchmarks.

[2] Well Gauging Reference - TOC/MP. Wells were gauged using a water level indicator.

[3] As reported on the MACTEC well log.

[4] Water detected in the well is trapped in the bottom cap of the well.

Table 2
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 46 - UST Contents Sample Laboratory Analytical Data
Detected VOCs, TPH-GRO, and TPH-DRO

VOCs Screening Levels	TPH Screening Level	Analytical Suite	Sample ID	UST-EAST	UST-WEST
			Lab Sample ID	7102016-01	7102016-02
EPA Tapwater RSLs	DDOE Tier 1 RBSL		Sample Collection Date	10/20/17	10/20/17
			Sample Collection Depth (feet BG)	5.5	5.5
			Sample Type	UST Contents	UST Contents
			Dilution Factor (VOCs and TPH)	1	1
(ug/L)	(ug/L)		Analyte Name	Concentration (ug/L)	
5.6E+01	-	VOCs	1,2,4-Trimethylbenzene	**2.5** J	5.0 U
6.0E+01	-		1,3,5-Trimethylbenzene	**2.4** J	5.0 U
-	3.45E+04	TPH	Gasoline-Range Organics	100 U	100 U
-	3.45E+04		Diesel-Range Organics	**310**	200 U

Table Notes:
VOCs Analytical Method: EPA Method 8260B
TPH Analytical Method: EPA Method 8015M
ug/L - micrograms per liter or parts per billion (ppb)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
Bold - Detected analyte concentration

Screening Levels:
EPA Tapwater Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DDOE Tier 1 Risk-Based Screening Level (RBSL) - Protection of Groundwater: Domestic Use of Water (Ingestion and Inhalation) Exposure Pathway (June 2011)

Screening Evaluation Notes:
Red, bold, and underline - Detected analyte concentration exceeds the respective Screening Level. (None on this table.)
Underline - MRL exceeds the respective Screening Level. (None on this table.)

Table 3
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 46 - Tar Base Layer and Soil Sample Laboratory Analytical Data
PAHs

Screening Levels		Sample ID	SB-01 (0.5')	SB-01 (3')	SB-07 (3')
		Lab Sample ID	8042710-01	8042710-02	8042710-03
EPA Residential Soil RSLs	EPA Industrial Soil RSLs	Sample Collection Date	04/23/18	04/23/18	04/24/18
		Sample Collection Depth (feet BG)	0.5	3	3
		Sample Type	Tar Base Layer	Subsurface Soil	Subsurface Soil
		Rationale for Soil Sample Collection Depth	Predetermined depth	Predetermined depth	Predetermined depth
		Soil Sample PID Reading (ppm)	12.3	0	0
		Dilution Factor	20	1	1
(mg/kg)	(mg/kg)	Analyte Name	Concentration (mg/kg)		
3.6E+03	4.5E+04	Acenaphthene	**62.4**	0.298 U	0.321 U
na	na	Acenaphthylene	**34.4** J	0.298 U	0.321 U
1.8E+04	2.3E+05	Anthracene	**194**	0.298 U	0.321 U
1.1E+00	2.1E+01	Benzo[a]anthracene	**237** *	0.298 U	0.321 U
1.1E+00	2.1E+01	Benzo[b]fluoranthene	**223** *	0.298 U	0.321 U
1.1E+01	2.1E+02	Benzo[k]fluoranthene	**77.2**	0.298 U	0.321 U
na	na	Benzo[ghi]perylene	**106**	0.298 U	0.321 U
1.1E-01	2.1E+00	Benzo[a]pyrene	**197** *	0.298 U	0.321 U
1.1E+02	2.1E+03	Chrysene	**220**	0.298 U	0.321 U
1.1E-01	2.1E+00	Dibenzo[a,h]anthracene	**35.5** J *	0.298 U	0.321 U
2.4E+03	3.0E+04	Fluoranthene	**717**	0.298 U	0.321 U
2.4E+03	3.0E+04	Fluorene	**156**	0.298 U	0.321 U
1.1E+00	2.1E+01	Indeno[1,2,3-cd]pyrene	**114** *	0.298 U	0.321 U
2.4E+02	3.0E+03	2-Methylnaphthalene	**105**	0.298 U	0.321 U
3.8E+00	1.7E+01	Naphthalene	**300** *	0.298 U	0.321 U
na	na	Phenanthrene	**749**	0.298 U	0.321 U
1.8E+03	2.3E+04	Pyrene	**387**	0.298 U	0.321 U

Table Notes:
PAH Analytical Method: EPA Method 8270D
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)

Screening Evaluation Notes:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level.
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Table 4
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 46 - Soil Sample Laboratory Analytical Data
Detected VOCs and TPH- C7-C12

VOC Screening Levels		TPH Screening Levels			Analytical Suite	Sample ID	SB-01 (5')	SB-02 1(6.5')	SB-03 (17')	SB-04 (29.5')	SB-05 (5')	SB-06 (5')	SB-06 (5') [SB-D1 (5')]	SB-07 (32.5')
						Lab Sample ID	8043007-01	8051413-01	8043007-02	8043007-03	8043007-04	8043007-05	8043007-09	8043007-06
EPA Residential Soil RSLs	EPA Industrial Soil RSLs	DOEE Tier 0 Soil Standard	DDOE Residential Subsurface Soil Tier 1 RBSL	DDOE Commercial Subsurface Soil Tier 1 RBSL		Sample Collection Date	04/23/18	05/01/18	04/25/18	04/23/18	04/24/18	04/24/18	04/24/18	04/24/18
						Sample Collection Depth (feet BG)	5	6.5	17	29.5	5	5	5	32.5
						Sample Type	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil
						Rationale for Soil Sample Collection Depth	Predetermined depth	High PID	High PID	High PID	Predetermined depth	Predetermined depth	Predetermined depth duplicate	Predetermined depth
						Soil Sample PID Reading (ppm)	0	618.4	20	0.1	0	0	0	0.2
						Dilution Factor (VOCs)	1	5	30.5	1	1	1	1	1
						Dilution Factor (TPH)	1	5	NA	NA	NA	NA	NA	NA
(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		Analyte Name	Concentration (mg/kg)							
3.9E+03	5.8E+04	-	-	-	VOCs	n-Butylbenzene	0.0047 U	**0.0434**	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
7.8E+03	1.2E+05	-	-	-		sec-Butylbenzene	0.0047 U	**0.0622**	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
7.7E+02	3.5E+03	-	-	-		Carbon disulfide	0.0047 U	0.0321 U	0.182 U	**0.0016** J	0.0039 U	0.0042 U	0.0044 U	0.0057 U
2.6E+00	1.1E+01	-	-	-		1,4-Dichlorobenzene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
1.6E+02	2.3E+03	-	-	-		cis-1,2-Dichloroethene	0.0047 U	0.0321 U	**0.613**	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
5.8E+00	2.5E+01	-	-	-		Ethylbenzene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
na	na	-	-	-		4-Isopropyltoluene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
3.8E+00	1.7E+01	-	-	-		Naphthalene	0.0047 U	0.0321 U	0.182 U	**0.0161**	**0.0473**	**0.0189**	0.0044 U	**0.146**
2.4E+01	1.0E+02	-	-	-		Tetrachloroethene	0.0047 U	0.0321 U	**1.25**	**0.0022** J	0.0039 U	0.0042 U	0.0044 U	0.0057 U
4.9E+03	4.7E+04	-	-	-		Toluene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
6.3E+01	9.3E+02	-	-	-		1,2,3-Trichlorobenzene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
2.4E+01	1.1E+02	-	-	-		1,2,4-Trichlorobenzene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
9.4E-01	6.0E+00	-	-	-		Trichloroethene	0.0047 U	0.0321 U	**0.0857** J	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
3.0E+02	1.8E+03	-	-	-		1,2,4-Trimethylbenzene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
6.5E+02	2.8E+03	-	-	-		o-Xylene	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
5.8E+02	2.5E+03	-	-	-		m- & p-Xylenes	0.0047 U	0.0321 U	0.182 U	0.0040 U	0.0039 U	0.0042 U	0.0044 U	0.0057 U
-	-	1.00E+02	5.44E+01	3.76E+02	TPH	C7-C12	0.43 U	**79.0**	NA	NA	NA	NA	NA	NA

Table Notes:
VOCs Analytical Method: EPA Method 8260B
TPH Analytical Method: EPA Method 8015M
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011) for gasoline range organics (GRO)
DDOE GRO Residential Subsurface Soil Tier 1 Risk-Based Screening Level (RBSL) - Resident Adult - Indoor Inhalation Exposure Pathway (June 2011)
DDOE GRO Commercial Subsurface Soil Tier 1 RBSL for TPH-GRO - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for VOCs:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level.
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level. (None on this table.)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard.
* - Detected analyte concentration also exceeds the DDOE Residential Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Subsurface Soil Tier 1 RBSL.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
m- & p-Xylenes	Total Xylenes	na for this table

Table 4
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 46 - Soil Sample Laboratory Analytical Data
Detected VOCs and TPH- C7-C12

VOC Screening Levels		TPH Screening Levels			Analytical Suite	Sample ID	SB-08 (5')	SB-09 (14')	SB-10 (7')	SB-10 (7') [SB-D2]	SB-11 (21.5')	SB-12 (24')	SB-13 (36')	SB-14 (5')
						Lab Sample ID	8050315-02	8050107-01	8050107-02	8050107-04	8050315-03	8043007-07	8043007-08	8050107-03
EPA Residential Soil RSLs	EPA Industrial Soil RSLs	DOEE Tier 0 Soil Standard	DDOE Residential Subsurface Soil Tier 1 RBSL	DDOE Commercial Subsurface Soil Tier 1 RBSL		Sample Collection Date	05/01/18	04/26/18	04/26/18	04/26/18	05/01/18	04/25/18	04/25/18	04/26/18
						Sample Collection Depth (feet BG)	5	14	7	7	21.5	24	36	5
						Sample Type	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil
						Rationale for Soil Sample Collection Depth	High PID	High PID	High PID	High PID Duplicate	High PID	Above perched groundwater zone	High PID	Predetermined depth
						Soil Sample PID Reading (ppm)	9.9	59.2	603.3	603.3	0.6	0	0.3	0
						Dilution Factor (VOCs)	1	1	562	65.8	1	1	1	1
						Dilution Factor (TPH)	1	1	28.1	32.9	1	NA	NA	1
(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		Analyte Name	Concentration (mg/kg)							
3.9E+03	5.8E+04	-	-	-		n-Butylbenzene	0.0036 U	0.0041 U	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
7.8E+03	1.2E+05	-	-	-		sec-Butylbenzene	0.0036 U	**0.0058**	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
7.7E+02	3.5E+03	-	-	-		Carbon disulfide	0.0036 U	0.0041 U	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
2.6E+00	1.1E+01	-	-	-		1,4-Dichlorobenzene	0.0036 U	0.0041 U	3.16 U	**5.55**	0.0037 U	0.0043 U	0.0040 U	0.0039 U
1.6E+02	2.3E+03	-	-	-		cis-1,2-Dichloroethene	0.0036 U	**0.0075**	3.16 U	0.370 U	**0.0035** J	0.0043 U	0.0040 U	0.0039 U
5.8E+00	2.5E+01	-	-	-		Ethylbenzene	**0.0020** J	0.0041 U	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
na	na	-	-	-		4-Isopropyltoluene	0.0036 U	0.0041 U	3.16 U	**0.849**	0.0037 U	0.0043 U	0.0040 U	0.0039 U
3.8E+00	1.7E+01	-	-	-		Naphthalene	0.0036 U	0.0041 U	3.16 U	0.370 U	0.0037 U	**0.0087**	0.0040 U	0.0039 U
2.4E+01	1.0E+02	-	-	-	VOCs	Tetrachloroethene	0.0036 U	**0.0321**	**13.1**	0.370 U	**0.0115**	0.0043 U	**0.0059**	0.0039 U
4.9E+03	4.7E+04	-	-	-		Toluene	**0.0017** J	0.0041 U	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
6.3E+01	9.3E+02	-	-	-		1,2,3-Trichlorobenzene	0.0036 U	0.0041 U	**19.5**	**0.336** J	0.0037 U	0.0043 U	0.0040 U	0.0039 U
2.4E+01	1.1E+02	-	-	-		1,2,4-Trichlorobenzene	0.0036 U	**0.0033** J	**86.8**	**0.654**	0.0037 U	0.0043 U	0.0040 U	0.0039 U
9.4E-01	6.0E+00	-	-	-		Trichloroethene	0.0036 U	0.0041 U	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
3.0E+02	1.8E+03	-	-	-		1,2,4-Trimethylbenzene	0.0036 U	0.0041 U	3.16 U	**0.410**	0.0037 U	0.0043 U	0.0040 U	0.0039 U
6.5E+02	2.8E+03	-	-	-		o-Xylene	**0.0033** J	0.0041 U	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
5.8E+02	2.5E+03	-	-	-		m- & p-Xylenes	**0.0084**	0.0041 U	3.16 U	0.370 U	0.0037 U	0.0043 U	0.0040 U	0.0039 U
-	-	1.00E+02	5.44E+01	3.76E+02	TPH	C7-C12	0.36 U	**15.1**	**1,760** * **	**566** * **	0.38 U	NA	NA	0.38 U

Table Notes:
VOCs Analytical Method: EPA Method 8260B
TPH Analytical Method: EPA Method 8015M
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011) for gasoline range organics (GRO)
DDOE GRO Residential Subsurface Soil Tier 1 Risk-Based Screening Level (RBSL) - Resident Adult - Indoor Inhalation Exposure Pathway (June 2011)
DDOE GRO Commercial Subsurface Soil Tier 1 RBSL for TPH-GRO - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for VOCs:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level.
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level. (None on this table.)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard.
* - Detected analyte concentration also exceeds the DDOE Residential Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Subsurface Soil Tier 1 RBSL.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
m- & p-Xylenes	Total Xylenes	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-01 (SS)	SB-76-01 (8'-TOP)	SB-76-01 (9')	SB-76-01 (13'-BTM)
								Lab Sample ID	**8043008-01**	**8043008-02**	**8043008-03**	**8043008-04**
EPA Residential Soil RSLs	**EPA Industrial Soil RSLs**	**DOEE Tier 0 Soil Standards**	**DDOE Residential Surface Soil Tier 1 RBSLs**	**DDOE Residential Subsurface Soil Tier 1 RBSLs**	**DDOE Commercial Surface Soil Tier 1 RBSLs**	**DDOE Commercial Subsurface Soil Tier 1 RBSLs**		**Sample Collection Date**	**04/27/18**	**04/27/18**	**04/27/18**	**04/27/18**
								Sample Collection Depth (feet BG)	**0**	**8**	**9**	**13**
								Sample Type	**Surface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**
								Rationale for Soil Sample Collection Depth	**SS**	**Top**	**High PID**	**Bottom**
								Soil Sample PID Reading (ppm)	**0**	**0**	**33.9**	**0**
								Dilution Factor (TPH)	**1**	**5**	**20**	**1**
								Dilution Factor (PAHs and PCBs)	**1**	**NA**	**NA**	**NA**
								Dilution Factor (Metals)	**NA**	**NA**	**2**	**NA**
(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**		**Analyte Name**	**Concentration (mg/kg)**			
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	10.0 U	**846**	**4,410** *	9.9 U
-	-	1.00E+02	2.02E+05	na	1.78E+06	na	TPH	Oil-Range Organics C28-C36	10 U	**628**	**2,240**	10 U
various	various	-	-	-	-	-	PAHs	All PAHs	ND	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	ND	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	NA	NA	**3.34** *	NA
1.5E+04	2.2E+05	-	-	-	-	-	Metals	Barium	NA	NA	**166**	NA
1.2E+05	1.8E+06	-	-	-	-	-	Metals	Chromium	NA	NA	**30.6**	NA
4.0E+02	8.0E+02	-	-	-	-	-	Metals	Lead	NA	NA	**14.3**	NA
3.9E+02	5.8E+03	-	-	-	-	-	Metals	Selenium	NA	NA	**2.21**	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	**EPA RSL**	**DDOE RBSL**
Chromium	Trivalent Chromium	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-02 (7.5'-TOP))	SB-76-02 (10')	SB-76-02 (14'-BTM)
								Lab Sample ID	**8043008-05**	**8043008-06**	**8043008-07**
EPA Residential Soil RSLs	**EPA Industrial Soil RSLs**	**DOEE Tier 0 Soil Standards**	**DDOE Residential Surface Soil Tier 1 RBSLs**	**DDOE Residential Subsurface Soil Tier 1 RBSLs**	**DDOE Commercial Surface Soil Tier 1 RBSLs**	**DDOE Commercial Subsurface Soil Tier 1 RBSLs**		**Sample Collection Date**	**04/27/18**	**04/27/18**	**04/27/18**
								Sample Collection Depth (feet BG)	**7.5**	**10**	**14**
								Sample Type	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**
								Rationale for Soil Sample Collection Depth	**Top**	**High PID**	**Bottom**
								Soil Sample PID Reading (ppm)	**0**	**22.4**	**0**
								Dilution Factor (TPH)	**1**	**10**	**1**
								Dilution Factor (PAHs and PCBs)	**NA**	**NA**	**NA**
								Dilution Factor (Metals)	**NA**	**2**	**NA**
(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**		**Analyte Name**	**Concentration (mg/kg)**		
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	10.0 U	**1,420**	**11.4**
-	-	1.00E+02	2.02E+05	na	1.78E+06	na		Oil-Range Organics C28-C36	10 U	**664**	**11**
various	various	-	-	-	-	-	PAHs	All PAHs	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	NA	**2.46**	NA
1.5E+04	2.2E+05	-	-	-	-	-		Barium	NA	**32.5**	NA
1.2E+05	1.8E+06	-	-	-	-	-		Chromium	NA	**21.4**	NA
4.0E+02	8.0E+02	-	-	-	-	-		Lead	NA	**8.84**	NA
3.9E+02	5.8E+03	-	-	-	-	-		Selenium	NA	**2.69**	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	**EPA RSL**	**DDOE RBSL**
Chromium	Trivalent Chromium	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-03 (SS)	SB-76-03 (1.5'-TOP)	SB-76-03 (3')	SB-76-03 (3') [SB-76-D1]	SB-76-03 (18'-btm)
								Lab Sample ID	**8043008-08**	**8043008-09**	**8043008-10**	**8043008-12**	**8043008-11**
								Sample Collection Date	**04/27/18**	**04/27/18**	**04/27/18**	**04/27/18**	**04/27/18**
								Sample Collection Depth (feet BG)	**0**	**1.5**	**3**	**3**	**18**
								Sample Type	**Surface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**
								Rationale for Soil Sample Collection Depth	**SS**	**Top**	**High PID**	**High PID Duplicate**	**Bottom**
								Soil Sample PID Reading (ppm)	**0**	**0**	**75.5**	**75.5**	**3**
								Dilution Factor (TPH)	**1**	**1**	**3**	**2**	**1**
								Dilution Factor (PAHs and PCBs)	**1**	**NA**	**NA**	**NA**	**NA**
								Dilution Factor (Metals)	**NA**	**NA**	**2**	**NA**	**NA**
EPA Residential Soil RSLs	**EPA Industrial Soil RSLs**	**DOEE Tier 0 Soil Standards**	**DDOE Residential Surface Soil Tier 1 RBSLs**	**DDOE Residential Subsurface Soil Tier 1 RBSLs**	**DDOE Commercial Surface Soil Tier 1 RBSLs**	**DDOE Commercial Subsurface Soil Tier 1 RBSLs**		**Analyte Name**	**Concentration (mg/kg)**				
(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**							
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	9.5 U	9.0 U	**478**	**324**	9.6 U
-	-	1.00E+02	2.02E+05	na	1.78E+06	na	TPH	Oil-Range Organics C28-C36	10 U	9 U	**212**	**146**	10 U
various	various	-	-	-	-	-	PAHs	All PAHs	ND	NA	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	ND	NA	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	NA	NA	**7.80** *	NA	NA
1.5E+04	2.2E+05	-	-	-	-	-	Metals	Barium	NA	NA	**76.8**	NA	NA
1.2E+05	1.8E+06	-	-	-	-	-	Metals	Chromium	NA	NA	**24.0**	NA	NA
4.0E+02	8.0E+02	-	-	-	-	-	Metals	Lead	NA	NA	**8.40**	NA	NA
3.9E+02	5.8E+03	-	-	-	-	-	Metals	Selenium	NA	NA	**2.91**	NA	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	**EPA RSL**	**DDOE RBSL**
Chromium	Trivalent Chromium	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-04 (7')	SB-76-04 (10.5')	SB-76-04 (25')	SB-76-05 (7')	SB-76-05 (15.5')	SB-76-05 (21')
								Lab Sample ID	8050317-04	8050317-05	8050317-06	8050317-07	8050317-08	8050317-09
EPA Residential Soil RSLs	EPA Industrial Soil RSLs	DOEE Tier 0 Soil Standards	DDOE Residential Surface Soil Tier 1 RBSLs	DDOE Residential Subsurface Soil Tier 1 RBSLs	DDOE Commercial Surface Soil Tier 1 RBSLs	DDOE Commercial Subsurface Soil Tier 1 RBSLs		Sample Collection Date	04/30/18	04/30/18	04/30/18	04/30/18	04/30/18	04/30/18
								Sample Collection Depth (feet BG)	7	10.5	25	7	15.5	21
								Sample Type	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil
								Rationale for Soil Sample Collection Depth	Top	High PID	Bottom of boring	Top	High PID	Bottom
								Soil Sample PID Reading (ppm)	0	13.9	12.9	0	92.6	0.1
								Dilution Factor (TPH)	1	100	1	1	1	1
								Dilution Factor (PAHs and PCBs)	NA	NA	NA	NA	NA	NA
								Dilution Factor (Metals)	NA	2	NA	NA	2	NA
(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		Analyte Name	Concentration (mg/kg)					
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	9.9 U	**3,980** *	9.6 U	9.9 U	9.4 U	9.9 U
-	-	1.00E+02	2.02E+05	na	1.78E+06	na	TPH	Oil-Range Organics C28-C36	10 U	**2,040**	10 U	10 U	9 U	10 U
various	various	-	-	-	-	-	PAHs	All PAHs	NA	NA	NA	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	NA	NA	NA	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	NA	**4.34** *	NA	NA	**0.857**	NA
1.5E+04	2.2E+05	-	-	-	-	-	Metals	Barium	NA	**43.1**	NA	NA	**9.85**	NA
1.2E+05	1.8E+06	-	-	-	-	-	Metals	Chromium	NA	**41.4**	NA	NA	**6.33**	NA
4.0E+02	8.0E+02	-	-	-	-	-	Metals	Lead	NA	**8.04**	NA	NA	**2.53**	NA
3.9E+02	5.8E+03	-	-	-	-	-	Metals	Selenium	NA	**1.60**	NA	NA	**0.651**	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
Chromium	Trivalent Chromium	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-06 (SS)	SB-76-06 (7.5')	SB-76-06 (12')	SB-76-06 (12') [SB-76-D2]	SB-76-06 (19')
								Lab Sample ID	**8050317-11**	**8050317-10**	**8050317-12**	**8050317-17**	**8050317-13**
								Sample Collection Date	**04/30/18**	**04/30/18**	**04/30/18**	**04/30/18**	**04/30/18**
								Sample Collection Depth (feet BG)	**0**	**7.5**	**12**	**12**	**19**
								Sample Type	**Surface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**	**Subsurface Soil**
								Rationale for Soil Sample Collection Depth	**SS**	**Top**	**High PID**	**High PID Duplicate**	**Bottom**
								Soil Sample PID Reading (ppm)	**0**	**0**	**34.6**	**34.6**	**0.8**
								Dilution Factor (TPH)	**5**	**1**	**100**	**100**	**1**
								Dilution Factor (PAHs and PCBs)	**1**	**NA**	**NA**	**NA**	**NA**
								Dilution Factor (Metals)	**NA**	**NA**	**2**	**NA**	**NA**
EPA Residential Soil RSLs	**EPA Industrial Soil RSLs**	**DOEE Tier 0 Soil Standards**	**DDOE Residential Surface Soil Tier 1 RBSLs**	**DDOE Residential Subsurface Soil Tier 1 RBSLs**	**DDOE Commercial Surface Soil Tier 1 RBLSs**	**DDOE Commercial Subsurface Soil Tier 1 RBLSs**							
(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**		**Analyte Name**	**Concentration (mg/kg)**				
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	**399**	9.4 U	**4,550** *	**4,830** *	9.6 U
-	-	1.00E+02	2.02E+05	na	1.78E+06	na	TPH	Oil-Range Organics C28-C36	**407**	9 U	**2,330**	**2,510**	10 U
various	various	-	-	-	-	-	PAHs	All PAHs	ND	NA	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	ND	NA	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	NA	NA	**1.96**	NA	NA
1.5E+04	2.2E+05	-	-	-	-	-	Metals	Barium	NA	NA	**57.4**	NA	NA
1.2E+05	1.8E+06	-	-	-	-	-	Metals	Chromium	NA	NA	**17.7**	NA	NA
4.0E+02	8.0E+02	-	-	-	-	-	Metals	Lead	NA	NA	**7.91**	NA	NA
3.9E+02	5.8E+03	-	-	-	-	-	Metals	Selenium	NA	NA	**2.02**	NA	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
Chromium	Trivalent Chromium	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-07 (1')	SB-76-07 (12')	SB-76-07 (23')	SB-76-08 (8')	SB-76-08 (17.5')	SB-76-08 (25')
								Lab Sample ID	8050317-14	8050317-15	8050317-16	8050317-01	8050317-02	8050317-03
EPA Residential Soil RSLs	EPA Industrial Soil RSLs	DOEE Tier 0 Soil Standards	DDOE Residential Surface Soil Tier 1 RBSLs	DDOE Residential Subsurface Soil Tier 1 RBSLs	DDOE Commercial Surface Soil Tier 1 RBSLs	DDOE Commercial Subsurface Soil Tier 1 RBSLs		Sample Collection Date	04/30/18	04/30/18	04/30/18	04/30/18	04/30/18	04/30/18
								Sample Collection Depth (feet BG)	1	12	23	8	17.5	25
								Sample Type	Surface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil	Subsurface Soil
								Rationale for Soil Sample Collection Depth	High PID	Middle	Bottom	Top	High PID	Bottom of boring
								Soil Sample PID Reading (ppm)	28.8	3	0	0	31.4	6.3
								Dilution Factor (TPH)	1	100	1	1	1	1
								Dilution Factor (PAHs and PCBs)	NA	NA	NA	NA	NA	NA
								Dilution Factor (Metals)	2	NA	NA	NA	2	NA
(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		Analyte Name	Concentration (mg/kg)					
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	9.8 U	**3,750** *	11.0 U	9.2 U	9.5 U	9.8 U
-	-	1.00E+02	2.02E+05	na	1.78E+06	na	TPH	Oil-Range Organics C28-C36	10 U	**2,050**	11 U	9 U	10 U	10 U
various	various	-	-	-	-	-	PAHs	All PAHs	NA	NA	NA	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	NA	NA	NA	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	**3.12** *	NA	NA	NA	**0.816**	NA
1.5E+04	2.2E+05	-	-	-	-	-	Metals	Barium	**22.3**	NA	NA	NA	**15.5**	NA
1.2E+05	1.8E+06	-	-	-	-	-	Metals	Chromium	**15.2**	NA	NA	NA	**8.04**	NA
4.0E+02	8.0E+02	-	-	-	-	-	Metals	Lead	**5.82**	NA	NA	NA	**2.17**	NA
3.9E+02	5.8E+03	-	-	-	-	-	Metals	Selenium	**1.14**	NA	NA	NA	**1.65**	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
Chromium	Trivalent Chromium	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-09 (SS)	SB-76-09 (0.5')	SB-76-09 (0.5') [SB-76-D3]	SB-76-09 (5')	SB-76-09 (12')
								Lab Sample ID	8050316-01	8050316-02	8050316-08	8050316-03	8050316-04
EPA Residential Soil RSLs	EPA Industrial Soil RSLs	DOEE Tier 0 Soil Standards	DDOE Residential Surface Soil Tier 1 RBSLs	DDOE Residential Subsurface Soil Tier 1 RBSLs	DDOE Commercial Surface Soil Tier 1 RBSLs	DDOE Commercial Subsurface Soil Tier 1 RBSLs		Sample Collection Date	05/01/18	05/01/18	05/01/18	05/01/18	05/01/18
								Sample Collection Depth (feet BG)	0	0.5	0.5	5	12
								Sample Type	Surface Soil	Surface Soil	Surface Soil	Subsurface Soil	Subsurface Soil
								Rationale for Soil Sample Collection Depth	SS/High PID	2nd High PID	2nd High PID Duplicate	Middle	Bottom
								Soil Sample PID Reading (ppm)	4159	211	211	10.2	0
								Dilution Factor (TPH)	1	1	1	1	1
								Dilution Factor (PAHs and PCBs)	1	NA	NA	NA	NA
								Dilution Factor (Metals)	NA	2	NA	NA	NA
(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		Analyte Name	Concentration (mg/kg)				
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	9.1 U	**13.0**	9.0 U	9.4 U	9.9 U
-	-	1.00E+02	2.02E+05	na	1.78E+06	na	TPH	Oil-Range Organics C28-C36	9 U	9 U	9 U	9 U	10 U
various	various	-	-	-	-	-	PAHs	All PAHs	ND	NA	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	ND	NA	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	NA	**5.15** *	NA	NA	NA
1.5E+04	2.2E+05	-	-	-	-	-	Metals	Barium	NA	**36.9**	NA	NA	NA
1.2E+05	1.8E+06	-	-	-	-	-	Metals	Chromium	NA	**19.2**	NA	NA	NA
4.0E+02	8.0E+02	-	-	-	-	-	Metals	Lead	NA	**8.40**	NA	NA	NA
3.9E+02	5.8E+03	-	-	-	-	-	Metals	Selenium	NA	**2.32**	NA	NA	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
Chromium	Trivalent Chromium	na for this table

Table 5
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 76 - Soil Sample Laboratory Analytical Data
TPH-DRO, TPH-ORO, and Detected PAHs, PCBs, and Metals

PAH, PCB, and Metals Screening Levels		TPH Screening Levels					Analytical Suite	Sample ID	SB-76-10 (8.5')	SB-76-10 (10')	SB-76-10 (19.5')
								Lab Sample ID	8050316-05	8050316-06	8050316-07
EPA Residential Soil RSLs	EPA Industrial Soil RSLs	DOEE Tier 0 Soil Standards	DDOE Residential Surface Soil Tier 1 RBSLs	DDOE Residential Subsurface Soil Tier 1 RBSLs	DDOE Commercial Surface Soil Tier 1 RBSLs	DDOE Commercial Subsurface Soil Tier 1 RBSLs		Sample Collection Date	05/01/18	05/01/18	05/01/18
								Sample Collection Depth (feet BG)	8.5	10	19.5
								Sample Type	Subsurface Soil	Subsurface Soil	Subsurface Soil
								Rationale for Soil Sample Collection Depth	Top	High PID	Bottom
								Soil Sample PID Reading (ppm)	0	11.3	0.5
								Dilution Factor (TPH)	5	100	1
								Dilution Factor (PAHs and PCBs)	NA	NA	NA
								Dilution Factor (Metals)	NA	2	NA
(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		Analyte Name	Concentration (mg/kg)		
-	-	1.00E+02	2.30E+05	2.12E+03	2.02E+06	1.46E+04	TPH	Diesel-Range Organics	**524**	**5,140** *	9.6 U
-	-	1.00E+02	2.02E+05	na	1.78E+06	na		Oil-Range Organics C28-C36	**239**	**1,890**	10 U
various	various	-	-	-	-	-	PAHs	All PAHs	NA	NA	NA
various	various	-	-	-	-	-	PCBs	All PCBs	NA	NA	NA
6.8E-01	3.0E+00	-	-	-	-	-	Metals	Arsenic	NA	**4.24** *	NA
1.5E+04	2.2E+05	-	-	-	-	-		Barium	NA	**168**	NA
1.2E+05	1.8E+06	-	-	-	-	-		Chromium	NA	**35.9**	NA
4.0E+02	8.0E+02	-	-	-	-	-		Lead	NA	**11.9**	NA
3.9E+02	5.8E+03	-	-	-	-	-		Selenium	NA	**4.07**	NA

Table Notes:
TPH Analytical Method: EPA Method 8015M
PAH Analytical Method: EPA Method 8270D
PCB Analytical Method: EPA Method 8082
Metals Analytical Method: EPA Method 6020A
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
mg/kg - milligrams per kilogram or parts per million (ppm)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
ND - No analytes within this analytical suite were detected in this sample.
Bold - Detected analyte concentration

Screening Levels:
EPA Residential Soil Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Industrial Soil RSLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DOEE Tier 0 Soil Standard (June 2011)
DDOE Residential Surface Soil Tier 1 Risk-Based Screening Levels (RBSLs) - Resident Child - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Residential Subsurface Soil Tier 1 RBSLs - Resident Child - Indoor Inhalation Exposure Pathway (June 2011)
DDOE Commercial Surface Soil Tier 1 RBSLs - Commercial Worker - Ingestion, Inhalation, and Dermal Contact Exposure Pathways (June 2011)
DDOE Commercial Subsurface Soil Tier 1 RBSLs - Commercial Worker - Indoor Inhalation Exposure Pathway (June 2011)

Screening Evaluation Notes for TPH:
Red, bold, and underline - Detected analyte concentration exceeds the DOEE Tier 0 Soil Standard.
Underline - MRL exceeds the DOEE Tier 0 Soil Standard. (None on this table.)
* - Detected analyte concentration also exceeds the DDOE Residential Surface Soil or Subsurface Soil Tier 1 RBSL.
** - Detected analyte concentration also exceeds the DDOE Commercial Surface Soil or Subsurface Soil Tier 1 RBSL. (None on this table.)

Screening Evaluation Notes for PAHs, PCBs, and Metals:
Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level. (None on this table.)
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
Chromium	Trivalent Chromium	na for this table

Table 6
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 46 – Subsurface Vapor Sample Laboratory Analytical Data
Detected VOCs

Screening Levels		Sample ID	VMP-01	VMP-02	VMP-03	VMP-04	VMP-05	VMP-06
		Lab Sample ID	8052901-01	8052901-02	8061501-01	8052901-03	8052901-04	8052901-05
EPA Residential Soil Vapor VISLs	EPA Commercial Soil Vapor VISLs	Sample Collection Date	05/24/18	05/24/18	06/13/18	05/24/18	05/24/18	05/24/18
		Sample Collection Depth (feet BG)	0.4	2.5-3	2.5-3	0.5	0.5	0.4
		Sample Type	Sub-Slab Vapor	Soil Vapor	Soil Vapor	Sub-Slab Vapor	Sub-Slab Vapor	Sub-Slab Vapor
		Dilution Factor	10	4	2	4	4	20
(ug/m³)	(ug/m³)	Analyte Name	Concentration (ug/m³)					
1.1E+06	4.5E+06	Acetone	24.0 U	**11.2**	**24.9**	9.60 U	9.60 U	48.0 U
1.2E+01	5.2E+01	Benzene	6.40 U	2.56 U	**1.02** J	2.56 U	2.56 U	12.8 U
2.5E+00	1.1E+01	Bromodichloromethane	13.0 U	**4.82** J	2.60 U	5.20 U	5.20 U	26.0 U
2.4E+04	1.0E+05	Carbon disulfide	6.20 U	**3.49**	**2.43**	2.48 U	2.48 U	12.4 U
4.1E+00	1.8E+01	Chloroform	**14.2**	**79.7** *	**1.17** J	3.88 U	3.88 U	19.4 U
3.5E+03	1.5E+04	Dichlorodifluoromethane	9.90 U	3.96 U	**2.77**	3.96 U	3.96 U	19.8 U
1.4E+04	5.8E+04	n-Heptane	8.20 U	3.28 U	**0.49** J	3.28 U	3.28 U	16.4 U
1.0E+03	4.4E+03	2-Hexanone	8.20 U	3.28 U	**0.41** J	3.28 U	3.28 U	16.4 U
1.7E+05	7.3E+05	Methyl ethyl ketone (2-Butanone)	5.90 U	2.36 U	**18.9**	2.36 U	2.36 U	11.8 U
3.6E+02	1.6E+03	Tetrachloroethene	**691**	**268**	**319**	**9.22**	**14.1**	**3,350** *
7.0E+04	2.9E+05	Tetrahydrofuran	5.90 U	2.36 U	**3.36**	2.36 U	2.36 U	11.8 U
1.7E+05	7.3E+05	Toluene	7.50 U	3.00 U	**0.60** J	3.00 U	3.00 U	15.0 U
1.6E+01	1.0E+02	Trichloroethene	**4.30** J	**3.44** J	**0.97** J	4.40 U	4.40 U	22.0 U
na	na	Trichlorofluoromethane (Freon 11)	11.0 U	**2.47** J	**2.02** J	**2.70** J	**2.70** J	22.0 U

Table Notes:

VOC Analytical Method: EPA TO-15

ug/m³ - micrograms per cubic meter
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
Bold - Detected analyte concentration

Screening Levels:

EPA Residential Soil Vapor Intrusion Screening Levels (VISLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
EPA Commercial Soil VISLs (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)

Screening Evaluation Notes:

Red, bold, and underline - Detected analyte concentration exceeds the respective Residential Screening Level.
Underline - MRL exceeds the respective Residential Screening Level.
* - Detected analyte concentration also exceeds the respective Industrial/Commercial Screening Level.

Table 7
Additional Phase II Environmental Site Assessment (ESA) at Buildings 46 and 76
Armed Forces Retirement Home (AFRH) - Main Campus
3700 N. Capital Street, NW, Washington, DC 20011

Building 46 – Groundwater Sample Laboratory Analytical Data
Detected VOCs and TPH- C7-C12

VOCs Screening Levels	TPH Screening Level	Analytical Suite	Sample ID	W46-2	W46-2 [MW-D]	W46-3 (23-28')	W46-3	W71-1	W71-2	W72-1	AFRH-TB-1	MW-TB	MW-ERB
			Lab Sample ID	8060711-04	8060711-06	8051713-01	8060711-08	8060711-03	8060711-07	8060711-02	8051713-02	8060711-01	8060711-05
EPA Tapwater RSLs	DDOE Tier 1 RBSL		Sample Collection Date	06/06/18	06/06/18	05/14/18	06/07/18	06/06/18	06/07/18	06/06/18	05/14/18	06/05/18	06/06/18
			Sample Collection Depth (feet BG)	112	112	23-28	107.7	109.3	106.5	98.3	NA	NA	NA
			Sample Type	Groundwater	Groundwater	Grab-Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Blank Water	Blank Water	Blank Water
			Dilution Factor (VOCs)	1	1	1	1	1	1	1	1	1	1
			Dilution Factor (TPH)	1	NA	1	NA	1	1	1	NA	NA	NA
(ug/L)	(ug/L)		Analyte Name	Concentration (ug/L)									
1.4E+04	-	VOCs	Acetone	10.0 U	10.0 U	10.0 U	**67.9**	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
4.6E-01	-		Benzene	5.0 U	5.0 U	5.0 U	**63.9**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
5.6E+03	-		2-Butanone (MEK)	10.0 U	10.0 U	10.0 U	**15.2**	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
2.2E-01	-		Chloroform	**9.6**	**9.5**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
3.6E+01	-		cis-1,2-Dichloroethene	5.0 U	5.0 U	**3.4** J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1.7E-01	-		Naphthalene	5.0 U	5.0 U	5.0 U	**5.5**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1.1E+01	-		Tetrachloroethene	**4.4** J	**4.5** J	**10.7**	5.0 U	**2.1** J	**2.4** J	**2.4** J	5.0 U	5.0 U	5.0 U
1.1E+03	-		Toluene	5.0 U	5.0 U	5.0 U	**26.5**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1.9E+02	-		m- & p-Xylenes	5.0 U	5.0 U	5.0 U	**2.4** J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
-	3.45E+04	TPH	C7-C12	500 U	NA	500 U	500 U	500 U	500 U	500 U	NA	NA	NA

Table Notes:

VOCs Analytical Method: EPA Method 8260B
TPH Analytical Method: EPA Method 8015M
[Sample ID] - Sample Identification as shown on COC and in Lab Report for duplicate samples.
ug/L - micrograms per liter or parts per billion (ppb)
BG - Below Grade
CR - Cancer Risk
HI - Hazard Index
U - Analyte not detected above specified Method Reporting Limit (MRL) (shown as a gray tone).
J - Detected above the Method Detection Limit (MDL) but below the MRL; result is an estimated concentration.
na - not applicable
NA - not analyzed
Bold - Detected analyte concentration

Screening Levels:

EPA Tapwater Regional Screening Levels (RSLs) (at CR = $1x10^{-6}$ or HI = 1.0) (May 2018)
DDOE Tier 1 Risk-Based Screening Level (RBSL) - Protection of Groundwater: Domestic Use of Water (Ingestion and Inhalation) Exposure Pathway (June 2011) for gasoline range organics (GRO)

Screening Evaluation Notes:

Red, bold, and underline - Detected analyte concentration exceeds the respective Screening Level.
Underline - MRL exceeds the respective Screening Level.

Additional Screening Level Notes:

Analyte	EPA RSL	DDOE RBSL
m- & p-Xylenes	Total Xylenes	na for this table