# Area C Infill
# Phase II Geology and Hydrology Report
# Brown Station Road Sanitary Landfill Facility

Prince George's County
Department of the Environment
Resource Recovery Division
3500 Brown Station Road
Upper Marlboro, MD 20774

SCS ENGINEERS

11260 Roger Bacon Drive
Reston, VA 20190
703-471-6150

02201056.30

October 29, 2020
Revision 1: August 09, 2021
Revision 2: December 21, 2021

# CERTIFICATION

I certify that the work described in this Report meets the requirements specified in COMAR 26.04.07.07. I certify that I have prepared or supervised the preparation of this report; that it has been prepared in accordance with industry standards and practices; that the information contained herein is truthful and accurate to the best of my knowledge; and that I am a duly registered Professional Engineer practicing under the laws of the State of Maryland.

Report: Phase II Geology and Hydrology Report
Area C Infill, Brown Station Road Sanitary Landfill

Name: Darrin D. Dillah, Ph.D., P.E., BCEE
Project Director and Vice President

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.
LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

Signature: ______________________

Date: December 21, 2021
Company: SCS Engineers
Address: 11260 Roger Bacon Drive, Suite 300
City/State/Zip: Reston, Virginia 20190

Prepared and Reviewed by:

1. Ravi Pal Singh Panesar, P.E.
   Project Manager
   SCS Engineers

   Signature ______________________

2. Gomathy Radhakrishna Iyer, Ph.D., EIT
Staff Professional
SCS Engineers

Signature ____________

3. Parita R Shah
Staff Professional
SCS Engineers

Signature ____________

4. Balwinder Singh Panesar, Ph.D.
Project Manager
SCS Engineers

Signature ____________

# EXECUTIVE SUMMARY

The existing Brown Station Road Sanitary Landfill (BSRSL), a municipal solid waste (MSW) facility, is owned and operated by the Prince George's County Government, Department of the Environment, Resource Recovery Division (the County). The facility encompasses about 1,250 acres; less than 25 percent of the property is currently used for landfill cells. The facility is located on Brown Station Road, about 2.5 miles northwest of Upper Marlboro, Maryland. It has three (3) disposal areas, Areas A-1, A-2, and B, with a total waste footprint of about 285 acres. Filling operations in Areas A-1 and A-2 stopped in 1993; Area B is presently active and continues to accept MSW.

The existing Landfill is expected to reach its permitted capacity by the end of 2025. To meet its solid waste management needs beyond 2025, the County plans to infill the airspace between the existing disposal areas, deemed the Area C Infill. The County submitted a Phase I Report and was informed on February 7, 2020 that the Phase I Permit Application is complete as per the Maryland Department of the Environment (MDE).

The proposed Area C Infill will span across approximately 225 acres within the existing site boundaries. About 165 acres of this area will overlay onto the existing fill areas and the existing waste footprint will increase by about 60 acres. This will add approximately 30 million cubic yards of airspace and extend the life of the Landfill for an additional 50 years beyond 2025.

SCS Engineers (SCS) has prepared this Phase II Geology and Hydrology Report to meet the requirements set forth in COMAR 26.04.07.07. To assist the reviewer in locating the specific sections of this report that address each COMAR regulatory requirement, a checklist table has been provided in Section 1.2.

The site's geology, upper aquifer, hydrogeology, and groundwater have been studied and monitored extensively during its 50-year plus history operating as a landfill. The Landfill is located within the Coastal Plain of Maryland. It overlies Quaternary Alluvium and Terrace Deposits, which overlay Tertiary Nanjemoy and Aquia Formations. The site's uppermost aquifer is encountered in the unconfined soil matrix of the Nanjemoy Formation, which is a clayey material. The site hydrogeology is such that the uppermost aquifer flows north, northeast, and east across the site towards Western Branch.

Based on geological investigations and geotechnical analyses, the subgrade material has adequate bearing strength to support the anticipated static and dynamic loads of the Area C Infill. Subgrade or existing waste settlement will not result in unacceptable liner elongation.

The Area C Infill project will be designed to meet the following requirements/criteria:

- A conceptual subgrade plan drawing was prepared so that the liner subbase is located at a minimum of 3 ft above the highest groundwater elevation, and sufficient bedding will be provided to prevent liner rupture during installation and operation.
- The bottom liner (BL) system will be similar in design to the Area B permitted system. An HDPE geomembrane liner will be used. Subgrade settlement and liner elongation calculations were preformed to support and confirm this design.
- The leachate collection layer will be designed to limit the maximum peak daily leachate head to less than 30 cm (1 ft) over the liner.

- An HDPE DR-17 leachate collection pipe will have sufficient strength and thickness to prevent collapse under pressures exerted by overlying waste, cover material, and operational equipment.

Leachate collected and removed from the Area C Infill will be pretreated at the existing leachate pretreatment plant onsite. Pretreated wastewater will continue to be discharged into the Washington Suburban Sanitary Commission's sanitary sewer system and sludge will be disposed at the working face of the Landfill. Present efforts are ongoing to upgrade and/or expand the pretreatment plant to handle leachate from the proposed Area C Infill.

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## Tables



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# LIST OF ABBREVIATIONS/ACRONYMS

| | |
|---|---|
| AMSL | Above Mean Sea Level |
| BL | Bottom liner |
| BSRSL | Brown Station Road Sanitary Landfill |
| CFR | Code of Federal Regulations |
| cm | Centimeter(s) |
| COC | Constituent of Concern |
| COMAR | The Code of Maryland Regulations |
| DR | Dimension Ratio |
| DW | Drinking Water Well |
| EPA | United States Environmental Protection Agency |
| ESD | Extreme Studentized Deviate |
| FEMA | Federal Emergency Management Agency |
| ft | Foot or feet |
| GPD | Gallon(s) per Day |
| GPM | Gallon(s) per Minute |
| GPS | Groundwater Protection Standard |
| GSWMR | Groundwater and Surface Water Monitoring Report |
| GW & SWMP | Groundwater and Surface Water Monitoring Plan |
| GWE | Groundwater Elevation |
| GWM | Groundwater Monitoring |
| HDPE | High Density Polyethylene |
| IFW | Irrigation/Farming Well |
| in | Inch(es) |
| IQR | Inter Quartile Range |
| $LB_1$ | Lower Boundary of Inner Fence |
| $LB_2$ | Lower Boundary of Outer Fence |
| LCR | Leachate Collection and Removal |
| LFG | Landfill Gas |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| LPP | Leachate Pretreatment Plant |
| LSB | Liner Subbase |

| | |
|---|---|
| MCL | Maximum Contaminant Level |
| MDE | Maryland Department of the Environment |
| MGS | Maryland Geological Survey |
| mil | One Thousandth of an Inch or 0.001 inch |
| MSL | Mean Sea Level |
| MSW | Municipal Solid Waste |
| NAIC | The North American Industry Classification |
| NEI | Nature and Extent Investigation |
| PE | Poly Ethylene |
| PIA | Public Information Act |
| pcy | Pound(s) per Cubic Yard |
| pcf | Pound(s) per Cubic Foot |
| psf | Pound(s) per Square Foot |
| PVC | Poly Vinyl Chloride |
| Q1 | $1^{st}$ Quartile ($25^{th}$ Percentile) |
| Q3 | $3^{rd}$ Quartile ($75^{th}$ Percentile) |
| RDP | Refuse Disposal Permit |
| SBR | Sequencing Batch Reactor |
| SCS | SCS Engineers |
| sec | Second(s) |
| SIC | Standard Industrial Classification |
| SSS | Sanitary Sewer System |
| TKN | Total Kjeldahl Nitrogen |
| UASB | Upflow Anaerobic Sludge Baffled |
| $UB_1$ | Upper boundary of inner fence |
| $UB_2$ | Upper boundary of outer fence |
| USEPA | United States Environmental Protection Agency |
| VOCs | Volatile Organic Compounds |
| WSSC | Washington Suburban Sanitary Commission |

# 1.0 INTRODUCTION

The existing Brown Station Road Sanitary Landfill (Landfill) is a municipal solid waste (MSW) landfill with a primary SIC code of 4953 and an NAIC code of 562212. The Prince George's County Government, Department of the Environment, Resource Recovery Division (County) owns and operates the Landfill disposal areas under Permit No. 2015-WMF-0589, issued by the Maryland Department of the Environment (MDE). Landfilling operations began in 1968, more than 50 years ago, and continues today to meet the County's solid waste needs.

The Landfill is located on Brown Station Road, about 2.5 miles northwest of the town of Upper Marlboro in Maryland. The Landfill encompasses about 1,250 acres; less than 25 percent of the property is currently used for landfill cells. Existing disposal areas of the Landfill are divided into two (2) primary areas: Areas A and B. Area A, approximately 150 acres, stopped accepting waste in 1993 and is separated into two (2) sub-areas: Areas A-1 and A-2. Area B, approximately 140 acres, began operations in 1992 and continues to accept MSW today.

The existing landfill is expected to reach its final permitted capacity in approximately three and a half (3.5) years, near the end of 2024. In order to meet the County's MSW management needs beyond 2024, the County plans to infill the airspace between the existing landfill disposal areas, deemed the Area C Infill.

The proposed Area C Infill will span approximately 216.5 acres within the existing site boundaries. About 165 acres of this area will overlay onto the existing fill areas and the existing waste footprint will be increased by about 52.5 acres. It will add about 30 million cubic yards of airspace and extend the life of the Landfill for an additional 50 years beyond 2025.

The County has since submitted a Phase I Report [18] to MDE and was informed that the Phase I Permit Application was complete on February 7, 2020.

## 1.1 PURPOSE

This Phase II Geology and Hydrology Report (Phase II Report) assessment for the proposed disposal Area C Infill is intended to meet the reporting requirements addressed in COMAR 26.04.07.07. This report includes a summary of the soils, geology, and hydrology of the site, as well as a conceptual design for the proposed bottom liner and leachate collection and pretreatment systems.

## 1.2 PHASE II REPORT REQUIREMENTS

A checklist for the Phase II Report as per the requirements identified under COMAR 26.04.07.07.C and corresponding report sections relevant to the requirements are provided in Table 1 below. Moreover, the table serves as a reference that corresponds the requirements to the relevant report sections.

Table 1. Phase II Report Checklist

| COMAR 26.04.07.07.C. – Sanitary Landfills – Municipal Landfills – Phase II Report | | Section of Phase II Report |
|---|---|---|
| (1) | Up-to-date site-specific topographic map using contour intervals which is practical for the site. The following items shall be shown on the map:<br>(a) Surface water and natural drainage features;<br>(b) 100-year flood-plain;<br>(c) Property lines;<br>(d) On-site buildings and structures;<br>(e) Forested and other vegetated areas; and<br>(f) Any buried or overhead transmission lines, utility pipelines, or storage tanks. | Section 2.2 and Exhibit II-1 |
| (2) | A discussion of the geologic formations directly underlying and in close proximity to the site, the present and projected use of these formations as a source of ground water and minerals, and the hydrogeologic relationship between the formations. | Sections 3.1 through 3.5 and Section 4.2; Exhibit II-3; Appendix II-A; Attachments 1 through 3 |
| (3) | A survey of all production wells within 1/2 mile of the site boundary. Each well shall be located on the topographic map and a table shall be developed which specifies all the available pertinent information such as well depth, screen type, productivity, materials encountered, and water level. | Section 4.1 Table 2; Exhibit II-8; Appendix II-B |
| (4) | Groundwater contour maps to show the occurrence and direction of groundwater flow beneath the site superimposed on the current topographic map. Three separate groundwater contour maps as specified below shall be constructed for each distinct water-bearing formation occurring within 50 ft of the anticipated lowest elevation of the refuse cell floor, using monthly groundwater elevation data collected from piezometers on the site over a period of not less than 12 months, or derived using a hydrologic simulation or prediction technique approved by the Department. Three groundwater contour maps shall be constructed from a set of:<br>(a) Water elevations measured or predicted during the month that represents the most:<br>(i) Elevated groundwater condition,<br>(ii) Depressed groundwater condition; and<br>(b) The highest observed or predicted ground water elevations. | Sections 4.3 and 4.4; and Exhibits II-9 through II-11, Exhibits II-C-1 through II-C-10; Appendix II-C |
| (5) | Geologic cross sections in sufficient detail, orientation, and number to clearly identify subsurface conditions at the site. | Section 3.5; Exhibits II-2 and II-4 through II-6 and II-19 |
| (6) | A bedrock map, except in the coastal plain outside the fall zone, to show the contours of the bedrock surface beneath the site. | N/A due to coastal plain physiography |
| (7) | An isopachous map to show the minimum thickness of soil and other unconsolidated sediments above the elevation of ground | Section 3.8 and Exhibit II-7 |

| COMAR 26.04.07.07.C. – Sanitary Landfills – Municipal Landfills – Phase II Report | | Section of Phase II Report |
|---|---|---|
| | water as determined in §C(4), or bedrock as determined in §C(6), of this regulation, whichever is the higher. | |
| (8) | A discussion of the chemical quality of groundwater in the aquifers beneath the site as determined in §C(2) of this regulation. The list of chemical parameters shall include pH, alkalinity, hardness, chloride, specific conductance, nitrate, chemical oxygen demand, arsenic, barium, cadmium, chromium, zinc, lead, mercury, the volatile priority pollutants, and any other pollutants specified by the Department. | Section 4.5; Appendix II-H |
| (9) | A discussion of the potential for the vertical and horizontal movement of pollutants into the waters of this State. | Section 4.6 |
| (10) | The results of a fracture trace or aerial photographic lineament analysis (except in the coastal plain) which identifies the relationship between these features and the local groundwater hydrology. | N/A due to coastal plain physiography |
| (11) | Test boring logs, well completion reports, piezometric measurements, chemical and physical soil/sediment analyses, and all accompanying geotechnical analyses. All laboratory and field methodologies and procedures shall be included. | Exhibits II-2A through II-2E; Attachments 1 through 4 |
| (12) | A preliminary conceptual design of the proposed municipal landfill based on the geotechnical information gathered in §C(1)—(11) of this regulation. The landfill design shall satisfy the following minimum design standards: | Section 5 and Exhibits II-12, II-20, and II-21 |
| | (a) A liner system that is designed, constructed, and installed to facilitate collection of leachate generated by the landfill and to prevent migration of pollutants out of the landfill to the adjacent subsurface soil, groundwater, or surface water. The liner may be constructed of natural earthen materials which are excavated from the site or which are imported from another location or of a synthetic or manufactured membrane material. The liner system shall be:<br>(i) Constructed of materials that have sufficient strength and thickness to prevent failure due to pressure gradients, physical contact with the waste or leachate, climatic conditions, the stress of installation, and the stress of daily operation.<br>(ii) A minimum of 1 foot of clay or other natural material having an in-place permeability of less than or equal to $1 \times 10^{-7}$th centimeters/second, or one or more unreinforced synthetic membranes with a combined minimum thickness of 50 mil, or a single reinforced synthetic membrane with a minimum thickness of 30 mil, which has a permeability less than or equal to $1 \times 10^{-10}$th centimeters/second, placed over a prepared subbase with a minimum thickness of 2 ft and a permeability less than or equal to $1 \times 10^{-5}$th | Sections 5.1 through 5.3; Exhibits II-13 through II-17; Appendices II-D, II-E, and II-G |

| COMAR 26.04.07.07.C. – Sanitary Landfills – Municipal Landfills – Phase II Report | Section of Phase II Report |
|---|---|
| centimeters/second. The Approving Authority may authorize the installation of a liner system with specifications different than those listed in this subparagraph only upon a successful demonstration by the applicant that the alternate system is capable of collecting and managing the leachate generated at the site, and that the liner system provides an equivalent level of protection to public health and the environment.<br>(iii) Placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression, uplift, puncture, cutting or activities at the landfill.<br>(iv) Installed to cover all surrounding earth likely to be in contact with the waste or leachate.<br>(v) Installed with a minimum slope of 2 percent to facilitate movement of leachate towards the leachate collection system and prevent leachate ponding on the landfill floor. | |
| (b) The liner system shall be located entirely above the composite high water table as determined in §C(4)(b) of this regulation, and bedrock as determined in §C(6) of this regulation. A minimum buffer distance, including the thickness of the prepared subbase, shall be required between the bedrock elevation and the maximum expected groundwater elevation, and the bottom of the liner system, as follows:<br>(i) Except as specified in §C(12)(b)(ii) of this regulation, the minimum buffer distance shall be 3 ft<br>(ii) In Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester Counties, the minimum buffer distance shall be 1.5 ft unless the Department determines from the available hydrogeological data that the site can provide an additional buffer. In these instances, the Department shall set a minimum buffer between 1.5 and 3.0 ft | Section 5.1.2 and Exhibit II-20 |
| (c) A leachate collection and removal system located immediately above the liner, that is designed, constructed, maintained, and operated to collect and remove leachate from the landfill. The leachate collection and removal system shall be:<br>(i) Constructed of materials that are chemically-resistant to the waste managed in the landfill and the leachate expected to be generated, and of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes, waste cover materials, and by any equipment used at the landfill;<br>(ii) Designed and operated to function without clogging; and | Section 5.4; Exhibits II-13 and II-18; and Appendix II-F |

| COMAR 26.04.07.07.C. – Sanitary Landfills – Municipal Landfills – Phase II Report | Section of Phase II Report |
|---|---|
| (iii) Designed and operated to ensure that the leachate depth over the liner does not exceed 30 centimeters (1 foot). | |

# 2.0 GENERAL SITE DESCRIPTION

## 2.1 SITE BACKGROUND

The Landfill is a refuse disposal facility classified with a primary SIC code of 4953 (Refuse Systems) and NAIC code of 562212 (Solid Waste Landfill). It has served as a landfill since 1968. It accepts MSW including, but not limited to, mixed household and commercial refuse, tree and shrub trimmings, household appliances and white goods, friable asbestos, scrap tires, and metal. Refer to Section 6.2 of the Phase I Report [18] for further details on the types of waste accepted. Waste is accepted from commercial contractors as well as private citizens.

Currently, less than 25 percent of the property is covered by the waste footprint. The remaining area is used for buffers, roads, soil storage, administration, and other ancillary facilities (e.g., leachate management, recycling, storage, vehicle maintenance, drainage and sedimentation control, and landfill gas management). Refer to Section 3.3 and Exhibits 4 and 5 of the Phase I Report for zoning and land use information.

The Landfill is operated in accordance with current federal, state, and local requirements. Stormwater is directed off the Landfill, by engineered downchutes and channels, into sedimentation basins. This system significantly reduces sediment loads and pollutants prior to discharge into surface waters.

Area A is closed and capped with a geomembrane liner system. Area B is presently active and accepting MSW. The site consists of two (2) 750,000-gallon holding tanks and a leachate pretreatment plant (LPP) that stores and treats leachate collected from Area B.

## 2.2 UP-TO-DATE SITE-SPECIFIC TOPOGRAPHIC MAP

An up-to-date site-specific topographic map based on a January 17, 2020 flyover is provided in Exhibit II-1. The map is presented on a scale of 1-in equals 300 ft on a 36-in × 24-in sheet with surface contours at 10-ft intervals. The following features are identified in this recent topographic map:

(1) Surface water features within the vicinity of the Area C Infill:
   a. Cabin Branch: Located south of Brown Station Road.
   b. Turkey Branch Creek: Borders the western portion of the site and flows into Western Branch.
   c. Western Branch: Borders the site to the north and east and flows into the Patuxent River several miles southeast of the facility.

(2) Wetlands:
   a. Located mainly north and east of the existing landfill footprint along Turkey Branch and Western Branch.

b. The County recently submitted a Wetlands Delineation Report (which includes a natural resource inventory and floodplain delineations) to the Maryland-National Capital Park and Planning Commission, Prince George's County Planning Department for review and approval, with consideration given to the recent Navigable Waters Protection Rule: Definition of "Waters of the United States" that went into effect on June 22, 2020.

(3) Surface water and natural drainage features

(4) Approximate 100-year floodplain line based on FEMA floodplain surface elevation data and recent aerial topography

a. A floodplain delineation plan is being submitted to document the floodplain line north of Area B based on a field survey performed by a Maryland-Licensed Land Surveyor.

(5) Property lines (Refer to Exhibits 4 and 5 of the Phase I Report)

(6) On-site buildings and structures

(7) Forested and other vegetative areas

(8) Buried/overhead utilities, including:

a. Transmission lines

b. Utility pipelines such as water, landfill gas, leachate, and condensate pipelines

# 3.0 GEOLOGY AND HYDROGEOLOGY

As the site has been operating as a landfill for over 50 years, there is a long history of geology/hydrology/geotechnical investigations and reports [2,3,5] that have been prepared, which includes the area that will encompass the Area C Infill. Refer to Exhibit II-2 for locations of borings/wells in and around the Landfill. A summary of the geologic formations, present and projected use of geologic formations, hydrogeologic relationships, soils and other unconsolidated sediment above the groundwater, geologic cross-sections, and bedrock presence is presented in this section.

## 3.1 PHYSIOGRAPHY

The site is located within the Atlantic Coastal Plain Physiographic Province (Coastal Plain). The landform is moderately to well-dissected upland with hillocks, largely occupying the interfluve between the Patuxent and Chesapeake watersheds. Northwest of the Coastal Plain is the Piedmont Plateau Physiographic Province and eastwards is the Atlantic Continental Shelf Province (off-shore), which extends to the Atlantic Ocean. The separation of the Coastal Plain and Piedmont provinces is known as the "Fall Zone", and is located approximately 15 miles northwest of the site (Exhibit II-3).

## 3.2 GEOMORPHOLOGY

The County consists of unconsolidated to semi-consolidated Coastal Plain sediment deposits of the Pleistocene to Cretaceous age. Deposits range from a high level of vertical and lateral homogeneity to a high level of variable localized heterogeneity. The Pleistocene lowland deposits (including what was formerly known as the Wicomico formation) consist of gravel, sand, silt, and clay deposits. These sediments have been deposited on the older consolidated rocks of the Triassic and Precambrian or early Paleozoic Age. In the extreme northwest of the County, the older rocks are exposed at the surface and the coastal sediments are absent. The sediments increase in thickness southeastwards and are approximately 1,100 ft thick near the site.

The stratigraphy of the Coastal Plain sediments in Prince George's County are shown on Table A-1 of Appendix II-A.

## 3.3 REGIONAL GEOLOGY

The Geologic Map of Prince George's County (Exhibit 8, Phase 1 Report [18]) identifies the site vicinity as chiefly being Terrace deposits, such as medium to coarse sand, pebbly sand, and subordinate silt-clay. The Terrace deposits were produced as a result of stream erosion during the early Quaternary and are now isolated along the valley walls above the modern floodplain due to renewed downcutting. These sediments are contained in a series of disjunct bodies flanking the major streams in the County, reaching elevations of nearly 160 ft in some portions and declining to near sea level closer to the Patuxent River.

Alluvium deposits are also found within the site vicinity as interbedded sand, silt-clay, and subordinate gravel. These deposits commonly underlay the channels and valley floors of all major and many minor streams in the County. Thicknesses of alluvial sediments range from less than 5 ft to 40 ft and average around 15 ft. Geologically, these sediments have mostly been deposited within the past 10,000 years. Refer to Exhibit 8 of the Phase I Report for a more detailed description of the regional geology.

## 3.4 SITE GEOLOGY

### 3.4.1 Soils

A detailed description of the soils at the Landfill can be found in Exhibit 6 of the Phase I Report [18]. The majority of Area C (about 165 acres) will overlap the existing landfilled areas, Areas A-1, A-2, and B.

### 3.4.2 Geology and Hydrogeologic Setting

As mentioned, Prince George's County's Landfill is located in the Coastal Plain of Maryland. According to the 1981 Geologic Map of the Upper Marlboro Quadrangle and the 1968 Geologic Map of Maryland, the Landfill overlies Quaternary Alluvium and Terrace Deposits, which overlay the Tertiary Nanjemoy and Aquia Formations. Refer to the Phase I Report for these maps and further details.

The alluvium can range in thickness from 3 to 15 ft. Alluvium derived from areas underlain by the Nanjemoy and Aquia Formations is predominantly a tan, brown, or pale to dark gray sand with variable glauconite content. The terrace deposits can range in thickness from 3 to 15 ft and consist of tan, reddish brown, or gray interbedded quartz sand and pebbly sand, glauconitic in part, with veins of quartz gravel and thin silty clay beds in places.

The uppermost aquifer beneath the Landfill is encountered in the unconfined soil matrix of the Nanjemoy Formation. The Nanjemoy Formation can range in thickness from 3 to 60 ft and it contains the Marlboro Clay Member at the base of the formation. The Nanjemoy Formation consists of the following:

- dark green to gray, argillaceous (clayey), glauconitic (green color), fine- to medium-grained sand

- minor amounts of gray to pale brown clay

The Aquia Formation can range in thickness from 3 to 140 ft and consists of dark green to gray-green, argillaceous, highly glauconitic, well sorted fine- to medium-grained sand, and contains layers of calcareous shelly sandstone.

The gamma ray logs of the wells A-1, A-2, A-3, A-4, M-1, M-2, M-3, and M-4 provided in the report titled Hydrogeological Characterization of Brown Station Road Sanitary Landfill Area "A" Phase 2 (electronic copy of the report included as Attachment 2) shows that the Aquia Formation underlying the site is at least 70 ft below ground. The Aquia Formation is underlain by the low permeability Brightseat/Monmouth Formation for at least another 40 ft, which is the lower confining layer for the Aquia aquifer and also the upper confining layer for the Magothy aquifer. The Magothy Formation exists below the Brightseat/Monmouth Formation.

Since the Landfill is active, hydrologic evaluations are performed semiannually to confirm that the existing background and compliance groundwater monitoring network satisfies the requirements of 40 CFR 258.51. To perform this evaluation, current and historical groundwater elevations are tabulated and reviewed [10,11,12].

Based on recent groundwater elevations measured in March 2020 and August 2020 from the uppermost aquifer groundwater wells, a groundwater contour map [11] was created to assess groundwater flow direction. Groundwater contours were generated via the Surfer™ surface mapping system software (Golden Software V7.04) using the kriging gridding method and altered utilizing professional judgement. An assessment of the groundwater flow direction was performed to establish which wells installed within the uppermost aquifer are located up-gradient, down-gradient, or cross-gradient of the Landfill. Below are the uppermost aquifer groundwater flow direction observations:

- The uppermost aquifer flows north, northeast, and east across the site.
- Groundwater monitoring wells A-1, A-4, A-10, A-11, B-8 through B-10 are up-gradient of the Landfill.
- Compliance groundwater monitoring wells A-2, A-3, A-15, A-17 through A-20, A-22, A-23, B-1, B-2R, B-3, B-4, B-6R, and B-7 are down-gradient or cross-gradient of the Landfill.

## 3.5 GEOLOGIC CROSS-SECTIONS

Well boring and construction logs are provided in Appendix C in Attachment 1, Appendix B in Attachment 2, Appendix A in Attachment 3, and Attachment 4. Exhibits II-2A through II-2E provide a summary of the boring logs. The geologic cross-sections interpolated from the well logs (Exhibits II-2A through II-2E) are presented in Exhibits II-4 through II-6 and II-19. The layout is shown in Exhibit II-2. These cross-sections were selected to understand the subsurface conditions of the proposed Area C Infill. A summary of the strata encountered is as follows:

- Stratum 1A/1B: The uppermost stratum consists of fill material that ranges from 0 to approximately 10 ft in depth. The fill layer is highly variable and contains both granular and cohesive type materials. Standard penetration resistances (N values) ranged from 3 to 29 blows per foot, indicating a wide variation in shear strength characteristics.

- Stratum 2A/2B/2C: This stratum consists of loose, coarse-grained and soft, fine-grained native soils, ranging in depth from ground surface to 30 ft below grade. N values for the coarse-grained sandy soils in this stratum ranged from weight of hammer (WOH) to 16 blows per foot, indicating low shear strength characteristics. N values for the clayey fine-grained soils ranged from 2 to 12 blows per foot.
- Stratum 3: Stratum 3 is a medium dense, fine to medium sand encountered at depths ranging from approximately 2 to 35 ft. N values for this stratum ranged from 16 to 32 blows per foot.
- Stratum 4: Stratum 4 directly underlies Stratum 2 or Stratum 3. It consists of dense to very dense, fine, silty sand of the Aquia Formation. N values vary from 32 to 100 blows per foot.
- Strata 5 & 6: Strata 5 and 6 underlie Stratum 4. It consists of very dense granular and cohesive material with N values ranging from 60 to 120 blows per foot. Only four wells (M1, M2, M3, and M4) were dug deep below the MSL to reach these strata.

## 3.6 BEDROCK MAP

The site is located in the Atlantic Coastal Plain outside of the Fall Zone (Exhibit II-3). As such, a bedrock map is not required [COMAR 26.04.07.07.C.(6)]. In Prince George's County, the bedrock (Pre-Cetaceous) is about 1000 - 2000 ft below the MSL [4].

## 3.7 FRACTURE TRACE ANALYSIS OR AERIAL PHOTOGRAPHIC LINEAMENT ANALYSIS

As stated earlier, the site is located in the Atlantic Coastal Plain. Therefore, fracture trace analysis or aerial photographic lineament analysis is not required [COMAR 26.04.07.07.C.(10)].

## 3.8 AN ISOPACHOUS MAP OF SOIL AND OTHER UNCONSOLIDATED SEDIMENTS ABOVE GROUNDWATER

The isopachous map of soil and other unconsolidated sediments above groundwater level was plotted by comparing the spot elevations from a January 2020 topographic map to the maximum groundwater levels (Exhibit II-7). As shown, the minimum depth of unconsolidated sediments above groundwater in the non-piggyback areas of the Area C Infill, other than streams and sedimentation basins, ranges from 0 to 18 ft.

# 4.0 GROUNDWATER

## 4.1 INVENTORY OF PRODUCTION WELLS

In response to SCS's request under the Public Information Act (PIA), the Water and Science Administration of MDE provided pertinent information regarding the production wells located in the vicinity of the Landfill (Tracking Number 2019-02778). Table B-1 in Appendix II-B provides pertinent information about production wells within ½ mile of the Area C Infill boundary and Exhibit II-8 shows a map of production wells. Considering water usage, Table B-1 and Exhibit II-8 show that there are:

- 62 wells for drinking water (identified as DW wells)

- Four (4) DW wells in the Water Science Administration's record that do not exist, and
- Five (5) wells for irrigation/farming (identified as IFW wells)

Well depths, pumping rates, depths of top-of-well screen, and lengths of well screen information for DW, IFW, and TW wells are summarized in Table 2 below.

Table 2. Pertinent Information on Production Wells in the Area C Infill Vicinity (Brown Station Road Sanitary Landfill)

| Type of Production Well | No. of Wells | Well Depth (ft) | | Pumping Rate (GPM) | | Well-Screen-Top Depth (ft) | | Well Screen Length (ft) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Max | Min | Max | Min | Max | Min | Max | Min |
| **DW Wells:** | 62 | | | | | | | | |
| **• < 50 ft deep** | 1 | 27 | | 6 | | N/A | | N/A | |
| **• 100 – 200 ft deep** | 10 | 200 | 102 | 50 | 5 | 183 | 94 | 10 | 5 |
| **• > 200 ft deep** | 41 | 316 | 208 | 120 | 9 | 303 | 190 | 32 | 5 |
| **IFW Wells** | 5 | 305 | 220 | 50 | 10 | 295 | 211 | 10 | 5 |

Notes: 1. ft, GPM, max, min, and N/A refers to foot (feet), gallons per minute, maximum, minimum, and not applicable, respectively.

2. Wells with missing parameter information were not included in calculations.

3. Well depth, GPM, and well screen data were not available for 10 DW wells.

## 4.2 PRESENT AND PROJECTED USE OF GEOLOGIC FORMATIONS AS A SOURCE OF GROUNDWATER

The geological formations underlying the site are discussed in Section 3.4.2. The uppermost aquifer, Aquia, is encountered in the unconfined soil matrix of the Nanjemoy Formation, and is found in the subsurface of the site (Attachment 2). The Marlboro Clay Member, with its low permeability, is considered to be in the upper confining bed of the Aquia Formation, indicating a limited capacity to transmit water and vertically recharge the Aquia. The Marlboro Clay Member is discontinuous and disjoint. Where present above the Aquia aquifer, the direct recharge of the aquifer by vertical infiltration would also be extremely limited. This is apparent by the presence of mottling in the soil above the Marlboro Clay on-site, indicating that water is perched above the clay and moves laterally rather than vertically. As a result of the limited presence and discontinuous nature of Marlboro Clay on this site, its effect on the groundwater regime of the site is very limited and localized.

Comparison of the elevations of the well screens of greater than 100 ft deep wells to the elevation of the top of the uppermost sand of the Magothy Formation indicates that these wells all pump from the Magothy Formation (deep). Hence, the major regional aquifer acting as a source of groundwater in the area around the Landfill is Magothy, which is separated from the Aquia aquifer by the Aquia Formation, followed by the low permeability Brightseat/Monmouth Formation (Attachments 1 and 2).

MGS recommended no new Pleistocene (shallow) or Aquia water supply wells be drilled within approximately 1,500 ft of the site and no new Pleistocene or Aquia wells yielding more than 15 GPM be drilled within 2,500 ft of the site. The purpose of this recommendation was to maintain the natural gradient towards Western Branch [1]. Exhibit II-8 shows the production wells within ½ mile of the site boundary and Appendix II-B provides related well data, including well depth and usage details. Out of the 170 wells in the Area C Infill vicinity, there are 62 DW wells and five (5) IFW wells. Of the 62 DW documented wells, 52 DW wells' depths are known: one (1) well is 27 ft deep, 10 wells are 100 to 200 ft deep, and 41 wells are greater than 200 ft deep. All DW wells located onsite were constructed after 1967. The production wells in the Landfill vicinity are unlikely to be affected by the Area C Infill for the following reasons:

- Most of the drinking water of the nearby residential areas are supplied by the Washington Suburban Sanitary Commission (WSSC), with an exception of a few older homes. Hence, a change in the usage of groundwater is not expected due to the Area C Infill project.
- The groundwater quality since the operation of the Landfill has not been significantly affected.
- None of the shallow wells located in the vicinity of the Landfill have a pumping rate greater than 15 GPM.
- The hydrogeological investigations performed (Attachment 2) on the underlying formations and groundwater flow relationships between the Aquia aquifer and the Magothy aquifer indicate that the hydraulic conductivities in the most permeable zones of Aquia Formation were in the order of $10^{-4}$ to $10^{-6}$ cm/s. Further, the Magothy aquifer is separated from the Aquia aquifer by the Brightseat/Monmouth Formation, which has a hydraulic conductivity ranging from $1.56 \times 10^{-7}$ cm/s to $7.13 \times 10^{-8}$ cm/s. This indicates that the Brightseat/Monmouth Formation is a low permeability/impervious layer, potentially restricting the potential vertical flow of pollutants. Therefore, the Landfill operations will not potentially impact the Magothy aquifer.
- Four (4) DW wells located within the Area C Infill (DW-29, DW-33, DW-34, and DW-59) no longer exist.
- Western Branch serves as a water divide between the Landfill and the DW wells on the north side of the facility property.

## 4.3 GROUNDWATER ELEVATION MONITORING

Groundwater monitoring (GWM) at the Landfill started in 1985 for Areas A-1 and A-2 and in 1989 for Area B. In accordance with the site's Refuse Disposal Permit (RDP), the Landfill performed two (2) monitoring events semiannually. Since 2005, the Landfill began monthly GWE monitoring.

Initially, the GWM network comprised of the following wells shown in Table 3:

Table 3. Initial Groundwater Monitoring Network

| Category | Area A | Area B |
|---|---|---|
| **Up-gradient Wells** | A-1, A-4, A-10, and A-11 | B-8 through B-10 |
| **Down-gradient or Cross-gradient Wells** | A-2, A-3, A-15, A-17 through A-20, A-22, and A-23 | B-1, B-2R, B-3, B-4, B-6R, and B-7 |

| | |
|---|---|
| **Other Wells** | A-5 through A-9, A-12 through A-14, A-16, A-21, PP-1A, PP-1B, PP-2A, PP-2B, PP-3A, PP-3B, PP-5A, PP-5B, PP-6A, PP-6B, and PP-8 |

### 4.3.1 Groundwater Monitoring Network History

The GWM network modification history is briefly summarized below.

- In 1995, GWM well B-5 was abandoned.
- In 2002, GWM wells PP-3A and PP-3B were abandoned.
- In March 2003, GWM well B-6R was installed adjacent to GWM well B-6 as its replacement well. Well B-6R serves to monitor the uppermost aquifer in a manner that is more representative of the actual conditions. In June 2005, GWM well B-6 was abandoned.
- In February-March 2005, GWM well B-6A was installed and later abandoned in June 2005.
- In June 2005, down-gradient GWM wells A-22 and A-23 were installed as requested by MDE. Well A-22 was installed down-gradient of well A-2 and well A-23 was installed down-gradient of well A-16.
- GWM well B-2 was damaged during construction of Cells 1 and 11. In August 2007, well B-2 was repaired.
- In June 2008, GWM well B-2R was installed about 100 ft east of GWM well B-2 as its replacement well. Well B-2 was not abandoned.
- Additional GWM wells were installed as part of NEIs:
    - In 2014, GWM wells NES-1D, NES-1S, NES-4, and NES-5 within B-6R Area of Concern and GWM wells NES-2D, NES-2S, and NES-3 within A-2 Area of Concern.
    - In May through November 2015, GWM wells NES-6D and NES-6S and deep GWM well NES-2DD within A-2 Area of Concern.
    - In June 2017, GWM wells A-22D, NES-7S, and NES-7D within A-2 Area of Concern.
- In June 2017, GWM well A-22D was installed.
- In September 2018, GWM well A-22DD was installed.
- In September 2019, GWM well A-22DD-A was installed and GWM well A-22DD was abandoned.

Western Branch isolates the north side groundwater elevations from the south side. Therefore, the monitored groundwater table on the north side of Western Branch does not affect the monitored/estimated groundwater table on the south (landfill) side of Western Branch.

### 4.3.1 Groundwater Monitoring Wells Network

The GWM well network monitored between 2005 and 2020 and their locations relative to Western Branch are summarized Table 4 below.

Table 4. Groundwater Monitoring Wells Network (Brown Station Road Sanitary Landfill)

| Category | Wells South of Western Branch | Wells North of Western Branch |
|---|---|---|
| **Up-gradient Wells** | A-1, A-4, A-10, A-11, and B-8 through B-10 | --- |
| **Down-gradient or Cross-gradient Wells** | A-2, A-3, A-15, A-17 through A-20, A-22, A-23, B-1, B-2, B-2R, B-3, B-4, B-6, B-6A, B-6R, and B-7 | --- |
| **Other Wells** | A-12 through A-14, A-16, A-21, A-22D, A-22DD, A-22DD-A, NES-1D, NES-1S, NES-2S, NES-2D, NES-2DD, NES-3, NES-4, NES-5, NES-6D, NES-6S, NES-7D, NES-7S, NES-8S, PP-1A, PP-1B, PP-2A, PP-2B, PP-5A, PP 5B, PP-6A, PP-6B, and PP-8 | A-5, A-6, A-7, A-8, and A-9 |

In summary:

- 58 GWM wells are located on the south side of Western Branch and five (5) wells are located on the north side of Western Branch.
- Seven (7) GWM wells (A-1, A-4, A-10, A-11, B-8 through B-10) are located up-gradient of the Landfill.
- 18 GWM wells (A-2, A-3, A-15, A-17 through A-20, A-22, A-23, B-1, B-2, B-2R, B-3, B-4, B-6, B-6A, B-6R, and B-7) are located down-gradient or cross-gradient of the Landfill.

#### 4.3.2 Groundwater Elevation Data Analyses

As stated earlier:

- The uppermost aquifer beneath the Landfill is an unconfined soil matrix of the Nanjemoy Formation.
- Aquia is an important aquifer in the subsurface on the site and the Marlboro Clay Member is considered an upper confining bed for the Aquia aquifer. Due to its limited presence and discontinuous nature, the effect of Marlboro Clay on the groundwater regime of the site is localized and insignificant. Furthermore, the water in the uppermost aquifer is perched above the Marlboro Clay member and moves laterally rather than vertically.
- The unconfined Aquia aquifer is the only aquifer encountered within 70 ft of the anticipated landfill floor. The Magothy aquifer was found to be deeper than 90 ft at the site.
- Groundwater levels on the north side of Western Branch do not affect groundwater elevations on the south side of the Landfill.

- The unconfined uppermost aquifer flows north and northeast across the site and likely discharges laterally to surrounding wetlands, Turkey Branch, and Western Branch.

Noting the above, the monthly GWE data from 2005 through 2020 was analyzed for all wells on the south side of Western Branch to determine the most:

- Elevated groundwater condition,
- Depressed groundwater condition, and
- Highest groundwater elevation.

GWM wells on the south side of Western Branch were split into two subsets: (1) critical wells subset comprising of wells located in the non-overlap portion of the Area C Infill and (2) other wells subset comprising of all wells on the south side of Western Branch not included in the critical wells subset.

The location of the BL system is determined based on the highest groundwater elevations. The measured data may have potential outliers, which are generally the extreme, unusual-looking, large or small measurements relative to rest of the data and are suspected of misrepresenting the population from which they are sampled. These outliers generally result from transcription or data-coding errors or inaccurate measurement. Inclusion of outliers in the determination of the highest groundwater would incorrectly predict highest groundwater elevation, resulting in:

- Reduction in airspace available for waste placement and
- Increased cost to expand horizontally to compensate for the lost airspace.

The outlier analyses performed is provided in Appendix II-C.

## 4.4 GROUNDWATER CONTOUR MAPS

Monthly GWE monitoring data of the critical wells subset comprising of GWM wells within the non-layover portion of the Area C Infill and other wells subset from 2005 through 2020 is presented in Table C-1 of Appendix II-C. Results indicated that the maximum average GWE of the critical wells subset occurred in May 2019 and the minimum average GWE occurred in October 2016. Therefore, the elevated and depressed GWE conditions were assumed to have occurred in May 2019 and October 2016, respectively.

The elevated, depressed, and maximum GWE conditions at the critical wells subset and other GWM wells is presented in Table C-1, Appendix C. Results for the critical wells subset are summarized below:

- Average elevated groundwater level was about 47.19 ft AMSL.
- Average depressed groundwater was about 4.5 ft below the elevated groundwater levels.

Based on the GWE data in Table 5 and the latest site topography, three (3) groundwater contour maps were generated using the surface mapping system software Surfer™ (Golden Software V7.04). The kriging gridding method and professional engineering judgment were utilized in the generation of these groundwater contour maps. Elevated, depressed, and highest groundwater conditions at the Landfill are provided in Exhibits II-9 through II-11, respectively. Based on these groundwater contours, the observed groundwater flow directions in the uppermost aquifer are north, northeast, and east across the site.

Table 5. Elevated, Depressed, and Highest GWE Conditions at Critical and Other GWM wells

| Well ID | Groundwater Elevation (ft, AMSL) | | |
|---|---|---|---|
| | Elevated Groundwater (5/13/2019)* | Depressed Groundwater (10/28/2016) | Highest Groundwater (2005 to 2020) |
| **A. Up-gradient GWM wells:** | | | |
| A-1 | 46.25 | 57.31+ | 48.10 |
| A-4 | 60.19 | 58.35 | 61.75 |
| A-11 | 75.31 | 82.02+ | 75.63 |
| B-8 | 81.17 | 79.10 | 83.59 |
| B-8 | 81.17 | 79.10 | 83.59 |
| B-9 | 81.56 | 78.99 | 83.29 |
| B-10 | 81.73 | 77.94 | 84.11 |
| **B. Down-gradient or Cross-gradient GWM wells:** | | | |
| A-2 | 32.25 | 30.69 | 35.15 |
| A-3 | 29.69 | 24.70 | 29.80 |
| A-15 | 37.11 | 36.53 | 39.17 |
| A-17 | 32.63 | 30.21 | 33.26 |
| A-18 | 29.50 | 28.55 | 30.96 |
| A-19 | 30.27 | 28.72 | 32.07 |
| A-20 | 32.66 | 29.44 | 33.38 |
| A-22 | 29.47 | 28.14 | 30.00 |
| A-22D | 31.55 | --- | 31.96 |
| A-23 | 33.92 | 31.67 | 33.92 |
| B-1 | 36.97 | 37.33 | 41.17 |
| B-2 | 42.34 | 37.94 | 45.71 |
| B-2R | 39.04 | 41.61 | 43.27 |
| B-3 | 41.60 | 40.68 | 43.28 |
| B-4 | 50.33 | 50.17 | 51.88 |
| B-6R | 56.59 | 55.61 | 57.52 |
| B-7 | 73.12 | 69.02 | 73.19 |
| **C. Other GWM wells** | | | |
| A-12 | 48.82 | 45.14 | 49.39 |
| A-13 | 42.65 | 41.80 | 42.83 |
| A-14 | 44.82+ | 35.28 | 39.65 |

| Well ID | Groundwater Elevation (ft, AMSL) | | |
|---|---|---|---|
| | Elevated Groundwater (5/13/2019)* | Depressed Groundwater (10/28/2016) | Highest Groundwater (2005 to 2020) |
| A-16 | 35.63 | 34.71 | 37.48 |
| A-21 | 52.89 | 51.32 | 53.59 |
| NES-1D | 30.94 | 29.38 | 31.23 |
| NES-1S | 31.42 | 29.84 | 31.84 |
| NES-2D | 29.56 | 27.97 | 29.70 |
| NES-2DD | 27.88 | 27.14 | 28.74 |
| NES-2S | 49.19 | 47.65 | 50.74 |
| NES-3 | 58.02 | 56.77 | 58.64 |
| NES-4 | 29.19 | 27.77 | 29.39 |
| NES-5 | 27.98 | 26.97 | 29.40 |
| NES-6D | --- | --- | 28.15 |
| NES-6S | --- | --- | 32.90 |
| NES-7S | 31.07 | 30.73 | 33.22 |
| NES-8S | 30.92 | 30.56 | 33.12 |
| PP-1A | 29.56 | 27.98 | 31.27 |
| PP-1B | 29.63 | 28.04 | 31.44 |
| PP-2A | 37.90 | 38.27 | 39.37 |
| PP-2B | 37.73 | 38.14 | 39.10 |
| PP-5A | 51.22 | 50.28 | 52.29 |
| PP-5B | 51.12 | 51.78 | 53.69 |
| PP-6A | 50.24 | 45.48 | 51.19 |
| PP-6B | 48.82 | 45.14 | 49.39 |
| PP-8 | 42.65 | 41.80 | 42.83 |

* Date when measured
+ High outlier statistically significant at *P*-value < 0.05.
--- GWE not measured.

## 4.5 GROUNDWATER QUALITY

Sampling, analysis, and reporting of groundwater and surface water quality at the site dates back to 1985, more than 35 years ago. In summary,

- The groundwater quality is monitored on a semiannual basis. The GWM network is designed in accordance with the regulations, which require monitoring both upstream and downstream of the Landfill.
- To date, there are no GPS exceedances beyond the property boundary.

- In the site's history, there have been groundwater exceedances in a few onsite wells, but most have transitioned to the assessment monitoring program and back to detection monitoring. More recently, there are three areas of concern, only one of which (Area A-2) is presently being further investigated:
  - Manhole #8 (MH-8) Area of Concern — In May 2012, a leachate seep was identified adjacent to MH-8. The seep was immediately repaired, and two sumps (PW-8 and PW-8A) were installed in the vicinity of MH-8 to remove groundwater from the affected area. Groundwater extraction from these sumps occurred from July 2012 through April 2014. Sumps PW-8 and PW-8A continue to be monitored as a precautionary measure.
  - B-6R Area of Concern — Assessment monitoring began in 2006. For the purposes of delineating cadmium- and cobalt-affected groundwater in the vicinity and down-gradient of compliance well B-6R, several groundwater monitoring wells were installed and classified as a performance or sentinel wells. To monitor the extent of the cadmium- and cobalt-affected groundwater, the performance well is monitored semi-annually and the sentinel wells are monitored annually for cadmium and cobalt only.
  - Area A-2 Area of Concern — Area A-2 entered an assessment monitoring program in 1997. The present contaminants of concern are benzene, cis-1,2-Dichloroethene, and vinyl chloride. An NEI has been completed and awaits MDE approval followed by a proposal of an Assessment of Corrective Measures to evaluate remedial options. The extent of this area of concern appears to be about 100 feet downstream of A-2. This area is located on the east side of Area A-2.

Additional details are described in the following subsections.

### 4.5.1 Groundwater and Surface Water Quality Monitoring History

1985: Groundwater monitoring for Area A began. In addition, two (2) surface water locations (CX-1 and CX-3) on Western Branch around Area A were also monitored.

1989: The Area B groundwater monitoring program began.

1994: Sampling was initiated for two (2) additional surface water locations (CX-4 and CX-5) on Western Branch and Turkey Branch, upstream of the Landfill.

1997: An Assessment Monitoring Program was implemented for Area A in accordance with 40 CFR 258.55 for GWM wells A-2 and A-16.

March 2003: GWM well B-6R was installed as a replacement well for B-6 due to ongoing turbidity issues. B-6R was installed adjacent to B-6 but slightly deeper and produced enough water to be properly developed and sampled without turbidity issues. Thus, B-6R served to monitor the uppermost aquifer in a manner that was more representative of actual conditions.

June 2005: Down-gradient GWM wells, A-22 and A-23, were installed as requested by MDE in a letter dated 04/05/2004. A-22 was installed down-gradient of A-2. A-23 was installed down-gradient of A-16. In addition, GWM well B-6 was abandoned and replaced in the monitoring network with previously installed GWM well B-6R.

December 1, 2006: An Assessment Monitoring Program was implemented for Area B wells B-3 and B-6R in accordance with 40 CFR 258.55 due to inter-well exceedances of various metals during each 2006 semiannual monitoring event. B-7 was included in the assessment monitoring program for up-gradient/background purposes.

June 2007: During the construction of Cells I & II in Area B, GWM well B-2 was damaged. On 08/23/2007, SCS oversaw the repair of B-2 as conducted by Groundwater Systems, Incorporated. A letter was submitted by SCS to MDE on 09/04/2007 documenting the repair and condition of B-2.

April 10, 2008: SCS notified MDE of the EPA-MCL exceedances detected in GWM well B-2 for the 2008 monitoring events and requested approval for installation of a replacement GWM well in the vicinity of GWM well B-2. In a letter dated 05/05/2008, MDE approved the installation of a replacement monitoring well. On 06/19/2008, SCS oversaw the installation of GWM well B-2R, approximately 100 ft east of GWM well B-2.

July 11, 2008: A request to replace GWM well B-2 with B-2R and subsequently abandon GWM well B-2 was submitted to MDE. In a letter dated 08/26/2008, MDE requested at least four (4) samples be collected from GWM well B-2R to conduct a comparative analysis prior to the abandonment of GWM well B-2.

2009: An inter-well exceedance was identified in GWM well A-22 for methylene chloride for the 1st semiannual 2009 monitoring event. Therefore, GWM well A-22 was added to the Area A assessment monitoring well network in accordance with 40 CFR 258.54 (c).

June 30, 2011: MDE was notified of the reclassification of GWM well B-3 to a detection monitoring well in the 1st semiannual 2011 Groundwater and Surface Water Monitoring Report (GSWMR) as Appendix II parameter concentrations had remained below background concentrations in GWM well B-3 since the 2nd semiannual 2008 groundwater monitoring event.

December 21, 2011: An updated Groundwater and Surface Water Monitoring Plan (GW & SWMP) was submitted to MDE.

April 30, 2012: A revised GW & SWMP was submitted to MDE based on comments provided by MDE in a letter dated 03/01/2012. The GW & SWMP was approved by MDE on 09/04/2012.

May 29, 2012: MDE was notified of the monitoring of the Area B underdrains conducted in April 2012 as a precautionary measure for detecting potential impacts from leachate. The April 2012 underdrain results did not indicate a potential impact. The County was subsequently instructed by MDE to monitor the Area B underdrains on a semiannual basis for the analysis of parameters listed in Tables I and II of the Landfill's RDP.

June 2013: GWM well B-7 was reclassified as a compliance well in response to comments provided in a letter from MDE dated 04/10/2013.

**February 2016:** An inter-well exceedance was identified in GWM well B-3 for cobalt in the 2nd semiannual 2015 monitoring event. Therefore, GWM well B-3 was added to the Area B assessment monitoring well network in accordance with 40 CFR 258.54 (c).

**December 2016**: An inter-well exceedance was identified in GWM well A-19 for barium in the 2nd semiannual 2016 monitoring event. Therefore, GWM well A-19 was added to the Area A assessment monitoring well network in accordance with 40 CFR 254.54 (c).

**September 2017**: An inter-well exceedance was identified in GWM well B-4 for cadmium. Therefore, GWM well B-4 was added to the Area B assessment monitoring well network in accordance with 40 CFR 258.54 (c).

**August 6, 2019**: MDE provided a response to the 2nd semiannual 2018 GSWMR with the following approvals or recommendations:

- Approved the recommendation to remove GWM well B-2 from the compliance monitoring well network and instead utilize GWM well B-2 as an additional well to help characterize groundwater flow.
- Recommended GWM well A-23 remain a compliance well and GWM well A-16 be maintained as an additional well for monitoring GWE as it may not be representative of groundwater quality at the compliance boundary.
- Recommended GWM well A-22 remain a compliance well rather than a performance well until the investigative work in the vicinity of GWM well A-2 is concluded.

**October 4, 2019**: A revised GW & SWMP was submitted to incorporate changes to the groundwater monitoring well network and address comments provided in the 08/06/2019 letter. MDE approved the GW & SWMP in a letter dated February 28, 2020.

### 4.5.2 MH-8 Area of Concern

Remediation and monitoring efforts conducted to-date to address the leachate seep issue in MH-8 are summarized below:

**May 4, 2012**: The County reported to MDE a leachate seep into a manhole (MH-8) located near GWM well A-12. The seep was noted during work to replace the leachate valves that shut off leachate from Cell 8 draining into MH-8. The seep appeared to come from around an overflow pipe that connects MH-8 to its adjacent valve manhole.

**May 4 and 7, 2012:** A sample of the liquid seeping into MH-8 was collected for the analysis of parameters listed in Tables I and II of the Landfill's RDP. Concentrations of six (6) metals (antimony, arsenic, chromium, cobalt, lead, and nickel) and two (2) volatile organic compounds (1,2-dichloroethane and benzene) were detected above GPS. Eight (8) VOCs were detected above the laboratory's limit of quantitation (LOQ), but below GPS. These monitoring results support a potential leachate impact.

**May 9, 2012:** A groundwater sample was collected from GWM well A-12 to assess if the leachate seep impacted local groundwater. Concentrations of two (2) metals (antimony and arsenic) were detected above GPS. 10 VOCs were detected above the laboratory's LOQ, but below GPS. These monitoring results supported a potential leachate impact.

**May 10, 2012:** Two (2) test pits were excavated adjacent to MH-8 on either side of the Cell 8 leachate header pipe draining into MH-8. Each test pit was about 16 to 17 ft deep (approximately 4 to 5 ft below the MH-8 seep penetration). The pits appeared to penetrate the groundwater table at approximately 16 to 17 ft below grade. Groundwater appeared clear and no odors were noted; thus, no potential leachate impacts were observed. No liquids were flowing from the side walls of the test pits.

Areas adjacent to MH-8 were also investigated. Potential leachate-impacted water appeared to be ponding near GWM well A-12, at the outlet of an old abandoned culvert. The appearance of the leachate-impacted water appeared to terminate approximately 500 ft northeast of well A-12 and a few hundred feet before the nearest sedimentation basin. An earthen clay dam was constructed at the old abandoned culvert to contain and manage the liquids.

May 11, 2012: MDE was provided an update via email regarding MH-8 remediation efforts.

May 16, 2012: The old abandoned culvert located west of GWM well A-12 was exposed. Gravel material was found around culvert. Potential leachate impacts were observed in the liquid seeping from the gravel material.

May 17, 2012: The top of the leachate header pipe entering MH-8 cell valve was excavated and a Fernco fitting connecting the leachate header pipe to Cell 8 valve manhole was located. The Fernco fitting was loose and leaking; this appeared to be the source of the leachate seeps.

May 18, 2012: MDE was provided an update via email regarding MH-8 remediation efforts.

May 21, 2012: The replacement of leaking Fernco fitting with PVC flanged fittings and a spool piece made from HDPE pipe was completed.

May 22, 2012: A test pit (Test Pit #1) was excavated approximately 30 ft southwest of MH-8 uncovering a gravity leachate pipe. No potential leachate impacts were observed in the gravel bedding around the pipe.

May 23, 2012: MH-8 and valve MH penetration leaks were repaired with hydraulic cement. No leaks were observed from the new piping connecting to MH-8. A noticeable reduction in the seeping liquid filling the temporary clay-dammed area constructed at the outlet of the old abandoned culvert was observed. This suggested the source had been controlled.

May 24, 2012: MDE was provided an update via email regarding MH-8 remediation efforts. To evaluate the extent of potential leachate impacts down-gradient of GWM well A-12, three (3) GWM wells (A-13, A-14, and A-15) located down-gradient of well A-12 were sampled for the analysis of parameters listed in Tables I and II of the Landfill's RDP. No parameters were detected above GPS and no VOCs were detected above the laboratory's limit of detection (LOD). These monitoring results indicated the extent of potential leachate impact to groundwater was limited to the immediate vicinity of well A-12.

To evaluate the extent of potential leachate impacts to area surface waters down-gradient of A-12, the sedimentation basin located approximately 500 ft northeast of A-12 was sampled for the analysis of parameters listed in Tables I and II of the Landfill's RDP. No parameters were detected above the Landfill's GPSs and no VOCs were detected above the laboratory's LOD. These monitoring results indicated the extent of potential leachate impact were limited to groundwater in the immediate vicinity of A-12.

**May 24, 2012:** A test pit (Test Pit #4) was excavated 120 ft downstream of MH-8, near where the gravity leachate pipe crosses over the old abandoned culvert. The pit appeared to penetrate the groundwater table at approximately 16 ft below grade where the test pit was terminated. Potential leachate impacts were observed in the groundwater.

Test pits were excavated approximately 50 ft (Test Pit #5) and 100 ft (Test Pit #7) northeast of GWM well A-12 to a hard stone-like material at 10 ft below-grade. The soil in the test pits, 18 in above the stone-like material, contained gravel. No standing water was observed. Both of these test pits were backfilled upon completion of the investigation.

**May 25, 2012:** A test pit (Test Pit #6) was excavated approximately 150 ft northeast of MH-8, over the 12-in leachate gravity pipeline. The gravity leachate pipe was uncovered at approximately 14 ft below-grade. No potential leachate impacts were observed in the gravel bedding around the pipe. The test pit appeared to penetrate the groundwater table at approximately 18 ft below-grade. A slight discoloration (light brown tint) to the groundwater was observed.

In an effort to remove potentially impacted soil at the old abandoned culvert outlet, the adjacent soil was over-excavated and removed. The liquids seeping into the excavation were removed and within one (1) hour, the seep stopped. During removal of the seeping liquids, the color of the liquid seeping into the excavation appeared to become clear. The test pits were backfilled upon completion of the investigation, except for around the old culvert outlet.

**May 30, 2012:** A test pit (Test Pit #8) was excavated approximately 200 ft northeast of MH-8, over the 12-in leachate gravity pipeline. The gravity leachate pipe was uncovered at approximately 13 ft below-grade. No potential leachate impacts were observed in the gravel bedding around the pipe. Test pit was excavated to approximately 18 ft below-grade where the groundwater was anticipated to be encountered. No water was encountered. Excavation was left open for about six (6) hours. Approximately three (3) inches of water accumulated at the bottom of the excavation. The liquid was observed to be clear.

A test pit (Test Pit #9) was excavated approximately 150 ft northeast of GWM well A-12 to hard stone-like material at 14 ft deep. Standing water observed to be clear. Test pits were backfilled upon completion of the investigation.

**May 31, and June 1, 2012:** Potentially impacted soil material continued to be removed from around the old abandoned culvert. The area around culvert was backfilled with clean clayey material. An 11 ft deep sump (PW-8) was constructed near the culvert outlet to serve as a monitoring well/pumping well. This sump was constructed from an 8-in pipe; bottom 4 ft perforated pipe and gravel pack around perforations.

**June 1, 2012:** MDE was provided an update via email regarding MH-8 remediation efforts.

**June 11, 2012:** To monitor the effectiveness of the MH-8 remedial actions, a groundwater sample was collected from GWM well A-12 for the analysis of the Tables I and II parameters. Six (6) VOCs were detected above the laboratory's LOQ but below GPS. This is a significant improvement over the May 2012 monitoring results, thus supporting the effectiveness of the latest repairs to MH-8.

**June 19, 2012:** MDE was provided an update via email regarding MH-8 remediation efforts. In addition, monitoring results were provided from the May 2012 sampling of GWM wells A-12, A-13, A-14, A-15, and the down-gradient sedimentation basin.

**June 29, 2012:** MDE was provided an update via email regarding MH-8 remediation efforts. To continue to monitor the effectiveness of the MH-8 remedial actions, quarterly monitoring of GWM wells A-12, A-13, and A-14 for the analysis of Table I VOCs and the following Table II Metals: Antimony, Arsenic, Cobalt, Iron, and Manganese was proposed.

**July 2012:** A second sump (PW-8A) was installed approximately 30 ft northeast of GWM well A-12. Liquids appeared clear. The 11-ft deep sump was constructed from an 8-in pipe; bottom 4 ft perforated pipe and gravel pack around perforations. An extraction pump was installed in PW-8 approximately 3 to 4 ft into the water table. Pumping from PW-8 began on 07/27/2012. Extracted water was discharged to the existing leachate collection system.

**November 26, 2012:** Visual observations of liquid from PW-8 continued to indicate a potential leachate impact, as liquid remained dark in color. Liquid in PW-8A appeared slightly discolored.

**November 27-29, 2012:** Test pits were excavated along the leachate gravity line and similar findings from prior investigations were found (i.e. leak contained in same general area). Prior to the repair at the MH-8 valve manhole, excavation revealed a leak at the inlet to the manhole where the new Vanstone flange joined with the old PVC pipe. Associated repairs were completed on 12/04/2012.

**November 29, 2012:** MDE was provided an update via email regarding MH-8 remediation efforts. Quarterly monitoring of GWM wells A-12, A-13, and A-14 and sumps PW-8 and PW-8A for the analysis of Table I VOCs and Table II Metals: Antimony, Arsenic, Cobalt, Iron, and Manganese was proposed.

**December 6, 2012:** An extraction pump was installed in PW-8A approximately 3 to 4 ft into the water table and pumping was initiated. Extracted water was discharged to the existing leachate collection system.

**December 10, 2012:** The excavation for the MH-8 valve manhole repair was backfilled. In addition, a "leak observation well" was constructed at the repair location outside MH-8 valve manhole to monitor for potential future leaks.

**December 13, 2012, July 1, 2013, & March 14, 2014:** MDE was provided an update via email regarding MH-8 remediation efforts.

**April 30, 2014:** MDE approved the cessation of pumping at sumps PW-8 and PW-8A.

**August 6, 2019:** MDE approved the removal of antimony, arsenic, and cobalt as constituents of concern for sumps PW-8 and PW-8A and monitoring well A-12.

**October 4, 2019**: A revised GW & SWMP [9] was submitted to incorporate changes to the MH-8 monitoring program which includes semiannual sampling of PW-8 and PW-8A for the analysis of parameters listed in Table I of the Landfill's RDP. MDE approved the GW & SWMP in a letter dated February 28, 2020.

### 4.5.3 Nature and Extent Investigations

A summary of the NEI [7] is provided below.

**April 10, 2013**: MDE commented on the 2nd semiannual 2012 GSWMR regarding metal detections in compliance well B-6R and VOC detections in compliance well A-22. MDE requested the submittal of an NEI work plan.

**June 6, 2013**: A NEI work plan was submitted to MDE. MDE provided comments in a letter dated 07/06/2013. A revised NEI work plan was submitted on 08/22/2013 and subsequently approved by MDE in a letter dated 11/22/2013.

**June 2014:** GWM wells NES-1D, NES-1S, NES-4, and NES-5 were installed in the vicinity of B-6R to horizontally and vertically delineate the extent of COCs cadmium and cobalt. GWM wells NES-2D, NES-2S, and NES-3 were installed in the vicinity of compliance well A-2 to horizontally and vertically delineate the extent of the VOC COCs.

**November 1, 2014**: A NEI Report was submitted to MDE documenting delineation activities for the GWM wells A-2 and B-6R areas of concern. In addition, the report presented groundwater monitoring data evaluating the nature and extent of the COCs and provided recommendations for future monitoring and investigation efforts.

**May 15, 2015:** MDE commented on the November 2014 NEI Report and agreed with the following monitoring and investigation efforts presented in the NEI Report:

- The addition of 1,2-dichloropropane as a COC in Area A;
- The addition of down-gradient GWM wells NES-6S and NES-6D and addition of deep GWM well NES-2DD within the A-2 Area of Concern;
- The continued monitoring of GWM wells A-22, NES-1S, NES-2S, and NES-2D on a semiannual basis for applicable COCs;
- The continued monitoring of GWM wells NES-1D, NES-3, NES-4, NES-5, and SW-1 on an annual basis for applicable COCs.

**November 2015:** Groundwater monitoring wells NES-2DD, NES-6S, and NES-6D were installed in the vicinity of compliance well A-2 to horizontally and vertically delineate the extent of the VOC COCs.

**April 12, 2016**: A NEI Addendum Report was submitted to MDE documenting the additional delineation activities in the vicinity of well A-2. The study presents groundwater monitoring data evaluating the nature and extent of the COCs and provides recommendations for future monitoring and investigation efforts.

**June 29, 2016:** MDE commented on the April 2016 NEI Report Addendum and required the following actions:

- Installation and sampling of three (3) new GWM wells (A-22D, NES-7S, and NES-8S) to assess the extent of vinyl chloride in the vicinity of well A-22.
- Continued semiannual assessment monitoring of well A-2.
- Semiannual monitoring of wells A-22, NES-2S, NES-2D, and NES-2DD for the parameters listed in Tables I and II.
- Annual monitoring of wells NES-3, NES-6S, and NES-6D for the parameters listed in Tables I and II.

March 17, 2017: A Joint Federal/State Application for the Alteration of a Non-tidal Wetland was submitted to MDE for the installation and construction of GWM well NES-7. Approval of this application was issued by MDE via a Letter of Authorization 17-NT-0114/201760557 dated 05/15/2017.

June 21-23, 2017: Three (3) GWM wells (A-22D, NES-7S, and NES-8S) were installed within the A-2 Area of Concern. A-22D was installed to further evaluate the vertical extent of vinyl chloride in the vicinity of well A-22. GWM wells NES-7S and NES-8S were installed to further evaluate the horizontal extent of vinyl chloride and to confirm the direction of groundwater flow in the vicinity of well A-22.

September 1, 2017: The Army Corps of Engineers was notified of project completion for installation of GWM well NES-7S within the wetland with the submittal of a compliance certification form.

November 27, 2017: An NEI Report 2nd Addendum was submitted to MDE documenting additional delineation activities for the A-2 Area of Concern. In addition, this 2nd addendum presented an evaluation of the nature and extent of the COCs within the well A-2 Area of Concern and presented recommendations for future monitoring and investigation efforts.

February 2, 2018: MDE approved the November 2017 NEI Report 2nd Addendum.

May 29, 2018: A modification to the Joint Federal/State Application for the Alteration of a Non-tidal Wetland (17-NT-0114/201760557) was submitted to MDE for the installation and construction of GWM well NES-7D. Approval of this application was issued by MDE via a Modification of Authorization 17-NT-0114/201760557 effective 07/11/2018.

September 2018: One (1) GWM well (A-22DD) was installed within the well A-2 Area of Concern to further evaluate the vertical extent of VOCs in the vicinity of well A-22D. Due to concerns with the sand pack length, well A-22DD was replaced with well A22DD-A in September 2019 and well A-22DD was subsequently abandoned. Installation and abandonment activities were documented in the 3rd NEI Addendum.

November 2019: One (1) GWM well (NES-7D) was installed within the A-2 Area of Concern to further evaluate the vertical extent of VOCs in the vicinity of well NES-7S. Installation activities were documented in the 3rd NEI Addendum.

May 4, 2020: A 3rd NEI Report Addendum was submitted to MDE documenting the completion of delineation activities associated with the well A-2 Area of Concern. This addendum documented the performance of additional groundwater delineation activities, presented an evaluation of the nature and extent of the COCs within the well A-2 Area of Concern, and presented recommendations for future monitoring efforts. In addition, the 3rd NEI Addendum indicated an Assessment of Corrective Measures evaluating the remedial options for the VOC COCs for the well A-2 Area of Concern will be submitted to MDE within 90 days of MDE approval of the 3rd NEI Addendum.

May 13, 2020: The Army Corps of Engineers was notified of project completion for installation of NES-7D within the wetland with the submittal of a compliance certification form.

## 4.6 POTENTIAL FOR VERTICAL AND HORIZONTAL MOVEMENTS OF POLLUTANTS

Since its inception in 1968 (over 50 years ago), the Landfill has had an excellent operational record of containing pollutants onsite. To date, there are no known regulated constituents in the groundwater that are above groundwater protection standards beyond the County's property boundary. This is partly attributed to the relatively low hydraulic conductivity of the natural clayey material that underlies most of the Landfill footprint, which limits the vertical and horizontal movement of potential pollutants.

Design attributes included in Area C to control potential vertical and horizontal movement of pollutants to surface and groundwater include the following:

- It is proposed that the Area C Infill will be lined with a geosynthetic HDPE membrane and a 2 ft thick subbase with hydraulic conductivity ($K_V$) ≤ $1x10^{-7}$ cm/sec or equivalent layer combination of lower hydraulic conductivity. These barriers will be designed and installed in accordance with COMAR 26.04.07.07.C.(12)(a)(ii) (see Sections 7.1.3 and 7.1.4 for details) and 40 CFR Part 258 Subpart D. These barriers will be designed to control potential vertical movement of subsurface pollutants to surface and groundwater.
- An LCR system, constructed of porous drainage rock, and perforated HDPE pipe within the Area C waste limits and solid HDPE pipe outside the Area C waste limits, will be installed to collect and transport leachate/pollutants, outside of the Area C Infill space to the existing LPP (see Sections 7.3 and 7.4 for details). The LCR system will be designed to control potential horizontal movement of subsurface pollutants to surface and groundwater.
- Stormwater at the site will be channeled through benches and swales and collected in sedimentation traps and basins. The outfalls from the sedimentation traps and basins will drain to established waterways. Water quality of the stormwater management discharge ponds will be maintained by implementing Best Management Practices, available industry standards, and in accordance with the Landfill's Stormwater Pollution Prevention Plan and Erosion and Sedimentation Control Plan. Currently, the Landfill is working with the Soil Conservation District (SCD) to renew the site's 5-Year Erosion and Sedimentation Control Plan.

Up-gradient and down-gradient GWM well networks will be reviewed semiannually and adjusted as needed to monitor the effectiveness of the liner and LCR system. Laboratory analyses of the up-gradient GWM wells will be compared with the down-gradient GWM wells on a semiannual basis in accordance with the site's RDP. GWM reports will be submitted to MDE.

The sedimentation traps/ponds outfalls will be monitored in accordance with the site's RDP. Surface water monitoring reports will be submitted to MDE.

# 5.0 PRELIMINARY CONCEPTUAL DESIGN

A preliminary conceptual design of the Area C Infill and its conceptual subgrade and final grading plans are presented in Exhibits II-12, II-20, and II-21, respectively. Note that this is a preliminary design, so we anticipate moderate changes to the outer limits and shape of the Landfill as we prepare detailed calculations and drawings during the Phase III report. The general concept of Area C Infill is summarized in the following:

- Occupies approximately 216.5 acres, of which approximately 165 acres will overlap onto the existing Landfill areas.
- Vertical height will extend no more than 200 ft above the existing grades outside the Landfill footprint (ground level). As the existing grades outside the Area C Infill waste footprint range between 62 and 86, the highest elevation of Area C Infill will be approximately 260 ft.
- Overall, the outer side slope grades will range up to approximately 1V:3H.
- The Area C Infill will add approximately 30 million cubic yards of airspace to the Landfill, extending the life of the Landfill by an additional 50 years.

Further details of the conceptual design as it relates to the subgrade and final grading plans, BL, and leachate collection and removal (LCR) systems are presented in the following subsections.

## 5.1 CONCEPTUAL SUBGRADE PLAN

Conceptual design specifications for the subgrade plan are provided below:

- There is a minimum three (3) foot separation between the bottom of the BL system and the highest groundwater table [COMAR 26.04.07.07C(12)(b)(i)].
- Install the BL system at a minimum 2% slope for positive drainage of leachate towards LCR system and prevention of leachate ponding on the BL [COMAR 26.04.07.07C(12)(a)(v)].
- The subgrade soil below the BL system shall:
    - Have adequate bearing capacity (strength) to support the anticipated static and dynamic loads [COMAR 26.04.07.07C(12)(a)(iii)].
    - Be free of large rocks, stones, sticks, roots, sharp objects, or debris and provide a smooth surface for BL system installation.

Exhibit II-20 provides the conceptual subgrade and the highest groundwater contours.

## 5.2 CONCEPTUAL FINAL GRADING PLAN

Conceptual design specifications for the final grading plan are provided below:

- Vertical height will extend no more than 200 ft above the existing grades outside the Landfill footprint (ground level). As the existing grades outside of the Area C Infill waste footprint range between 62 and 86, the highest elevation of Area C Infill will be approximately 260 ft.
- Side slopes of the final cover do not exceed 1V:3H. Note, however, that stormwater features (e.g., stormwater channels/benches) constructed atop the final cover slopes may have an outside slope up to 1V:2H.
- Stormwater drainage slope at top deck is about 5%.

Exhibit II-21 provides the conceptual final grading contours.

## 5.3 BOTTOM LINER SYSTEM

### 5.3.1 Soil Bearing Capacity Calculations

Soil bearing capacity calculations for the subgrade material are provided in Appendix II-D. The calculated design ratio is 23, indicating that the subgrade material below the BL system has adequate bearing strength to support the anticipated static and dynamic loads.

Sufficient subgrade material or bedding will be provided below the BL to prevent liner rupture during liner installation and operation. Proposed steps for the preparation and installation of subgrade material are summarized below:

- Reroute any existing drainage channels and divert stormwater away from working areas.
- Remove water remaining in the working area.
- Remove/clear all vegetation, organic material, top soil, and soft/loose natural soil from the working area.
- Existing onsite fill material undercut from within the Landfill footprint or other areas shall be segregated according to soil type and stockpiled in designated areas.
- All fill material used as subgrade shall be tested and approved by the inspector. All particle diameters greater than six (6) inches, organic material, debris, rubble, and any other deleterious material shall be removed prior to use.
- Approved subgrade material shall be placed in 12-in (loose thickness) lifts and compacted to a minimum of 90 percent of the maximum dry density.

### 5.3.2 Liner System Separation from Groundwater

Exhibit II-13 presents the basic design detail of the BL system. The system will be designed such that there is a minimum 3 ft separation between the bottom of the subbase and the composite high groundwater elevation. The overall high groundwater elevations are shown in Exhibit II-11.

### 5.3.3 Subgrade Settlement and Liner Elongation

Area C Infill was divided into three (3) portions for settlement analyses:

(1) Area C Infill without overlap onto the existing Landfill (Non-Overlap)
(2) Area C with overlap onto Area A (Area A Overlap)
(3) Area C with overlap onto Area B (Area B Overlap)

Subgrade/existing waste settlement and BL elongation analyses were performed along three (3) sections: A-A', B-B', and C-C'. Exhibit II-14 shows the layout of these sections and Exhibits II-15 through II-17 show profiles for each of these sections. Settlement and BL elongation/contraction calculations are presented in Tables E-1 through E-3 of Appendix II-E.

Overall, the analysis indicates that the BL systems in both the Non-Overlapped and Overlapped portions will not result in significant elongation or overstressing of the BL system, nor will it significantly alter direction of the leachate flow. Subgrade/existing waste settlement results indicate that the bottom elongation was not more than 0.25 percent, which is significantly less than the maximum allowable elongation of 12 percent for HDPE materials [8]. Further, the BL slope analyses before and after settlement (Table E-3 of Appendix II-E) indicate that leachate flow will not be significantly altered due to settlement.

Further details of these calculations are provided in the following subsections.

#### 5.3.3.1 Subgrade Settlement and BL Elongation in Non-Overlap Area

Constructed subgrade and other compressible materials overlay the Aquia Formation - a dense sand located about 15 to 20 ft below ground. For the BL system settlement calculations, a thickness of 40 ft below ground (15 to 20 ft of subgrade material plus the remaining Aquia Formation soils) was assumed as compressible subgrade material.

Table E-1 of Appendix II-E provides subgrade settlement calculations and Table E-3 provides BL elongation calculations. As shown, the BL settlement ranged from 0.30 to 0.96 ft and the elongation and contraction of the BL was estimated to be no more than 0.01 percent and 0.38 percent, respectively.

#### 5.3.3.2 Subgrade Settlement and BL Elongation in Area A Overlap

Table E-2 of Appendix II-E presents the primary and secondary settlement results of the existing waste in the Area A Overlap and Table E-3 provides the BL elongation calculations. As shown, the bottom settlement ranged from about 0.7 to 10.4 ft and the elongation and contraction of the BL was estimated to be no more than 3.24 percent and 1.01 percent, respectively.

#### 5.3.3.3 Subgrade Settlement and BL Elongation in Area B Overlap

Since Area B is already lined with a similar liner, no additional liner is needed for the Area B Overlap. Moreover, since the waste depths over the Area B Overlap are less than the waste depths over the Area C Non-Overlap, by deduction, the Area B Overlap will show even less subgrade settlement and BL elongation. Thus, no additional calculations were needed for this area.

### 5.3.4 Bottom Liner System and Leachate Collection Layer

The BL system, including the leachate collection layer, will be similar to the Area B permit design and the Landfill's RDP. Exhibit II-13 shows the typical BL details. For the Non-Overlap and Area A Overlap, the following systems are proposed (top to bottom):

(1) Non-Overlap
   a. 24-in thick leachate collection layer with a permeability of ($K_v$) ≥ 0.2 cm/sec or an equivalent layered system with an equal or greater permeability.
   b. 16-oz non-woven bedding geotextile
   c. 60-mil HDPE geomembrane liner with a permeability of ($K_v$) ≤ 1 x $10^{-10}$ cm/sec
   d. 24-in thick prepared subbase with a permeability of ($K_v$) ≤ 1 x $10^{-7}$ cm/sec; or an equivalent layered system with an equal or lower permeability

(2) Area A Overlap
   a. 24-in thick leachate collection layer with a permeability of ($K_v$) ≥ 0.2 cm/sec or an equivalent layered system with an equal or greater permeability.

b. 60-mil HDPE geomembrane liner with a permeability of ($K_v$) ≤ 1 x $10^{-10}$ cm/sec
c. 24-in thick prepared subbase with a permeability of ($K_v$) ≤ 1 x $10^{-7}$ cm/sec; or an equivalent layered system with an equal or lower permeability
d. Remove existing topsoil and about 6-in of vegetative layer from the existing Area A cap and place new subbase over the remaining cap layers:
    i. Existing 12-in (±) thick vegetative growth layer
    ii. Existing 10-oz non-woven filter geotextile
    iii. Existing Geocomposite Drainage Net
    iv. Existing 40-mil textured geomembrane (LLDPE)
    v. Existing 10-oz non-woven geotextile
    vi. Existing 6-in subgrade soil
    vii. Existing 24-in intermediate soil cover

The leachate collection layer will be designed to limit the maximum peak daily leachate head to less than 30 cm (1 ft) over the BL.

### 5.3.5 Geomembrane Liners

The BL systems will have an HDPE geomembrane liner and a non-woven geotextile above it for protection. The HDPE geomembrane will be textured where needed (i.e., on the side slopes) to provide a greater angle of interfacial friction within its interface layers. Stability calculations and cost analysis will guild these selections.

The selected HDPE geomembrane liner will have very low hydraulic conductivity, excellent resistance to chemical constituents found in typical sanitary leachate, adequate puncture resistance, and tensile properties. HDPE is commonly used in MSW landfill liner applications.

HDPE's relatively linear polymer structure, close-fitting polymer chains, and relatively dense semi-crystalline structure results in very low permeability and minimal potential penetration of chemicals into the polymer. Carbon black is added to the polymer to improve ultraviolet (UV) light resistance. Project requirements will limit the period of UV exposure to curtail potential degradation. Antioxidants are also added to HDPE (as appropriate) to reduce oxidation potential. Plasticizers are not added to HDPE, in contrast to other geomembrane products, and thus the migration of plasticizers is not a concern.

## 5.4 LEACHATE COLLECTION AND REMOVAL SYSTEM

In accordance with COMAR 26.04.07.07.C.(12)(c), the Area C Infill LCR system will be designed with the following objectives:

(1) The system shall be constructed with materials that are chemically resistant to waste managed at the Area C Infill and the generated leachate.
(2) The system shall have sufficient:
    a. Flow capacity to handle anticipated leachate flows over the expected life of the Area C Infill, including the post-closure care period, and
    b. Strength and thickness to prevent collapse under pressures exerted by overlying waste and cover materials and by any operational equipment.
(3) The system shall be designed and operated:
    a. To function without physical or biochemical clogging, and

b. To ensure that depth over the bottom geomembrane liner does not exceed 30 cm (1 ft).

The LCR design will be similar to the Area B permit design. Leachate generated within the Area C Infill will flow through the leachate collection layer to a series of perforated HDPE collection laterals. The leachate collection layer will be sloped 2 percent minimum towards the perforated collection laterals. The depth of the leachate collection layer and spacing between the perforated collection laterals will be designed to limit the maximum peak daily leachate head to less than 30 cm (1 ft) over the bottom geomembrane liner.

The perforated collection laterals will gravity drain to leachate headers that eventually penetrate the bottom Landfill side slopes, draining into a manhole system or sump located outside the waste footprint. The leachate collection pipes will be surrounded with a layer of inert non-calcareous coarse aggregate to provide filter protection and bedding support. The aggregate and perforations will be sized to minimize clogging of the perforations yet large enough to minimize migration of the aggregate into the leachate collection pipes. Cleanouts will be provided at the top of the side slopes to allow periodic cleaning of the leachate header pipes.

Leachate from the sumps will be pumped, transmitted, and discharged to existing tanks at the Tank Farm via HDPE forcemain(s). The storage capacity of existing sumps and tanks will be checked and upsized if needed.

Leachate collection pipe strength calculations are provided in Appendix II-F. As shown, DR-17 or thicker-walled HDPE leachate pipe for the Area C Infill is proposed to provide sufficient strength and thickness to prevent collapse due to pressures exerted by waste, cover materials, and operational equipment. Appendix II-F also provides calculations to confirm the integrity of the existing leachate collection pipes in Area B.

## 5.5 BOTTOM LINER SYSTEM AND LCR SYSTEM STABILITY

Veneer stability analysis was performed to verify the proposed liner system would work on the steepest bottom grades of the Area C Infill. The steepest base slopes occur in the overlay area of the Area C Infill; these slopes are at most 25 percent (1V:4H), or 14 degrees. The analysis was performed using two (2) approaches, as described in the following subsections.

### 5.5.1 Koerner and Soong Method

Veneer stability of various BL interfaces in the overlay area were analyzed using the Koerner and Soong (1998) method. Refer to Appendix II–G Table G-1 for the calculations. All factors of safety used in this approach were greater than the typical minimum factor of safety of 1.5. The lowest factor of safety (1.78) was obtained for the interface between the existing waste and the existing intermediate cover. Based on the calculations guided by this method, the BL and LCR system stabilities are considered satisfactory.

### 5.5.2 Simplified Janbu Method (PCSTABL)

Veneer stability was also analyzed using the Simplified Janbu method (PCSTABL software) to serve as a check for the Koerner and Soong method results. Refer to Appendix II-G for the calculations. The lowest factor of safety using this approach was 3.2, which is greater than the typical minimum factor of safety of 1.5. This approach confirmed that the BL and LCR system will be stable for the Area C Infill.

## 5.6 LEACHATE PRETREATMENT AND DISPOSAL

Leachate collected from the Landfill is stored in two (2) existing leachate storage tanks (750,000 gallons each) located at the Tank Farm. The leachate is pumped to the existing LPP. After pretreatment, the wastewater is discharged into the WSSC sanitary sewer system and the sludge cake is disposed at the Landfill.

In the recent 20 years, leachate amounts have averaged about 23,000 GPD with a standard deviation of 7,000 GPD.

### 5.6.1 Leachate Pretreatment Plant

A schematic diagram of the existing LPP is provided in Exhibit II-18. The plant uses a biological process (sequencing batch reactor) to pretreat the leachate to levels suitable for discharge to WSSC. The plant consists of the following components:

(1) Leachate treatment process comprising of a 20,000-gal equalization tank, two (2) 650-gal pH-controlled tanks (one before flocculation and one after clarification), a 1,600-gal flocculation tank, an 18-ft diameter clarifier, dual upflow anaerobic sludge baffled (UASB) reactors for anaerobic digestion, an odor control system, a 14-ft diameter thickener, a 7,000-gal holding tank to equalize flows between the thickener and sludge tank, a 7,000-gal sludge separation tank, a 50-$ft^3$ filter press, and a filtrate sump to store filtrate;
(2) Dual heat exchanger;
(3) Dual sequencing batch reactors;
(4) Fume scrubber;
(5) A holding tank for SBR effluent; and
(6) Two (2) boilers to generate process steam when needed.

The existing LPP was originally designed to handle an average leachate flow of 60,000 GPD[13]. The design capacity of the existing LPP was based on loadings of high carbonaceous BOD and acceptable levels of ammonia and TKN in the leachate. As the Landfill has aged, the leachate quality has changed to low carbonaceous BOD and relatively high ammonia and chemical oxygen demand.

An upgrade to the LPP to handle leachate from the Landfill, including the proposed Area C Infill, is presently under consideration. Review of existing leachate data indicates that the primary constituents of concern are ammonia, phosphorus, and BOD. Based on a preliminarily evaluation of the raw leachate constituents, continued biological treatment appears to be appropriate. Hydrologic Evaluation of Landfill Performance (HELP) V3.07 modelling will be performed to estimate future leachate flows, with consideration given to phased new cell construction and phased landfill capping. Upgrades to the existing LPP system will be designed to optimize the capacity and efficacy of the treatment facility to meet current and future permit limits. These upgrades are expected to be completed by December 2024.

# 6.0 REFERENCES


1. Whitman, Ezra, Requardt, G. J., and Associates. Water Supplies in New Castle County, DE; Baltimore, MD, dated 1956. [Consulting engineers' report to the Levy Court of New Castle County, DE.]

2. "Soils, Geology, and Groundwater for Area B, Brown Station Road Sanitary Landfill", prepared by Roy F. Weston, Inc., dated July 1978. Updated November 1979.

3. "Soils, Geology, Groundwater for Vertical Extension of Brown Station Road Sanitary Landfill", prepared by Bureau of Urban Services, Department of Public Works and Transportation, dated August 1980.

4. Hansen, H.J. and Edwards, J. The lithology and distribution of pre-Cretaceous basement rocks beneath the Maryland Coastal Plain, Maryland Geological Report of Investigations 44, dated 1986.

5. "Summary of the Findings of the Geotechnical Investigations of Area B, Brown Station Road Sanitary Landfill", prepared by Roy F. Weston, Inc., dated September 1989.

6. "Amendment to the Phase II and III Report, Brown Station Road Landfill, Area B", prepared by EA Engineering, dated February 2004.

7. "Nature and Extent Investigation Report Third Addendum, Brown Station Road Sanitary Landfill", prepared by SCS Engineers, dated May 4, 2020.

8. Geosynthetic Research Institute's (GRI) GM13 Standard Specifications, Revision 15, dated September 9, 2019.

9. "Groundwater and Surface Water Monitoring Plan, Brown Station Road Sanitary Landfill", prepared by SCS Engineers, dated October 4, 2019.

10. "1st Semiannual 2020 Groundwater and Surface Water Monitoring Report, Brown Station Road Sanitary Landfill", prepared by SCS Engineers, dated June 29, 2019.

11. "2nd Semiannual 2020 Groundwater and Surface Water Monitoring Report, Brown Station Road Sanitary Landfill", prepared by SCS Engineers, dated December 15, 2020.

12. "1st Semiannual 2021 Groundwater and Surface Water Monitoring Report, Brown Station Road Sanitary Landfill", prepared by SCS Engineers, dated June 25, 2021.

13. "Operation & Maintenance Manual, Brown Station Road Sanitary Landfill Leachate Pretreatment Plant", prepared by Jet Tech, dated February 6, 1995.

14. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance", EPA 530/R-09-007, dated March 2009.

15. "Data Quality Assessment: Statistical Methods for Practitioners", EPA QA/G-9S, dated February 2008.

16. Rosner, Bernard, Percentage Points for a Generalized ESD Many-Outlier Procedure. Technometrics, Vol. 25, No. 2, dated May 1983.

17. NIST/SEMATECH e-Handbook of Statistical Methods, http://www.itl.nist.gov/div898/handbook/, dated March 1, 2021

18. "Phase I Report, Brown Station Road Sanitary Landfill", prepared by SCS Engineers, dated July 1, 2019.

EXHIBITS

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1-17-2020 BY QUANTUM SPATIAL.

2. INFORMATION ON UNDERGROUND/ABOVEGROUND UTILITIES/PIPING IS INCORPORATED FROM:
   - 2.1. "PHASE IB LFG COLLECTION SYSTEM BLOWER BUILDING AND FLARES" CONSTRUCTION DRAWINGS DATED 10-6-1994, MAGUIRE GROUP, INC. OF FOXBOROUGH, MA.
   - 2.2. "FLARE STATION MODIFICATIONS AND EXPANSION PLANS" DATED DECEMBER 2010, SCS ENGINEERS OF RESTON, VA.
   - 2.3. "BROWN STATION ROAD SANITARY LANDFILL LEACHATE CONVEYANCE/STORAGE SYSTEM" DRAWINGS DATED 10-2-1990, WESTON MANAGERS DESIGNERS/CONSULTANTS OF WEST CHESTER, PA.
   - 2.4. "BROWN STATION ROAD SANITARY LANDFILL LEACHATE CONVEYANCE/STORAGE SYSTEM" AS-BUILT DRAWINGS DATED 12-11-1992, M.F. RONCA & SONS, INC., OF BETHLEHEM, PA.
   - 2.5. "BROWN STATION ROAD SANITARY LANDFILL AREA A CLOSURE" AS-BUILT DRAWINGS DATED NOVEMBER 1995, EA ENGINEERING SCIENCE AND TECHNOLOGY, INC. OF SPARKS, MD.

NOTES CONTINUED

   - 2.6. "BROWN STATION ROAD SANITARY LANDFILL PIPELINE REPLACEMENT PROJECT" AS-BUILT DRAWINGS DATED 10-27-1999, STATOIL ENERGY OF BETHLEHEM, PA.
   - 2.7 "BROWN STATION SOUTH LEG PUMPING STATION UPGRADES" DESIGN DRAWINGS DATED JULY 2004, JOHNSON, MIRMIRAN & THOMPSON OF BALTIMORE, MD.
   - 2.8 "AREA B, PHASE II THROUGH IV LFG COLLECTION SYSTEM AND FLARE STATION MODIFICATIONS AND EXPANSION" AS-BUILT DRAWINGS, SCS ENGINEERS OF RESTON, VA.
   - 2.9 "BROWN STATION ROAD SANITARY LANDFILL AREA B LFG HEADER PIPE RELOCATION" AS-BUILT DRAWINGS DATED 10-23-2003 PROVIDED BY J.A. RICE, INC. OF MILLERSVILLE, MD AND SCS ENGINEERS OF RESTON, VA.
   - 2.10 "BROWN STATION ROAD LANDFILL, LANDFILL GAS EXTRACTION TRENCH" DESIGN DRAWING DATED 3-31-2003, SCS ENGINEERS OF RESTON, VA.
   - 2.11 UTILITIES DRAWING (EZX8899) DATED 4-27-2004, SO-DEEP, INC. OF MANASSAS PARK, VA.

3. 100-YEAR FLOODPLAIN LINE BASED ON 1-17-2020 AERIAL TOPOGRAPHY BY QUANTUM SPATIAL AND FEMA SURFACE ELEVATION DATA GATHERED FROM PRINCE GEORGE'S COUNTY DEPARTMENT OF PERMITTING, INSPECTIONS AND ENFORCEMENT (DPIE). WORK IS ONGOING TO VERIFY THE FLOODPLAIN NORTH OF AREA B.

4. WETLAND INFORMATION IS INCORPORATED FROM WETLAND DELINEATION DATED JUNE 2020 PERFORMED BY AB CONSULTANTS, INC. OF LANHAM, MD.

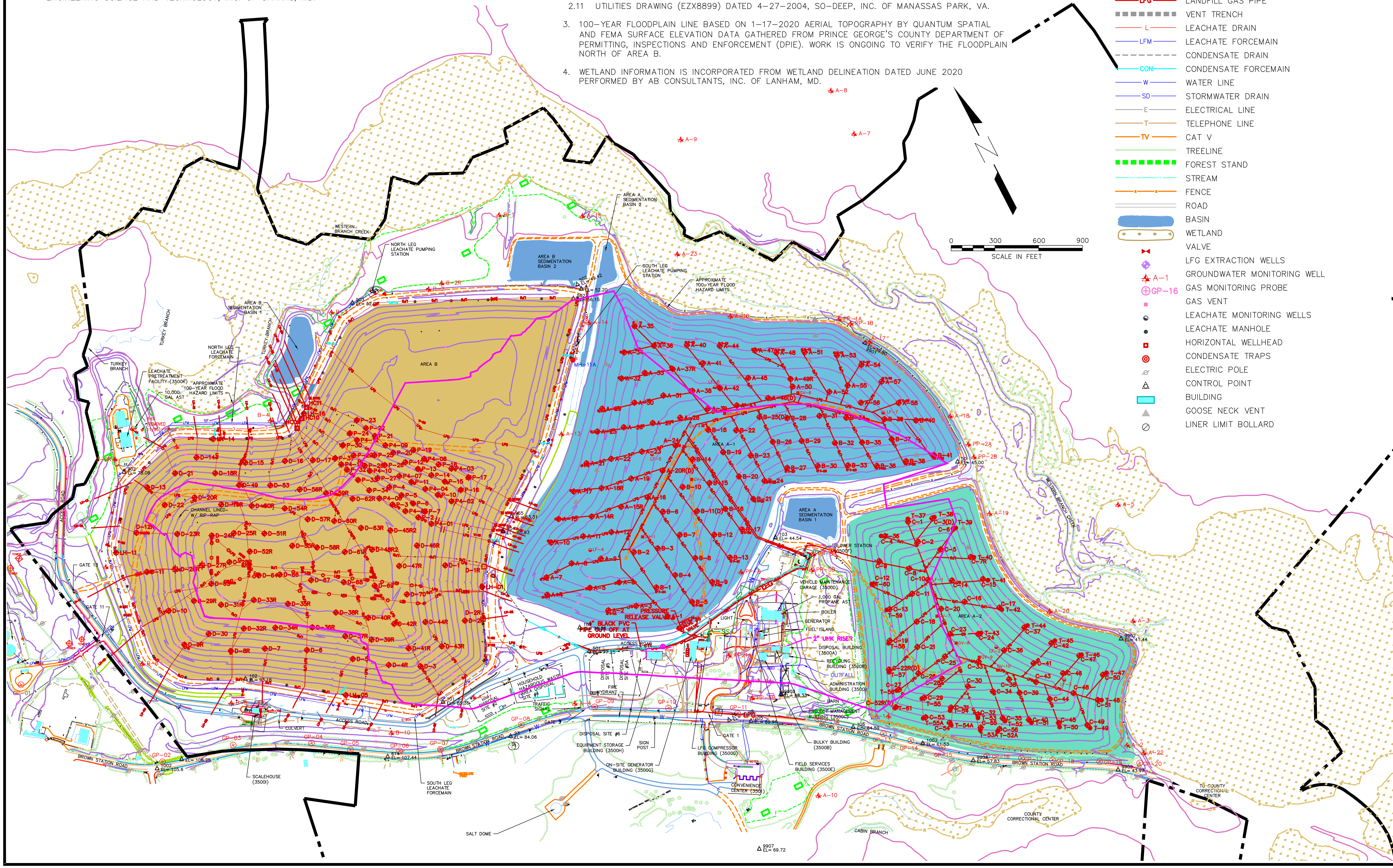
REVISION -1 NOTE: REVISED AREA C INFILL WASTE LIMITS

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND · DARRIN DOMINIC DILLAH · LIC. REG. CERT. NO 30160 · PROFESSIONAL ENGINEER

12-21-21




LEGEND

| | |
|---|---|
| COUNTY PROPERTY BOUNDARY | |
| 100-YEAR FLOODPLAIN | |
| APPROXIMATE WASTE LIMITS - AREA C INFILL | |
| WASTE FOOTPRINT - AREA A-1 | |
| WASTE FOOTPRINT - AREA A-2 | |
| WASTE FOOTPRINT - AREA B | |
| LFG | LANDFILL GAS PIPE |
| | VENT TRENCH |
| L | LEACHATE DRAIN |
| LFM | LEACHATE FORCEMAIN |
| | CONDENSATE DRAIN |
| CON | CONDENSATE FORCEMAIN |
| W | WATER LINE |
| SD | STORMWATER DRAIN |
| E | ELECTRICAL LINE |
| T | TELEPHONE LINE |
| TV | CAT V |
| | TREELINE |
| | FOREST STAND |
| | STREAM |
| | FENCE |
| | ROAD |
| | BASIN |
| | WETLAND |
| | VALVE |
| | LFG EXTRACTION WELLS |
| | GROUNDWATER MONITORING WELL |
| A-1 | GAS MONITORING PROBE |
| GP-16 | GAS VENT |
| | LEACHATE MONITORING WELLS |
| | LEACHATE MANHOLE |
| | HORIZONTAL WELLHEAD |
| | CONDENSATE TRAPS |
| | ELECTRIC POLE |
| | CONTROL POINT |
| | BUILDING |
| | GOOSE NECK VENT |
| | LINER LIMIT BOLLARD |

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION -1 | 4-28-21 |

SHEET TITLE: EXHIBIT II-1 SITE-SPECIFIC TOPOGRAPHIC MAP

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

PROJ. NO. 02201056.30 · DWN. BY: BSP · Q/A RVW BY: DDD · DSN. BY: BSP · CHK. BY: DDD · APP. BY: DDD

CADD FILE:

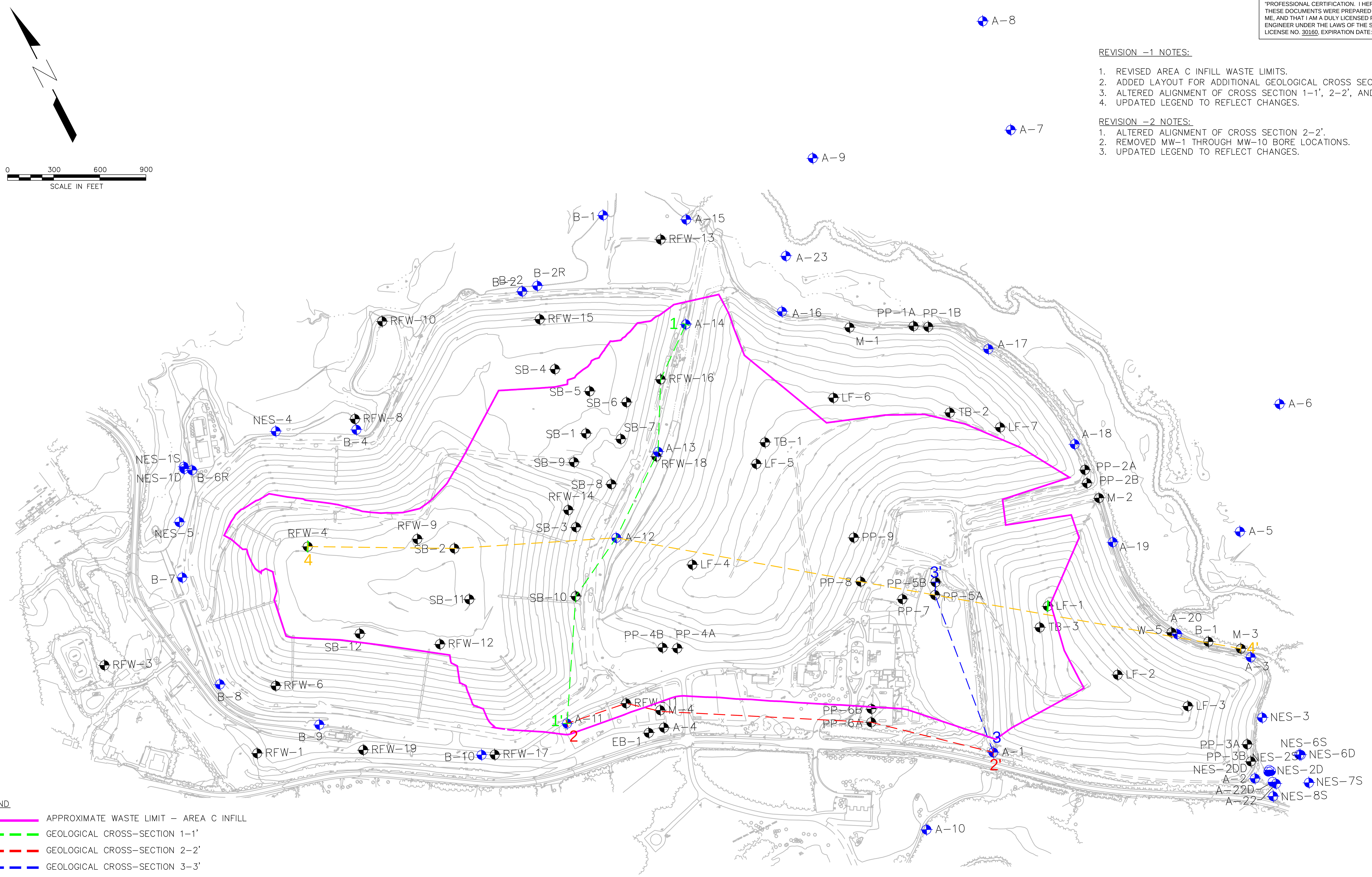
DATE: MAY 15, 2020

SCALE:

EXHIBIT NO. II-1

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."




REVISION -1 NOTES:

1. REVISED AREA C INFILL WASTE LIMITS.
2. ADDED LAYOUT FOR ADDITIONAL GEOLOGICAL CROSS SECTION 4-4'.
3. ALTERED ALIGNMENT FOR CROSS SECTION 1-1', 2-2', AND 3-3'.
4. UPDATED LEGEND TO REFLECT CHANGES.

REVISION -2 NOTES:

1. ALTERED ALIGNMENT OF CROSS SECTION 2-2'.
2. REMOVED MW-1 THROUGH MW-10 BORE LOCATIONS.
3. UPDATED LEGEND TO REFLECT CHANGES.

LEGEND

- APPROXIMATE WASTE LIMIT – AREA C INFILL
- GEOLOGICAL CROSS-SECTION 1-1'
- GEOLOGICAL CROSS-SECTION 2-2'
- GEOLOGICAL CROSS-SECTION 3-3'
- GEOLOGICAL CROSS-SECTION 4-4'
- GROUNDWATER MONITORING BORING LOCATIONS
- GEOTECHNICAL INVESTIGATION BORING LOCATIONS

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1-17-2020 BY QUANTUM SPATIAL.
2. GROUNDWATER MONITORING BORING LOCATIONS WERE OBTAINED FROM THE 1ST 2021 GROUNDWATER AND SURFACE WATER MONITORING REPORT. GEOTECHNICAL INVESTIGATION BORING LOCATIONS ARE APPROXIMATE AND WERE OBTAINED FROM THE 1984 AND 1989 GEOTECHNICAL INVESTIGATION REPORTS.

STATE OF MARYLAND – DARRIN DOMINIC DILLAH – PROFESSIONAL ENGINEER – 12-21-21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION - 1 | 5/21/21 |
| 2 | REVISION - 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-2 SOIL BORING & GEOLOGICAL CROSS-SECTIONS - LAYOUT

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND


SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

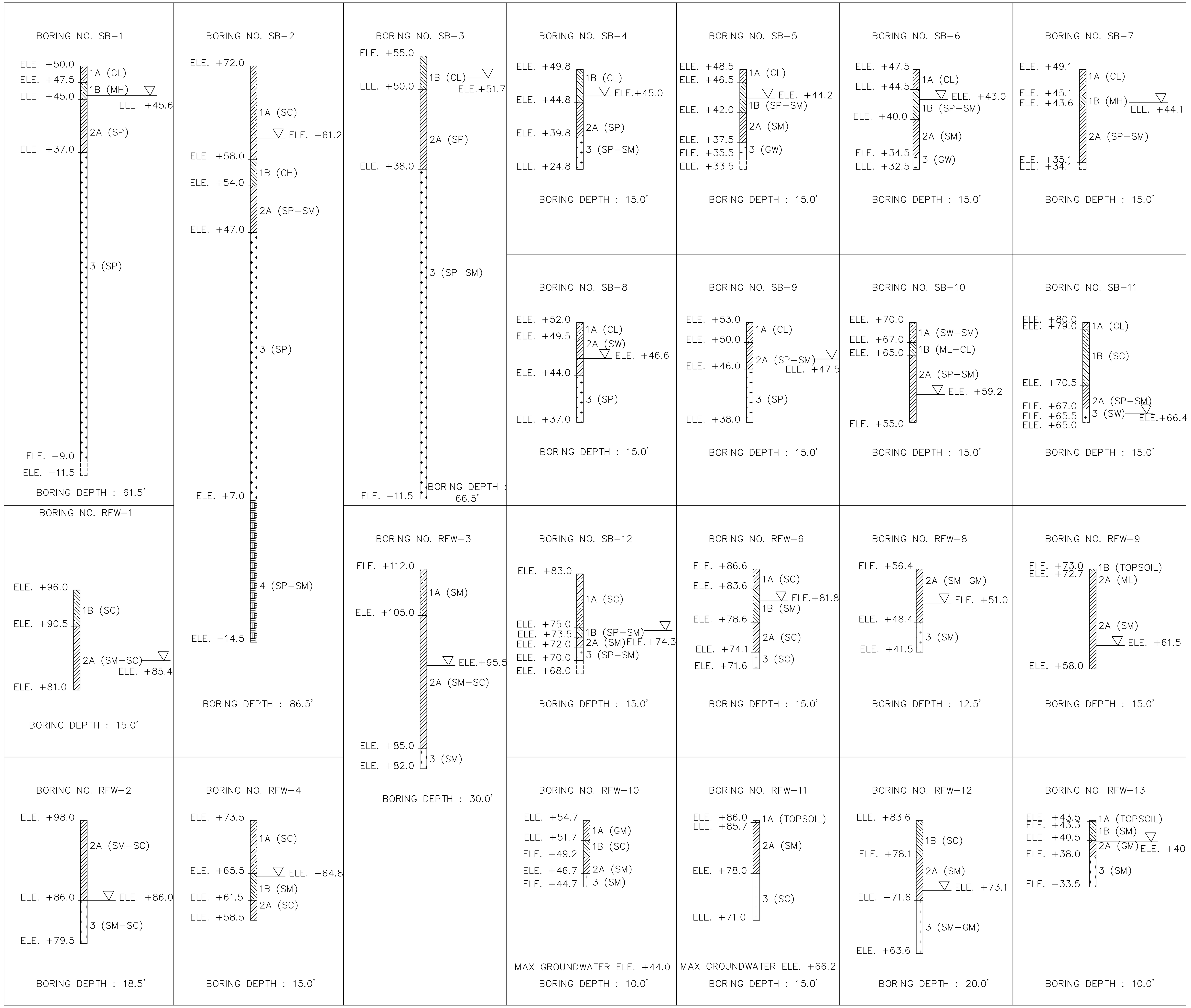

PROJ. NO. 02201056.30 | DWN. BY: GRI/JSG | Q/A RVW BY: DDD
DSN. BY: GRI | CHK. BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE:

EXHIBIT NO. II-2




LEGEND

| | | |
|---|---|---|
| 1A | | GRANULAR FILL |
| 1B | | COHESIVE FILL |
| 2A | | GRANULAR NATURAL SOIL |
| 3 | | GRANULAR SOIL (16<N<32) |
| 4 | | GRANULAR SOIL (32<N) |
| | | SOIL TYPE NOT IDENTIFIED |
| | (CL) | ASTM SOIL CLASSIFICATION |
| | ▽ | MAXIMUM GROUNDWATER ELEVATION |

REVISION -1 NOTES:

1. REVISED NOMENCLATURE AND ADDED SOIL CLASSIFICATION INFORMATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

REVISION -2 NOTES:

1. REVISED GROUNDWATER ELEVATION ON BORING LOGS TO REFLECT MAXIMUM GROUNDWATER ELEVATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND — DARRIN DOMINIC DILLAH — LIC. REG. No. 30160 — PROFESSIONAL ENGINEER

12-21-21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION - 1 | 5/21/21 |
| 2 | REVISION - 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-2A WELL LOG SUMMARY

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND


SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

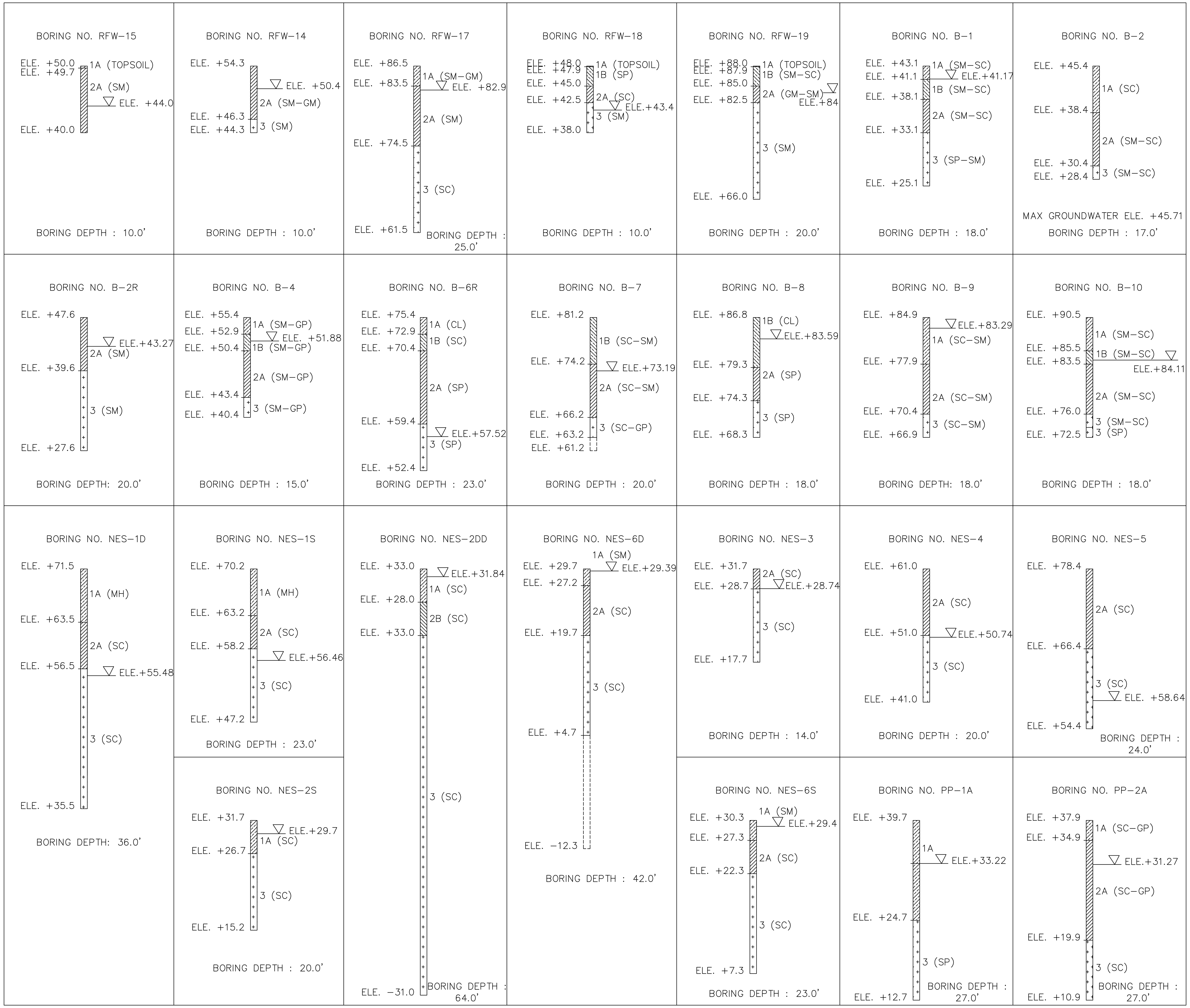

PROJ. NO. 02201056.30 | DSN. BY: GRI | DWN. BY: GRI/JSG | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

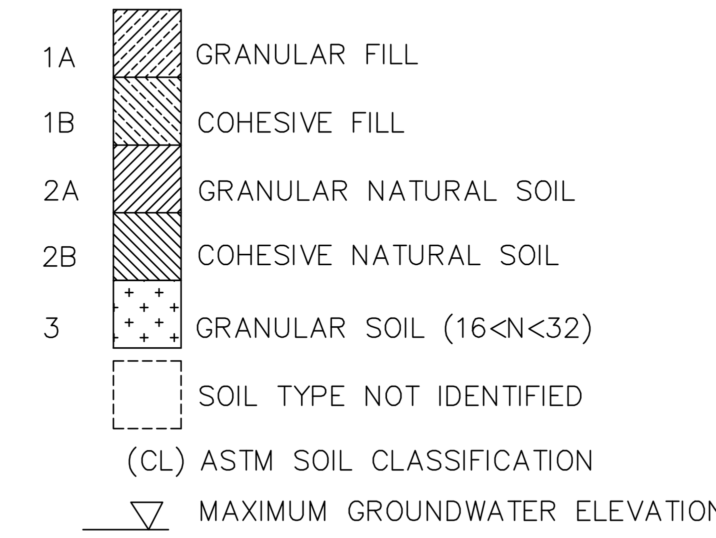
DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO. II-2A




LEGEND




REVISION -1 NOTES:

1. REVISED NOMENCLATURE AND ADDED SOIL CLASSIFICATION INFORMATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

REVISION -2 NOTES:

1. REVISED GROUNDWATER ELEVATION ON BORING LOGS TO REFLECT MAXIMUM GROUNDWATER ELEVATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND – DARRIN DOMINIC DILLAH – PROFESSIONAL ENGINEER

12-21-21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION - 1 | 5/21/21 |
| 2 | REVISION - 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-2B WELL LOG SUMMARY

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

PROJ. NO. 02201056.30 | DSN. BY: GRI | DWN. BY: GRI/JSG | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

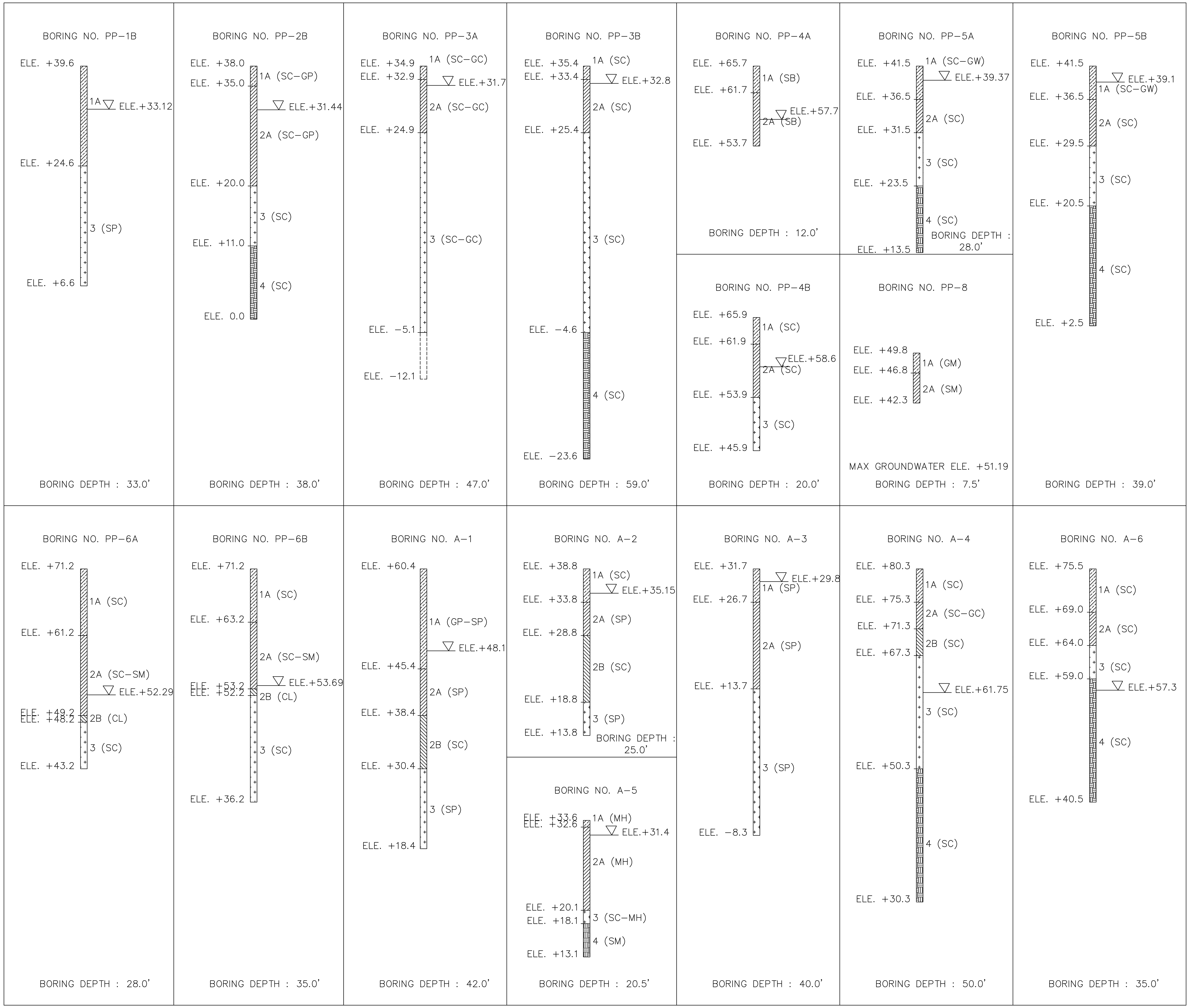
DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO. II-2B

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."




LEGEND

| | |
|---|---|
| 1A | GRANULAR FILL |
| 2A | GRANULAR NATURAL SOIL |
| 2B | COHESIVE NATURAL SOIL |
| 3 | GRANULAR SOIL (16<N<32) |
| 4 | GRANULAR SOIL (32<N) |
| | SOIL TYPE NOT IDENTIFIED |
| (CL) | ASTM SOIL CLASSIFICATION |
| ▽ | MAXIMUM GROUNDWATER ELEVATION |

REVISION -1 NOTES:

1. REVISED NOMENCLATURE AND ADDED SOIL CLASSIFICATION INFORMATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

REVISION -2 NOTES:

1. REVISED GROUNDWATER ELEVATION ON BORING LOGS TO REFLECT MAXIMUM GROUNDWATER ELEVATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION - 1 | 5/21/21 |
| 2 | REVISION - 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-2C WELL LOG SUMMARY

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND


SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

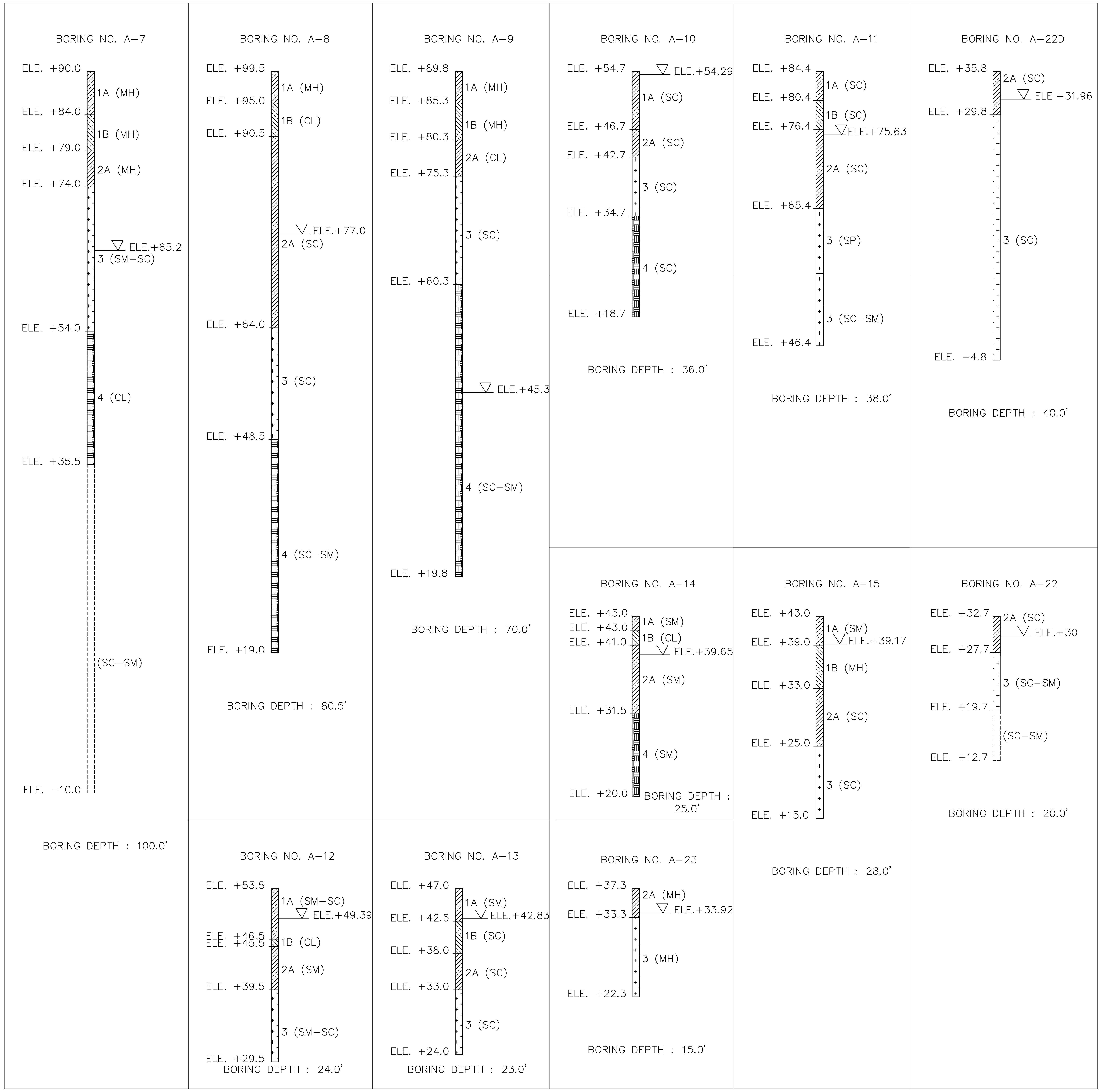

PROJ. NO. 02201056.30 | DSN. BY: GRI | DWN. BY: GRI/JSG | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO. II-2C




SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

LEGEND

| | |
|---|---|
| 1A | GRANULAR FILL |
| 1B | COHESIVE FILL |
| 2A | GRANULAR NATURAL SOIL |
| 3 | GRANULAR SOIL (16<N<32) |
| 4 | GRANULAR SOIL (32<N) |
| | SOIL TYPE NOT IDENTIFIED |
| (CL) | ASTM SOIL CLASSIFICATION |
| ▽ | MAXIMUM GROUNDWATER ELEVATION |

REVISION -1 NOTES:

1. REVISED NOMENCLATURE AND ADDED SOIL CLASSIFICATION INFORMATION.
2. UPDATED LEGEND TO REFLECT CHANGES.
4. MOVED BORING M-1 TO EXHIBIT II-2E.

REVISION -2 NOTES:

1. REVISED GROUNDWATER ELEVATION ON BORING LOGS TO REFLECT MAXIMUM GROUNDWATER ELEVATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

STATE OF MARYLAND DARRIN DOMINIC DILLAH LIC. REG. NO. 30160 PROFESSIONAL ENGINEER 12-21-21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION - 1 | 5/21/21 |
| 2 | REVISION - 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-2D WELL LOG SUMMARY

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

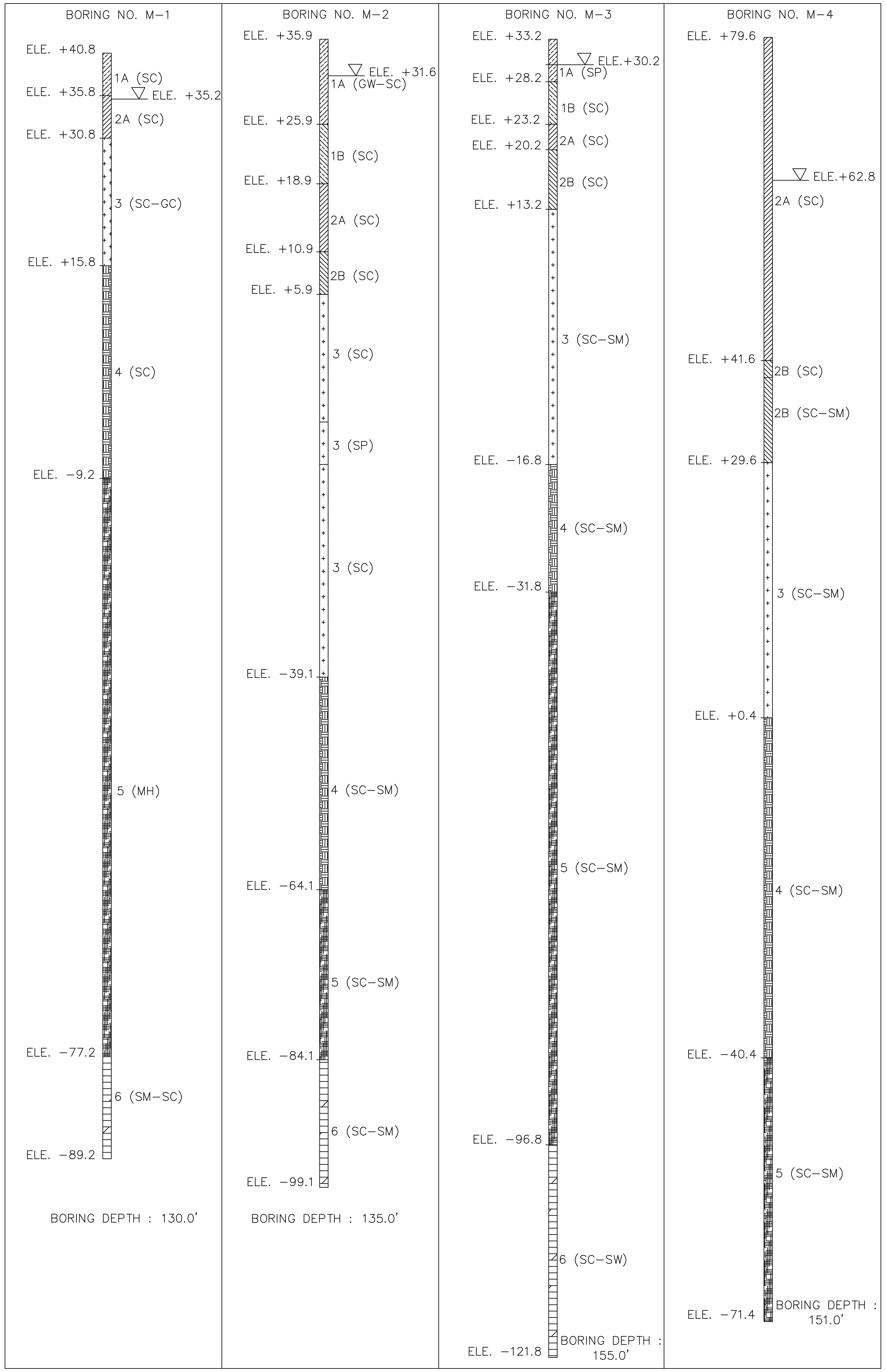
PROJ. NO. 02201056.30 | DWN. BY: GRI/JSG | Q/A RVW BY: DDD
DSN. BY: GRI | CHK. BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO. II-2D




SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND — DARRIN DOMINIC DILLAH — LIC. REG. No. 30160 — PROFESSIONAL ENGINEER

12-21-21

LEGEND

| | |
|---|---|
| 1A | GRANULAR FILL |
| 1B | COHESIVE FILL |
| 2A | GRANULAR NATURAL SOIL |
| 2B | COHESIVE NATURAL SOIL |
| 3 | GRANULAR SOIL (16<N<32) |
| 4 | GRANULAR SOIL (32<N) |
| 5 | GRANULAR NATURAL SOIL (N<100) |
| 6 | COHESIVE NATURAL SOIL (N<120) |
| (CL) | ASTM SOIL CLASSIFICATION |
| ▽ | MAXIMUM GROUNDWATER ELEVATION |

REVISION -1 NOTES:

1. REVISED NOMENCLATURE AND ADDED SOIL CLASSIFICATION INFORMATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

REVISION -2 NOTES:

1. REVISED GROUNDWATER ELEVATION ON BORING LOGS TO REFLECT MAXIMUM GROUNDWATER ELEVATION.
2. UPDATED LEGEND TO REFLECT CHANGES.

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION - 1 | 5/21/21 |
| 2 | REVISION - 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-2E WELL LOG SUMMARY

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

PROJ. NO. 02201056.30 | DSN. BY: GRI | DWN. BY: GRI/JSG | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

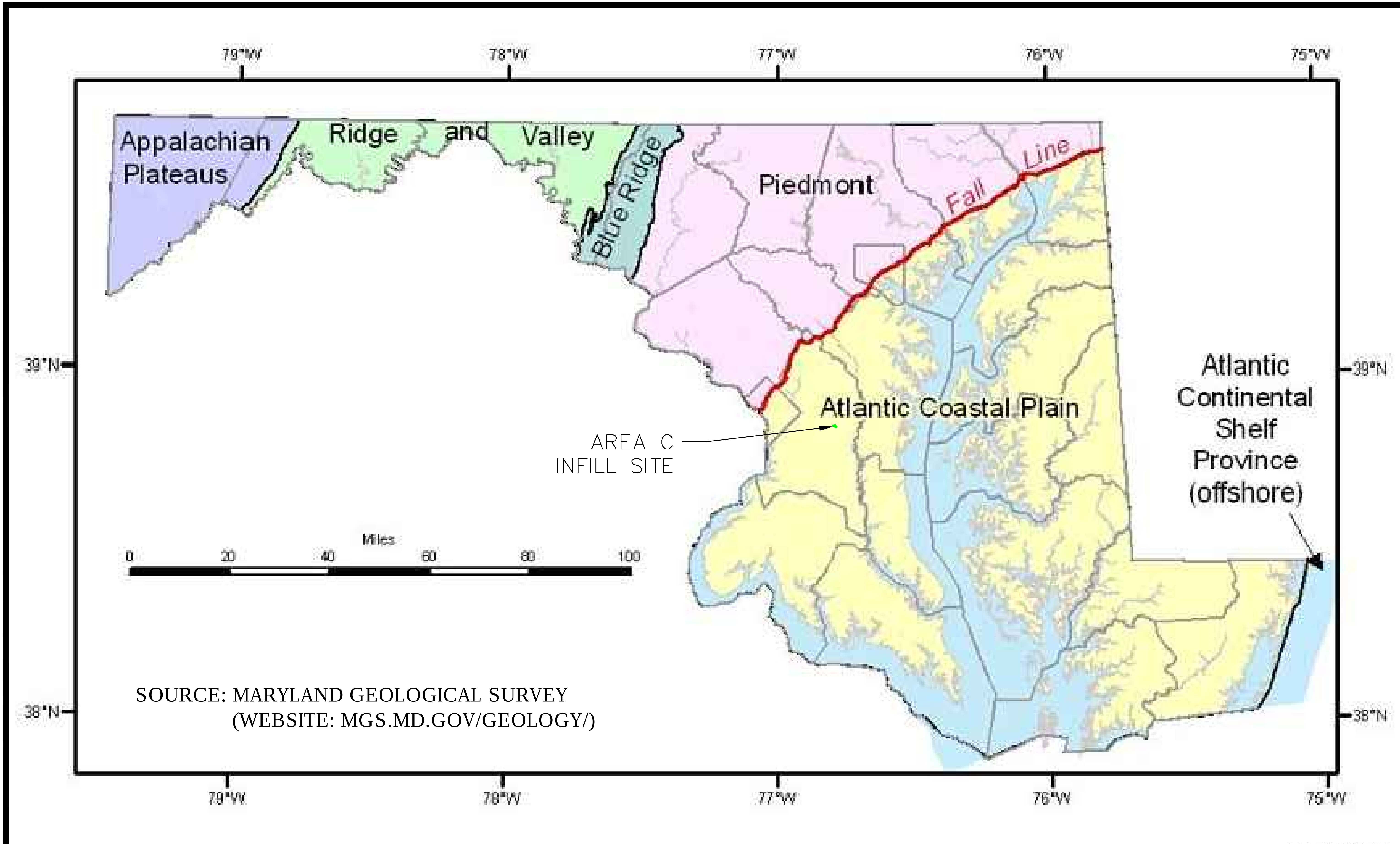
DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO.

# II-2E

DRAWN BY: BSP DATE: MAY 2020 PROJECT NO.: 02201056.30




SCS ENGINEERS

EXHIBIT II-3. MARYLAND PHYSIOGRAPHIC PROVINCES AND APPROXIMATE SITE LOCATION

REVISION–1 NOTES:

1. ADDED SOIL CLASSIFICATION, STRATIGRAPHIC UNITS, EXISTING GROUND AND MAXIMUM GROUNDWATER ELEVATIONS, LAYER BOUNDARIES, AND LATERAL CONTINUITY.
2. REVISED LEGEND TO REFLECT CHANGES.

REVISION–2 NOTES:

1. REVISED TO REFLECT ONLY THE MAXIMUM GROUNDWATER ELEVATION IN ALL BORINGS.
2. REVISED LEGEND TO REFLECT CHANGES.

SCS ENGINEERS

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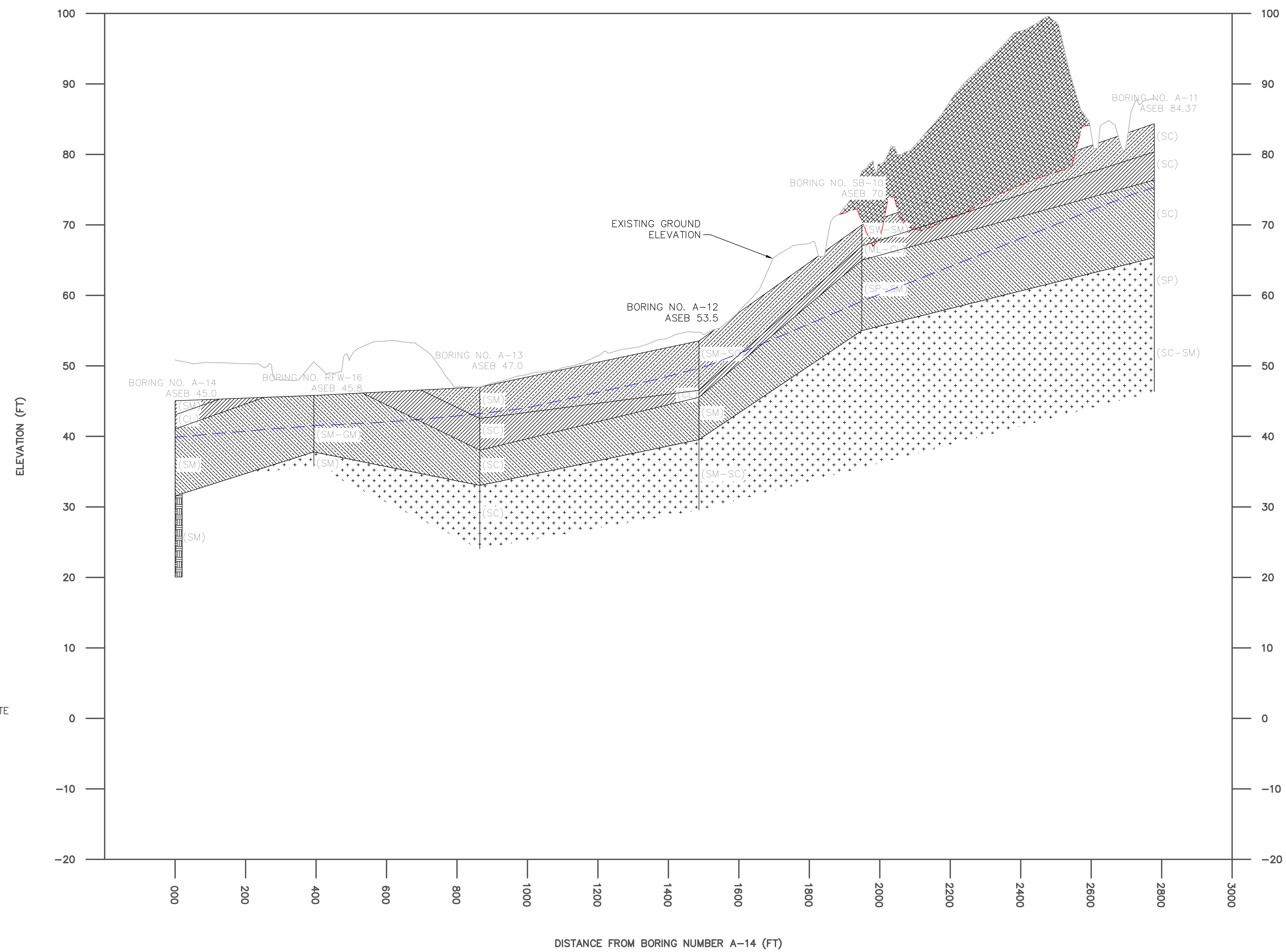



LEGEND

| | |
|---|---|
| 1A | GRANULAR FILL |
| 1B | COHESIVE FILL |
| 2A | GRANULAR NATURAL SOIL |
| 3 | GRANULAR SOIL (16<N<32) |
| 4 | GRANULAR SOIL (N>32) |
| | STRUCTURAL FILL |
| | WASTE |
| | GROUND ELEVATION (2020) |
| | ESTIMATED BOTTOM OF WASTE |
| | MAXIMUM GROUNDWATER ELEVATION |

ASEB=APPROXIMATE SURFACE ELEVATION OF BORING

NOTE:

1. SURFACE ELEVATIONS OF RFW–16 SOIL BORING IS APPROXIMATE AND BASED ON PROFESSIONAL JUDGEMENT.

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |
| 2 | REVISION – 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-4 GEOLOGICAL CROSS SECTION 1-1'

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND


SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676


PROJ. NO. 02201056.30 | DWN. BY: GRI | Q/A RVW BY: DDD
DSN. BY: GRI | CHK. BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO. II-4

REVISION–1 NOTES:

1. ADDED SOIL CLASSIFICATION, STRATIGRAPHIC UNITS, EXISTING GROUND AND MAXIMUM GROUNDWATER ELEVATIONS, LAYER BOUNDARIES, AND LATERAL CONTINUITY.
2. REVISED LEGEND TO REFLECT CHANGES.

REVISION–2 NOTES:

1. REVISED TO REFLECT ONLY THE MAXIMUM GROUNDWATER ELEVATION IN ALL BORINGS.
2. REPLACED BORING MW–1 WITH BORING M–4.
3. REVISED LEGEND TO REFLECT CHANGES.

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

12-21-21

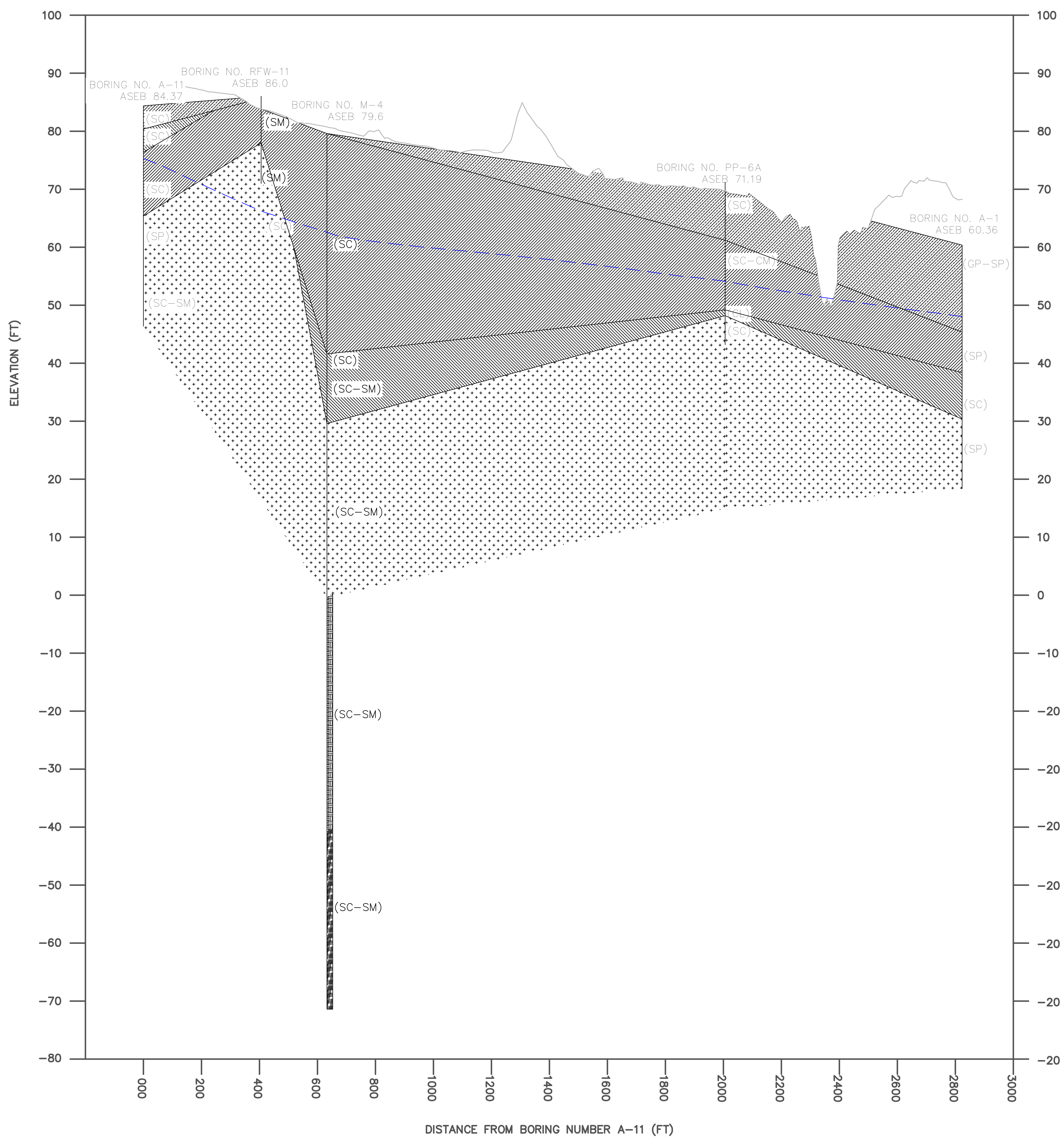
LEGEND

| | |
|---|---|
| 1A | GRANULAR FILL |
| 1B | COHESIVE FILL |
| 2A | GRANULAR NATURAL SOIL |
| 2B | COHESIVE NATURAL SOIL |
| 3 | GRANULAR SOIL (16<N<32) |
| —— | GROUND ELEVATION (2020) |
| — — | MAXIMUM GROUNDWATER ELEVATION |

ASEB=APPROXIMATE SURFACE ELEVATION OF BORING

NOTE:

1. SURFACE ELEVATIONS OF RFW–11 AND M–4 SOIL BORINGS ARE APPROXIMATE AND BASED ON PROFESSIONAL JUDGEMENT.




| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |
| 2 | REVISION – 2 | 12/06/21 |

SHEET TITLE: EXHIBIT II-5 GEOLOGICAL CROSS SECTION 2-2'

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

PROJ. NO. 02201056.30 | DSN. BY: GRI | DWN. BY: GRI | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO. II-5

REVISION–1 NOTES:

1. ADDED SOIL CLASSIFICATION, STRATIGRAPHIC UNITS, EXISTING GROUND AND MAXIMUM GROUNDWATER ELEVATIONS, LAYER BOUNDARIES, AND LATERAL CONTINUITY.
2. REVISED LEGEND TO REFLECT CHANGES.

REVISION–2 NOTES:

1. REVISED TO REFLECT ONLY THE MAXIMUM GROUNDWATER ELEVATION IN ALL BORINGS.
2. REVISED LEGEND TO REFLECT CHANGES.

SCS ENGINEERS

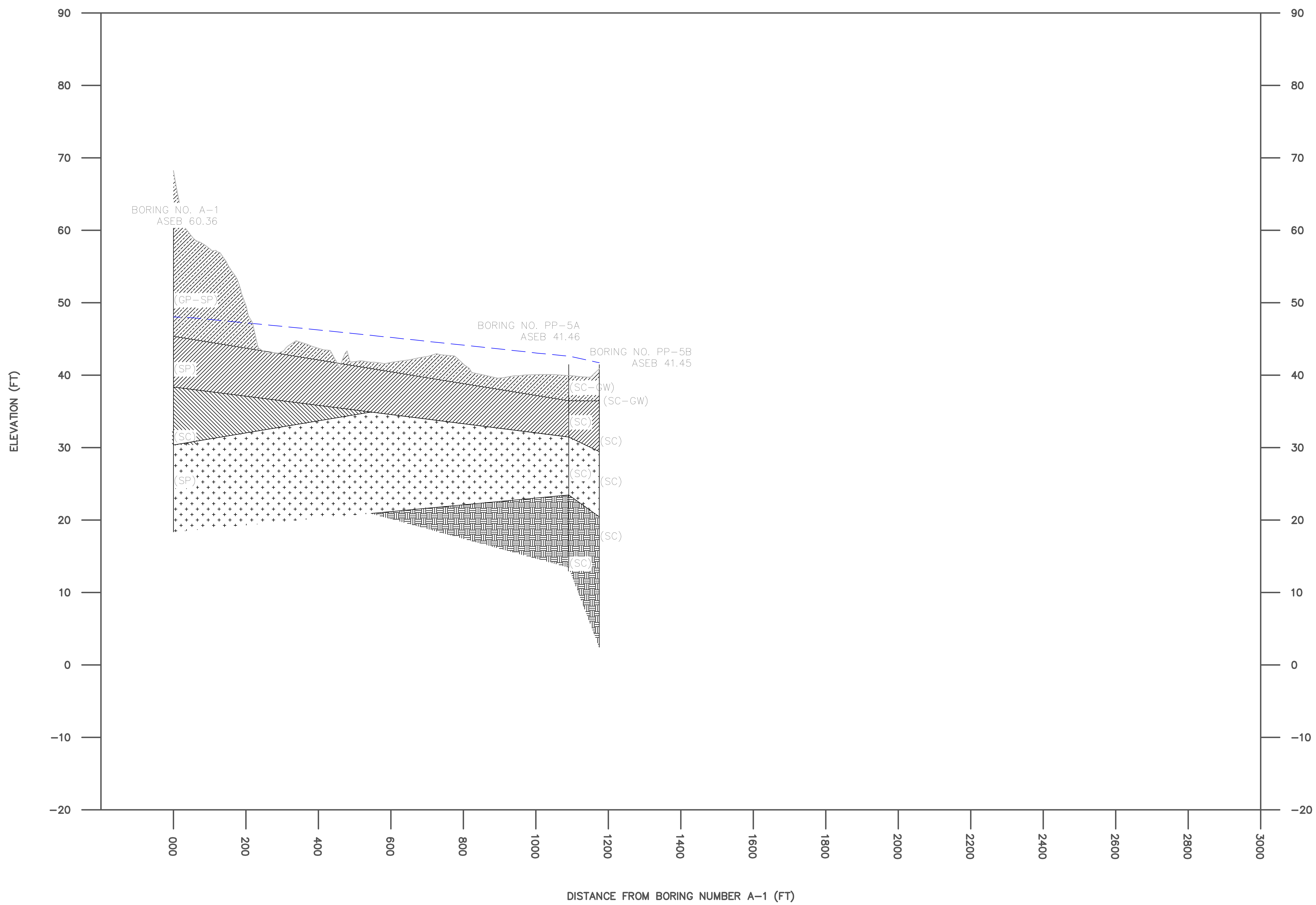
"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND – DARRIN DOMINIC DILLAH – LIC. REG. NO. 30160 – PROFESSIONAL ENGINEER

12-21-21

LEGEND

1A GRANULAR FILL
2A GRANULAR NATURAL SOIL
2B COHESIVE NATURAL SOIL
3 GRANULAR SOIL (16<N<32)
4 GRANULAR SOIL (N>32)
GROUND ELEVATION (2020)
MAXIMUM GROUNDWATER ELEVATION
ASEB=APPROXIMATE SURFACE ELEVATION OF BORING




| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |
| 2 | REVISION – 2 | 12/06/21 |

SHEET TITLE
EXHIBIT II-6
GEOLOGICAL CROSS SECTION 3-3'

PROJECT TITLE
AREA C INFILL - PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

PROJ. NO. 02201056.30 | DSN. BY: GRI | DWN. BY: GRI | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

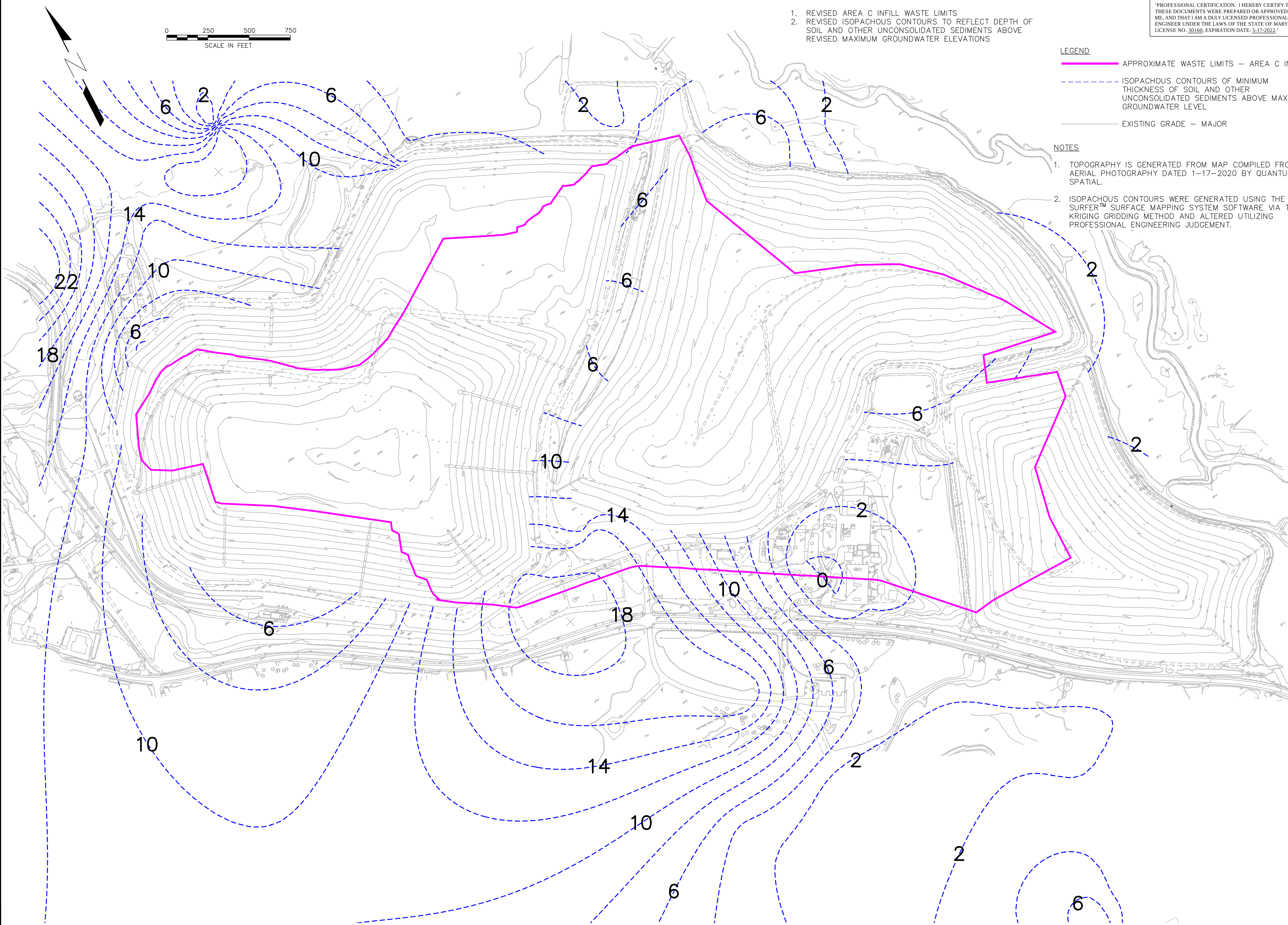
DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO.
II-6

REVISION–1 NOTES:

1. REVISED AREA C INFILL WASTE LIMITS
2. REVISED ISOPACHOUS CONTOURS TO REFLECT DEPTH OF SOIL AND OTHER UNCONSOLIDATED SEDIMENTS ABOVE REVISED MAXIMUM GROUNDWATER ELEVATIONS




LEGEND

APPROXIMATE WASTE LIMITS – AREA C INFILL

ISOPACHOUS CONTOURS OF MINIMUM THICKNESS OF SOIL AND OTHER UNCONSOLIDATED SEDIMENTS ABOVE MAXIMUM GROUNDWATER LEVEL

EXISTING GRADE – MAJOR

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1–17–2020 BY QUANTUM SPATIAL.
2. ISOPACHOUS CONTOURS WERE GENERATED USING THE SURFER™ SURFACE MAPPING SYSTEM SOFTWARE VIA THE KRIGING GRIDDING METHOD AND ALTERED UTILIZING PROFESSIONAL ENGINEERING JUDGEMENT.

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND DARRIN DOMINIC DILLAH LIC REG CERT NO 30160 PROFESSIONAL ENGINEER

12.21.21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |

SHEET TITLE: EXHIBIT II-7 ISPACHOUS MAP OF SOIL AND OTHER UNCONSOLIDATED SEDIMENTS ABOVE GROUNDWATER

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

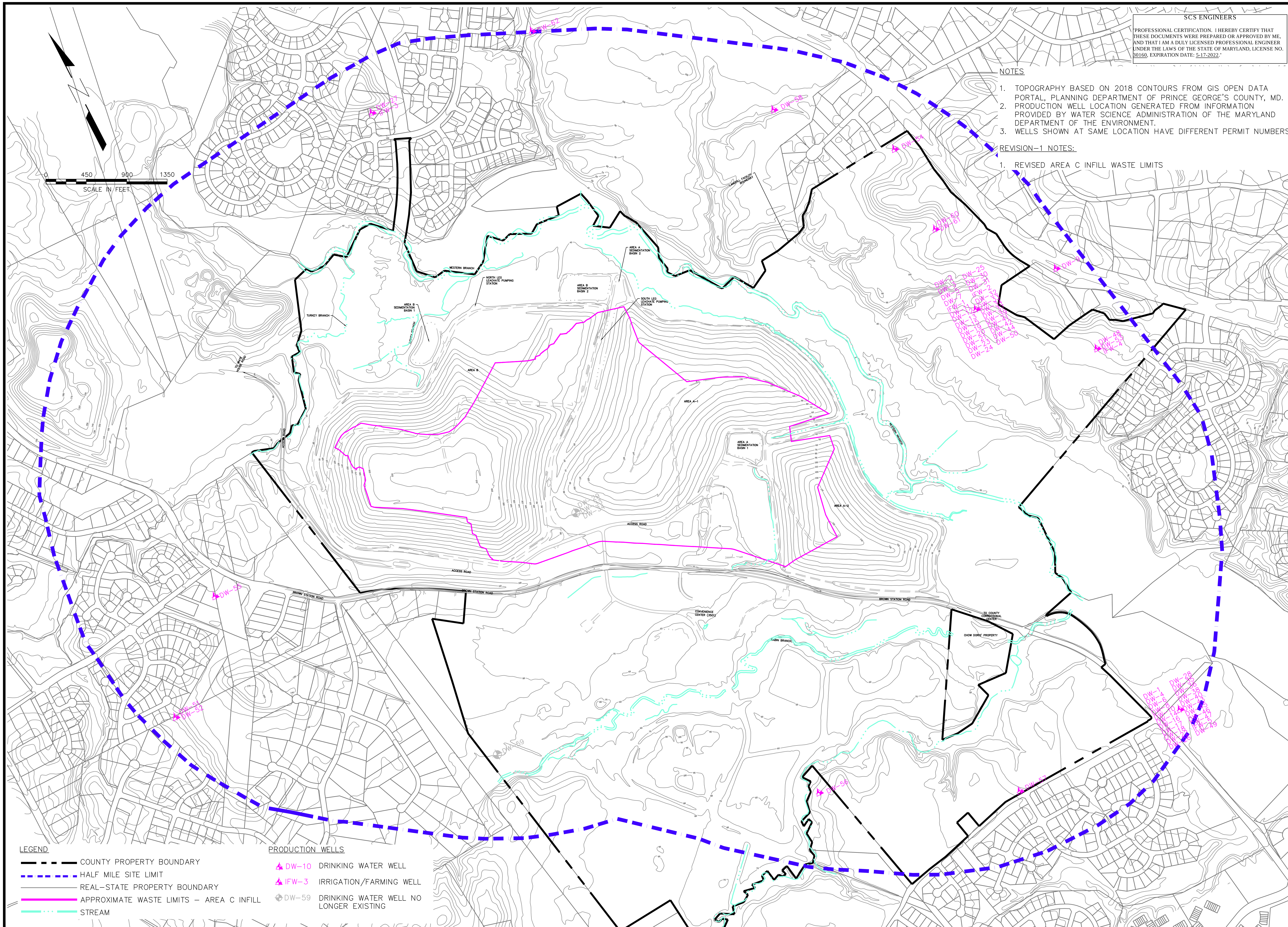
| PROJ. NO. 02201056.30 | DWN. BY: BSP/RSP/GRI | Q/A RVW BY: DDD |
|---|---|---|
| DSN. BY: BSP/RSP/GRI | CHK. BY: DDD | APP. BY: DDD |

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS SHOWN

EXHIBIT NO. II-7




SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

NOTES

1. TOPOGRAPHY BASED ON 2018 CONTOURS FROM GIS OPEN DATA PORTAL, PLANNING DEPARTMENT OF PRINCE GEORGE'S COUNTY, MD.
2. PRODUCTION WELL LOCATION GENERATED FROM INFORMATION PROVIDED BY WATER SCIENCE ADMINISTRATION OF THE MARYLAND DEPARTMENT OF THE ENVIRONMENT.
3. WELLS SHOWN AT SAME LOCATION HAVE DIFFERENT PERMIT NUMBERS.

REVISION-1 NOTES:

1. REVISED AREA C INFILL WASTE LIMITS

LEGEND

- COUNTY PROPERTY BOUNDARY
- HALF MILE SITE LIMIT
- REAL-STATE PROPERTY BOUNDARY
- APPROXIMATE WASTE LIMITS – AREA C INFILL
- STREAM

PRODUCTION WELLS

- DW-10 DRINKING WATER WELL
- IFW-3 IRRIGATION/FARMING WELL
- DW-59 DRINKING WATER WELL NO LONGER EXISTING

STATE OF MARYLAND — DARRIN DOMINIC DILLAH — LIC. REG. CERT. NO. 30160 — PROFESSIONAL ENGINEER

12-21-21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |

SHEET TITLE
EXHIBIT II-8
MAP OF PRODUCTION WELLS WITHIN 1/2 MILE

PROJECT TITLE
AREA C PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

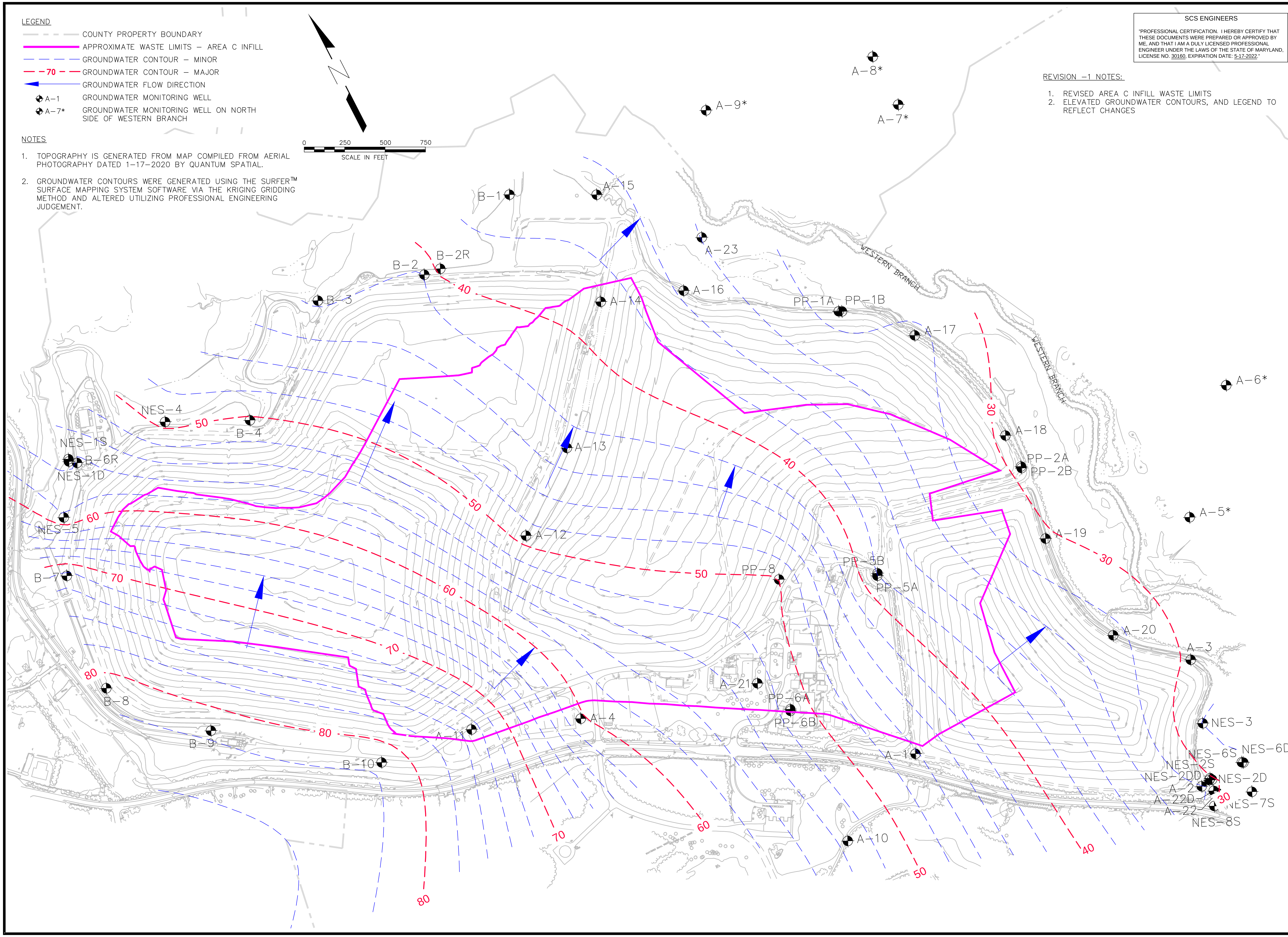
PROJ. NO. 02201056.30 | DWN. BY: RSP | Q/A RVW BY: BSP
DSN. BY: RSP | CHK. BY: BSP | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS NOTED

EXHIBIT NO. II-8




STATE OF MARYLAND
DARRIN DOMINIC DILLAH
LIC REG CERT NO 30160
PROFESSIONAL ENGINEER
12.21.21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION –1 | 4–28–21 |

SHEET TITLE
EXHIBIT II-9
ELEVATED GROUNDWATER CONTOUR MAP

PROJECT TITLE
AREA C PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND


SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

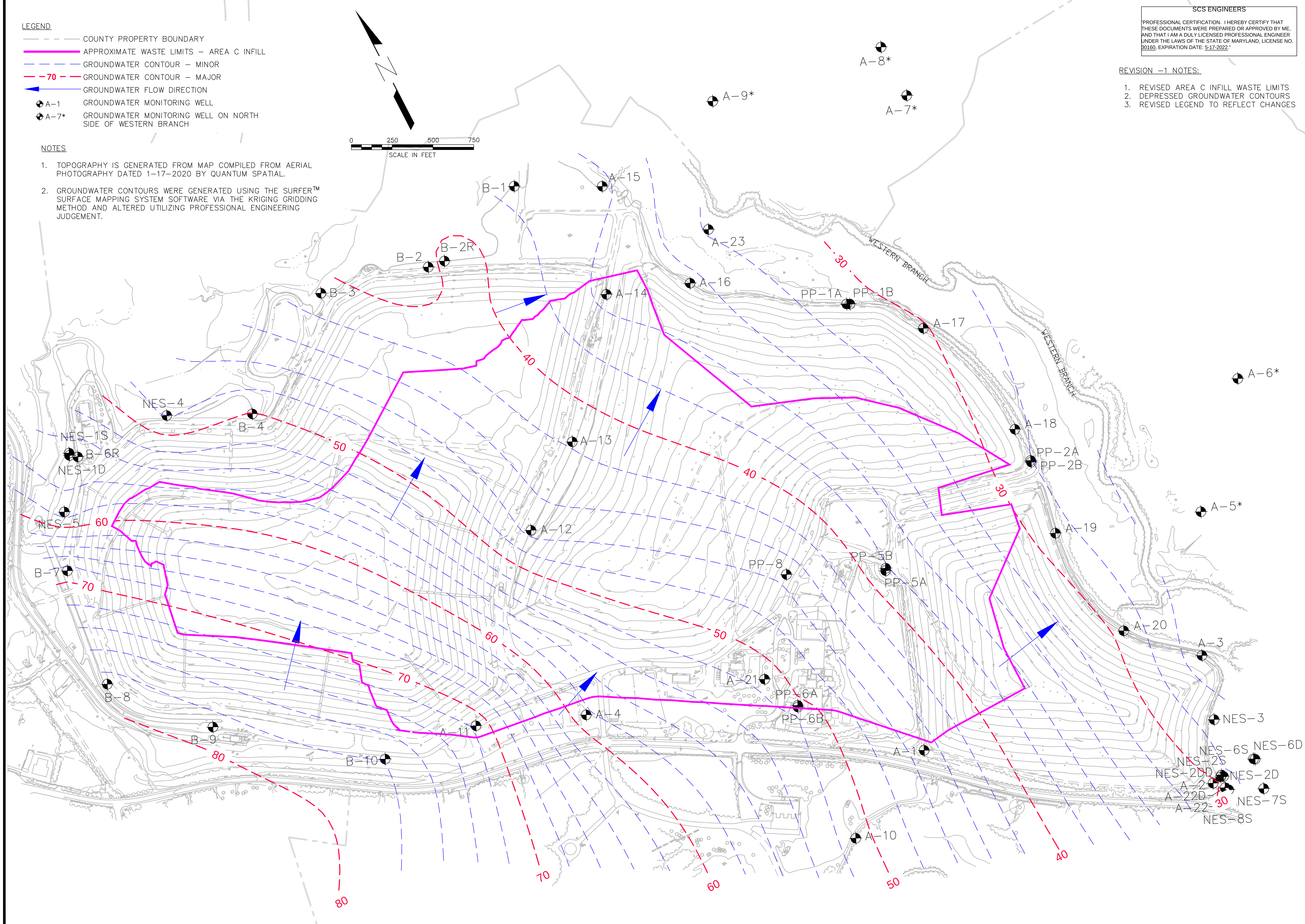

PROJ. NO. 02201056.30 | DWN. BY: RSP | Q/A RVW BY: BSP
DSN. BY: RSP | CHK. BY: BSP/GRI | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS NOTED

EXHIBIT NO.
II-9




LEGEND

- COUNTY PROPERTY BOUNDARY
- APPROXIMATE WASTE LIMITS – AREA C INFILL
- GROUNDWATER CONTOUR – MINOR
- 70 GROUNDWATER CONTOUR – MAJOR
- GROUNDWATER FLOW DIRECTION
- A-1 GROUNDWATER MONITORING WELL
- A-7* GROUNDWATER MONITORING WELL ON NORTH SIDE OF WESTERN BRANCH

0 250 500 750
SCALE IN FEET

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1-17-2020 BY QUANTUM SPATIAL.
2. GROUNDWATER CONTOURS WERE GENERATED USING THE SURFER™ SURFACE MAPPING SYSTEM SOFTWARE VIA THE KRIGING GRIDDING METHOD AND ALTERED UTILIZING PROFESSIONAL ENGINEERING JUDGEMENT.

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND – DARRIN DOMINIC DILLAH – LIC. REG. NO. 30160 – PROFESSIONAL ENGINEER

12.21.21

REVISION –1 NOTES:

1. REVISED AREA C INFILL WASTE LIMITS
2. DEPRESSED GROUNDWATER CONTOURS
3. REVISED LEGEND TO REFLECT CHANGES

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION -1 | 4-28-21 |

SHEET TITLE
EXHIBIT II-10
DEPRESSED GROUNDWATER CONTOUR MAP

PROJECT TITLE
AREA C PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

PROJ. NO. 02201056.30
DSN. BY: RSP
DWN. BY: RSP
CHK. BY: BSP/GRI
Q/A RVW BY: BSP
APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS NOTED

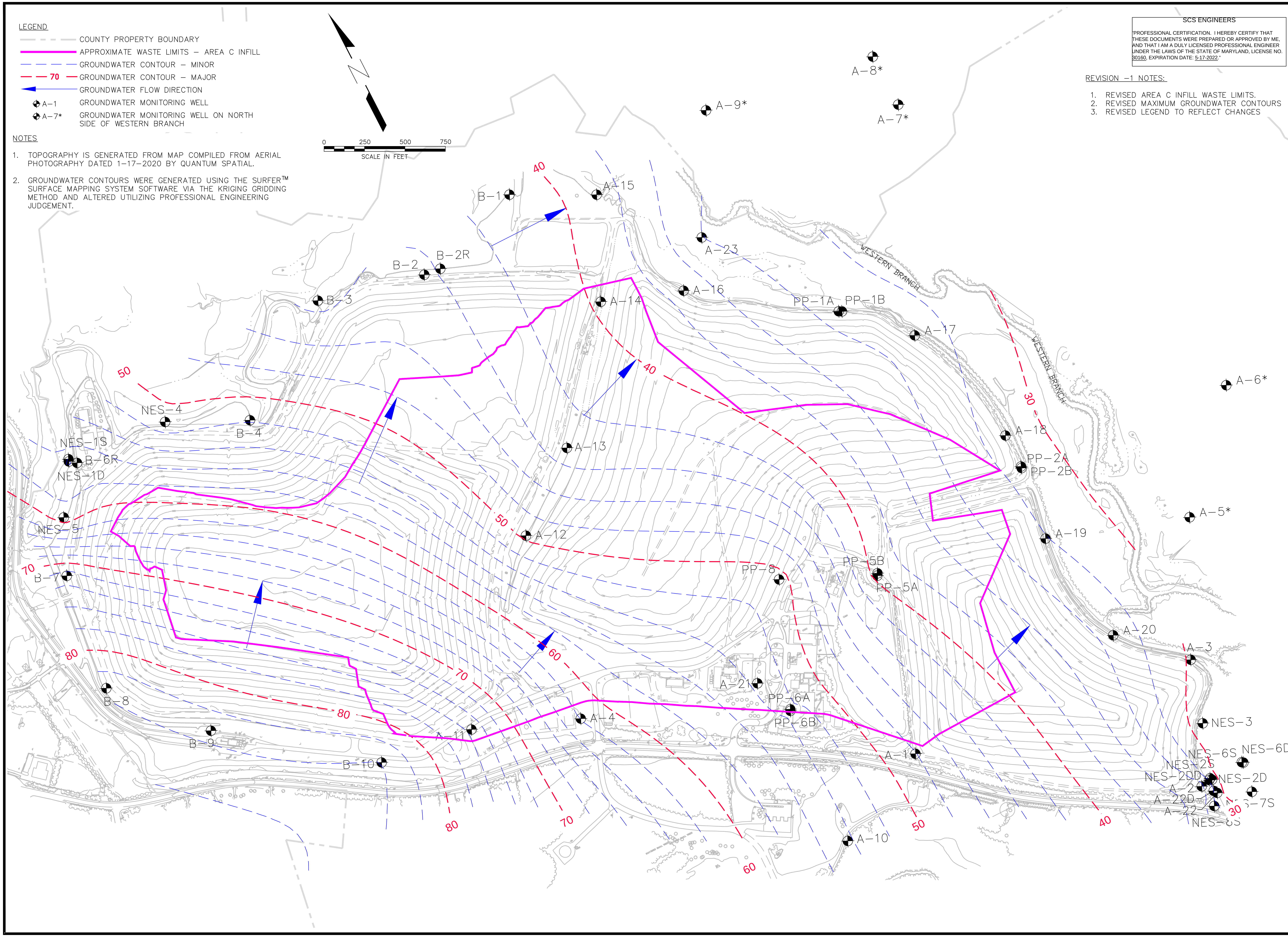
EXHIBIT NO.
II-10

LEGEND

- COUNTY PROPERTY BOUNDARY
- APPROXIMATE WASTE LIMITS – AREA C INFILL
- GROUNDWATER CONTOUR – MINOR
- 70 GROUNDWATER CONTOUR – MAJOR
- GROUNDWATER FLOW DIRECTION
- A-1 GROUNDWATER MONITORING WELL
- A-7* GROUNDWATER MONITORING WELL ON NORTH SIDE OF WESTERN BRANCH

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1-17-2020 BY QUANTUM SPATIAL.
2. GROUNDWATER CONTOURS WERE GENERATED USING THE SURFER™ SURFACE MAPPING SYSTEM SOFTWARE VIA THE KRIGING GRIDDING METHOD AND ALTERED UTILIZING PROFESSIONAL ENGINEERING JUDGEMENT.




REVISION -1 NOTES:

1. REVISED AREA C INFILL WASTE LIMITS.
2. REVISED MAXIMUM GROUNDWATER CONTOURS
3. REVISED LEGEND TO REFLECT CHANGES

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND – DARRIN DOMINIC DILLAH – LIC REG CERT NO 30160 – PROFESSIONAL ENGINEER

12.21.21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION -1 | 4-28-21 |

SHEET TITLE
EXHIBIT II-11
MAXIMUM GROUNDWATER CONTOUR MAP

PROJECT TITLE
AREA C PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND


SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676


PROJ. NO. 02201056.30 | DWN. BY: RSP | Q/A RVW BY: BSP
DSN. BY: RSP | CHK. BY: BSP/GRI | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS NOTED

EXHIBIT NO.
II-11

SCS ENGINEERS

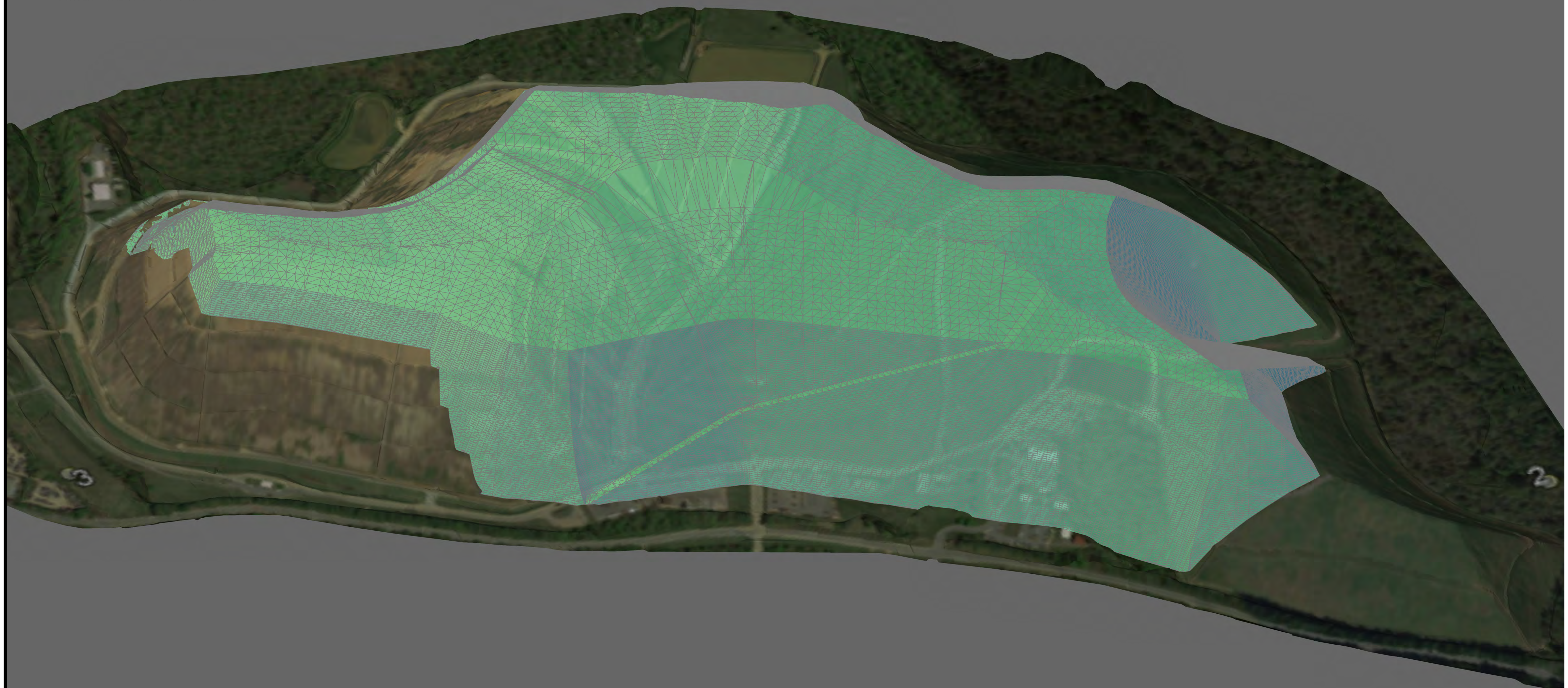
"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

NOTES:

1. VERTICAL SCALE IS EXAGGERATED BY A FACTOR OF 4.
2. THE PURPOSE OF THIS DRAWING IS TO PROVIDE THE OVERALL CONCEPT FOR AREA C INFILL——THE AREA AND SURFACES PRESENTED HERE ARE CONCENPTUAL AND APPROXIMATE

REVISION –1 NOTES:

1. REVISED AREA C INFILL WASTE LIMITS
2. REVISED THE CONCEPTUAL 3–DIMENSIONAL MODEL TO REFLECT THE REVISED FINAL GRADES




| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |

SHEET TITLE: EXHIBIT II-12 PRELIMINARY CONCEPTUAL DESIGN

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND


SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676


PROJ. NO. 02201056.30 | DWN. BY: GRI | Q/A RVW BY: DDD/BSP
DSN. BY: GRI | CHK. BY: DDD | APP. BY: DDD

CADD FILE:

DATE: OCT 15, 2020

SCALE: AS SHOWN

EXHIBIT NO. II-12

DRAWN BY: BSP/RSP/GRI DATE: 7/22/2020 PROJECT NO.: 02201056.30

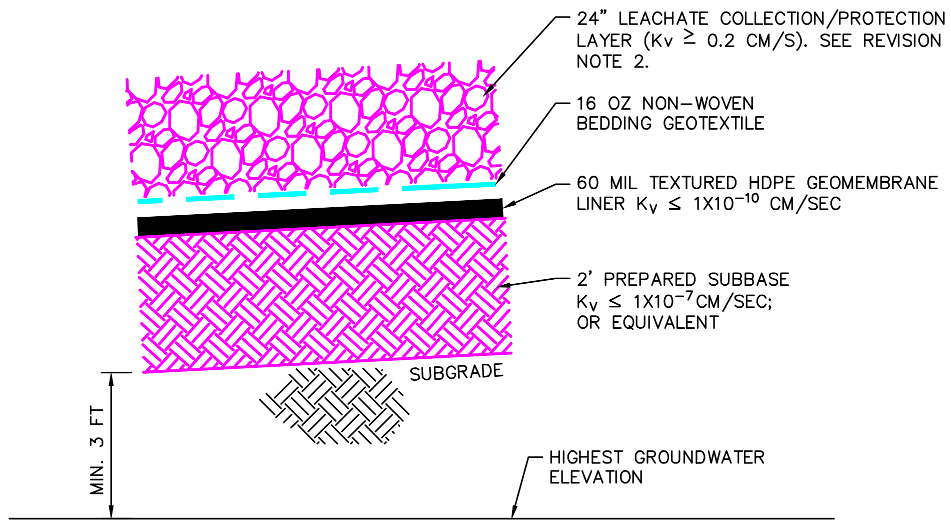
NOTES

1. 2 FT PREPARED SUBBASE SHALL BE LOCATED MINIMUM 3 FT ABOVE HIGHEST GROUNWATER ELEVATION, AS SHOWN.

2. LEACHATE COLLECTION LAYER SHALL BE DESIGNED TO ENSURE THAT LEACHATE DEPTH OVER LINER DOES NOT EXCEED 30 CM (1 FT).

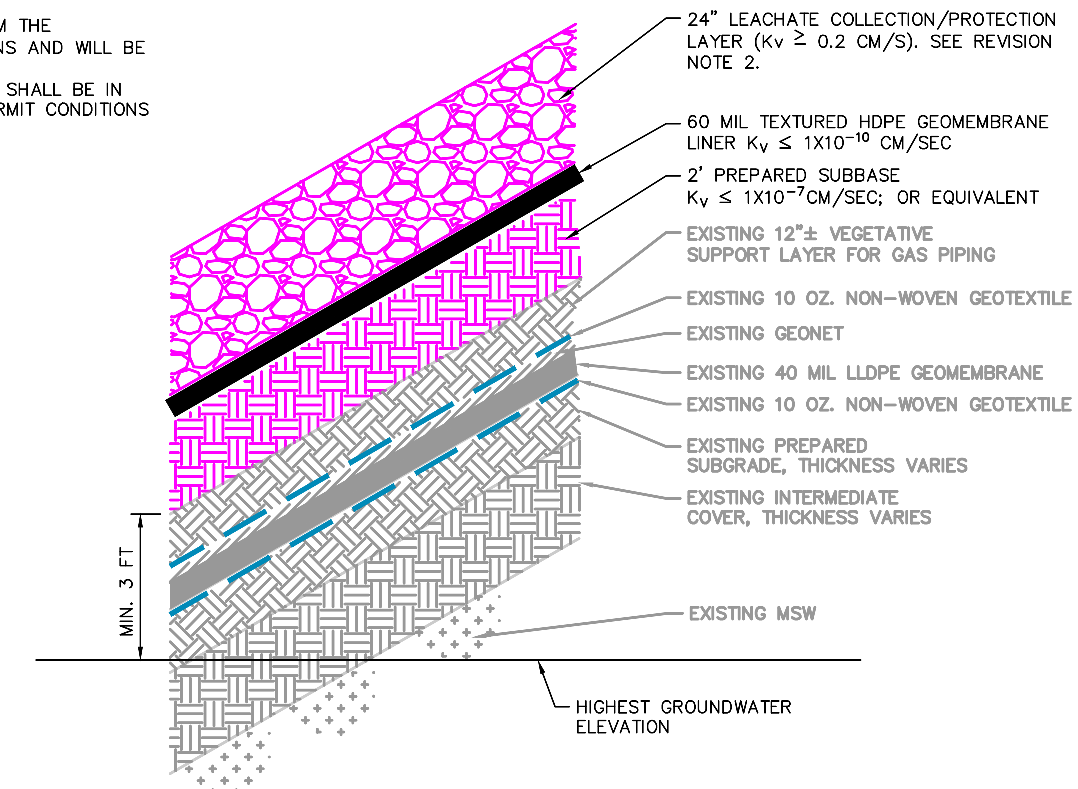
REVISION -1 NOTES

1. HELP MODEL CALCULATIONS ARE ONGOING TO CONFIRM THE LEACHATE COLLECTION SYSTEM DETAILS/SPECIFICATIONS AND WILL BE INCLUDED IN THE PHASE III SUBMITTAL
2. LEACHATE COLLECTION/PROTECTIVE LAYER THICKNESS SHALL BE IN ACCORDANCE WITH THE LATEST REFUSE DISPOSAL PERMIT CONDITIONS




BOTTOM LINER SYSTEM – FOR USE IN LANDFILL FLOOR AREAS

NO SCALE




BOTTOM LINER SYSTEM – FOR USE OVER EXISTING SLOPED CAPPED AREAS ONLY

NO SCALE

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |
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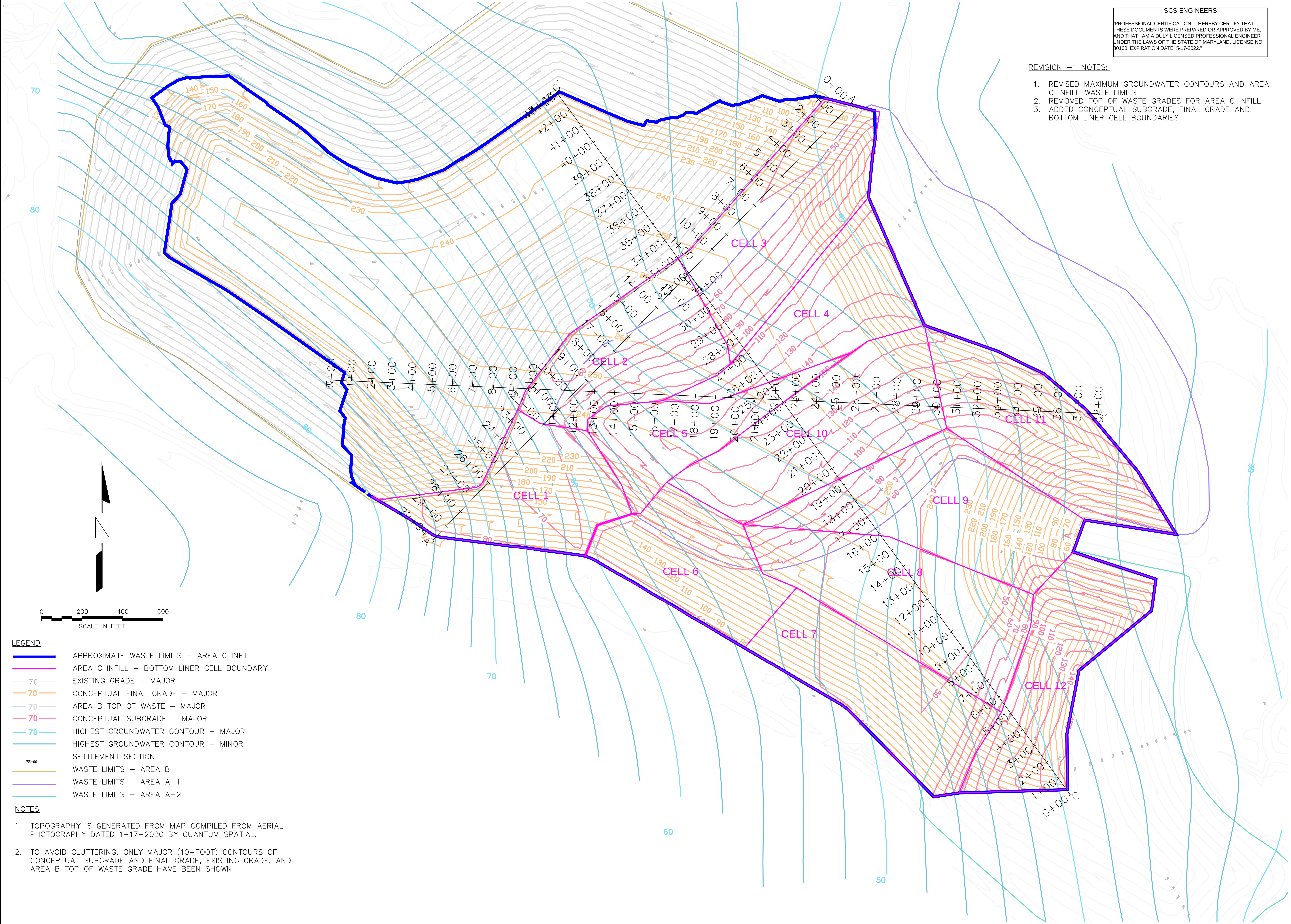
SCS ENGINEERS

# EXHIBIT II-13 - BOTTOM LINER SYSTEM - AREA C INFILL




SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

REVISION –1 NOTES:

1. REVISED MAXIMUM GROUNDWATER CONTOURS AND AREA C INFILL WASTE LIMITS
2. REMOVED TOP OF WASTE GRADES FOR AREA C INFILL
3. ADDED CONCEPTUAL SUBGRADE, FINAL GRADE AND BOTTOM LINER CELL BOUNDARIES

LEGEND

- APPROXIMATE WASTE LIMITS – AREA C INFILL
- AREA C INFILL – BOTTOM LINER CELL BOUNDARY
- 70 EXISTING GRADE – MAJOR
- 70 CONCEPTUAL FINAL GRADE – MAJOR
- 70 AREA B TOP OF WASTE – MAJOR
- 70 CONCEPTUAL SUBGRADE – MAJOR
- 70 HIGHEST GROUNDWATER CONTOUR – MAJOR
- HIGHEST GROUNDWATER CONTOUR – MINOR
- 25+00 SETTLEMENT SECTION
- WASTE LIMITS – AREA B
- WASTE LIMITS – AREA A-1
- WASTE LIMITS – AREA A-2

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1-17-2020 BY QUANTUM SPATIAL.
2. TO AVOID CLUTTERING, ONLY MAJOR (10-FOOT) CONTOURS OF CONCEPTUAL SUBGRADE AND FINAL GRADE, EXISTING GRADE, AND AREA B TOP OF WASTE GRADE HAVE BEEN SHOWN.

STATE OF MARYLAND – DARRIN DOMINIC DILLAH – PROFESSIONAL ENGINEER – LIC. REG. NO. 30160

Darrin Dillah 12-21-21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION -1 | 5-17-21 |

SHEET TITLE: EXHIBIT II-14 SETTLEMENT SECTIONS - LAYOUT

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT, BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY, 3500 BROWN STATION ROAD, UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.

PROJ. NO. 02201056.30 | DSN. BY: DDD/BSP | DWN. BY: BSP/RSP/GRI | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS SHOWN

EXHIBIT NO. II-14

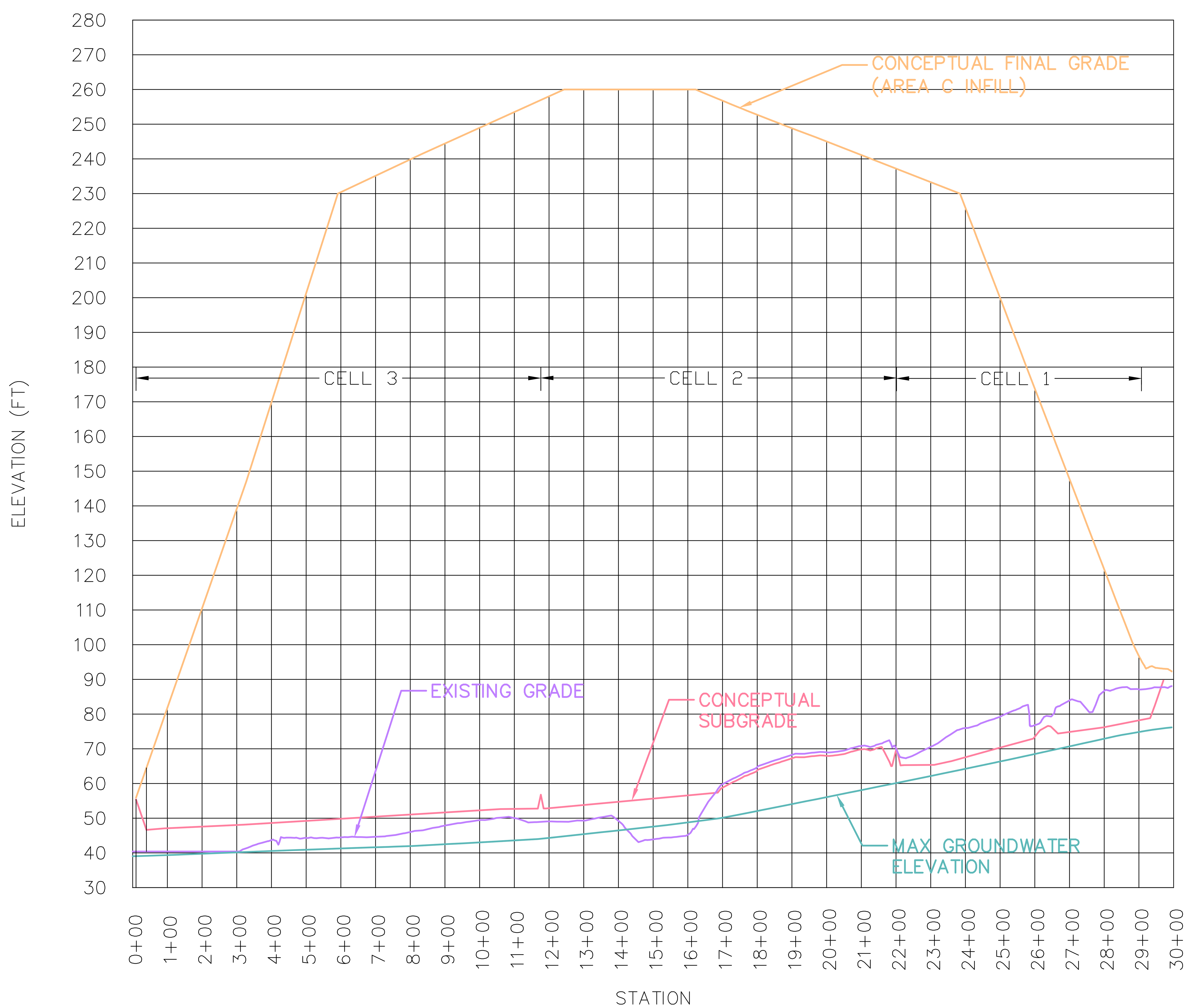
SCS ENGINEERS

'PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND
DARRIN DOMINIC DILLAH
LIC REG CERT NO. 30160
PROFESSIONAL ENGINEER
12.21.21

REVISION –1 NOTES:

1. REVISED MAXIMUM GROUNDWATER CONTOURS AND AREA C INFILL WASTE LIMITS
2. REMOVED TOP OF WASTE GRADES FOR AREA C INFILL
3. ADDED CONCEPTUAL SUBGRADE, FINAL GRADE AND BOTTOM LINER CELL BOUNDARY




SECTION A–A' PROFILE

| NO. | REVISION | DATE |
| --- | --- | --- |
| 1 | REVISION –1 | 5–17–21 |

SHEET TITLE
EXHIBIT II-15
PROFILE - SECTION A-A'

PROJECT TITLE
AREA C INFILL - PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.

PROJ. NO. 02201056.30
DSN. BY: DDD/BSP
DWN. BY: BSP/RSP/GRI
CHK. BY: DDD
Q/A RVW BY: DDD
APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS SHOWN

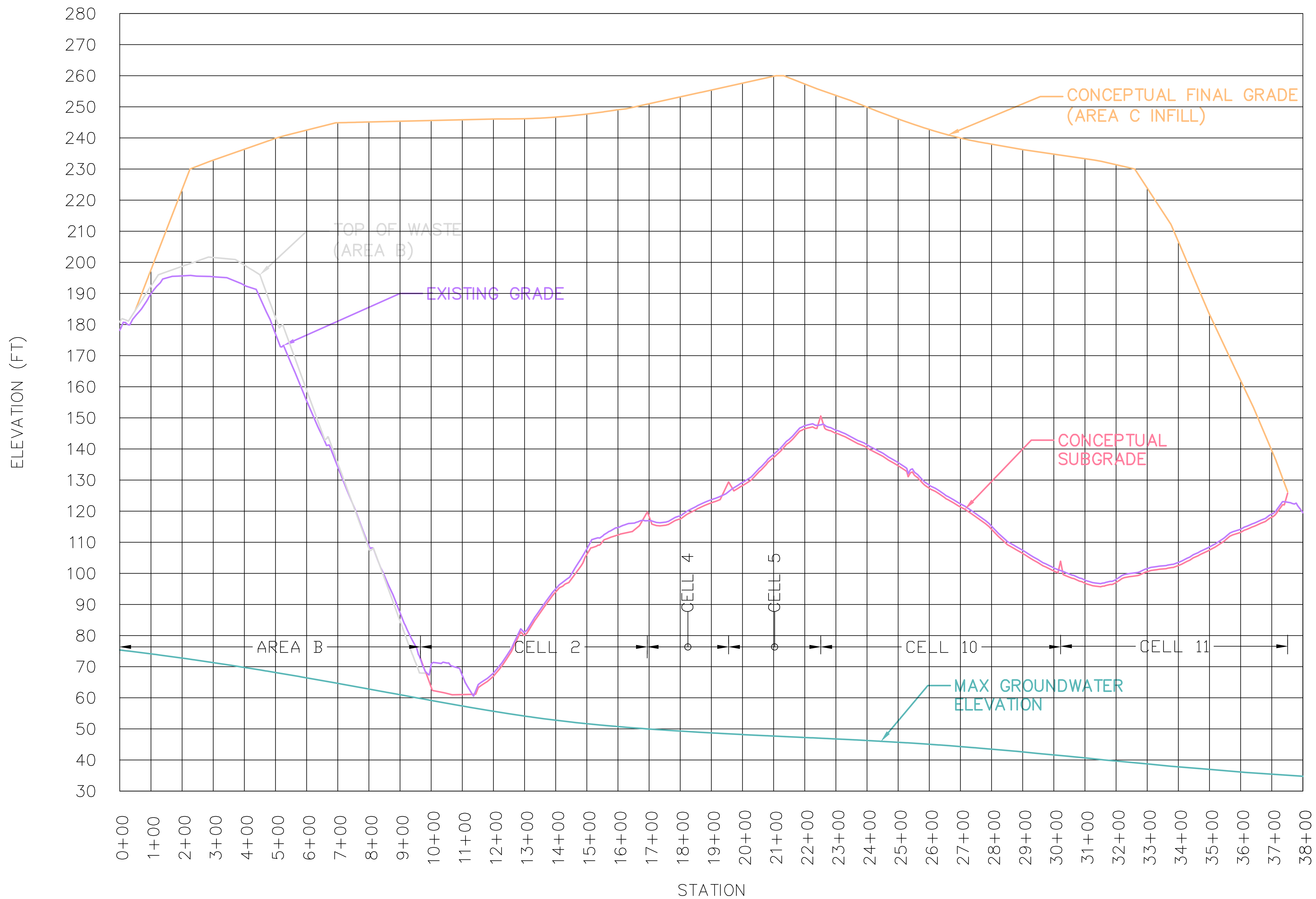
EXHIBIT NO.
II-15

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

REVISION -1 NOTES:

1. REVISED MAXIMUM GROUNDWATER CONTOURS AND AREA C INFILL WASTE LIMITS
2. REMOVED TOP OF WASTE GRADES FOR AREA C INFILL
3. ADDED CONCEPTUAL SUBGRADE, FINAL GRADE AND BOTTOM LINER CELL BOUNDARY




SECTION B-B' PROFILE

STATE OF MARYLAND DARRIN DOMINIC DILLAH PROFESSIONAL ENGINEER LIC. REG. NO. 30160
12-21-21

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION -1 | 5-17-21 |

SHEET TITLE
EXHIBIT II-16
PROFILE - SECTION B-B'

PROJECT TITLE
AREA C INFILL - PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.

PROJ. NO. 02201056.30 | DSN. BY: DDD/BSP | DWN. BY: BSP/RSP/GRI | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS SHOWN

EXHIBIT NO.
II-16

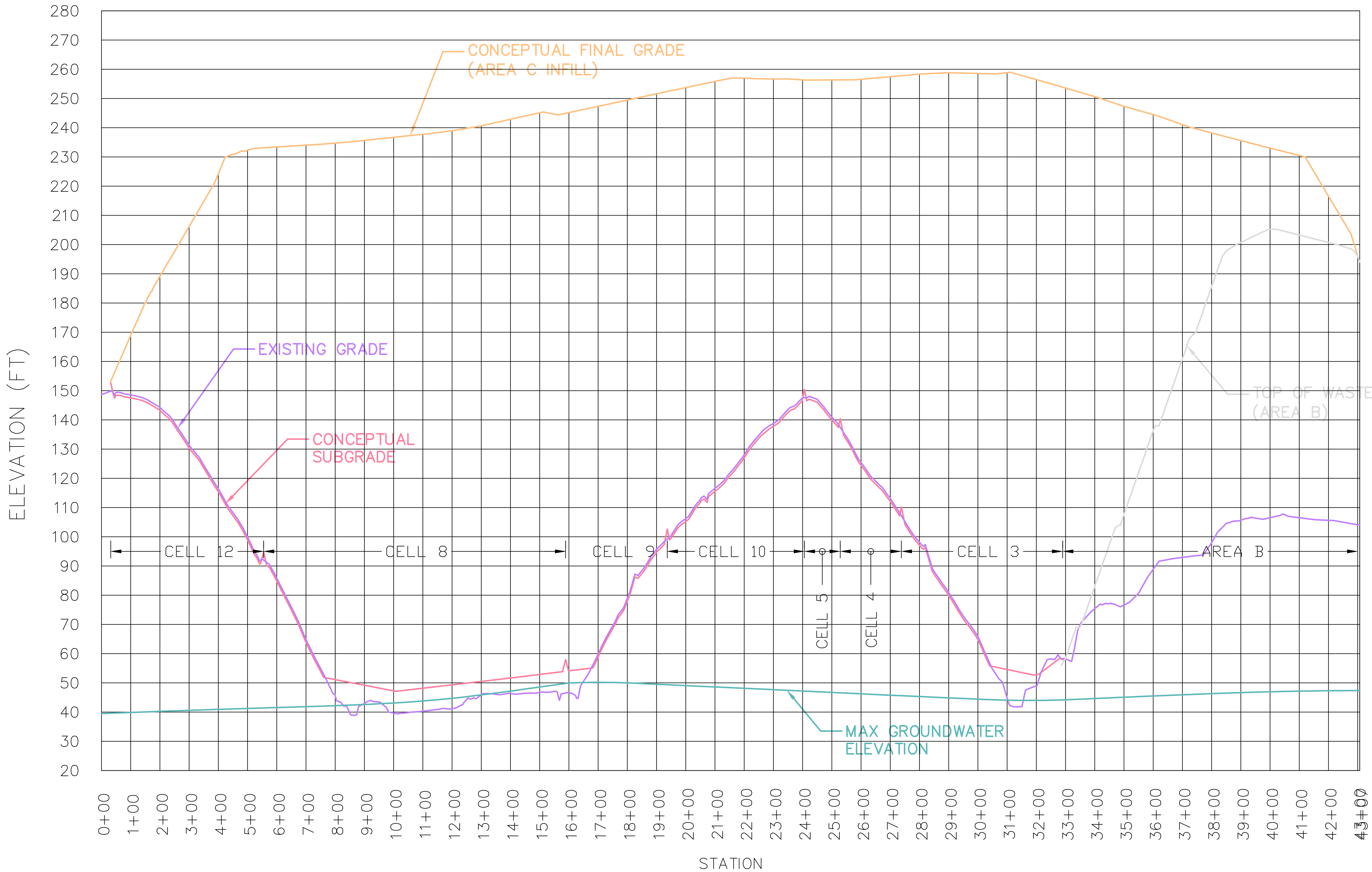
SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND
DARRIN DOMINIC DILLAH
LIC REG CERT NO 30160
PROFESSIONAL ENGINEER
12.21.21

REVISION -1 NOTES:

1. REVISED MAXIMUM GROUNDWATER CONTOURS AND AREA C INFILL WASTE LIMITS
2. REMOVED TOP OF WASTE GRADES FOR AREA C INFILL
3. ADDED CONCEPTUAL SUBGRADE, FINAL GRADE AND BOTTOM LINER CELL BOUNDARY




SECTION C-C' PROFILE

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION -1 | 5-17-21 |

SHEET TITLE: EXHIBIT II-17 PROFILE - SECTION C-C'

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.

PROJ. NO. 02201056.30 | DWN. BY: BSP/RSP/GRI | Q/A RVW BY: DDD
DSN. BY: DDD/BSP | CHK. BY: DDD | APP. BY: DDD

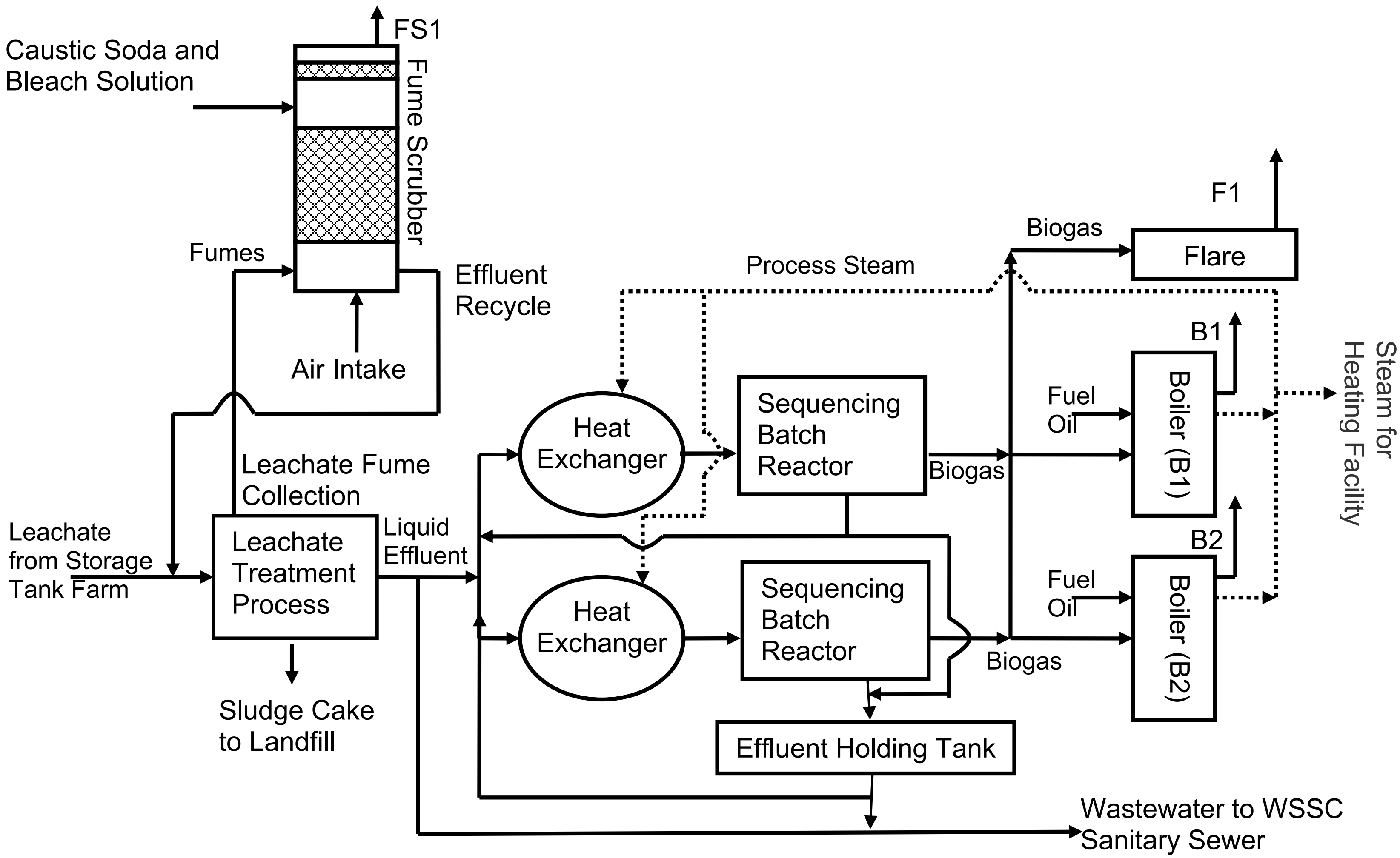
CADD FILE:

DATE: MAY 15, 2020

SCALE: AS SHOWN

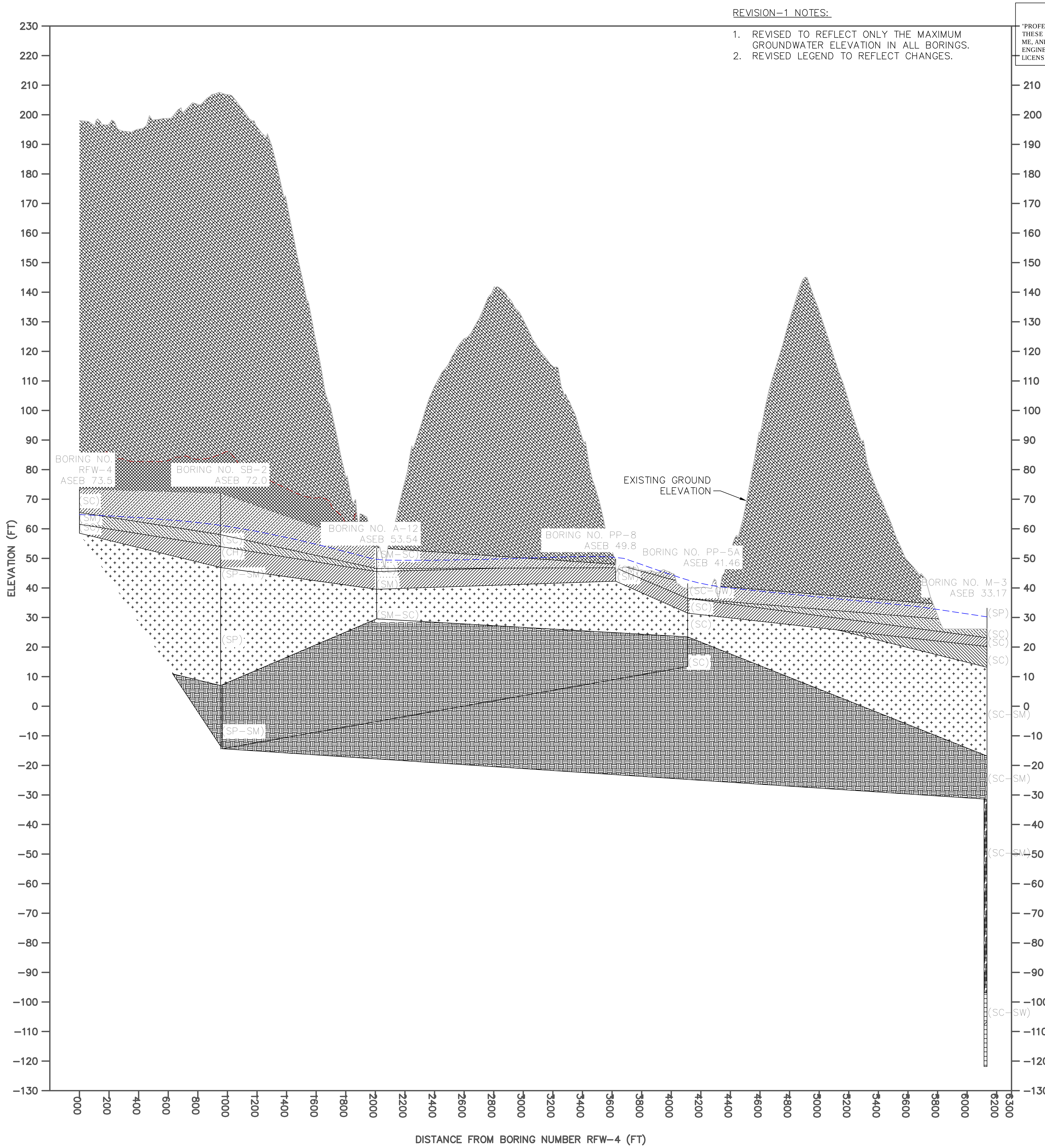
EXHIBIT NO. II-17

# EXHIBIT II-18. LEACHATE PRETREATMENT PLANT SCHEMATIC



REVISION-1 NOTES:

1. REVISED TO REFLECT ONLY THE MAXIMUM GROUNDWATER ELEVATION IN ALL BORINGS.
2. REVISED LEGEND TO REFLECT CHANGES.




LEGEND

- 1A GRANULAR FILL
- 1B COHESIVE FILL
- 2A GRANULAR NATURAL SOIL
- 2B COHESIVE NATURAL SOIL
- 3 GRANULAR SOIL (16<N<32)
- 4 GRANULAR SOIL (N>32)
- 5 GRANULAR NATURAL SOIL
- 6 COHESIVE NATURAL SOIL
- STRUCTURAL FILL
- WASTE

- – – ESTIMATED BOTTOM OF WASTE
- —— GROUND ELEVATION (2020)
- – – MAXIMUM GROUNDWATER ELEVATION
- ASEB=APPROXIMATE SURFACE ELEVATION OF BORING

NOTE:

1. SURFACE ELEVATIONS OF RFW-4 AND M-3 SOIL BORINGS ARE APPROXIMATE AND BASED ON PROFESSIONAL JUDGEMENT.

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| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION - 1 | 12/06/21 |

SHEET TITLE: EXHIBIT II-19 GEOLOGICAL CROSS SECTION 4-4'

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY 3500 BROWN STATION ROAD UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

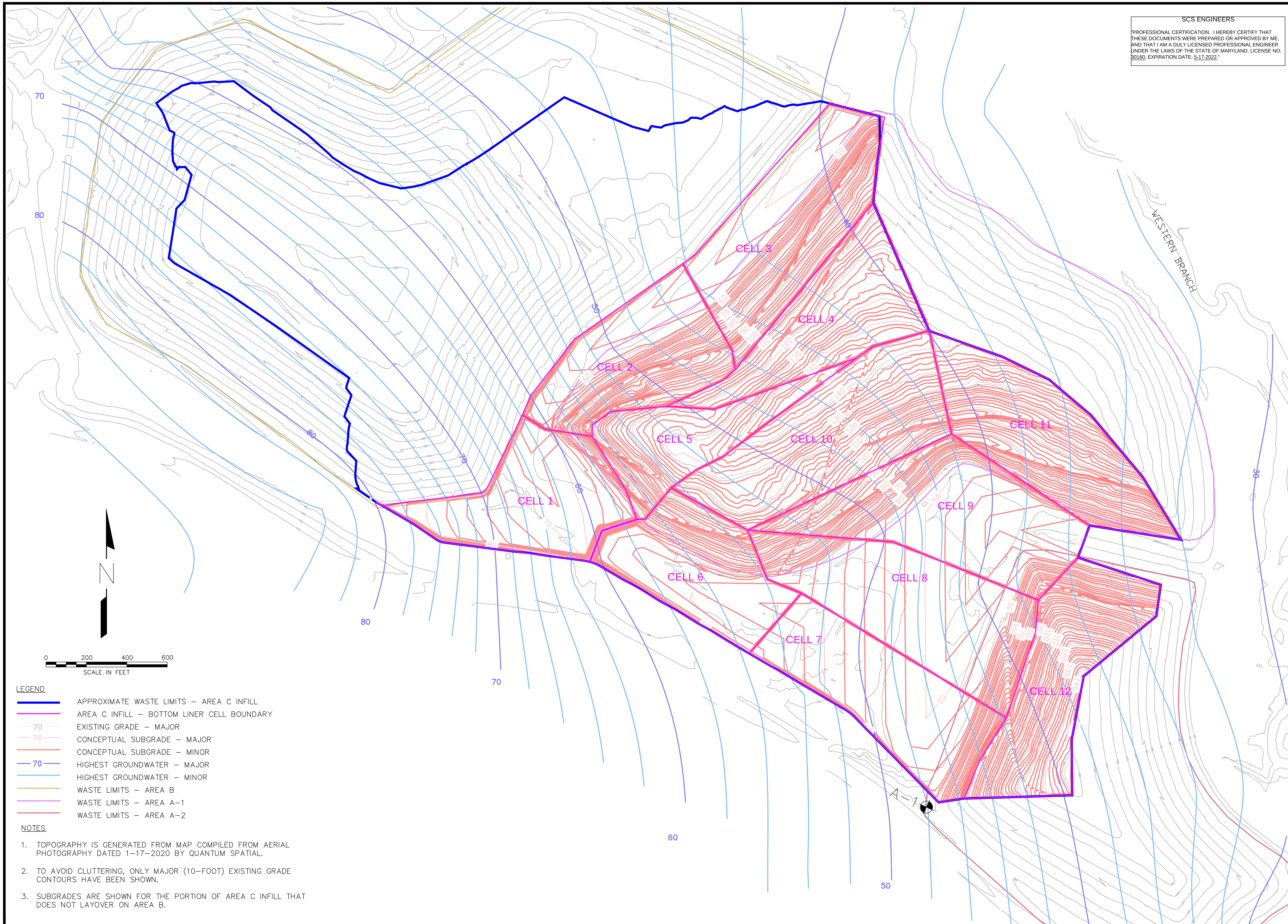
PROJ. NO. 02201056.30 | DSN. BY: GRI | DWN. BY: GRI | CHK. BY: DDD | Q/A RVW BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: NO SCALE

EXHIBIT NO. II-19




LEGEND

- APPROXIMATE WASTE LIMITS – AREA C INFILL
- AREA C INFILL – BOTTOM LINER CELL BOUNDARY
- 70 EXISTING GRADE – MAJOR
- 70 CONCEPTUAL SUBGRADE – MAJOR
- CONCEPTUAL SUBGRADE – MINOR
- 70 HIGHEST GROUNDWATER – MAJOR
- HIGHEST GROUNDWATER – MINOR
- WASTE LIMITS – AREA B
- WASTE LIMITS – AREA A-1
- WASTE LIMITS – AREA A-2

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1-17-2020 BY QUANTUM SPATIAL.
2. TO AVOID CLUTTERING, ONLY MAJOR (10-FOOT) EXISTING GRADE CONTOURS HAVE BEEN SHOWN.
3. SUBGRADES ARE SHOWN FOR THE PORTION OF AREA C INFILL THAT DOES NOT LAYOVER ON AREA B.

SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND — DARRIN DOMINIC DILLAH — LIC REG CERT NO 30160 — PROFESSIONAL ENGINEER

12.21.21

| NO. | REVISION | DATE |
|---|---|---|
| | | |

SHEET TITLE: EXHIBIT II-20 CONCEPTUAL SUBGRADE PLAN

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

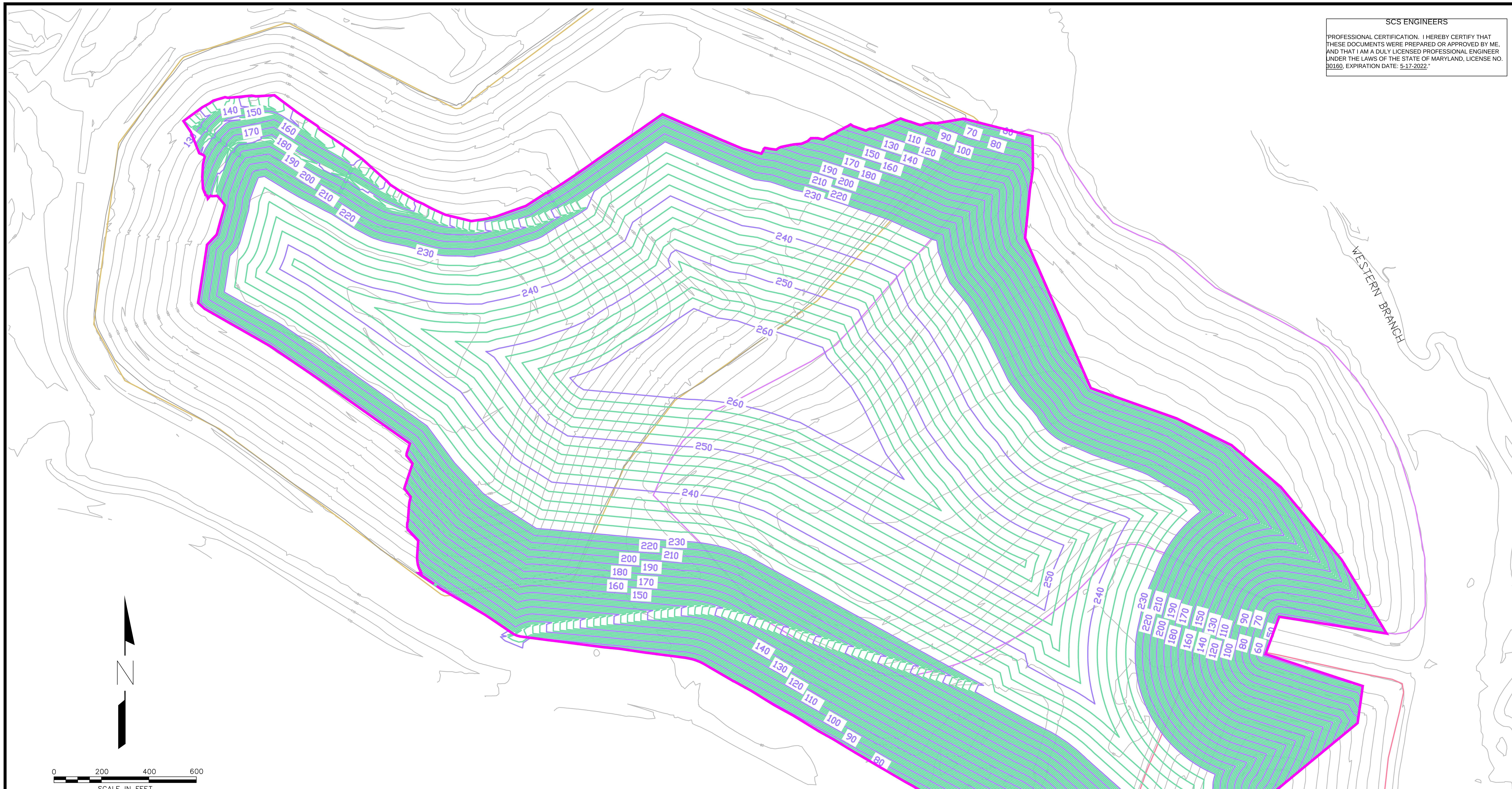
PROJ. NO. 02201056.30
DWN. BY: BSP/RSP/GRI
Q/A RVW BY: DDD
DSN. BY: DDD/BSP
CHK. BY: DDD
APP. BY: DDD

CADD FILE:

DATE: MAY 17, 2021

SCALE: AS SHOWN

EXHIBIT NO. II-20




SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

12.21.21

LEGEND

| | |
|---|---|
| (magenta line) | APPROXIMATE WASTE LIMITS – AREA C INFILL |
| 70 | EXISTING GRADE – MAJOR |
| 70 | CONCEPTUAL FINAL GRADE – MAJOR |
| (green line) | CONCEPTUAL FINAL GRADE – MINOR |
| (tan line) | WASTE LIMITS – AREA B |
| (violet line) | WASTE LIMITS – AREA A-1 |
| (red line) | WASTE LIMITS – AREA A-2 |

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1-17-2020 BY QUANTUM SPATIAL.
2. TO AVOID CLUTTERING, ONLY MAJOR (10-FOOT) EXISTING GRADE CONTOURS HAVE BEEN SHOWN.

| NO. | REVISION | DATE |
|---|---|---|
| | | |

SHEET TITLE
EXHIBIT II-21
CONCEPTUAL FINAL GRADE PLAN

PROJECT TITLE
AREA C INFILL - PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT
PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.
11260 ROGER BACON DRIVE - RESTON, VA 20190
PH. (703) 471-6150 FAX. (703) 471-6676

PROJ. NO. 02201056.30 | DWN. BY: BSP/RSP/GRI | Q/A RVW BY: DDD
DSN. BY: DDD/BSP | CHK. BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 17, 2021

SCALE: AS SHOWN

EXHIBIT NO. II-21

# APPENDICES

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Reston, VA 20190
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# APPENDIX II-A

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __2___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE __10/13/2020__

## Table A-1. Coastal Plain Stratigraphy of Prince George's County, Maryland

| Series | Formation | Approximate Thickness (ft) | Physical Character | Water Bearing Properties |
|---|---|---|---|---|
| **Recent and Pleistocone** | Lowland deposits | 0 – 150 | Sand, gravel, sandy clay and clay | Largely undeveloped as a source of groundwater |
| **Pleistocene and Pliocene** | Upland deposits | 0 – 55 | Irregularly stratified cobbles, gravel, sand and clay lenses | Source of numerous rural water supplies |
| **Miocene** | St. Marys | 0 – 50 | Sand, clayey sand, and blue clay; fossiliferous | Not an important aquifer |
| | Choptank | 20 – 105 | Fine sand, sandy clay, and sand with fossiliferous layers | Not an important aquifer |
| | Calvert | 20 – 80 | Sandy clay and fine sand, fossiliferous, diatomaceous earth | Yields small quantities of water |
| **Eocene** | Piney point | 0 – 60 | Sand, slightly glauconitic, with intercalated "rock" layers | Hydrogeologically connected with underlying Nanjemoy formation. Yields up to 200 gallons per minute reported from drilled wells |
| | Nanejoy | 40 – 240 | Glauconitic sand with clayey layers. Basal part is red or gray clay | An important aquifer in Calvertand St. Mary's Counties |
| | Aquia green sand | 30 – 203 | Glauconitic, greenish to brown sand with indurated or "rock" layers in middle and basal parts | An important aquifer in Calvert and St. Mary's Counties |
| **Paleocene** | Brightseat | 0 – 40 | Gray to dark gray micaceous silty and sandy clay | Not known to be an aquifer in Southern Maryland |
| **Upper Cretaceous** | Monmouth and Matawan | 20 – 135 | Sandy clay and sand, dark gray to black, with some glauconite. Basal part is lighter in color and less glauconitic. | Not a major aquifer in Southern Maryland |
| | Magothy | 0 – 140 | Light gray to white sand and fine gravel with interbedded clay layers; contains pyrite and lignite | An important aquifer in Prince George's and Anne Arundel Counties |
| | Raritan | 100 | Interbedded sand and clay with ironstone nodules, locally contains indurated layers | Utilized chiefly in Anne Arundel County |

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# APPENDIX II-A



| Series | Formation | Approximate Thickness (ft) | Physical Character | Water Bearing Properties |
|---|---|---|---|---|
| **Upper Cretaceous** | Patapsco | 100 – 650 | Interbedded sand, clay, and sandy clay; color variegated but chiefly hues of red and yellow | An important aquifer in Prince George's and Anne Arundel Counties |
| | Arundel Clay | 25 – 200 | Red, brown, and gray clay, in places contains ironstone nodules and plant remains | Not generally a water bearing formation in Southern Maryland |
| **Lower Cretaceous** | Patuxent | 100 – 450+ | Chiefly gray and yellow sand with interbedded clay, kaolonized feldspar and lignite common. Locally clay layers predominate | Utilized by wells in parts of Prince George's and Anne Arundel Counties |
| | | Unknown | Chiefly gneiss, granite, gabbro, metagabbro, quartz diotite, and granitized schist | Yelds moderate supplies of groundwater |

Source: Groundwater in Prince George's County by Frederick K. Mack, Bulletin 29, Maryland Geologic Survey, 1966

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# APPENDIX II-B

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __2___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE __10/13/2020__

Table B-1. Production Wells within One Half Mile of the Brown Station Road Sanitary Landfill Site

| | | | | | | Well Location | | | | | | Well Casing | | Well Screen | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Converted from LAT-LONG | | | | | | | | | | | | |
| Well-ID | Permit # | City | State | Water Use for | Replacement Well | Latitude (degree) | Longitude (degree) | Northing (ft) | Easting (ft) | Permit Issue Date | Total Depth (ft) | Type | Dia. (inch) | Type | Dia. (inch) | Top (ft) | Bottom (ft) | Length (ft) | Pumping Rate (GPM) | Water Level Before Pumping (ft) |
| DW-1 | PG731104 | Upper Marlboro | MD | DW | N | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 7/30/1979 | 316 | ST | 4 | ST | 3 | 303 | 313 | 10 | 100 | 145 |
| DW-2 | PG710030 | Upper Marlboro | MD | DW | S | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 10/28/1970 | | | | | | | | | | |
| DW-3 | PG710031 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 10/28/1970 | 255 | ST | 4 | PL | | 248 | 255 | 7 | 20 | 86 |
| DW-4 | PG730476 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 11/19/1975 | 284 | ST | 4 | ST | 3 | 279 | 284 | 5 | 30 | 94 |
| DW-5 | PG730786 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 9/27/1977 | | | | | | | | | | |
| DW-6 | PG730791 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 10/5/1977 | 299 | PL | 4 | PL | 2 | 279 | 299 | 20 | 25 | 120 |
| DW-7 | PG710059 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 3/4/1971 | 102 | ST | 4 | PL | 2 | 97 | 102 | 5 | 5 | 30 |
| DW-8 | PG730499 | Upper Marlboro | MD | DW | S | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 2/13/1976 | 246 | ST | 4 | ST | 3 | 240 | 246 | 6 | 30 | 66 |
| DW-9 | PG731470 | Upper Marlboro | MD | DW | Y | 38.849207 | 76.767952 | 430748.8011 | 1378419.3265 | 6/29/1981 | | | | | | | | | | |
| DW-10 | PG730515 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 3/31/1976 | 110 | PL | 4 | PL | 2 | 103 | 110 | 7 | 9 | 54 |
| DW-11 | PG720003 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 6/29/1971 | 225 | ST | 2 | BR | 2 | 200 | 225 | 25 | 16 | 67 |
| DW-12 | PG730527 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 5/3/1976 | 258 | ST | 4 | ST | 3 | 252 | 258 | 6 | 12 | 99 |
| DW-13 | PG730846 | Upper Marlboro | MD | DW | S | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 12/21/1977 | 208 | ST | 4 | ST | 2 | 198 | 208 | 10 | 120 | 65 |
| DW-14 | PG720024 | Upper Marlboro | MD | DW | N | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 9/8/1971 | 300 | ST | 4 | ST | 2 | 285 | 300 | 15 | 11 | 145 |
| DW-15 | PG730556 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 6/17/1976 | 108 | PL | 4 | PL | 2 | 103 | 108 | 5 | 15 | 21 |
| DW-16 | PG730559 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 7/2/1976 | 304 | ST | 4 | ST | 3 | 299 | 304 | 5 | 30 | 97 |
| DW-17 | PG720052 | Upper Marlboro | MD | DW | N | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 11/26/1971 | 290 | ST | 4 | ST | 3 | 285 | 290 | 5 | 25 | 126 |
| DW-18 | PG720058 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 12/21/1971 | 295 | ST | 2 | ST | 1 | 280 | 295 | 15 | 9 | 140 |
| DW-19 | PG730241 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 6/20/1974 | 104 | PL | 4 | PL | 2 | 94 | 104 | 10 | 12 | 9 |
| DW-20 | PG730576 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 7/19/1976 | 300 | ST | 4 | ST | 2 | 269 | 279 | 10 | 25 | 125 |
| DW-21 | PG730884 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 4/17/1978 | 252 | ST | 4 | PL | 2 | 220 | 252 | 32 | 15 | 70 |
| DW-22 | PG730901 | Upper Marlboro | MD | DW | S | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 5/8/1978 | 315 | ST | 4 | ST | 2 | 303 | 313 | 10 | 75 | 119 |
| DW-23 | PG720061 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 1/7/1972 | 217 | ST | 2 | ST | 1 | 202 | 217 | 15 | 9 | 50 |
| DW-24 | PG720063 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 1/12/1972 | 220 | ST | 4 | ST | 2 | 205 | 220 | 15 | 9 | 60 |
| DW-25 | PG730905 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 5/16/1978 | 260 | ST | 4 | ST | 3 | 250 | 260 | 10 | 30 | 108 |
| DW-26 | PG730918 | Upper Marlboro | MD | DW | N | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 6/22/1978 | | | | | | | | | | |
| DW-27 | PG810098 | Upper Marlboro | MD | DW | Y | 38.862975 | 76.788979 | 435748.5065 | 1372419.3730 | 12/8/1981 | 200 | ST | 4 | ST | 3 | 183 | 193 | 10 | 50 | 52 |
| DW-28 | PG720089 | Upper Marlboro | MD | DW | N | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 5/3/1972 | | | | | | | | | | |
| DW-29* | PG730320 | Upper Marlboro | MD | DW | Y | 38.849247 | 76.789019 | 430748.8102 | 1372419.5384 | 12/2/1974 | 260 | ST | 4 | ST | 2 | 255 | 260 | 5 | 30 | 115 |
| DW-30 | PG730637 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 12/22/1976 | 210 | ST | 4 | PL | 2 | 205 | 210 | 5 | 12 | 70 |
| DW-31 | PG730948 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 8/18/1978 | | | | | | | | | | |
| DW-32 | PG730654 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 1/31/1977 | | | | | | | | | | |
| DW-33* | PG730026 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 9/8/1972 | 107 | PL | 4 | PL | 2 | 102 | 107 | 5 | 10 | 12 |
| DW-34* | PG730684 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 4/1/1977 | 112 | PL | 4 | PL | 2 | 107 | 112 | 5 | 10 | 12 |
| DW-35 | PG730996 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 11/3/1978 | 274 | PL | 4 | PL | 2 | 269 | 274 | 5 | 15 | 95 |
| DW-36 | PG700013 | Upper Marlboro | MD | DW | S | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 8/21/1969 | 270 | ST | 2 | ST | | 240 | 270 | 30 | 10 | 140 |
| DW-37 | PG730697 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 4/14/1977 | | | | | | | | | | |
| DW-38 | PG730705 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 5/16/1977 | 305 | ST | 4 | OT | 3 | 295 | 305 | 10 | 45 | 98 |
| DW-39 | PG731008 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 12/11/1978 | 245 | PL | 4 | PL | 2 | 238 | 245 | 7 | 80 | 85 |
| DW-40 | PG731012 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 12/21/1978 | 303 | ST | 4 | ST | 3 | 293 | 303 | 10 | 40 | 100 |
| DW-41 | PG700024 | Upper Marlboro | MD | DW | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 10/15/1969 | 221 | ST | 2 | BR | | 200 | 221 | 21 | 15 | 63 |
| DW-42 | PG730062 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 2/5/1973 | 115 | PL | 4 | PL | 2 | 110 | 115 | 5 | 15 | 17 |
| DW-43 | PG730084 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 4/18/1973 | 260 | OT | 4 | PL | 2 | 255 | 260 | 5 | 50 | 80 |
| DW-44 | PG730087 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 5/4/1973 | 115 | PL | 4 | PL | 2 | 110 | 115 | 5 | 5 | 12 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-B

JOB NO. ____02201056.30__
SHEET NO. _2_ OF __2___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE __10/13/2020__

| Well-ID | Permit # | City | State | Water Use for | Replacement Well | Well Location | | | | Permit Issue Date | Total Depth (ft) | Well Casing | | Well Screen | | | | | Pumping Rate (GPM) | Water Level Before Pumping (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Latitude (degree) | Longitude (degree) | Converted from LAT-LONG Northing (ft) | Converted from LAT-LONG Easting (ft) | | | Type | Dia. (inch) | Type | Dia. (inch) | Top (ft) | Bottom (ft) | Length (ft) | | |
| DW-45 | PG730727 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 6/15/1977 | 242 | PL | 4 | PL | 2 | 237 | 242 | 5 | 45 | 80 |
| DW-46 | PG700073 | Upper Marlboro | MD | DW | S | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 6/1/1970 | 295 | ST | 2 | BR | | 270 | 295 | 25 | 12 | 80 |
| DW-47 | PG731070 | Upper Marlboro | MD | DW | N | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 5/8/1979 | | | | | | | | | | |
| DW-48 | PG810907 | Upper Marlboro | MD | DW | Y | 38.846461 | 76.767961 | 429748.7168 | 1378419.3054 | 7/26/1985 | 300 | PL | 4 | ST | 3 | 290 | 300 | 10 | 60 | 150 |
| DW-49 | PG730138 | Upper Marlboro | MD | DW | Y | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 9/26/1973 | 27 | CO | 30 | | | | | | 6 | 11 |
| DW-50 | PG731095 | Upper Marlboro | MD | DW | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 7/11/1979 | 212 | ST | 4 | ST | 3 | 202 | 212 | 10 | 30 | 65 |
| DW-51 | PG811594 | Upper Marlboro | MD | DW | N | 38.849277 | 76.806576 | 430748.6609 | 1367419.3880 | 5/28/1987 | 210 | PL | 4 | PL | 3 | 200 | 210 | 10 | 12 | 70 |
| DW-52 | PG811595 | Upper Marlboro | MD | DW | N | 38.849277 | 76.806576 | 430748.6609 | 1367419.3880 | 7/29/1987 | 210 | PL | 4 | PL | 3 | 200 | 210 | 10 | 12 | 75 |
| DW-53 | PG810960 | Upper Marlboro | MD | DW | Y | 38.846461 | 76.767961 | 429748.7168 | 1378419.3054 | 9/13/1985 | 210 | ST | 4 | PL | 2 | 200 | 210 | 10 | 30 | 89 |
| DW-54 | PG811071 | Upper Marlboro | MD | DW | Y | 38.854705 | 76.771445 | 432748.6336 | 1377419.5282 | 12/11/1985 | 210 | PL | 4 | PL | 3 | 200 | 210 | 10 | 45 | 65 |
| DW-55 | PG811134 | Upper Marlboro | MD | DW | N | 38.852017 | 76.803057 | 431748.6976 | 1368419.4248 | 4/25/1986 | 214 | PL | 4 | PL | 3 | 200 | 210 | 10 | 12 | 90 |
| DW-56 | PG882455 | Upper Marlboro | MD | DW | N | 38.838257 | 76.785541 | 426748.6230 | 1373419.4543 | 2/18/1992 | 235 | PL | 4 | PL | 3 | 221 | 230 | 9 | 12 | 85 |
| DW-57 | PG882523 | Upper Marlboro | MD | DW | Y | 38.835498 | 76.778528 | 425748.5817 | 1375419.4587 | 5/20/1992 | 190 | PL | 4 | PL | 2 | 183 | 190 | 7 | 30 | 52 |
| DW-58 | PG920931 | Upper Marlboro | MD | DW | Y | 38.857458 | 76.774948 | 433748.7839 | 1376419.5002 | 3/13/1996 | 242 | PL | 4 | ST | 3 | 232 | 242 | 10 | 30 | 85 |
| DW-59* | PG880509 | Upper Marlboro | MD | DW | N | 38.843767 | 76.796058 | 428748.4683 | 1370419.3327 | 9/8/1989 | | | | | | | | | | |
| DW-60 | PG940779 | Upper Marlboro | MD | DW | Y | 38.851959 | 76.771454 | 431748.5485 | 1377419.4690 | 11/9/1998 | 215 | PL | 4 | ST | 2 | 190 | 200 | 10 | 30 | 95 |
| DW-61 | PG941741 | Upper Marlboro | MD | DW | Y | 38.851959 | 76.771454 | 431748.5485 | 1377419.4690 | | 285 | PL | 4 | PL | 3 | 275 | 285 | 10 | 80 | 120 |
| DW-62 | PG950628 | Upper Marlboro | MD | DW | N | 38.862963 | 76.781955 | 435748.8363 | 1374419.3908 | 10/24/2005 | 270 | PL | 4 | PL | 2 | 260 | 270 | 10 | 50 | 7 |
| IFW-1 | PG710060 | Upper Marlboro | MD | I | N | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 10/7/1970 | 220 | ST | 4 | ST | 2 | 211 | 220 | 9 | 10 | 80 |
| IFW-2 | PG730951 | Upper Marlboro | MD | F | Y | 38.849214 | 76.771463 | 430748.8280 | 1377419.4087 | 8/18/1978 | 246 | ST | 4 | ST | 3 | 240 | 246 | 6 | 30 | 78 |
| IFW-3 | PG720122 | Upper Marlboro | MD | F | N | 38.862975 | 76.788979 | 435748.5065 | 1372419.3730 | 6/9/1972 | 250 | ST | 4 | PL | 2 | 245 | 250 | 5 | 50 | 66 |
| IFW-4 | PG730129 | Upper Marlboro | MD | I | S | 38.835485 | 76.771507 | 425748.7760 | 1377419.3928 | 7/2/1973 | 274 | ST | 4 | ST | 3 | 268 | 274 | 6 | 25 | 120 |
| IFW-5 | PG812075 | Upper Marlboro | MD | I | Y | 38.846461 | 76.767961 | 429748.7168 | 1378419.3054 | 7/19/1988 | 305 | ST | 4 | ST | 2 | 295 | 305 | 10 | | |

Notes: 1. Blank means no data was available/provided.
2. Well identification (Well-ID) DW- and IFW- means drinking water well and irrigation/farming well, respectively.
3. Water use symbols DW, F, and I means drinking water, farming, and irrigation well, respectively.
4. Replacement well symbols Y, N, and S means replacement well, new well, and unknown, respectively.
5. Casing/screen type symbols BR, CO, OT, PL, and ST means brass/bronze, concrete, others, plastic, and steel, respectively.
6. Well screen length is calculated (length = bottom - top).
7. Drinking water wells with '*' (DW-29, 33, 34, and 59) are in Water Science Administration record but no longer existing.

# APPENDIX II-C

# GROUNDWATER MONITORING DATA AND OUTLIER ANALYSIS

## GROUNDWATER MONITORING DATA

Monthly groundwater monitoring data from 2005 through 2020 is provided in Table C-1 of this Appendix.

## OUTLIER ANALYSES[14,15,16,17]

Graphical and parametric screening tools were used to identify potential outliers and reviewed GWE measurements within the GWM well's vicinity to confirm. The following approach was used to identify potential outliers in the GWE data:

1. Graphical Screening Tool: Graphs[14,15] such as Box-Whisker plots, ranked data plots, normal probability plots, and time plots can be used to identify observations that are too small or too large compared to the rest of the sample population. Box-Whisker plots were used for initial screening of outliers and is described in further detail in Exhibit II-C-1.

2. Statistical Tests: To determine outliers, EPA[14,15] recommends two statistical tests: Dixon's (Extreme Value) test and generalized ESD (Extreme Studentized Deviate) test also known as the Rosner's test[16,17]. Dixon's test is generally used to identify one outlier at a time, whereas Rosner's test is used to identify multiple outliers at a time. For Rosner's test, EPA[15] recommends a minimum sample size of 25. SCS used Rosner's test to identify up to 10 outliers for GWM wells which had mild or extreme high outliers identified using the graphical screening tool. Rosner's outlier analyses were performed at 95% confidence interval bound (i.e., a $p$-value < 0.05) and is further described in Exhibit II-C-1.

3. Outlier Judgment: For GWM wells with high outliers, GWE data for the months preceding and following the outlier were reviewed with reference to:
    a. GWE data of GWM wells in the vicinity during the corresponding period. Because groundwater in the upper unconfined aquifer flows north or northeast across the site, GWM wells on the east and west sides of the outlier well were considered for data review.
    b. Presence of nearby water bodies such as sedimentation basins, streams, etc.

The GWE data for the following GWM wells did not undergo outlier analyses because the sample size was below the EPA recommendation of 25. These wells were also removed from estimation of depressed and elevated groundwater conditions and highest groundwater elevations.

- Well A-22DD: This well was monitored from October 2018 through August 2019 (11 monitoring events).
- Well A-22DD-A: This well has been monitored since September 2019 (15 monitoring events).
- Well B-6: This well was not monitored after 2005 (9 monitoring events).
- Well B-6A: This well was monitored from March to June 2005 (3 monitoring events).
- Well NES-7D: This well has been monitored since January 2020 (11 monitoring events).

GWE monitoring data is presented in Table II-C-1. The outlier results presented in Exhibits II-C-2 through II-C-10 are summarized in Table II-C-2.

To assess if a high outlier should be removed, the GWE data (provided in Table II-C-1, Appendix II-C) was further reviewed, as summarized below.

<u>GWM well A-1:</u>

Rosner's test (Exhibit II-C-9) identified three (3) high outliers (on 8/8/2008, 1/16/2012, and 10/28/2016) at a ≥ 95% confidence interval bound (i.e., a $p$-value < 0.05):

1. <u>Outlier on August 8, 2008</u>: A GWE of 52.02 ft was more than 6 ft higher than the GWE during the previous month (7/8/2008) and the following month (9/8/2008). GWE of surrounding wells, GWM Well A-2 (east) and GWM well PP-6A (west), were nearly unaffected during this same period. It was 31 ft at GWM well A-2 and about 51 ft at GWM well PP-6A. Furthermore, another nearby GWM well PP-6B exhibited GWE more than 5 ft lower than GWM well A-1 on the alleged outlier date of 08/08/2008. Due to these reasons, this outlier was removed from the data set.
2. <u>Outlier on January 16, 2012</u>: A GWE of 56.61 ft was about 10 ft higher than the GWE during the previous month (12/20/2011) and the following month (2/13/2011). Again, GWM wells on the east and west sides exhibited nearly constant GWE during this period. It was about 33 ft on the east side of GWM well A-2, it ranged from 51 ft to 52 ft on the west side GWM well PP-6A, and it was about 53 ft on the west side of GWM well PP-6B. This outlier was removed from the data set.
3. <u>Outlier on October 28, 2016</u>: A GWE of 57.31 ft was more than 10 ft higher than the GWE during the previous month (9/9/2016) and the following month (11/22/2016). Again, the GWE was almost the same on east and west sides during this period. It was about 30 ft on the east side of GWM well A-2, about 50 ft on the west side of GWM well PP-6A, and about 52 ft on the west side of GWM well PP-6B. This outlier was removed from the data set.

<u>GWM well A-10:</u>

Rosner's test (Exhibit II-C-10) identified one (1) high outlier at a $p$-value < 0.05. The outlier GWE of 58.27 ft on 7/8/2008 was more than 6 ft higher than the GWE during the previous month (6/8/2008) and the following month (8/8/2008). The GWE was almost the same during this 3-month period in nearby GWM wells PP-6A and PP-6B. It was about 51 ft and 53 ft at GWM wells PP-6A and PP-6B, respectively. Furthermore, the GWE was about 6 ft lower in nearby GWM well A-1 during June and July of 2008 compared to August 2008. This outlier was thus removed.

<u>GWM well A-11:</u>

Rosner's test (Exhibit II-C-9) identified four (4) high outliers at a $p$-value < 0.05:

1. <u>Outlier on November 10, 2006</u>: A GWE of 79.01 ft was more than 6 ft higher than the GWE during the previous month (11/10/2006) and the following month (12/14/2006), whereas the GWE on the east and west GWM wells was almost same during these three months. It was about 60 ft at GWM well A-4 on the east and about 79 ft at GWM well B-10 on the west. This outlier was removed from the data set.

2. Outlier on October 28, 2016: A GWE of 82.02 ft was about 10 ft higher than the GWE during the previous month (9/9/2016) and the following month (11/22/2016), whereas the GWE on the east and west GWM wells was almost same during these three months. It was about 58 to 59 ft at GWM well A-4 on the east and about 78 ft at GWM well B-10 on the west. This outlier was removed from the data set.
3. Outlier on July 24, 2017: A GWE of 81.26 ft was about 10 ft higher than the GWE during the previous month (6/15/207) and the following month (8/31/2017), whereas the GWE at the east and west side wells were almost same during these three months. It was about 57 ft at GWM well A-4 on the east and about 76 ft at GWM Well B-10 on the west. This outlier was removed from the data set.
4. Outlier on April 6, 2018: A GWE of 81.66 ft was about 10 ft higher than the GWE during the previous month (3/15/2018) and the following month (5/31/2018). The GWE at the east and west side wells were almost same during these three months. It was about 58 ft at GWM Well A-4 on the east and about 77 ft at the GWM well B-10 on the west. This outlier was removed from the data set.

GWM well A-13:

Rosner's test (Exhibit II-C-9) identified three (3) high outliers (on 1/5/2005, 2/11/2005, and 3/24/2005) at a $p$-value < 0.05. A GWE of about 44 ft during these monitoring events was about 2 ft higher than the GWE during the following month (4/21/2005). The GWE at this well is influenced by the water level in the Area A Sedimentation Basin 2. The normal pool elevation for this basin is 40.3 ft, which is about 4 ft lower than the outliers' GWE. These three outliers were thus removed from the data set.

GWM well A-14:

Rosner's test (Exhibit II-C-9) identified one (1) high outlier at a $p$-value < 0.05. A GWE of 44.82 ft on 05/13/2019 was about 5 ft higher than the GWE during the previous month (4/18/2019) and the following month (6/4/2019). The GWE at this well is also influenced by the water level in Area A Sedimentation Basin 2 which has a normal pool elevation of 40.3 ft Since this outlier GWE is more than 4 ft higher than this basin, it was removed from the data set.

GWM well A-18:

Rosner's test (Exhibit II-C-10) identified one (1) high outlier at a $p$-value < 0.05. A GWE of 36.25 ft on 11/10/2006 was about 6 ft higher than the GWE during the previous month (10/31/2006) and about 8 ft higher than the following month (12/14/2006). The GWE at wells east of the identified outlier, PP-2A and PP-2B, were about 29 ft during this period. As such, the outlier was removed from the data set.

GWM well A-19:

Rosner's test (Exhibit II-C-10) identified one (1) high outlier at a $p$-value < 0.05. A GWE of 33.82 ft on 11/10/2006 was about 5 ft higher than the GWE during the previous month (10/31/2006) and the following month (12/14/2006). The GWE at GWM well A-20 (east) and GWM wells PP-2A and PP-2B (west) were about 29 ft during this same period. As such, this outlier was removed from the data set.

GWM well A-20:

Rosner's test (Exhibit II-C-10) identified two (2) high outliers at a *p*-value < 0.05:

1. Outlier on April 8, 2008: A GWE of 39.30 ft was about 10 ft higher than the GWE during the previous month (3/8/2008) and the following month (5/8/2008). The GWE at the GWM wells located east and west of this well were almost same during this period. It was about 30 ft at GWM well A-19 (west) and about 25 ft at GWM well A-3 (east). This outlier was removed from the data set.
2. Outlier on December 13, 2013: A GWE of 33.38 ft was about 3 ft higher than the GWE during the previous month (11/7/2013) and the following month (1/17/2014). However, at the west side GWM well A-19 and east side GWM well A-3, GWE during the outlier month and the following month were slightly higher than the month prior to outlier month. As such, this outlier was not removed from the data set.

GWM well A-21:

Rosner's test (Exhibit II-C-9) identified one (1) high outlier at a *p*-value < 0.05. A outlier GWE of 63.27 ft on 12/07/2007 was about 13 ft higher than the GWE during the previous month (11/7/2007) or the following month (1/8/2008). While the GWE was about 51 ft at GWM wells PP-6A and PP-6B (east) and about 60 ft at GWM Well A-4 (west). This outlier was removed from the data set.

GWM well PP-2A:

Rosner's test (Exhibit II-C-9) identified one (1) high outlier at a *p*-value < 0.05. A GWE of 31.27 ft on 03/24/2005, was about 3 ft higher than the GWE during the previous month (2/11/2005) and the following month (4/21/2005). A similar GWE trend was observed at the neighboring GWM well PP-2B. As such, this outlier was not removed from the data set.

GWM well PP-2B:

Rosner's test (Exhibit II-C-9) identified one (1) high outlier at a *p*-value < 0.05. A GWE of 31.44 ft on 03/24/2005 was about 3 ft higher than the GWE during the previous month (2/11/2005) and the following month (4/21/2005). A similar GWE trend was also observed at the neighboring GWM well PP-2A. As such, this outlier was not removed from the data set.

GWM well B-1:

Rosner's test (Exhibit II-C-10) identified one (1) high outlier at a *p*-value < 0.05. A GWE of 41.17 ft on 11/14/2018 was about 4 ft higher than the GWE during the previous month (10/16/2018) and the following month (12/05/2018). The GWE at GWM well A-15 (east) and GWM well B-2R (west) was about 1 ft higher in November 2018 than the previous and the following month's monitoring events. As such, this outlier was not removed from the data set.

GWM well B-3:

Rosner's test (Exhibit II-C-10) identified three (3) high outliers at a *p*-value < 0.05:

1. Outlier on May 4, 2006: A GWE of 45.72 ft was about 4 ft higher than the GWE during the previous month (4/6/2006) and the following month (6/12/2006). During these three months, the GWE was about 50 ft at the west side GWM well B-4. GWE at the east side

GWM well B-2 was lower on the date of the outlier than during the previous or the following month's monitoring events. This outlier was removed from the data set.

2. Outlier on May 7, 2007: A GWE of 46.35 ft was about 5 ft higher than the GWE during the previous month (4/7/2007) and the following month (6/1/2007). During these three months, the GWE was about 44 ft at the east side GWM well B-2. GWE at the west side GWM well B-4 was lower on the date of outlier than during the previous or the following month's monitoring events. This outlier was removed from the data set.
3. Outlier on July 1, 2007: A GWE of 45.63 ft was about 4 to 5 ft higher than the GWE during the previous month (6/1/2007) and the following month (8/7/2007). During these three months, the GWE was about 44 ft at the east side GWM well B-2 and about 50 ft at the west side GWM well B-4. This outlier was removed from the data set.

GWM well B-6R:

Rosner's test (Exhibit II-C-10) identified six (6) high outliers (three (3) in 2006, two (2) in 2007, and one (1) in 2008) at a *p*-value < 0.05. Note that GWM wells NES-1D, NES-1S, NES-4 and NES-5 were not constructed. At that time, GWM wells B-4 and B-7 were existing in the vicinity of GWM well B-6R.

1. Outliers on June 12 and July 25, 2006: A GWE of 61.75 ft on 6/12/2006 and 61.25 ft on 7/25/2006 were about 6 ft higher than the GWE during the previous month (5/4/2006) and the following month (8/28/2006). During these four months, the GWE was about 68 ft at nearby GWM well B-7 and about 50 ft at nearby GWM well B-4. Both outliers were removed from the data set.
2. Outlier on November 10, 2006: A GWE of 62.45 ft on 11/10/2006 was about 6 ft higher than the GWE during the previous month (10/31/2006) and the following month (12/14/2006). During these four months, the GWE at nearby GWM well B-4 was 13 ft lower on the outlier date than during the previous or following month's monitoring events. GWE at the nearby GWM well B-7 was about 50 ft As such, this outlier was removed from the data set.
3. Outliers on November 7 and December 7, 2007: A GWE of 61.75 ft on 11/7/2008 and 12/7/2006 were about 6 ft higher than the GWE during the previous month (10/7/2008) and the following month (1/8/2008). During these four months, the GWE was about 68 ft at nearby GWM Well B-7 and about 50 ft at nearby GWM well B-4. Both outliers were removed from the data set.
4. Outlier on December 8, 2008: A GWE of 64.90 ft was about 9 ft higher than the GWE during the previous month (11/8/2006) and the following month (1/26/2009). During these four months, the GWE was about 69 ft at nearby GWM well B-7 and about 50 ft at nearby GWM well B-4. This outlier was removed from the data set.

GWM well B-8:

Rosner's test (Exhibit II-C-10) identified two (2) high outliers at a *p*-value < 0.05:

1. Outlier on November 25, 2009: A GWE of 83.59 ft was only 1 ft higher than the GWE during the previous month (10/29/2009) and the following month (12/30/2009). As such, the outlier was not removed from the data set.
2. Outlier on October 29, 2020: A GWE of 84.49 ft was about 4 ft higher than the GWE during the previous month (9/11/2020) and the following month (11/24/2020). During these three months, the GWE at the east side GWM well B-9 was about 81 ft and about 73 ft at the west side GWM well B-7. This outlier was removed from the data set.

GWM well NES-1S:

Rosner's test (Exhibit II-C-10) identified one (1) high outlier at a *p*-value ≤ 0.05. A GWE of 58.77 ft on 02/20/2017 was about 3 ft higher than the GWE during the previous month (1/5/2017) and the following month (3/17/2017). During these three months, the GWE at nearby Wells B-6R and NES-1D was about 56 ft and 54 ft, respectively. As such, this outlier was removed from the data set.

GWM Well NES-6D:

Rosner's test (Exhibit II-C-10) identified One (1) high outlier at a *p*-value < 0.05. A GWE of 29.39 ft on 9/11/2020 were less than 1-ft higher than the GWE during the previous month and the following month's monitoring events. The outlier was not removed from the data set.

GWM well NES-6S:

Rosner's test (Exhibit II-C-10) identified two (2) high outliers at a *p*-value < 0.05. A GWE of 29.4 ft on 9/11/2020 and a GWE of 29.21 ft on 12/14/2020 were less than 2 ft higher than the GWE during the previous month and the following month's monitoring events. These outliers were not removed from the data set.

11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676



CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

**TABLE C-1. GROUNDWATER ELEVATION (ft-AMSL) FROM 2005 THROUGH 2020**
**(BROWN STATION ROAD SANITARY LANDFILL)**

**A. CRITICAL-GWM-WELLS SET**

| Date | A-1 | A-4 | A-11 | A-12 | A-13 | A-14 | A-21 | PP-2A | PP-2B | PP-5A | PP-5B | PP-6A | PP-6B | PP-8 | Mean GWE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | (ft-AMSL) |
| 1/5/2005 | 48.10 | 61.02 | 73.39 | 46.95 | 43.95+ | 36.46 | 51.06 | 28.26 | 28.45 | 37.13 | 37.86 | 50.82 | 52.30 | 44.67 | 45.88 |
| 2/11/2005 | 46.33 | 61.27 | 67.62 | 46.99 | 43.87+ | 36.49 | 49.03 | 28.44 | 28.63 | 37.28 | 37.00 | 51.08 | 52.51 | 44.76 | 45.19 |
| 3/24/2005 | 46.53 | 61.39 | 73.78 | 47.29 | 44.19+ | 38.71 | 51.25 | 31.27 | 31.44 | 37.88 | 37.64 | 50.96 | 52.45 | 45.01 | 46.58 |
| 4/21/2005 | 46.86 | 61.33 | 74.03 | 46.86 | 41.93 | 38.77 | 51.59 | 28.15 | 28.36 | 37.21 | 37.00 | 51.41 | 53.00 | 44.63 | 45.80 |
| 5/24/2005 | 46.68 | 61.45 | 74.06 | 46.93 | 41.83 | 35.21 | 51.45 | --- | 29.44 | 37.28 | 36.97 | 51.25 | 52.79 | 44.77 | 46.93 |
| 6/8/2005 | 46.58 | 61.02 | 73.88 | 47.13 | 41.82 | 35.23 | 51.38 | 29.32 | 29.51 | 37.13 | 36.82 | 50.99 | 52.54 | 45.13 | 45.61 |
| 7/1/2005 | 45.95 | 60.22 | 73.43 | 45.90 | 41.39 | 34.66 | 51.23 | 27.75 | 27.94 | 36.43 | 36.22 | 50.83 | 52.49 | 44.37 | 44.92 |
| 8/15/2005 | 45.74 | 59.57 | 73.41 | 45.23 | 41.07 | 35.19 | 51.56 | 27.95 | 27.97 | 36.62 | 36.34 | 50.63 | 52.10 | 44.73 | 44.87 |
| 9/7/2005 | 45.28 | 59.01 | 72.44 | 44.93 | 40.59 | 35.14 | 51.37 | 27.47 | 27.46 | 36.21 | 35.97 | 50.46 | 51.96 | 43.95 | 44.45 |
| 11/18/2005 | 44.93 | 59.01 | 72.52 | 45.73 | 40.87 | 35.34 | 51.12 | 28.85 | 28.85 | 36.93 | 36.72 | 50.28 | 51.78 | 44.35 | 44.81 |
| 12/27/2005 | 45.79 | 59.96 | 71.73 | 46.78 | 41.26 | 33.79 | 50.72 | 29.21 | 29.56 | 37.26 | 36.97 | 51.23 | 53.04 | --- | 45.18 |
| 2/6/2006 | 46.27 | 59.72 | 73.36 | 47.73 | 41.73 | 34.25 | 51.45 | 28.83 | 30.39 | 37.41 | 37.15 | 50.66 | 52.09 | 45.15 | 45.44 |
| 3/24/2006 | 46.02 | 59.94 | 72.29 | 45.82 | 40.93 | 32.81 | 50.80 | 28.05 | 28.16 | 36.93 | 36.48 | 51.44 | 51.32 | 44.24 | 44.66 |
| 4/6/2006 | 45.83 | 59.72 | 72.63 | 46.60 | 40.87 | 32.84 | 50.78 | 28.17 | 28.36 | 36.71 | 36.52 | 51.31 | 51.04 | 44.25 | 44.69 |
| 5/4/2006 | 45.33 | 59.92 | 72.38 | 45.78 | 40.81 | 31.74 | 50.63 | 27.77 | 28.14 | 35.97 | 35.71 | 50.20 | 51.93 | 44.44 | 44.34 |
| 6/12/2006 | 45.57 | 59.95 | 72.78 | 45.09 | 38.78 | 33.36 | 50.55 | 28.23 | 28.56 | 36.55 | 36.33 | 50.19 | 51.89 | 44.53 | 44.45 |
| 7/25/2006 | 45.38 | 59.17 | 72.72 | 45.03 | 38.59 | 33.58 | 50.53 | 28.07 | 28.26 | 36.51 | 36.32 | 50.13 | 51.84 | 44.15 | 44.31 |
| 8/28/2006 | 44.90 | 58.63 | 72.13 | 44.55 | 40.13 | 32.78 | 51.04 | 27.38 | 27.38 | 35.74 | 35.53 | 50.12 | 51.69 | 44.37 | 44.03 |
| 9/11/2006 | 45.73 | 56.97 | 72.15 | 45.47 | 40.28 | 39.64 | 49.55 | 28.27 | 28.38 | 37.31 | 37.10 | 50.28 | 51.79 | 43.81 | 44.77 |
| 10/31/2006 | 46.23 | 59.12 | 72.68 | 45.88 | 40.79 | 33.04 | 52.78 | 28.37 | 28.41 | 37.40 | 37.15 | 50.37 | 51.79 | 43.91 | 44.85 |
| 11/10/2006 | 46.63 | 60.37 | 79.01+ | 43.33 | 38.43 | 35.39 | 52.63 | 28.61 | 29.61 | 37.93 | 38.22 | 51.04 | 52.69 | 44.25 | 43.01 |
| 12/14/2006 | 46.33 | 60.27 | 72.73 | 47.13 | 40.94 | 33.12 | 51.23 | 28.37 | 29.54 | 37.61 | 37.92 | 50.83 | 52.49 | 44.05 | 45.18 |
| 1/1/2007 | 46.27 | 58.71 | 72.58 | 45.81 | 40.29 | 33.00 | 52.21 | 28.26 | 28.38 | 37.35 | 37.09 | 50.22 | 51.64 | 43.80 | 44.69 |
| 2/2/2007 | 46.52 | 60.64 | 73.42 | 46.67 | 41.58 | 33.85 | 52.03 | 28.53 | 28.55 | 37.54 | 37.31 | 51.20 | 52.61 | 44.97 | 45.39 |
| 3/7/2007 | 46.33 | 58.73 | 72.60 | 45.83 | 40.30 | 33.05 | 52.25 | 28.31 | 28.40 | 37.39 | 37.13 | 50.29 | 51.73 | 43.87 | 44.73 |
| 4/7/2007 | 46.28 | 58.71 | 72.53 | 45.80 | 40.24 | 33.00 | 52.23 | 28.29 | 28.63 | 37.36 | 37.11 | 50.26 | 51.70 | 43.83 | 44.71 |
| 5/7/2007 | 46.15 | 59.72 | 72.83 | 46.18 | 40.29 | 32.76 | 51.28 | 27.89 | 28.05 | 36.93 | 36.88 | 51.58 | 52.50 | 43.85 | 44.78 |
| 6/1/2007 | 46.33 | 58.78 | 72.58 | 45.85 | 40.28 | 33.09 | 52.28 | 28.37 | 28.40 | 37.42 | 37.14 | 50.29 | 51.79 | 43.88 | 44.75 |
| 7/1/2007 | 46.03 | 59.65 | 72.13 | 44.48 | 40.15 | 32.59 | 50.66 | 27.07 | 28.16 | 36.31 | 36.12 | 50.08 | 51.84 | 43.65 | 44.21 |
| 8/7/2007 | 45.20 | 58.66 | 72.47 | 45.91 | 41.45 | 33.88 | 51.21 | 28.47 | 27.85 | 37.21 | 36.96 | 50.24 | 51.74 | 44.99 | 44.73 |
| 9/7/2007 | 45.43 | 59.17 | 72.72 | 45.03 | 38.59 | 32.69 | --- | 28.07 | 28.26 | 36.51 | 36.32 | 50.13 | 50.84 | 44.15 | 43.69 |
| 10/7/2007 | 44.64 | 57.97 | 71.46 | 45.08 | 41.24 | 33.95 | 50.89 | 29.28 | 29.28 | 36.42 | 36.13 | 49.93 | 51.53 | 45.13 | 44.50 |
| 11/7/2007 | 45.57 | 59.95 | 72.78 | 45.09 | 38.78 | 33.36 | 50.55 | 28.23 | 28.56 | 36.55 | 36.33 | 50.19 | 51.89 | 44.53 | 44.45 |
| 12/7/2007 | 45.45 | 59.83 | 72.68 | 45.06 | 38.64 | 37.79 | 63.27+ | 28.11 | 28.36 | 36.45 | 36.27 | 50.19 | 51.69 | 43.95 | 44.19 |
| 1/8/2008 | 45.83 | 59.57 | 71.43 | 45.88 | 40.89 | 33.19 | 50.83 | 28.47 | 28.96 | 38.51 | 38.82 | 50.18 | 50.69 | --- | 44.87 |
| 2/1/2008 | 45.71 | 59.27 | 72.00 | 47.00 | 41.66 | 33.95 | 51.09 | 29.40 | 29.42 | 38.64 | 38.51 | 50.19 | 51.70 | 45.16 | 45.26 |
| 3/8/2008 | 46.73 | 60.77 | 71.93 | 46.08 | 41.09 | --- | 51.63 | 28.87 | 29.36 | 39.01 | 38.82 | 49.98 | 51.29 | --- | 46.30 |
| 4/8/2008 | 45.83 | 59.47 | 71.83 | 45.78 | 40.89 | 33.19 | 50.53 | 28.77 | 28.96 | 38.71 | 38.22 | 50.18 | 51.79 | 44.65 | 44.91 |
| 5/8/2008 | 46.03 | 59.77 | 72.23 | 45.88 | 40.89 | 33.29 | 50.73 | 28.87 | 29.06 | 38.61 | 38.52 | 50.38 | 51.19 | --- | 45.03 |
| 6/8/2008 | 46.66 | 60.42 | 73.64 | 45.87 | 41.57 | 34.09 | 52.47 | 28.82 | 28.84 | 38.77 | 38.77 | 51.58 | 52.96 | 45.59 | 45.72 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150   FAX 703 471-6676

APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date | A-1 | A-4 | A-11 | A-12 | A-13 | A-14 | A-21 | PP-2A | PP-2B | PP-5A | PP-5B | PP-6A | PP-6B | PP-8 | Mean GWE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | (ft-AMSL) |
| 7/8/2008 | 45.33 | 60.37 | 73.83 | 45.18 | 41.49 | 34.69 | 52.43 | 28.37 | 28.46 | 38.51 | 38.27 | 51.38 | 52.79 | 45.95 | 45.50 |
| 8/8/2008 | 52.02+ | 59.63 | 73.33 | 45.15 | 40.79 | 33.68 | 52.13 | 27.28 | 28.84 | 37.77 | 37.67 | 51.08 | 46.55 | 45.07 | 44.54 |
| 9/8/2008 | 45.63 | 58.99 | 72.74 | 45.17 | 40.80 | 34.26 | 51.69 | 28.08 | 28.36 | 37.92 | 37.78 | 51.40 | 52.10 | 45.08 | 45.00 |
| 10/8/2008 | 45.50 | 58.72 | 72.34 | 44.79 | 41.49 | 34.08 | 51.45 | 28.38 | 28.61 | 38.00 | 37.84 | 50.44 | 51.96 | 45.00 | 44.90 |
| 11/8/2008 | 45.50 | 58.67 | 72.30 | 45.59 | 41.38 | 33.95 | 51.34 | 28.54 | 28.54 | 38.37 | 38.34 | 50.35 | 51.88 | 44.77 | 44.97 |
| 12/8/2008 | 45.60 | 59.07 | 72.33 | 46.07 | 41.58 | 34.08 | 51.21 | 28.66 | 28.69 | 38.71 | 38.61 | 50.27 | 51.88 | 44.91 | 45.12 |
| 1/26/2009 | 45.63 | 59.16 | 72.21 | 46.34 | 41.52 | 33.72 | 51.22 | 28.35 | 28.37 | 38.65 | 38.54 | 50.28 | 51.81 | 44.83 | 45.05 |
| 2/17/2009 | 45.67 | 59.30 | 72.13 | 45.84 | 41.56 | 33.94 | 51.20 | 28.25 | 28.39 | 38.76 | 38.66 | 50.26 | 51.74 | 44.85 | 45.04 |
| 3/27/2009 | 45.64 | 59.42 | 72.15 | 46.20 | 41.58 | 33.98 | 51.11 | 28.71 | 28.72 | 38.82 | 38.73 | 50.19 | 51.71 | 45.07 | 45.15 |
| 4/28/2009 | 45.99 | 60.05 | 74.88 | 46.49 | 41.68 | 33.97 | 51.32 | 28.75 | 28.77 | 38.93 | 38.83 | 50.47 | 51.94 | 45.18 | 45.52 |
| 5/22/2009 | 46.29 | 60.41 | 73.37 | 47.22 | 41.67 | 33.99 | 51.67 | 28.94 | 28.55 | 38.92 | 38.81 | 50.76 | 52.19 | 45.22 | 45.57 |
| 6/25/2009 | 46.18 | 60.33 | 73.48 | 47.07 | 41.62 | 34.13 | 51.87 | 28.66 | 28.46 | 38.75 | 38.66 | 50.92 | 52.36 | 45.14 | 45.55 |
| 7/1/2009 | 45.66 | 59.36 | 73.00 | 45.80 | 40.50 | 33.61 | 51.76 | 28.05 | 27.83 | 37.83 | 37.76 | 50.72 | 52.20 | 44.80 | 44.92 |
| 8/1/2009 | 45.62 | 59.16 | 72.78 | 46.25 | 41.40 | 34.35 | 51.56 | 28.74 | 28.76 | 38.58 | 38.09 | 50.56 | 52.03 | 45.15 | 45.22 |
| 9/24/2009 | 45.65 | 59.27 | 72.89 | 46.47 | 41.47 | 33.71 | 51.52 | 28.33 | 28.08 | 38.28 | 38.18 | 50.48 | 51.96 | 44.99 | 45.09 |
| 10/29/2009 | 46.15 | 60.14 | 73.32 | 48.05 | 41.98 | 35.02 | 51.57 | 29.24 | 30.23 | 39.37 | 38.86 | 50.59 | 52.02 | 45.98 | 45.89 |
| 11/25/2009 | 46.71 | 60.94 | 73.99 | 48.65 | 42.12 | 34.56 | 52.16 | 29.98 | 30.10 | 39.20 | 39.10 | 51.13 | 52.51 | 46.31 | 46.25 |
| 12/30/2009 | 47.17 | 61.34 | 74.50 | 48.36 | 41.93 | 34.02 | 52.67 | 29.24 | 29.26 | 39.01 | 38.90 | 51.77 | 53.11 | 46.36 | 46.26 |
| 1/28/2010 | 46.99 | 61.21 | 74.52 | 48.11 | 41.89 | 34.02 | 52.82 | 29.03 | 29.04 | 39.10 | 38.98 | 51.74 | 53.16 | 46.39 | 46.21 |
| 3/1/2010 | 47.40 | 61.75 | 75.28 | 48.19 | 42.12 | 34.23 | 52.99 | 29.63 | 29.65 | 39.21 | 39.10 | --- | --- | 47.24 | 45.57 |
| 4/8/2010 | 47.58 | 61.68 | 75.63 | 47.83 | 41.86 | 34.00 | 53.35 | 28.69 | 28.71 | 39.09 | 38.98 | 52.29 | 53.69 | 46.55 | 46.42 |
| 5/28/2010 | 46.53 | 60.27 | 74.66 | 46.75 | 41.19 | 33.68 | 52.36 | 28.51 | 28.18 | 38.76 | 38.66 | 51.22 | 52.65 | 45.57 | 45.64 |
| 6/30/2010 | 45.78 | 59.32 | 73.91 | 45.25 | 40.17 | 33.74 | 51.98 | 26.58 | 27.59 | 38.32 | 38.23 | 50.78 | 52.28 | 45.18 | 44.94 |
| 7/28/2010 | 45.57 | 59.09 | 73.72 | 45.06 | 41.01 | 34.94 | 52.11 | 27.85 | 27.88 | 38.48 | 38.38 | 50.65 | 52.13 | 45.27 | 45.15 |
| 8/16/2010 | 45.61 | 59.14 | 73.71 | 45.47 | 41.50 | 34.41 | 52.29 | 28.96 | 28.64 | 38.70 | 38.59 | 50.66 | 52.16 | 45.57 | 45.39 |
| 9/23/2010 | 45.08 | 58.60 | 72.95 | 44.74 | 40.40 | 33.23 | 51.90 | 27.79 | 27.59 | 37.81 | 37.78 | 50.45 | 51.97 | 45.14 | 44.67 |
| 10/21/2010 | 45.74 | 59.26 | 73.53 | 47.90 | 41.69 | 33.67 | 51.99 | 28.77 | 28.39 | 38.72 | 38.72 | 50.62 | 52.08 | 45.60 | 45.48 |
| 11/22/2010 | 45.77 | 59.22 | 73.19 | 47.55 | 41.60 | 33.64 | 51.82 | 28.54 | 28.47 | 39.24 | 38.74 | 51.31 | 51.24 | 45.32 | 45.40 |
| 12/16/2010 | 45.83 | 59.38 | 73.10 | 47.68 | 41.74 | 33.69 | 51.64 | 29.08 | 29.01 | 38.89 | 38.78 | 50.46 | 51.94 | 45.40 | 45.47 |
| 1/6/2011 | 45.78 | 59.33 | 72.85 | 46.51 | 41.66 | 33.61 | 51.55 | 28.21 | 28.37 | 38.88 | 38.77 | 50.41 | 51.91 | 45.24 | 45.22 |
| 2/7/2011 | 45.91 | 59.77 | 73.01 | 47.84 | 41.85 | 33.82 | 51.45 | 28.96 | 29.17 | 39.02 | 38.91 | 50.42 | 51.89 | 45.77 | 45.56 |
| 3/3/2011 | 45.78 | 59.68 | 72.81 | 47.64 | 41.69 | 33.68 | 51.39 | 28.73 | 28.75 | 38.90 | 38.77 | 50.38 | 51.87 | 45.50 | 45.40 |
| 4/7/2011 | 46.23 | 60.39 | 73.73 | 47.58 | 41.79 | 33.78 | 51.85 | 28.59 | 28.61 | 39.01 | 38.90 | 50.79 | 52.21 | 45.74 | 45.66 |
| 5/3/2011 | 46.29 | 60.44 | 73.99 | 47.60 | 41.69 | 33.81 | 52.11 | 28.50 | 28.56 | 39.06 | 38.99 | 50.96 | 52.38 | 45.75 | 45.72 |
| 6/24/2011 | 45.48 | 59.09 | 73.15 | 44.97 | 40.58 | 33.03 | 51.76 | 27.61 | 27.62 | 38.56 | 38.46 | 50.55 | 52.08 | 45.14 | 44.86 |
| 7/25/2011 | 45.00 | 58.61 | 72.78 | 44.57 | 40.22 | 30.77 | 51.74 | 27.67 | 27.68 | 38.34 | 38.25 | 50.38 | 51.90 | 45.00 | 44.49 |
| 8/15/2011 | 44.93 | 58.38 | 72.49 | 44.61 | 41.29 | 31.06 | 51.57 | 28.10 | 28.29 | 38.69 | 38.57 | 50.28 | 51.80 | 45.63 | 44.69 |
| 9/26/2011 | 46.64 | 60.31 | 74.21 | 48.03 | 42.09 | 35.78 | 52.40 | 29.53 | 29.23 | 39.09 | 39.03 | 51.14 | 52.52 | 46.47 | 46.18 |
| 10/27/2011 | 46.38 | 60.10 | 74.02 | 48.12 | 41.84 | 35.56 | 52.28 | 28.43 | 28.46 | 39.02 | 38.93 | 51.13 | 52.55 | 45.75 | 45.90 |
| 11/18/2011 | 46.24 | 60.05 | 73.75 | 48.01 | 41.80 | 35.63 | 51.99 | 29.22 | 28.73 | 37.77 | 37.51 | 50.92 | 52.38 | 45.75 | 45.70 |
| 12/20/2011 | 46.74 | 60.77 | 74.34 | 48.27 | 41.88 | 35.59 | 52.35 | 28.57 | 28.57 | 37.37 | 37.07 | 51.29 | 52.67 | 45.70 | 45.80 |
| 1/16/2012 | 56.61+ | 60.62 | 74.26 | 48.24 | 41.90 | 35.67 | 52.32 | 27.72 | 28.73 | 37.61 | 37.34 | 52.27 | 52.74 | 45.70 | 45.78 |
| 2/13/2012 | 46.56 | 60.64 | 74.23 | 48.15 | 41.89 | 35.63 | 52.15 | 28.32 | 28.33 | 37.71 | 37.46 | 51.14 | 52.56 | 45.61 | 45.74 |
| 3/5/2012 | 46.65 | 60.82 | 74.24 | 48.31 | 41.95 | 35.74 | 52.02 | 29.06 | 29.09 | 38.57 | 38.42 | 51.09 | 52.46 | 45.85 | 46.02 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date Monitored | A-1 | A-4 | A-11 | A-12 | A-13 | A-14 | A-21 | PP-2A | PP-2B | PP-5A | PP-5B | PP-6A | PP-6B | PP-8 | Mean GWE (ft-AMSL) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | |
| 4/18/2012 | 46.14 | 59.77 | 73.71 | 47.22 | 41.21 | 34.91 | 51.90 | 27.95 | 27.95 | 38.24 | 38.11 | 50.86 | 52.33 | 45.07 | 45.38 |
| 5/7/2012 | 46.03 | 59.61 | 73.51 | 46.54 | 41.55 | 35.43 | 51.74 | 28.06 | 28.07 | 38.39 | 38.25 | 50.71 | 52.17 | 45.16 | 45.37 |
| 6/11/2012 | 45.59 | 59.00 | 73.11 | 45.28 | 41.27 | 35.46 | 51.62 | 27.85 | 27.88 | 38.02 | 37.91 | 50.52 | 52.02 | 45.07 | 45.04 |
| 7/27/2012 | 45.07 | 58.47 | 72.55 | 44.67 | 41.35 | 35.47 | 51.38 | 27.81 | 27.82 | 38.02 | 37.90 | 50.24 | 51.75 | 46.18 | 44.91 |
| 8/13/2012 | 44.87 | 58.21 | 72.30 | 44.62 | 41.37 | 35.49 | 52.40 | 27.68 | 27.71 | 38.07 | 37.95 | 50.21 | 51.49 | 45.95 | 44.88 |
| 9/21/2012 | 44.72 | 57.92 | 71.94 | 44.74 | 41.48 | 35.53 | 51.33 | 28.07 | 28.10 | 38.18 | 38.05 | 50.11 | 51.66 | 45.30 | 44.80 |
| 10/4/2012 | 44.55 | 57.76 | 71.77 | 44.79 | 41.29 | 35.30 | 51.25 | 27.71 | 27.75 | 38.01 | 37.90 | 50.07 | 51.64 | 44.96 | 44.63 |
| 11/15/2012 | 45.16 | 58.09 | 71.78 | 45.07 | 41.73 | 35.66 | 51.17 | 28.32 | 28.34 | 38.29 | 38.13 | 50.10 | 51.62 | 44.95 | 44.89 |
| 12/12/2012 | 45.11 | 57.92 | 71.29 | 44.71 | 41.62 | 35.21 | 51.03 | 28.33 | 28.39 | 38.29 | 38.16 | 50.00 | 51.57 | 45.03 | 44.76 |
| 1/29/2013 | 45.51 | 58.54 | 71.74 | 45.34 | 41.86 | 35.61 | 51.15 | 28.25 | 28.32 | 38.41 | 38.26 | 50.16 | 51.68 | 45.20 | 45.00 |
| 2/11/2013 | 45.67 | 58.85 | 71.99 | 46.35 | 42.02 | 35.71 | 51.30 | 28.57 | 28.62 | 38.59 | 38.44 | 50.29 | 51.78 | 45.27 | 45.25 |
| 3/21/2013 | 46.02 | 59.52 | 75.43 | 45.94 | 41.87 | 35.62 | 51.42 | 28.29 | 28.37 | 38.48 | 38.33 | 50.44 | 51.92 | 45.19 | 45.49 |
| 4/8/2013 | 45.95 | 59.53 | 72.45 | 45.44 | 41.85 | 35.58 | 51.47 | 28.16 | 28.23 | 38.49 | 38.36 | 50.52 | 51.99 | 45.23 | 45.23 |
| 5/14/2013 | 45.95 | 59.63 | 72.67 | 45.05 | 41.86 | 35.72 | 51.50 | 28.41 | 28.47 | 38.50 | 38.35 | 50.56 | 52.03 | 45.13 | 45.27 |
| 6/14/2013 | 46.06 | 59.98 | 73.07 | 47.23 | 41.93 | 35.78 | 51.47 | 29.18 | 29.24 | 38.48 | 38.34 | 50.59 | 52.03 | 45.38 | 45.63 |
| 7/9/2013 | 45.98 | 59.78 | 73.09 | 46.42 | 41.76 | 35.68 | 51.72 | 28.06 | 28.14 | 38.31 | 38.20 | 50.72 | 52.17 | 45.30 | 45.38 |
| 7/29/2013 | 45.91 | 59.51 | 73.09 | 46.46 | 41.39 | 35.48 | 51.85 | 27.71 | 27.77 | 37.99 | 37.89 | 50.80 | 52.22 | 45.12 | 45.23 |
| 8/15/2013 | 45.67 | 58.05 | 72.71 | 44.62 | 41.53 | 35.56 | 51.80 | 27.86 | 27.94 | 38.11 | 37.98 | 50.69 | 52.18 | 45.10 | 44.99 |
| 9/11/2013 | 45.21 | 58.48 | 72.28 | 44.26 | 40.87 | 32.40 | 51.60 | 27.32 | 27.37 | 37.64 | 37.55 | 50.47 | 51.99 | 44.96 | 44.46 |
| 10/25/2013 | 45.52 | 58.72 | 72.43 | 45.51 | 41.72 | 35.57 | 51.58 | 28.05 | 28.12 | 38.22 | 38.08 | 50.47 | 51.94 | 45.09 | 45.07 |
| 11/7/2013 | 45.63 | 58.70 | 72.34 | 45.47 | 41.54 | 35.28 | 51.53 | 28.09 | 28.16 | 38.27 | 38.14 | 50.46 | 51.91 | 45.00 | 45.04 |
| 12/13/2013 | 45.91 | 59.27 | 72.54 | 47.65 | 42.11 | 35.78 | 51.52 | 28.92 | 28.99 | 38.54 | 38.39 | 50.53 | 51.99 | 45.48 | 45.54 |
| 1/17/2014 | 46.37 | 60.34 | 73.21 | 48.26 | 42.10 | 35.71 | 51.90 | 28.87 | 28.93 | 38.66 | 38.51 | 50.93 | 52.33 | 45.91 | 45.86 |
| 2/11/2014 | 46.41 | 60.38 | 73.22 | 47.80 | 42.01 | 35.62 | 52.04 | 28.63 | 28.71 | 38.56 | 38.42 | 51.09 | 52.49 | 45.80 | 45.80 |
| 3/24/2014 | 44.18 | 58.28 | 73.80 | 45.31 | 39.50 | 33.14 | 52.39 | 26.01 | 26.09 | 36.10 | 35.98 | 51.46 | 52.85 | 45.90 | 44.36 |
| 4/25/2014 | 47.04 | 61.01 | 74.30 | 47.89 | 41.99 | 35.67 | 52.81 | 28.47 | 28.54 | 38.62 | 38.48 | 51.86 | 53.27 | 45.77 | 46.12 |
| 5/15/2014 | 47.24 | 60.99 | 74.50 | 47.83 | 41.54 | 35.64 | 53.01 | 28.35 | 28.40 | 38.59 | 38.45 | 52.05 | 53.48 | 45.85 | 46.14 |
| 6/24/2014 | 46.53 | 60.09 | 74.21 | 47.12 | 41.39 | 35.49 | 52.51 | 28.06 | 28.11 | 38.25 | 38.13 | 51.39 | 52.83 | 45.45 | 45.68 |
| 7/9/2014 | 46.13 | 59.55 | 73.81 | 46.29 | 41.18 | 35.15 | 52.26 | 28.01 | 28.07 | 37.96 | 37.85 | 51.13 | 52.60 | 45.46 | 45.39 |
| 8/13/2014 | 46.20 | 59.37 | 73.60 | 47.52 | 42.03 | 36.13 | 52.05 | 29.87 | 29.95 | 38.40 | 38.26 | 50.93 | 52.35 | 45.88 | 45.90 |
| 9/22/2014 | 45.56 | 58.78 | 72.87 | 44.94 | 41.14 | 35.16 | 51.63 | 27.63 | 27.67 | 37.80 | 37.69 | 50.55 | 52.02 | 44.94 | 44.88 |
| 10/27/2014 | 45.53 | 58.60 | 72.63 | 45.03 | 41.61 | 35.59 | 51.57 | 28.08 | 28.14 | 38.17 | 38.02 | 50.46 | 51.97 | 44.97 | 45.03 |
| 11/14/2014 | 45.50 | 58.46 | 72.36 | 44.88 | 41.51 | 35.41 | 51.37 | 27.98 | 28.04 | 38.17 | 38.02 | 50.36 | 51.82 | 44.88 | 44.91 |
| 12/17/2014 | 45.80 | 59.05 | 72.74 | 47.54 | 42.06 | 35.68 | 51.34 | 28.70 | 28.76 | 38.47 | 38.34 | 50.38 | 51.86 | 45.25 | 45.43 |
| 1/15/2015 | 45.98 | 59.53 | 72.85 | 47.99 | 42.15 | 35.72 | 51.52 | 28.78 | 28.85 | 38.59 | 38.45 | 50.54 | 52.00 | 45.50 | 45.60 |
| 2/5/2015 | 46.11 | 60.00 | 72.97 | 47.99 | 42.08 | 35.62 | 51.46 | 28.48 | 28.55 | 38.50 | 38.37 | 50.59 | 51.98 | 45.53 | 45.59 |
| 3/16/2015 | 46.46 | 60.65 | 73.58 | 48.66 | 42.25 | 35.78 | 51.97 | 29.19 | 29.26 | 38.82 | 38.69 | 51.02 | 52.41 | 46.12 | 46.06 |
| 4/28/2015 | 46.62 | 60.66 | 73.75 | 47.72 | 42.04 | 35.72 | 52.16 | 28.47 | 28.51 | 38.66 | 38.52 | 51.25 | 52.63 | 45.61 | 45.88 |
| 5/29/2015 | 46.13 | 59.68 | 73.25 | 45.93 | 41.51 | 35.57 | 52.00 | 27.95 | 28.01 | 38.41 | 38.27 | 50.98 | 52.41 | 45.22 | 45.38 |
| 6/22/2015 | 46.28 | 59.91 | 73.50 | 47.77 | 42.03 | 35.83 | 51.93 | 29.52 | 29.59 | 38.74 | 38.59 | 50.95 | 52.35 | 45.53 | 45.89 |
| 7/30/2015 | 46.05 | 59.51 | 73.30 | 47.24 | 41.17 | 35.14 | 52.16 | 27.81 | 27.87 | 38.07 | 37.94 | 51.04 | 52.48 | 51.19 | 45.78 |
| 8/17/2015 | 45.64 | 58.92 | 72.85 | 45.22 | 40.90 | 34.91 | 51.92 | 27.55 | 27.61 | 37.74 | 37.60 | 50.79 | 52.26 | 45.05 | 44.93 |
| 9/16/2015 | 45.12 | 58.26 | 72.29 | 44.86 | 40.61 | 34.37 | 51.65 | 27.37 | 27.41 | 37.30 | 37.18 | 50.48 | 51.99 | 44.89 | 44.56 |
| 10/8/2015 | 45.55 | 57.76 | 72.79 | 47.56 | 41.95 | 35.69 | 51.51 | 28.51 | 28.58 | 38.47 | 38.31 | 51.44 | 51.92 | 45.41 | 45.39 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150   FAX 703 471-6676

APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date Monitored | A-1 | A-4 | A-11 | A-12 | A-13 | A-14 | A-21 | PP-2A | PP-2B | PP-5A | PP-5B | PP-6A | PP-6B | PP-8 | Mean GWE (ft-AMSL) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | |
| 11/9/2015 | 45.55 | 58.55 | 72.23 | 46.50 | 41.78 | 35.59 | 51.45 | 28.85 | 28.90 | 38.62 | 38.45 | 50.37 | 51.88 | 45.22 | 45.28 |
| 12/3/2015 | 45.81 | 58.99 | 72.42 | 48.09 | 42.24 | 35.69 | 51.31 | 29.35 | 29.41 | 38.54 | 38.58 | 50.37 | 51.83 | 45.65 | 45.59 |
| 1/6/2016 | 45.83 | 59.36 | 72.64 | 47.95 | 41.91 | 35.65 | 51.66 | 28.66 | 28.73 | 38.65 | 38.53 | 50.55 | 52.02 | 45.51 | 45.55 |
| 2/8/2016 | 46.42 | 60.51 | 73.48 | 49.39 | 42.27 | 35.75 | 52.01 | 28.96 | 29.05 | 38.97 | 38.83 | 50.65 | 52.34 | 46.46 | 46.08 |
| 3/18/2016 | 46.36 | 60.33 | 73.36 | 47.66 | 41.56 | 35.59 | 52.28 | 28.52 | 28.57 | 38.67 | 38.53 | 51.22 | 52.64 | 45.88 | 45.80 |
| 4/25/2016 | 44.05 | 59.64 | 72.99 | 45.14 | 41.21 | 34.99 | 52.06 | 28.32 | 28.39 | 38.46 | 38.31 | 50.99 | 52.42 | 45.38 | 45.17 |
| 5/31/2016 | 46.17 | 60.06 | 73.48 | 47.89 | 41.92 | 35.72 | 51.90 | 29.09 | 29.17 | 38.67 | 38.53 | 50.93 | 52.32 | 45.80 | 45.83 |
| 6/13/2016 | 45.84 | 59.52 | 73.17 | 46.56 | 41.14 | 35.33 | 51.88 | 28.18 | 28.23 | 38.16 | 38.03 | 50.82 | 52.28 | 45.34 | 45.32 |
| 7/7/2016 | 45.79 | 59.22 | 73.01 | 46.39 | 41.45 | 35.47 | 51.77 | 28.33 | 28.39 | 38.49 | 38.34 | 50.70 | 52.16 | 45.40 | 45.35 |
| 8/8/2016 | 45.48 | 58.76 | 72.62 | 45.80 | 41.38 | 35.52 | 51.55 | 28.05 | 27.01 | 38.21 | 38.08 | 50.48 | 51.95 | 45.21 | 45.01 |
| 9/9/2016 | 44.95 | 59.21 | 72.10 | 44.56 | 40.75 | 34.57 | 51.37 | 27.63 | 27.69 | 37.64 | 37.52 | 50.28 | 51.80 | 44.72 | 44.63 |
| 10/28/2016 | 57.31+ | 58.35 | 82.02+ | 45.14 | 41.80 | 35.28 | 51.32 | 27.98 | 28.04 | 38.27 | 38.14 | 50.28 | 51.78 | 45.48 | 42.66 |
| 11/22/2016 | 45.18 | 58.00 | 71.50 | 44.61 | 41.01 | 34.55 | 51.15 | 27.86 | 27.93 | 38.26 | 37.81 | 50.12 | 51.67 | 45.14 | 44.63 |
| 12/6/2016 | 45.32 | 58.09 | 71.43 | 44.72 | 41.43 | 34.33 | 51.23 | 28.07 | 28.16 | 37.90 | 37.76 | 50.10 | 51.63 | 45.16 | 44.67 |
| 1/5/2017 | 45.42 | 58.27 | 71.41 | 46.17 | 42.09 | 35.56 | 51.08 | 28.85 | 28.92 | 38.58 | 38.43 | 51.12 | 51.62 | 45.52 | 45.22 |
| 2/20/2017 | 44.97 | 58.32 | 71.26 | 44.98 | 41.62 | 35.17 | 50.67 | 27.98 | 27.74 | 37.92 | 37.79 | 49.70 | 51.21 | 44.73 | 44.58 |
| 3/17/2017 | 45.45 | 58.36 | 71.09 | 45.41 | 41.97 | 35.52 | 50.97 | 28.69 | 29.47 | 38.48 | 38.34 | 50.04 | 51.57 | 45.28 | 45.05 |
| 4/13/2017 | 45.73 | 59.00 | 71.62 | 45.37 | 41.87 | 35.59 | 52.18 | 28.30 | 28.37 | 38.64 | 38.21 | 50.26 | 51.74 | 45.38 | 45.16 |
| 5/4/2017 | 45.70 | 58.95 | 71.73 | 45.06 | 41.63 | 35.48 | 51.29 | 28.04 | 28.10 | 38.37 | 38.26 | 50.32 | 51.83 | 45.26 | 45.00 |
| 6/15/2017 | 44.47 | 57.64 | 71.92 | 44.92 | 41.03 | 38.63 | 51.36 | 26.47 | 26.56 | 36.81 | 36.67 | 49.83 | 49.87 | 48.08 | 44.59 |
| 7/24/2017 | 43.98 | 56.87 | 81.26+ | 44.75 | 41.46 | 37.59 | 51.05 | 28.96 | 29.05 | 37.10 | 36.95 | 49.52 | 49.60 | 48.38 | 42.71 |
| 8/31/2017 | 43.86 | 56.82 | 71.27 | 44.68 | 41.16 | 38.35 | 51.27 | 26.49 | 26.60 | 36.83 | 36.69 | 49.30 | 49.76 | 48.41 | 44.39 |
| 9/22/2017 | 44.16 | 57.08 | 71.54 | 44.90 | 41.20 | 38.48 | 51.24 | 26.61 | 26.37 | 36.97 | 36.83 | 50.49 | 48.92 | 48.12 | 44.49 |
| 10/23/2017 | 43.93 | 56.67 | 71.07 | 44.54 | 40.92 | 37.66 | 51.06 | 26.50 | 26.55 | 36.93 | 36.77 | 49.52 | 49.60 | 47.94 | 44.26 |
| 11/30/2017 | 44.08 | 56.71 | 70.90 | 44.61 | 41.32 | 37.97 | 50.96 | 26.74 | 26.78 | 37.15 | 36.97 | 49.46 | 49.54 | 47.91 | 44.36 |
| 1/29/2018 | 44.01 | 56.55 | 70.38 | 44.74 | 41.54 | 37.31 | 50.83 | 26.79 | 26.85 | 37.33 | 37.16 | 49.37 | 49.46 | 48.22 | 44.32 |
| 2/12/2018 | 44.41 | 56.97 | 70.57 | 47.40 | 42.52 | 39.44 | 50.74 | 29.12 | 29.19 | 37.66 | 37.50 | 49.39 | 49.41 | 48.98 | 45.24 |
| 3/15/2018 | 44.65 | 57.71 | 71.52 | 45.98 | 41.95 | 39.04 | 51.20 | 26.89 | 26.95 | 37.38 | 37.22 | 49.72 | 49.75 | 48.56 | 44.89 |
| 4/6/2018 | 44.78 | 57.94 | 81.66+ | 45.84 | 41.91 | 39.02 | 51.34 | 26.89 | 26.95 | 37.40 | 36.94 | 49.86 | 49.87 | 48.66 | 42.88 |
| 5/31/2018 | 45.31 | 58.66 | 72.42 | 47.44 | 41.97 | 39.17 | 51.73 | 26.97 | 27.04 | 37.43 | 37.27 | 50.25 | 50.19 | 48.81 | 45.33 |
| 6/13/2018 | 45.61 | 59.14 | 72.90 | 47.73 | 42.12 | 39.35 | 52.05 | 27.45 | 27.52 | 37.60 | 37.44 | 50.53 | 50.44 | 49.16 | 45.65 |
| 7/6/2018 | 45.00 | 58.03 | 72.38 | 45.17 | 41.00 | 38.45 | 52.15 | 26.46 | 26.53 | 36.94 | 36.81 | 50.52 | 50.51 | 48.87 | 44.92 |
| 8/23/2018 | 45.47 | 58.70 | 73.07 | 47.35 | 41.80 | 38.97 | 52.48 | 27.63 | 27.70 | 37.38 | 37.23 | 50.85 | 50.74 | 49.65 | 45.64 |
| 9/11/2018 | 45.34 | 58.49 | 73.08 | 47.55 | 42.07 | 39.12 | 52.43 | 27.49 | 27.58 | 37.47 | 37.33 | 50.76 | 50.71 | 49.54 | 45.64 |
| 10/16/2018 | 45.54 | 59.22 | 73.58 | 48.40 | 42.14 | 39.30 | 52.72 | 27.34 | 27.41 | 37.58 | 37.33 | 50.98 | 50.94 | 49.58 | 45.86 |
| 11/14/2018 | 45.86 | 59.72 | 73.94 | 48.85 | 42.42 | 39.39 | 52.86 | 28.56 | 28.62 | 37.66 | 37.49 | 51.11 | 50.99 | 49.89 | 46.24 |
| 12/5/2018 | 46.06 | 59.94 | 74.13 | 48.53 | 42.16 | 39.24 | 53.16 | 27.36 | 27.43 | 37.58 | 37.42 | 51.50 | 51.49 | 49.99 | 46.14 |
| 1/17/2019 | 46.28 | 60.14 | 74.49 | 48.47 | 42.13 | 39.16 | 53.30 | 27.37 | 27.42 | 37.64 | 37.48 | 51.62 | 51.56 | 50.06 | 46.22 |
| 2/4/2019 | 46.50 | 60.31 | 74.81 | 48.63 | 42.24 | 39.24 | 53.59 | 27.42 | 27.55 | 37.74 | 37.52 | 51.85 | 51.72 | 50.13 | 46.38 |
| 3/4/2019 | 46.84 | 60.72 | 75.34 | 49.07 | 42.59 | 39.39 | 53.59 | 29.75 | 29.81 | 38.02 | 37.79 | 51.94 | 51.85 | 50.49 | 46.94 |
| 4/18/2019 | 46.38 | 60.18 | 75.27 | 48.48 | 42.25 | 39.29 | 51.33 | 27.07 | 27.20 | 37.62 | 37.44 | 51.54 | 51.48 | 49.62 | 46.08 |
| 5/13/2019 | 46.25 | 60.19 | 75.31 | 48.82 | 42.65 | 44.82+ | 52.89 | 29.56 | 29.63 | 37.90 | 37.73 | 51.22 | 51.12 | 50.24 | 47.19 |
| 6/4/2019 | 43.28 | 57.36 | 74.56 | 47.95 | 39.84 | 39.12 | 52.32 | 24.41 | 24.44 | 35.13 | 34.71 | 48.49 | 50.91 | 49.04 | 44.40 |
| 7/9/2019 | 45.54 | 58.98 | 74.77 | 48.03 | 41.69 | 38.91 | 52.54 | 26.78 | 28.57 | 37.01 | 37.28 | 50.68 | 50.64 | 49.21 | 45.76 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date Monitored | A-1 | A-4 | A-11 | A-12 | A-13 | A-14 | A-21 | PP-2A | PP-2B | PP-5A | PP-5B | PP-6A | PP-6B | PP-8 | Mean GWE (ft-AMSL) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | |
| 8/26/2019 | 44.79 | 57.87 | 73.76 | 47.14 | 41.10 | 38.10 | 52.20 | 26.91 | 26.97 | 37.15 | 36.85 | 50.36 | 50.42 | 48.44 | 45.15 |
| 9/16/2019 | 44.40 | 57.52 | 73.42 | 45.21 | 40.64 | 37.34 | 52.02 | 26.42 | 26.53 | 36.43 | 36.25 | 50.23 | 50.26 | 48.24 | 44.64 |
| 10/10/2019 | 43.52 | 56.56 | 70.36 | 43.74 | 39.88 | 36.42 | 51.23 | 25.78 | 25.85 | 35.53 | 35.38 | 49.45 | 49.52 | 47.50 | 43.62 |
| 11/14/2019 | 44.47 | 57.39 | 72.91 | 47.21 | 41.53 | 38.89 | 51.58 | 26.90 | 26.96 | 37.16 | 37.01 | 49.88 | 49.90 | 48.37 | 45.01 |
| 12/5/2019 | 44.61 | 57.57 | 72.73 | 47.68 | 41.84 | 39.05 | 51.32 | 27.12 | 27.20 | 37.39 | 37.16 | 49.82 | 49.84 | 48.53 | 45.13 |
| 1/21/2020 | 44.84 | 58.10 | 73.04 | 47.99 | 41.90 | 39.09 | 51.70 | 27.11 | 27.17 | 37.45 | 37.30 | 50.02 | 50.01 | 48.83 | 45.33 |
| 2/18/2020 | 45.26 | 58.95 | 73.57 | 48.43 | 42.09 | 39.19 | 51.94 | 27.45 | 27.53 | 37.66 | 37.49 | 50.32 | 50.25 | 49.36 | 45.68 |
| 3/16/2020 | 45.03 | 58.63 | 73.11 | 46.92 | 41.57 | 38.90 | 51.88 | 26.97 | 27.06 | 37.45 | 37.24 | 50.28 | 50.24 | 48.82 | 45.29 |
| 4/2/2020 | --- | --- | 73.56 | 48.02 | 41.91 | 39.18 | --- | --- | --- | --- | --- | --- | --- | --- | 50.67* |
| 5/5/2020 | --- | --- | 73.92 | 48.65 | 42.24 | 39.33 | --- | --- | --- | --- | --- | --- | --- | --- | 51.04* |
| 6/11/2020 | 45.22 | 58.76 | 73.53 | 46.83 | 41.19 | 38.24 | 52.11 | 26.96 | 27.03 | 37.20 | 37.12 | 50.46 | 50.40 | 48.62 | 45.26 |
| 7/9/2020 | 45.16 | 58.54 | 73.47 | 47.46 | 41.76 | 39.20 | 51.97 | 27.72 | 27.80 | 37.45 | 37.29 | 50.30 | 50.24 | 49.40 | 45.55 |
| 8/14/2020 | 45.30 | 58.84 | 73.88 | 48.46 | 42.18 | 39.38 | 52.16 | 29.02 | 29.08 | 37.71 | 37.55 | 50.39 | 50.31 | 50.02 | 46.02 |
| 9/11/2020 | 45.49 | 59.15 | 74.15 | 48.24 | 41.99 | 39.31 | 52.57 | 29.87 | 29.96 | 37.61 | 37.45 | 50.76 | 50.37 | 50.04 | 46.21 |
| 10/29/2020 | 45.51 | 59.26 | 74.41 | 48.85 | 42.83 | 39.65 | 52.72 | 28.98 | 28.92 | 37.84 | 37.67 | 50.84 | 50.77 | 50.61 | 46.35 |
| 11/24/2020 | 45.84 | 59.75 | 74.41 | 48.40 | 41.89 | 39.22 | 52.75 | 27.24 | 27.31 | 37.53 | 37.37 | 51.04 | 50.92 | 50.02 | 45.98 |
| 12/14/2020 | 46.12 | 60.00 | 74.62 | 48.45 | 41.99 | 39.25 | 53.08 | 27.48 | 27.55 | 37.73 | 37.57 | 51.32 | 51.20 | 50.47 | 46.20 |
| Maximum | 48.10 | 61.75 | 75.63 | 49.39 | 42.83 | 39.65 | 53.59 | 31.27 | 31.44 | 39.37 | 39.10 | 52.29 | 53.69 | 51.19 | 47.19 |
| Minimum | 43.28 | 56.55 | 67.62 | 43.33 | 38.43 | 30.77 | 49.03 | 24.41 | 24.44 | 35.13 | 34.71 | 48.49 | 46.55 | 43.65 | 42.66 |

Notes: 1. GWE, '---', and ft-AMSL means groundwater elevation, data not recorded, and feet above mean sea level, respectively.
2. GWE data with '+' sign is identified high outlier and mean GWE data with '*' means the number of wells are less than 5.

Depressed groundwater conditions.
Elevated groundwater conditions.

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676



CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

**B. OTHER GWM WELLS**

| Date | A-2 | A-3 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-15 | A-16 | A-17 | A-18 | A-19 | A-20 | A-22 | A-22D | A-23 | B-1 | B-2 | B-2R | B-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | | |
| 1/5/2005 | 31.96 | 25.99 | 61.02 | 61.02 | 61.02 | 61.02 | 61.02 | 52.64 | 37.03 | 34.70 | 31.10 | 26.46 | 29.23 | 28.95 | --- | --- | --- | 37.13 | 45.33 | --- | 41.83 |
| 2/11/2005 | 32.09 | 25.16 | 61.27 | 61.27 | 61.27 | 61.27 | 61.27 | 49.67 | 37.17 | 35.29 | 30.60 | 28.60 | 29.21 | 28.50 | --- | --- | --- | 37.30 | 45.15 | --- | 41.91 |
| 3/24/2005 | 33.08 | 26.93 | 61.39 | 61.39 | 61.39 | 61.39 | 61.39 | 53.42 | 38.40 | 36.79 | 33.26 | 30.85 | 31.49 | 31.65 | --- | --- | --- | 38.52 | 45.71 | --- | 43.01 |
| 4/21/2005 | 26.35 | 25.00 | 61.33 | 61.33 | 61.33 | 61.33 | 61.33 | 52.55 | --- | 34.34 | 30.90 | 28.38 | 28.87 | 28.78 | --- | --- | --- | 37.54 | 44.98 | --- | 41.88 |
| 5/24/2005 | 32.65 | 25.55 | 61.45 | 61.45 | 61.45 | 61.45 | 61.45 | 51.95 | 37.18 | 34.66 | 31.15 | 29.40 | 29.47 | 29.52 | --- | --- | --- | 37.84 | 45.43 | --- | 42.30 |
| 6/8/2005 | 32.18 | 25.84 | 61.02 | 61.02 | 61.02 | 61.02 | 61.02 | 52.82 | 37.02 | 36.00 | 31.20 | 29.46 | 29.62 | 29.93 | --- | --- | --- | 36.96 | 45.19 | --- | 41.75 |
| 7/1/2005 | 31.38 | 24.53 | 60.22 | 60.22 | 60.22 | 60.22 | 60.22 | 50.81 | 35.87 | 33.64 | 30.10 | 27.90 | 28.20 | 27.55 | --- | --- | --- | 35.89 | 44.03 | --- | 40.93 |
| 8/15/2005 | 31.41 | 24.56 | 59.57 | 59.57 | 59.57 | 59.57 | 59.57 | 51.86 | 36.51 | 34.04 | 30.94 | 28.46 | 28.60 | 29.40 | 27.89 | --- | 31.64 | 35.94 | 43.86 | --- | 40.73 |
| 9/7/2005 | 30.88 | 17.71 | 59.01 | 59.01 | 59.01 | 59.01 | 59.01 | 50.40 | 36.17 | 33.49 | 29.92 | 27.98 | 27.97 | 29.10 | 27.20 | --- | --- | 29.89 | 42.32 | --- | 42.39 |
| 11/18/2005 | 31.63 | 25.28 | 59.01 | 59.01 | 59.01 | 59.01 | 59.01 | 52.48 | 37.12 | 34.59 | 31.53 | 29.25 | 29.22 | 29.18 | 27.63 | --- | --- | 30.79 | 44.00 | --- | 41.54 |
| 12/27/2005 | 31.53 | 25.46 | 59.96 | 59.96 | 59.96 | 59.96 | 59.96 | 53.02 | 38.32 | 36.25 | 30.50 | 29.15 | 29.87 | 29.70 | 28.20 | --- | --- | 26.49 | 44.96 | --- | 42.19 |
| 2/6/2006 | 32.79 | 26.01 | 59.72 | 59.72 | 59.72 | 59.72 | 59.72 | 53.78 | 38.08 | 37.14 | 32.16 | 30.16 | 30.56 | 31.27 | 28.84 | --- | 33.11 | 38.29 | 44.28 | --- | 42.93 |
| 3/24/2006 | 31.78 | 24.60 | 59.94 | 59.94 | 59.94 | 59.94 | 59.94 | 51.67 | 36.09 | 34.07 | 30.87 | 28.17 | 28.49 | 28.31 | 24.91 | --- | 29.41 | 36.69 | 42.89 | --- | 41.22 |
| 4/6/2006 | 31.61 | 24.91 | 59.72 | 59.72 | 59.72 | 59.72 | 59.72 | 51.77 | 30.70 | 33.93 | 30.80 | 28.33 | 28.72 | 28.65 | 24.93 | --- | 29.27 | 36.55 | 43.56 | --- | 41.15 |
| 5/4/2006 | 29.83 | 24.51 | 59.92 | 59.92 | 59.92 | 59.92 | 59.92 | 51.57 | 30.22 | 33.79 | 30.75 | 28.05 | 28.32 | 28.05 | 24.03 | --- | 28.12 | 36.06 | 40.72 | --- | 45.72+ |
| 6/12/2006 | 31.79 | 25.21 | 59.95 | 59.95 | 59.95 | 59.95 | 59.95 | 51.15 | 35.96 | 34.19 | 30.66 | 30.32 | 29.00 | 29.03 | 24.81 | --- | 29.22 | 36.41 | 41.99 | --- | 41.08 |
| 7/25/2006 | 31.53 | 24.81 | 59.17 | 59.17 | 59.17 | 59.17 | 59.17 | 51.16 | 35.82 | 33.59 | 30.60 | 30.25 | 28.82 | 28.70 | 24.93 | --- | 29.12 | 36.24 | 41.91 | --- | 40.95 |
| 8/28/2006 | 30.71 | 23.79 | 58.63 | 58.63 | 58.63 | 58.63 | 58.63 | 50.59 | 35.76 | 33.42 | 29.96 | 27.95 | 27.97 | 29.07 | 27.19 | --- | 31.47 | 35.68 | 41.10 | --- | 40.11 |
| 9/11/2006 | 31.58 | 23.51 | 56.97 | 56.97 | 56.97 | 56.97 | 56.97 | 41.97 | 35.60 | 33.89 | 30.59 | 29.86 | 28.62 | 28.75 | 25.22 | --- | 30.12 | 36.95 | 43.68 | --- | 41.35 |
| 10/31/2006 | 32.08 | 24.11 | 59.12 | 59.12 | 59.12 | 59.12 | 59.12 | 42.26 | 36.22 | 34.12 | 30.76 | 30.37 | 28.82 | 28.80 | 25.25 | --- | 30.16 | 37.04 | 43.85 | --- | 41.55 |
| 11/10/2006 | 32.73 | 25.51 | 60.37 | 60.37 | 60.37 | 60.37 | 60.37 | 43.04 | 37.89 | 37.29 | 20.30 | 36.25+ | 33.82+ | 29.38 | 24.11 | --- | 30.09 | 37.58 | 41.10 | --- | 42.06 |
| 12/14/2006 | 32.33 | 25.11 | 60.27 | 60.27 | 60.27 | 60.27 | 60.27 | 42.57 | 36.27 | 34.09 | 30.89 | 28.70 | 28.94 | 29.00 | 23.43 | --- | 29.42 | 37.29 | 43.49 | --- | 41.55 |
| 1/1/2007 | 32.18 | 24.21 | 58.71 | 58.71 | 58.71 | 58.71 | 58.71 | 42.27 | 35.80 | 34.04 | 30.80 | 30.28 | 28.60 | 28.82 | 27.79 | --- | 33.09 | 36.69 | 43.74 | --- | 41.35 |
| 2/2/2007 | 32.45 | 25.29 | 60.64 | 60.64 | 60.64 | 60.64 | 60.64 | 53.09 | 36.82 | 34.84 | 31.61 | 29.24 | 29.22 | 30.15 | 28.58 | --- | 32.51 | 37.51 | 44.27 | --- | 41.88 |
| 3/7/2007 | 32.23 | 24.22 | 58.73 | 58.73 | 58.73 | 58.73 | 58.73 | 42.37 | 35.84 | 34.09 | 30.85 | 30.31 | 28.64 | 28.85 | 27.80 | --- | 33.12 | 36.74 | 43.79 | --- | 41.37 |
| 4/7/2007 | 32.21 | 24.21 | 58.71 | 58.71 | 58.71 | 58.71 | 58.71 | 42.10 | 35.80 | 34.03 | 30.80 | 30.28 | 28.61 | 28.83 | 27.55 | --- | 33.07 | 36.66 | 43.75 | --- | 41.35 |
| 5/7/2007 | 31.78 | 24.61 | 59.72 | 59.72 | 59.72 | 59.72 | 59.72 | 51.29 | 35.67 | 33.43 | 30.50 | 28.00 | 28.52 | 28.38 | 27.72 | --- | 31.76 | 36.27 | 43.95 | --- | 46.35+ |
| 6/1/2007 | 32.25 | 24.25 | 58.78 | 58.78 | 58.78 | 58.78 | 58.78 | 42.15 | 35.84 | 34.11 | 30.84 | 30.32 | 28.65 | 28.90 | 27.60 | --- | 33.14 | 36.72 | 43.78 | --- | 41.39 |
| 7/1/2007 | 30.43 | 24.31 | 59.65 | 59.65 | 59.65 | 59.65 | 59.65 | 51.15 | 34.22 | 32.49 | 30.70 | 27.90 | 28.42 | 28.10 | 27.00 | --- | 30.84 | 34.94 | 43.56 | --- | 45.63+ |
| 8/7/2007 | 30.86 | 25.11 | 58.66 | 58.66 | 58.66 | 58.66 | 58.66 | 52.69 | 35.77 | 35.12 | 31.40 | 29.03 | 29.04 | 29.89 | 27.78 | --- | 32.43 | 36.59 | --- | --- | 40.46 |
| 9/7/2007 | 31.83 | 24.81 | 59.17 | 59.17 | 59.17 | 59.17 | 59.17 | 51.16 | 35.82 | 33.59 | 30.60 | 30.25 | 28.82 | 28.70 | --- | --- | --- | 36.24 | 41.91 | --- | 40.95 |
| 10/7/2007 | 30.29 | 25.62 | 57.97 | 57.97 | 57.97 | 57.97 | 57.97 | 51.63 | 35.25 | 33.70 | 31.93 | 29.00 | 29.71 | 31.18 | 27.92 | --- | 33.14 | 36.08 | --- | --- | 39.82 |
| 11/7/2007 | 31.79 | 25.21 | 59.95 | 59.95 | 59.95 | 59.95 | 59.95 | 51.15 | 35.96 | 34.99 | 30.66 | 29.60 | 29.00 | 29.03 | 24.81 | --- | 29.22 | 36.41 | 41.99 | --- | 41.08 |
| 12/7/2007 | 31.67 | 25.16 | 59.83 | 59.83 | 59.83 | 59.83 | 59.83 | 51.02 | 31.09 | 36.59 | 29.95 | 30.85 | 24.62 | 30.90 | 23.45 | --- | 28.96 | 39.64 | 39.95 | --- | 42.71 |
| 1/8/2008 | 32.63 | 25.41 | 59.57 | 59.57 | 59.57 | 59.57 | 59.57 | 52.97 | 35.82 | 36.29 | 32.20 | 29.10 | 29.22 | 30.30 | 25.83 | --- | --- | 38.14 | 38.05 | --- | 42.25 |
| 2/1/2008 | 32.63 | 25.88 | 59.27 | 59.27 | 59.27 | 59.27 | 59.27 | 53.63 | 37.86 | 36.60 | 32.00 | 29.99 | 30.56 | 30.82 | 28.74 | --- | 33.41 | 38.46 | 38.80 | --- | 42.68 |
| 3/8/2008 | 32.93 | 25.11 | 60.77 | 60.77 | 60.77 | 60.77 | 60.77 | 52.87 | 36.62 | 36.99 | 30.70 | 28.90 | 29.12 | 29.00 | 25.13 | --- | --- | 38.04 | 38.05 | --- | 41.65 |
| 4/8/2008 | 32.33 | 25.21 | 59.47 | 59.47 | 59.47 | 59.47 | 59.47 | 53.17 | 32.72 | 35.79 | 31.00 | 28.90 | 29.82 | 39.3+ | 25.33 | --- | --- | 37.64 | --- | --- | 41.15 |
| 5/8/2008 | 32.63 | 25.41 | 59.77 | 59.77 | 59.77 | 59.77 | 59.77 | 53.07 | 37.12 | 35.29 | 30.90 | 29.10 | 29.72 | 29.30 | 25.43 | --- | --- | 38.04 | 37.55 | --- | 41.35 |
| 6/8/2008 | 32.59 | 25.64 | 60.42 | 60.42 | 60.42 | 60.42 | 60.42 | 52.69 | 36.80 | 34.43 | 31.53 | 29.33 | 29.55 | 30.60 | 28.20 | --- | 32.51 | 37.22 | 37.99 | 41.71 | 41.22 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date | A-2 | A-3 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-15 | A-16 | A-17 | A-18 | A-19 | A-20 | A-22 | A-22D | A-23 | B-1 | B-2 | B-2R | B-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | | |
| 7/8/2008 | 32.13 | 25.21 | 60.37 | 60.37 | 60.37 | 60.37 | 60.37 | 58.27+ | 35.82 | 34.59 | 31.20 | 29.20 | 29.52 | 29.10 | 26.10 | --- | 32.51 | 36.64 | --- | 40.39 | 41.45 |
| 8/8/2008 | 31.74 | 24.77 | 59.63 | 59.63 | 59.63 | 59.63 | 59.63 | 51.33 | 36.24 | 33.85 | 30.97 | 28.57 | 28.71 | 29.57 | 27.87 | --- | 31.52 | 36.32 | 36.50 | 39.81 | 40.44 |
| 9/8/2008 | 31.19 | 25.22 | 58.99 | 58.99 | 58.99 | 58.99 | 58.99 | 51.54 | 36.45 | 34.31 | 31.40 | 29.05 | 29.04 | 30.05 | 27.88 | --- | 32.17 | 36.52 | 37.89 | 40.27 | 40.32 |
| 10/8/2008 | 30.98 | 25.27 | 58.72 | 58.72 | 58.72 | 58.72 | 58.72 | 50.95 | 36.19 | 34.38 | 31.57 | 29.08 | 29.19 | 30.52 | 27.70 | --- | 32.49 | 36.36 | 37.87 | 41.79 | 40.35 |
| 11/8/2008 | 31.32 | 25.21 | 58.67 | 58.67 | 58.67 | 58.67 | 58.67 | 52.17 | 36.74 | 34.62 | 31.39 | 25.14 | 29.05 | 30.02 | 28.04 | --- | 29.08 | 36.88 | 37.71 | 41.60 | 40.80 |
| 12/8/2008 | 31.94 | 25.35 | 59.07 | 59.07 | 59.07 | 59.07 | 59.07 | 53.00 | 37.27 | 35.31 | 31.56 | 29.21 | 29.64 | 30.11 | 28.32 | --- | 32.69 | 37.63 | 38.26 | 42.22 | 41.54 |
| 1/26/2009 | 31.90 | 25.06 | 59.16 | 59.16 | 59.16 | 59.16 | 59.16 | 52.35 | 36.89 | 34.69 | 31.31 | 28.88 | 29.04 | 29.81 | 28.25 | --- | 32.39 | 37.63 | 37.88 | 41.84 | 41.37 |
| 2/17/2009 | 31.82 | 25.10 | 59.30 | 59.30 | 59.30 | 59.30 | 59.30 | 52.44 | 36.81 | 34.76 | 31.47 | 28.97 | 29.04 | 29.73 | 28.46 | --- | 32.39 | 37.47 | 37.66 | 41.31 | 41.19 |
| 3/27/2009 | 31.69 | 25.29 | 59.42 | 59.42 | 59.42 | 59.42 | 59.42 | 52.12 | 36.58 | 34.70 | 31.46 | 29.24 | 29.28 | 30.28 | 28.11 | --- | 32.52 | 37.03 | 38.29 | 42.05 | 41.04 |
| 4/28/2009 | 32.50 | 25.42 | 60.05 | 60.05 | 60.05 | 60.05 | 60.05 | 53.44 | 37.44 | 35.12 | 31.49 | 29.44 | 29.50 | 30.19 | 28.72 | --- | 32.66 | 38.32 | 38.92 | 42.61 | 41.87 |
| 5/22/2009 | 32.52 | 25.32 | 60.41 | 60.41 | 60.41 | 60.41 | 60.41 | 53.27 | 37.22 | 34.95 | 31.36 | 29.26 | 29.28 | 29.96 | 28.61 | --- | 32.43 | 38.25 | 38.90 | 42.62 | 41.67 |
| 6/25/2009 | 32.18 | 25.26 | 60.33 | 60.33 | 60.33 | 60.33 | 60.33 | 52.68 | 36.91 | 34.68 | 31.22 | 29.13 | 29.15 | 29.93 | 28.38 | --- | 32.27 | 37.87 | 38.60 | 42.45 | 41.27 |
| 7/1/2009 | 31.17 | 24.30 | 59.36 | 59.36 | 59.36 | 59.36 | 59.36 | 51.07 | 35.82 | 33.72 | 30.49 | 28.38 | 28.36 | 29.33 | 27.56 | --- | 31.44 | 36.28 | 36.81 | 40.19 | 40.28 |
| 8/1/2009 | 31.28 | 25.47 | 59.16 | 59.16 | 59.16 | 59.16 | 59.16 | 51.80 | 35.87 | 34.09 | 31.32 | 29.18 | 29.34 | 30.35 | 28.14 | --- | 32.27 | 36.59 | 38.23 | 42.17 | 40.40 |
| 9/24/2009 | 31.80 | 24.70 | 59.27 | 59.27 | 59.27 | 59.27 | 59.27 | 51.92 | 36.56 | 34.49 | 31.22 | 28.65 | 28.68 | 29.31 | 28.23 | --- | 31.96 | 37.41 | 37.93 | 41.64 | 40.94 |
| 10/29/2009 | 33.23 | 26.58 | 60.14 | 60.14 | 60.14 | 60.14 | 60.14 | 53.96 | 38.91 | 37.33 | 32.60 | 30.78 | 32.07 | 31.73 | 29.37 | --- | 33.70 | 39.53 | 39.11 | 43.02 | 43.23 |
| 11/25/2009 | 33.59 | 26.57 | 60.94 | 60.94 | 60.94 | 60.94 | 60.94 | 54.29 | 38.85 | 37.48 | 32.50 | 30.67 | 31.87 | 31.62 | 29.59 | --- | 33.67 | 39.50 | 39.56 | 43.27 | 43.28 |
| 12/30/2009 | 33.46 | 25.95 | 61.34 | 61.34 | 61.34 | 61.34 | 61.34 | 54.03 | 38.17 | 35.91 | 31.69 | 29.91 | 30.38 | 30.69 | 29.35 | --- | 33.14 | 39.40 | 39.12 | 42.83 | 43.01 |
| 1/28/2010 | 32.93 | 25.84 | 61.21 | 61.21 | 61.21 | 61.21 | 61.21 | 53.66 | 37.33 | 35.97 | 31.90 | 29.64 | 30.44 | 30.51 | 29.03 | --- | 32.86 | 38.27 | 39.01 | 42.64 | 41.83 |
| 3/1/2010 | 33.74 | 26.28 | 61.75 | 61.75 | 61.75 | 61.75 | 61.75 | 54.24 | 38.63 | 37.04 | 32.31 | 30.22 | 31.63 | 31.25 | 29.52 | --- | 33.21 | 39.14 | 39.31 | 43.01 | 43.20 |
| 4/8/2010 | 33.10 | 25.64 | 61.68 | 61.68 | 61.68 | 61.68 | 61.68 | 53.56 | 37.12 | 34.99 | 31.39 | 29.44 | 29.42 | 30.26 | 29.02 | --- | 32.57 | 38.54 | 39.00 | 42.50 | 41.97 |
| 5/28/2010 | 31.90 | 25.18 | 60.27 | 60.27 | 60.27 | 60.27 | 60.27 | 51.77 | 35.90 | 34.14 | 31.07 | 28.77 | 28.92 | 29.80 | 28.31 | --- | 32.07 | DRY | 38.15 | 41.68 | 40.69 |
| 6/30/2010 | 30.82 | 24.38 | 59.32 | 59.32 | 59.32 | 59.32 | 59.32 | 50.66 | 35.12 | 33.39 | 30.29 | 28.03 | 28.14 | 29.36 | 27.17 | --- | 31.38 | 38.67 | 37.76 | 41.18 | 39.74 |
| 7/28/2010 | 30.72 | 24.87 | 59.09 | 59.09 | 59.09 | 59.09 | 59.09 | 51.06 | 35.54 | 33.71 | 30.85 | 28.39 | 28.65 | 29.62 | 27.51 | --- | 31.76 | 38.85 | 38.27 | 41.95 | 39.75 |
| 8/16/2010 | 31.02 | 25.38 | 59.14 | 59.14 | 59.14 | 59.14 | 59.14 | 49.45 | 36.14 | 34.73 | 31.15 | 29.30 | 29.17 | 30.07 | 27.62 | --- | 32.72 | 37.01 | 38.44 | 42.39 | 40.35 |
| 9/23/2010 | 30.24 | 18.26 | 58.60 | 58.60 | 58.60 | 58.60 | 58.60 | 50.41 | 35.60 | 33.59 | 29.47 | 28.06 | 28.07 | 29.20 | 26.67 | --- | 31.60 | 36.38 | 36.98 | 40.31 | 39.69 |
| 10/21/2010 | 32.03 | 25.20 | 59.26 | 59.26 | 59.26 | 59.26 | 59.26 | 52.63 | 36.89 | 35.13 | 31.32 | 29.07 | 29.50 | 29.75 | 28.11 | --- | 32.61 | 37.83 | 38.58 | 42.22 | 41.85 |
| 11/22/2010 | 32.17 | 25.28 | 59.22 | 59.22 | 59.22 | 59.22 | 59.22 | 52.60 | 36.69 | 34.87 | 31.30 | 29.08 | 29.36 | 29.84 | 28.32 | --- | 32.64 | 37.80 | 38.75 | 42.28 | 41.65 |
| 12/16/2010 | 32.37 | 25.62 | 59.38 | 59.38 | 59.38 | 59.38 | 59.38 | 53.15 | 37.05 | 35.54 | 31.58 | 29.52 | 29.89 | 30.37 | 28.75 | --- | 32.86 | 25.95 | 38.73 | 42.46 | 41.83 |
| 1/6/2011 | 32.10 | 25.13 | 59.33 | 59.33 | 59.33 | 59.33 | 59.33 | 52.38 | 36.55 | 34.92 | 31.37 | 29.02 | 29.19 | 29.66 | 28.63 | --- | 32.56 | 37.49 | 38.54 | 41.98 | 41.38 |
| 2/7/2011 | 32.65 | 25.76 | 59.77 | 59.77 | 59.77 | 59.77 | 59.77 | 53.56 | 37.64 | 36.33 | 31.85 | 29.80 | 30.62 | 30.58 | 28.93 | --- | 33.19 | 38.49 | 39.03 | 42.80 | 42.45 |
| 3/3/2011 | 32.43 | 25.46 | 59.68 | 59.68 | 59.68 | 59.68 | 59.68 | 53.34 | 37.04 | 35.70 | 31.48 | 29.28 | 29.98 | 30.11 | 28.82 | --- | 32.85 | 38.00 | 38.70 | 42.39 | 41.71 |
| 4/7/2011 | 32.70 | 25.44 | 60.39 | 60.39 | 60.39 | 60.39 | 60.39 | 53.48 | 36.87 | 35.03 | 31.44 | 29.23 | 29.60 | 30.01 | 28.96 | --- | 32.69 | 38.11 | 39.03 | 42.60 | 41.80 |
| 5/3/2011 | 32.66 | 25.38 | 60.44 | 60.44 | 60.44 | 60.44 | 60.44 | 53.28 | 36.62 | 34.79 | 31.29 | 29.29 | 29.24 | 29.93 | 28.81 | --- | 32.66 | 37.91 | 39.02 | 42.47 | 41.53 |
| 6/24/2011 | 30.89 | 24.25 | 59.09 | 59.09 | 59.09 | 59.09 | 59.09 | 50.85 | 35.21 | 33.54 | 30.46 | 28.10 | 28.13 | 29.29 | 27.38 | --- | 31.40 | 36.00 | 38.35 | 41.48 | 40.08 |
| 7/25/2011 | 30.33 | 24.28 | 58.61 | 58.61 | 58.61 | 58.61 | 58.61 | 50.65 | 34.86 | 33.15 | 30.05 | 28.19 | 28.14 | 29.29 | 26.96 | --- | 31.20 | 36.09 | 37.66 | 40.60 | 39.51 |
| 8/15/2011 | 30.16 | 24.77 | 58.38 | 58.38 | 58.38 | 58.38 | 58.38 | 51.37 | 34.97 | 33.12 | 30.48 | 28.60 | 28.68 | 30.04 | 27.26 | --- | 31.92 | 36.11 | 38.05 | 41.64 | 39.43 |
| 9/26/2011 | 33.36 | 25.93 | 60.31 | 60.31 | 60.31 | 60.31 | 60.31 | 53.91 | 37.43 | 36.02 | 31.49 | 29.97 | 30.95 | 30.66 | 29.20 | --- | 33.44 | 39.04 | 39.17 | 42.86 | 42.22 |
| 10/27/2011 | 32.65 | 25.29 | 60.10 | 60.10 | 60.10 | 60.10 | 60.10 | 52.68 | 36.23 | 34.94 | 31.15 | 29.11 | 29.34 | 29.94 | 28.81 | --- | 32.68 | 37.54 | 38.75 | 42.11 | 41.36 |
| 11/18/2011 | 32.58 | 25.49 | 60.05 | 60.05 | 60.05 | 60.05 | 60.05 | 53.37 | 36.29 | 35.05 | 31.65 | 29.20 | 30.01 | 30.21 | 28.90 | --- | 32.98 | 37.59 | 38.56 | 42.24 | 41.32 |
| 12/20/2011 | 33.12 | 25.43 | 60.77 | 60.77 | 60.77 | 60.77 | 60.77 | 53.49 | 37.02 | 35.19 | 31.16 | 29.23 | 29.54 | 29.99 | 29.16 | --- | 32.82 | 38.55 | 38.90 | 42.55 | 42.08 |
| 1/16/2012 | 32.98 | 25.63 | 60.62 | 60.62 | 60.62 | 60.62 | 60.62 | 53.57 | 37.01 | 35.68 | 31.31 | 29.32 | 30.08 | 30.19 | 29.22 | --- | 32.94 | 38.40 | 38.75 | 42.50 | 41.96 |
| 2/13/2012 | 32.68 | 25.29 | 60.64 | 60.64 | 60.64 | 60.64 | 60.64 | 53.29 | 36.48 | 35.10 | 31.21 | 28.96 | 29.47 | 29.80 | 28.95 | --- | 32.62 | 37.73 | 38.60 | 42.18 | 41.46 |
| 3/5/2012 | 33.02 | 25.87 | 60.82 | 60.82 | 60.82 | 60.82 | 60.82 | 53.69 | 37.30 | 36.17 | 31.48 | 29.76 | 30.62 | 30.64 | 28.95 | --- | 33.24 | 38.51 | 38.82 | 42.63 | 42.20 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676



CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date | A-2 | A-3 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-15 | A-16 | A-17 | A-18 | A-19 | A-20 | A-22 | A-22D | A-23 | B-1 | B-2 | B-2R | B-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | | |
| 4/18/2012 | 31.90 | 24.71 | 59.77 | 59.77 | 59.77 | 59.77 | 59.77 | 51.86 | 35.79 | 34.33 | 30.80 | 28.49 | 28.53 | 29.40 | 28.06 | --- | 31.78 | 36.77 | 37.36 | 40.60 | 40.82 |
| 5/7/2012 | 31.83 | 24.84 | 59.61 | 59.61 | 59.61 | 59.61 | 59.61 | 51.92 | 35.94 | 34.42 | 30.82 | 28.70 | 28.65 | 29.52 | 28.06 | --- | 31.93 | 36.82 | 38.25 | 41.84 | 40.64 |
| 6/11/2012 | 31.19 | 24.64 | 59.00 | 59.00 | 59.00 | 59.00 | 59.00 | 51.04 | 35.27 | 33.88 | 30.51 | 28.46 | 28.44 | 29.39 | 27.59 | --- | 31.66 | 36.52 | 37.50 | 40.92 | 40.12 |
| 7/27/2012 | 30.50 | 24.61 | 58.47 | 58.47 | 58.47 | 58.47 | 58.47 | 50.76 | 35.13 | 33.75 | 30.57 | 28.41 | 28.47 | 29.45 | 27.45 | --- | 31.53 | 36.24 | 37.42 | 41.18 | 39.60 |
| 8/13/2012 | 30.27 | 24.59 | 58.21 | 58.21 | 58.21 | 58.21 | 58.21 | 50.36 | 35.17 | 33.68 | 30.58 | 28.17 | 28.52 | 29.53 | 27.11 | --- | 31.57 | 36.29 | 37.68 | 41.42 | 39.31 |
| 9/21/2012 | 30.39 | 24.85 | 57.92 | 57.92 | 57.92 | 57.92 | 57.92 | 50.20 | 35.33 | 33.96 | 30.65 | 28.66 | 28.61 | 29.55 | 27.66 | --- | 31.88 | --- | 43.10 | 36.17 | 39.47 |
| 10/4/2012 | 30.27 | 24.38 | 57.76 | 57.76 | 57.76 | 57.76 | 57.76 | 49.93 | 36.03 | 33.96 | 30.69 | 28.20 | 28.25 | 29.28 | 27.34 | --- | 31.56 | 36.28 | 37.53 | 41.24 | 39.56 |
| 11/15/2012 | 31.80 | 25.13 | 58.09 | 58.09 | 58.09 | 58.09 | 58.09 | 52.23 | 36.71 | 34.71 | 30.95 | 28.97 | 29.22 | 29.65 | 28.16 | --- | 32.46 | 37.69 | 38.32 | 42.11 | 40.98 |
| 12/12/2012 | 31.56 | 24.81 | 57.92 | 57.92 | 57.92 | 57.92 | 57.92 | 52.03 | 36.32 | 34.53 | 31.20 | 28.84 | 29.71 | 29.35 | 28.17 | --- | 32.24 | 37.12 | 38.08 | 41.82 | 40.76 |
| 1/29/2013 | 32.16 | 25.05 | 58.54 | 58.54 | 58.54 | 58.54 | 58.54 | 52.92 | 36.77 | 34.96 | 31.14 | 29.00 | 29.33 | 29.64 | 28.75 | --- | 32.67 | 37.92 | 38.54 | 42.22 | 41.30 |
| 2/11/2013 | 32.44 | 25.31 | 58.85 | 58.85 | 58.85 | 58.85 | 58.85 | 53.65 | 37.03 | 35.43 | 31.70 | 29.25 | 30.13 | 29.86 | 28.74 | --- | 33.19 | 38.28 | 38.98 | 42.79 | 41.57 |
| 3/21/2013 | 32.56 | 25.16 | 59.52 | 59.52 | 59.52 | 59.52 | 59.52 | 53.65 | 37.03 | 35.10 | 31.11 | 29.05 | 29.50 | 29.65 | 28.96 | --- | 32.68 | 38.30 | 38.79 | 42.48 | 41.64 |
| 4/8/2013 | 32.38 | 25.03 | 59.53 | 59.53 | 59.53 | 59.53 | 59.53 | 53.28 | 36.73 | 34.89 | 31.01 | 28.86 | 29.20 | 29.52 | 28.64 | --- | 32.23 | 37.98 | 38.65 | 42.21 | 41.35 |
| 5/14/2013 | 32.35 | 25.21 | 59.63 | 59.63 | 59.63 | 59.63 | 59.63 | 53.51 | 36.62 | 34.97 | 31.03 | 29.17 | 29.73 | 29.72 | 28.63 | --- | 32.37 | 37.54 | 38.73 | 42.38 | 41.08 |
| 6/14/2013 | 32.60 | 25.84 | 59.98 | 59.98 | 59.98 | 59.98 | 59.98 | 53.43 | 37.62 | 35.46 | 31.13 | 29.92 | 30.14 | 30.55 | 28.60 | --- | 32.97 | 38.60 | 38.88 | 42.70 | 41.76 |
| 7/9/2013 | 32.26 | 24.91 | 59.78 | 59.78 | 59.78 | 59.78 | 59.78 | 52.81 | 36.72 | 34.59 | 30.67 | 28.75 | 29.21 | 29.25 | 28.22 | --- | 31.88 | 37.88 | 38.47 | 42.16 | 40.85 |
| 7/29/2013 | 31.85 | 24.53 | 59.51 | 59.51 | 59.51 | 59.51 | 59.51 | 51.81 | 36.36 | 34.04 | 27.90 | 28.29 | 28.32 | 29.40 | 27.76 | --- | 31.35 | 37.51 | 37.78 | 41.15 | 40.66 |
| 8/15/2013 | 31.33 | 24.62 | 58.05 | 58.05 | 58.05 | 58.05 | 58.05 | 51.39 | 36.03 | 33.87 | 30.40 | 28.37 | 28.51 | 29.63 | 27.63 | --- | 31.39 | 36.82 | 37.94 | 41.56 | 40.18 |
| 9/11/2013 | 30.47 | 23.84 | 58.48 | 58.48 | 58.48 | 58.48 | 58.48 | 50.57 | 33.06 | 33.46 | 30.18 | 27.80 | 27.79 | 29.01 | 26.73 | --- | 28.64 | 36.12 | 36.73 | 39.98 | 39.43 |
| 10/25/2013 | 31.77 | 24.85 | 58.72 | 58.72 | 58.72 | 58.72 | 58.72 | 52.33 | 36.94 | 34.74 | 30.71 | 28.66 | 29.18 | 29.45 | 28.12 | --- | 32.19 | 37.87 | 38.07 | 41.91 | 41.04 |
| 11/7/2013 | 31.62 | 24.84 | 58.70 | 58.70 | 58.70 | 58.70 | 58.70 | 51.82 | 36.59 | 34.67 | 28.61 | 30.96 | 28.92 | 29.54 | 28.24 | --- | 32.11 | 37.52 | 37.79 | 41.30 | 40.92 |
| 12/13/2013 | 32.84 | 25.59 | 59.27 | 59.27 | 59.27 | 59.27 | 59.27 | 53.71 | 37.96 | 36.23 | 31.45 | 29.65 | 30.80 | 33.38 | 28.88 | --- | 33.05 | 38.85 | 38.83 | 42.79 | 42.15 |
| 1/17/2014 | 33.05 | 25.57 | 60.34 | 60.34 | 60.34 | 60.34 | 60.34 | 53.89 | 37.65 | 36.03 | 31.44 | 29.59 | 30.70 | 30.28 | 28.99 | --- | 32.88 | 38.78 | 38.99 | 42.85 | 42.09 |
| 2/11/2014 | 32.85 | 25.41 | 60.38 | 60.38 | 60.38 | 60.38 | 60.38 | 53.66 | 37.40 | 35.46 | 31.19 | 29.32 | 30.00 | 29.97 | 28.90 | --- | 32.70 | 38.61 | 38.68 | 42.56 | 41.91 |
| 3/24/2014 | 30.32 | 22.86 | 58.28 | 58.28 | 58.28 | 58.28 | 58.28 | 51.21 | 34.62 | 33.12 | 28.64 | 26.64 | 27.56 | 27.47 | 26.33 | --- | 30.10 | 38.45 | 38.64 | 39.81 | 41.68 |
| 4/25/2014 | 32.97 | 25.36 | 61.01 | 61.01 | 61.01 | 61.01 | 61.01 | 53.66 | 37.09 | 35.03 | 30.95 | 29.20 | 29.47 | 29.93 | 28.87 | --- | 32.35 | 38.53 | 38.67 | 42.29 | 41.77 |
| 5/15/2014 | 32.92 | 25.20 | 60.99 | 60.99 | 60.99 | 60.99 | 60.99 | 53.31 | 36.89 | 34.72 | 30.74 | 29.05 | 29.06 | 29.79 | 28.73 | --- | 32.10 | 38.55 | 38.52 | 41.99 | 41.57 |
| 6/24/2014 | 31.99 | 24.87 | 60.09 | 60.09 | 60.09 | 60.09 | 60.09 | 51.98 | 36.30 | 34.19 | 30.36 | 28.67 | 28.60 | 29.56 | 28.24 | --- | 31.59 | 37.10 | 37.90 | 41.30 | 40.47 |
| 7/9/2014 | 31.38 | 24.68 | 59.55 | 59.55 | 59.55 | 59.55 | 59.55 | 51.01 | 35.86 | 33.79 | 30.34 | 28.53 | 28.53 | 29.72 | 27.51 | --- | 31.25 | 36.49 | 37.62 | 40.89 | 39.88 |
| 8/13/2014 | 31.89 | 26.33 | 59.37 | 59.37 | 59.37 | 59.37 | 59.37 | 52.73 | 36.77 | 36.19 | 31.84 | 30.34 | 30.46 | 31.33 | 28.51 | --- | 33.65 | 37.57 | 38.17 | 42.23 | 40.75 |
| 9/22/2014 | 30.57 | 24.11 | 58.78 | 58.78 | 58.78 | 58.78 | 58.78 | 50.61 | 35.82 | 33.85 | 30.13 | 28.16 | 28.08 | 29.19 | 26.75 | --- | 31.29 | 36.30 | 36.90 | 40.21 | 38.81 |
| 10/27/2014 | 31.05 | 24.89 | 58.60 | 58.60 | 58.60 | 58.60 | 58.60 | 51.55 | 36.36 | 34.59 | 30.51 | 28.65 | 28.71 | 29.51 | 27.82 | --- | 31.88 | 36.82 | 37.98 | 41.76 | 40.50 |
| 11/14/2014 | 31.17 | 24.78 | 58.46 | 58.46 | 58.46 | 58.46 | 58.46 | 51.42 | 36.42 | 34.59 | 30.74 | 28.56 | 28.60 | 29.37 | 27.93 | --- | 31.97 | 36.84 | 37.88 | 41.52 | 40.63 |
| 12/17/2014 | 32.27 | 25.44 | 59.05 | 59.05 | 59.05 | 59.05 | 59.05 | 53.17 | 37.11 | 35.88 | 31.40 | 29.36 | 30.16 | 30.43 | 28.49 | --- | 32.70 | 37.96 | 38.74 | 42.61 | 41.14 |
| 1/15/2015 | 32.58 | 25.59 | 59.53 | 59.53 | 59.53 | 59.53 | 59.53 | 53.42 | 37.48 | 36.14 | 31.51 | 29.60 | 30.70 | 30.32 | 28.74 | --- | 32.80 | 38.41 | 38.87 | 42.68 | 41.58 |
| 2/5/2015 | 32.57 | 25.33 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 53.36 | 37.22 | 35.61 | 31.25 | 29.28 | 30.22 | 29.98 | 28.73 | --- | 32.59 | 38.49 | 38.87 | 42.76 | 41.73 |
| 3/16/2015 | 33.14 | 25.90 | 60.65 | 60.65 | 60.65 | 60.65 | 60.65 | 53.91 | 38.09 | 36.59 | 31.65 | 30.00 | 31.22 | 31.25 | 29.09 | --- | 33.16 | 36.07 | 39.22 | 43.09 | 42.62 |
| 4/28/2015 | 32.78 | 25.30 | 60.66 | 60.66 | 60.66 | 60.66 | 60.66 | 53.49 | 37.15 | 35.16 | 30.88 | 29.20 | 29.61 | 29.91 | 28.81 | --- | 32.49 | 38.59 | 38.81 | 42.51 | 41.91 |
| 5/29/2015 | 31.67 | 24.82 | 59.68 | 59.68 | 59.68 | 59.68 | 59.68 | 52.01 | 36.13 | 34.26 | 30.33 | 28.59 | 28.61 | 29.52 | 28.01 | --- | 31.47 | 36.99 | 37.77 | 41.18 | 41.63 |
| 6/22/2015 | 32.26 | 26.13 | 59.91 | 59.91 | 59.91 | 59.91 | 59.91 | 53.33 | 37.15 | 35.68 | 31.46 | 30.33 | 30.42 | 30.58 | 28.65 | --- | 33.44 | 37.77 | 38.81 | 42.74 | 40.98 |
| 7/30/2015 | 31.46 | 24.59 | 59.51 | 59.51 | 59.51 | 59.51 | 59.51 | 51.30 | 35.92 | 33.94 | 30.17 | 28.38 | 28.41 | 29.51 | 27.33 | --- | 31.12 | 36.67 | 37.26 | 40.43 | 40.22 |
| 8/17/2015 | 30.67 | 24.20 | 58.92 | 58.92 | 58.92 | 58.92 | 58.92 | 50.67 | 35.47 | 33.58 | 29.99 | 28.09 | 28.14 | 29.39 | 26.66 | --- | 30.85 | 36.06 | 37.16 | 40.38 | 39.60 |
| 9/16/2015 | 29.87 | 23.78 | 58.26 | 58.26 | 58.26 | 58.26 | 58.26 | 50.14 | 35.15 | 33.26 | 29.86 | 27.91 | 27.91 | 29.11 | 25.92 | --- | 30.74 | 35.73 | 36.37 | 39.46 | 39.07 |
| 10/8/2015 | 31.58 | 25.18 | 57.76 | 57.76 | 57.76 | 57.76 | 57.76 | 52.76 | 36.97 | 35.41 | 30.82 | 29.13 | 29.77 | 29.84 | 27.87 | --- | 32.60 | 37.42 | 39.56 | 42.10 | 40.36 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date | A-2 | A-3 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-15 | A-16 | A-17 | A-18 | A-19 | A-20 | A-22 | A-22D | A-23 | B-1 | B-2 | B-2R | B-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | | |
| 11/9/2015 | 31.77 | 24.98 | 58.55 | 58.55 | 58.55 | 58.55 | 58.55 | 52.12 | 36.51 | 34.98 | 30.71 | 29.31 | 29.53 | 29.66 | 28.11 | --- | 32.08 | 37.35 | 38.04 | 41.77 | 40.78 |
| 12/3/2015 | 31.38 | 25.90 | 58.99 | 58.99 | 58.99 | 58.99 | 58.99 | 52.80 | 37.49 | 37.20 | 31.80 | 29.96 | 31.68 | 31.07 | 28.70 | --- | 32.96 | 38.25 | 38.63 | 42.70 | 41.21 |
| 1/6/2016 | 31.55 | 25.24 | 59.36 | 59.36 | 59.36 | 59.36 | 59.36 | 52.31 | 37.25 | 35.43 | 30.89 | 29.39 | 29.73 | 29.80 | 28.69 | --- | 32.31 | 38.40 | 38.46 | 42.30 | 42.04 |
| 2/8/2016 | 32.34 | 25.66 | 60.51 | 60.51 | 60.51 | 60.51 | 60.51 | 53.00 | 37.94 | 36.18 | 31.90 | 29.79 | 30.78 | 30.36 | 29.21 | --- | 33.00 | 39.11 | 39.23 | 43.05 | 42.69 |
| 3/18/2016 | 31.56 | 25.21 | 60.33 | 60.33 | 60.33 | 60.33 | 60.33 | 52.27 | 36.81 | 35.03 | 30.73 | 29.16 | 29.35 | 29.80 | 28.78 | --- | 32.17 | 37.61 | 38.45 | 42.06 | 41.54 |
| 4/25/2016 | 30.79 | 24.82 | 59.64 | 59.64 | 59.64 | 59.64 | 59.64 | 51.37 | 36.23 | 34.57 | 30.42 | 28.93 | 28.81 | 29.85 | 28.28 | --- | 31.72 | 37.12 | 37.79 | 41.22 | 41.01 |
| 5/31/2016 | 31.54 | 25.83 | 60.06 | 60.06 | 60.06 | 60.06 | 60.06 | 52.40 | 36.93 | 35.08 | 31.00 | 29.82 | 29.76 | 30.53 | 28.67 | --- | 32.69 | 37.83 | 38.79 | 42.53 | 41.33 |
| 6/13/2016 | 30.80 | 24.70 | 59.52 | 59.52 | 59.52 | 59.52 | 59.52 | 50.96 | 36.26 | 34.28 | 30.13 | 28.75 | 28.68 | 29.45 | 27.89 | --- | 31.33 | 37.15 | 37.78 | 41.21 | 40.74 |
| 7/7/2016 | 30.79 | 25.17 | 59.22 | 59.22 | 59.22 | 59.22 | 59.22 | 51.26 | 36.17 | 34.34 | 30.21 | 29.03 | 28.89 | 29.77 | 28.16 | --- | 32.06 | 36.99 | 38.38 | 42.08 | 40.41 |
| 8/8/2016 | 30.53 | 24.83 | 58.76 | 58.76 | 58.76 | 58.76 | 58.76 | 50.86 | 36.30 | 34.13 | 30.06 | 28.68 | 28.66 | 29.52 | 27.79 | --- | 31.52 | 36.85 | 37.96 | 41.80 | 40.09 |
| 9/9/2016 | 29.41 | 24.17 | 59.21 | 59.21 | 59.21 | 59.21 | 59.21 | 49.55 | 35.57 | 33.52 | 29.96 | 28.17 | 28.25 | 29.26 | 26.93 | --- | 30.85 | 36.18 | 36.83 | 40.07 | 39.46 |
| 10/28/2016 | 30.69 | 24.70 | 58.35 | 58.35 | 58.35 | 58.35 | 58.35 | 50.88 | 36.53 | 34.71 | 30.21 | 28.55 | 28.72 | 29.44 | 28.14 | --- | 31.67 | 37.33 | 37.94 | 41.61 | 40.68 |
| 11/22/2016 | 30.09 | 24.55 | 58.00 | 58.00 | 58.00 | 58.00 | 58.00 | 50.33 | 36.16 | 34.50 | 30.18 | 28.38 | 28.43 | 29.42 | 27.91 | --- | 31.63 | 36.70 | 36.86 | 40.35 | 40.65 |
| 12/6/2016 | 30.21 | 24.96 | 58.09 | 58.09 | 58.09 | 58.09 | 58.09 | 50.61 | 36.05 | 34.60 | 30.30 | 28.69 | 28.78 | 29.67 | 28.22 | --- | 32.04 | 36.22 | 37.67 | 41.40 | 40.69 |
| 1/5/2017 | 31.24 | 25.58 | 58.27 | 58.27 | 58.27 | 58.27 | 58.27 | 52.39 | 37.24 | 36.29 | 31.69 | 29.56 | 30.96 | 30.44 | 28.64 | --- | 33.10 | 37.55 | 38.40 | 42.42 | 41.09 |
| 2/20/2017 | 30.46 | 24.74 | 58.32 | 58.32 | 58.32 | 58.32 | 58.32 | 50.87 | 36.49 | 34.81 | 30.40 | 28.57 | 28.91 | 29.41 | 28.47 | --- | 32.75 | 37.00 | 37.73 | 41.32 | 41.00 |
| 3/17/2017 | 30.98 | 25.39 | 58.36 | 58.36 | 58.36 | 58.36 | 58.36 | 52.29 | 36.88 | 35.72 | 31.22 | 29.30 | 30.29 | 30.28 | 28.62 | --- | 32.63 | 37.64 | 38.36 | 42.30 | 41.19 |
| 4/13/2017 | 31.39 | 25.19 | 59.00 | 59.00 | 59.00 | 59.00 | 59.00 | 52.35 | 37.22 | 35.25 | 30.68 | 29.01 | 29.45 | 29.68 | 28.73 | --- | 32.57 | 38.03 | 38.55 | 42.45 | 41.68 |
| 5/4/2017 | 31.02 | 24.84 | 58.95 | 58.95 | 58.95 | 58.95 | 58.95 | 51.69 | 36.45 | 34.76 | 30.29 | 28.64 | 28.59 | 29.41 | 28.38 | --- | 31.76 | 37.80 | 38.29 | 41.54 | 41.17 |
| 6/15/2017 | 30.56 | 26.86 | 57.64 | 57.64 | 57.64 | 57.64 | 57.64 | 50.68 | 36.11 | 32.54 | 29.99 | 26.78 | 26.86 | 29.31 | 27.81 | --- | 31.11 | 36.13 | 41.76 | 40.94 | 40.50 |
| 7/24/2017 | 29.73 | 28.65 | 56.87 | 56.87 | 56.87 | 56.87 | 56.87 | 50.42 | 35.55 | 32.14 | 31.69 | 28.58 | 28.10 | 31.77 | 27.82 | 29.18 | 32.58 | 35.16 | 41.75 | 41.32 | 39.69 |
| 8/31/2017 | 30.39 | 27.15 | 56.82 | 56.82 | 56.82 | 56.82 | 56.82 | 50.84 | 35.99 | 32.63 | 29.73 | 26.86 | 26.93 | 29.45 | 27.77 | 29.74 | 31.96 | 35.96 | 42.39 | 42.01 | 40.55 |
| 9/22/2017 | 30.61 | 27.05 | 57.08 | 57.08 | 57.08 | 57.08 | 57.08 | 50.49 | 36.22 | 32.84 | 30.02 | 26.88 | 27.04 | 29.39 | 27.97 | 29.85 | 31.43 | 36.19 | 41.78 | 41.23 | 40.37 |
| 10/23/2017 | 30.78 | 26.67 | 56.67 | 56.67 | 56.67 | 56.67 | 56.67 | 49.58 | 35.86 | 32.67 | 30.04 | 26.73 | 26.79 | 29.28 | 27.58 | 29.18 | 31.38 | 35.55 | 41.52 | 40.75 | 40.23 |
| 11/30/2017 | 30.48 | 27.21 | 56.71 | 56.71 | 56.71 | 56.71 | 56.71 | 50.49 | 36.37 | 33.14 | 30.39 | 26.99 | 26.94 | 29.52 | 28.35 | 29.82 | 31.89 | 36.32 | 42.08 | 41.56 | 40.73 |
| 1/29/2018 | 30.35 | 27.27 | 56.55 | 56.55 | 56.55 | 56.55 | 56.55 | 50.65 | 36.27 | 33.27 | 30.97 | 27.13 | 27.33 | 29.56 | 28.31 | 29.96 | 31.99 | 36.14 | 42.21 | 41.78 | 40.79 |
| 2/12/2018 | 32.37 | 29.03 | 56.97 | 56.97 | 56.97 | 56.97 | 56.97 | 52.70 | 39.17 | 35.73 | 32.30 | 29.27 | 30.36 | 32.22 | 29.34 | 30.97 | 33.76 | 39.07 | 42.89 | 42.86 | 42.93 |
| 3/15/2018 | 31.34 | 27.45 | 57.71 | 57.71 | 57.71 | 57.71 | 57.71 | 51.97 | 36.88 | 33.65 | 30.78 | 27.29 | 27.75 | 29.63 | 28.74 | 30.58 | 32.15 | 37.05 | 42.18 | 41.81 | 41.42 |
| 4/6/2018 | 31.39 | 27.47 | 57.94 | 57.94 | 57.94 | 57.94 | 57.94 | 52.09 | 36.91 | 33.55 | 30.66 | 27.28 | 27.67 | 29.59 | 28.77 | 30.64 | 32.15 | 36.97 | 41.85 | 41.28 | 41.49 |
| 5/31/2018 | 31.80 | 27.61 | 58.66 | 58.66 | 58.66 | 58.66 | 58.66 | 52.38 | 37.12 | 33.46 | 30.40 | 27.39 | 27.47 | 29.66 | 28.85 | 30.90 | 32.26 | 37.40 | 41.99 | 41.28 | 41.74 |
| 6/13/2018 | 32.20 | 28.10 | 59.14 | 59.14 | 59.14 | 59.14 | 59.14 | 52.80 | 37.25 | 33.96 | 31.00 | 27.96 | 28.69 | 30.19 | 29.03 | 31.21 | 32.64 | 37.80 | 42.62 | 42.04 | 41.89 |
| 7/6/2018 | 30.72 | 26.90 | 58.03 | 58.03 | 58.03 | 58.03 | 58.03 | 50.70 | 35.89 | 32.39 | 29.91 | 27.95 | 26.79 | 29.29 | 27.84 | 29.85 | 31.04 | 35.71 | 40.84 | 39.98 | 40.16 |
| 8/23/2018 | 31.57 | 28.20 | 58.70 | 58.70 | 58.70 | 58.70 | 58.70 | 52.47 | 36.98 | 33.56 | 30.76 | 28.04 | 28.09 | 30.45 | 28.79 | 30.87 | 33.21 | 36.52 | 41.34 | 40.81 | 41.07 |
| 9/11/2018 | 31.64 | 28.12 | 58.49 | 58.49 | 58.49 | 58.49 | 58.49 | 52.59 | 36.85 | 34.41 | 31.39 | 27.94 | 29.34 | 30.36 | 28.92 | 30.83 | 33.17 | 36.41 | 41.24 | 40.74 | 40.96 |
| 10/16/2018 | 32.10 | 28.01 | 59.22 | 59.22 | 59.22 | 59.22 | 59.22 | 52.67 | 37.27 | 34.05 | 30.73 | 27.56 | 28.38 | 30.29 | 28.95 | 31.04 | 32.91 | 37.12 | 41.67 | 41.19 | 41.49 |
| 11/14/2018 | 32.61 | 29.03 | 59.72 | 59.72 | 59.72 | 59.72 | 59.72 | 54.27 | 38.22 | 35.38 | 31.84 | 28.77 | 30.06 | 31.77 | 29.58 | 31.43 | 33.39 | 41.17 | 42.71 | 42.24 | 42.44 |
| 12/5/2018 | 32.29 | 28.10 | 59.94 | 59.94 | 59.94 | 59.94 | 59.94 | 52.97 | 37.25 | 34.11 | 30.87 | 27.69 | 28.52 | 30.19 | 29.34 | 31.22 | 32.84 | 37.62 | 42.42 | 41.79 | 41.98 |
| 1/17/2019 | 32.04 | 28.08 | 60.14 | 60.14 | 60.14 | 60.14 | 60.14 | 52.91 | 36.85 | 33.95 | 30.82 | 27.69 | 28.37 | 30.25 | 29.13 | 31.22 | 32.72 | 37.20 | 42.31 | 41.68 | 41.73 |
| 2/4/2019 | 35.15 | 28.16 | 60.31 | 60.31 | 60.31 | 60.31 | 60.31 | 52.95 | 37.23 | 34.16 | 31.13 | 27.89 | 28.47 | 30.35 | 29.31 | 31.29 | 32.78 | 37.44 | 42.47 | 41.82 | 41.99 |
| 3/4/2019 | 33.08 | 29.71 | 60.72 | 60.72 | 60.72 | 60.72 | 60.72 | 53.61 | 38.62 | 35.64 | 32.33 | 29.73 | 30.55 | 32.91 | 30.00 | 31.96 | 33.81 | 38.49 | 43.25 | 42.66 | 43.14 |
| 4/18/2019 | 31.75 | 28.13 | 60.18 | 60.18 | 60.18 | 60.18 | 60.18 | 52.80 | 36.62 | 33.56 | 30.60 | 27.64 | 27.64 | 30.17 | 28.99 | 31.06 | 32.40 | 36.57 | 41.88 | 41.24 | 41.43 |
| 5/13/2019 | 32.25 | 29.69 | 60.19 | 60.19 | 60.19 | 60.19 | 60.19 | 53.47 | 37.11 | 35.63 | 32.63 | 29.50 | 30.27 | 32.66 | 29.47 | 31.55 | 33.92 | 36.97 | 42.34 | 39.04 | 41.60 |
| 6/4/2019 | 29.17 | 27.37 | 57.36 | 57.36 | 57.36 | 57.36 | 57.36 | 51.34 | 35.72 | 33.13 | 30.08 | 26.70 | 26.84 | 29.29 | 28.20 | 28.54 | 32.17 | 36.11 | 41.05 | 40.30 | 40.74 |
| 7/9/2019 | 31.13 | 29.51 | 58.98 | 58.98 | 58.98 | 58.98 | 58.98 | 52.18 | 36.33 | 34.23 | 31.51 | 28.91 | 29.47 | 32.38 | 29.30 | 31.08 | 33.67 | 36.18 | 40.79 | 40.57 | 38.90 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150   FAX 703 471-6676

# APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date Monitored | A-2 | A-3 | A-5 | A-6 | A-7 | A-8 | A-9 | A-10 | A-15 | A-16 | A-17 | A-18 | A-19 | A-20 | A-22 | A-22D | A-23 | B-1 | B-2 | B-2R | B-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | | |
| 8/26/2019 | 30.15 | 27.66 | 57.87 | 57.87 | 57.87 | 57.87 | 57.87 | 49.93 | 35.47 | 32.56 | 29.98 | 27.29 | 27.35 | 29.92 | 27.96 | 29.80 | 32.25 | 35.49 | 39.77 | 39.05 | 40.12 |
| 9/16/2019 | 29.51 | 26.90 | 57.52 | 57.52 | 57.52 | 57.52 | 57.52 | 49.53 | 34.99 | 32.04 | 29.72 | 26.71 | 26.86 | 29.52 | 27.04 | 28.87 | 28.19 | 35.08 | 39.45 | 38.72 | 39.60 |
| 10/10/2019 | 28.44 | 26.00 | 56.56 | 56.56 | 56.56 | 56.56 | 56.56 | 48.88 | 34.15 | 31.30 | 29.04 | 26.00 | 26.05 | 28.89 | 26.10 | 28.23 | 30.54 | 34.34 | 38.45 | 37.84 | 38.72 |
| 11/14/2019 | 30.85 | 27.50 | 57.39 | 57.39 | 57.39 | 57.39 | 57.39 | 51.57 | 36.24 | 33.47 | 30.24 | 27.22 | 27.41 | 29.63 | 28.18 | 30.00 | 32.34 | 35.93 | 39.89 | 39.55 | 40.64 |
| 12/5/2019 | 31.89 | 27.83 | 57.57 | 57.57 | 57.57 | 57.57 | 57.57 | 52.17 | 36.42 | 34.44 | 30.99 | 27.48 | 28.54 | 30.11 | 28.63 | 30.40 | 32.66 | 36.20 | 40.23 | 39.93 | 40.93 |
| 1/21/2020 | 31.94 | 27.84 | 58.10 | 58.10 | 58.10 | 58.10 | 58.10 | 52.70 | 36.84 | 34.21 | 30.80 | 27.47 | 28.36 | 29.92 | 29.00 | 30.84 | 32.69 | 36.77 | 41.39 | 40.97 | 41.47 |
| 2/18/2020 | 32.47 | 28.14 | 58.95 | 58.95 | 58.95 | 58.95 | 58.95 | 53.01 | 37.66 | 34.56 | 31.02 | 27.98 | 28.65 | 30.26 | 29.33 | 31.24 | 32.93 | 37.60 | 42.28 | 41.68 | 42.19 |
| 3/16/2020 | 31.61 | 27.68 | 58.63 | 58.63 | 58.63 | 58.63 | 58.63 | 52.29 | 36.49 | 33.55 | 30.44 | 27.28 | 27.59 | 29.88 | 28.93 | 30.77 | 32.27 | 36.42 | 41.31 | 40.75 | 41.33 |
| 4/2/2020 | --- | --- | --- | --- | --- | --- | --- | --- | 36.97 | --- | --- | --- | --- | --- | --- | --- | --- | 36.80 | 41.97 | 41.38 | 41.70 |
| 5/5/2020 | --- | --- | --- | --- | --- | --- | --- | --- | 38.41 | --- | --- | --- | --- | --- | --- | --- | --- | 38.56 | 42.61 | 42.08 | 42.70 |
| 6/11/2020 | 31.18 | 27.68 | 58.76 | 58.76 | 58.76 | 58.76 | 58.76 | 51.81 | 36.00 | 32.90 | 29.97 | 27.31 | 27.23 | 29.80 | 28.51 | 30.54 | 31.99 | 35.81 | 40.67 | 39.66 | 40.62 |
| 7/9/2020 | 31.79 | 28.39 | 58.54 | 58.54 | 58.54 | 58.54 | 58.54 | 52.63 | 36.90 | 34.02 | 30.78 | 28.24 | 28.29 | 30.49 | 28.82 | 30.91 | 33.21 | 36.50 | 40.92 | 40.60 | 40.93 |
| 8/14/2020 | 33.26 | 29.20 | 58.84 | 58.84 | 58.84 | 58.84 | 58.84 | 52.73 | 38.07 | 35.84 | 31.87 | 29.15 | 30.06 | 32.07 | 29.34 | 31.46 | 33.57 | 37.85 | 41.97 | 41.76 | 41.61 |
| 9/11/2020 | 32.22 | 29.80 | 59.15 | 59.15 | 59.15 | 59.15 | 59.15 | 52.90 | 37.36 | 34.68 | 32.23 | 29.83 | 30.03 | 32.63 | 29.72 | 31.59 | 33.91 | 37.09 | 41.36 | 40.94 | 41.45 |
| 10/29/2020 | 32.28 | 28.75 | 59.26 | 59.26 | 59.26 | 59.26 | 59.26 | 52.77 | 37.21 | 35.92 | 32.69 | 28.66 | 30.35 | 31.56 | 29.40 | 31.21 | --- | 37.08 | 41.76 | 41.69 | 42.84 |
| 11/24/2020 | 32.18 | 28.06 | 59.75 | 59.75 | 59.75 | 59.75 | 59.75 | 52.80 | 37.08 | 33.76 | 30.47 | 27.66 | 28.06 | 30.04 | 29.31 | 31.21 | 32.60 | 37.47 | 41.89 | 41.35 | 41.68 |
| 12/14/2020 | 32.32 | 28.25 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 53.02 | 37.19 | 33.92 | 30.79 | 27.93 | 28.28 | 30.25 | 29.44 | 31.34 | 32.84 | 37.64 | 42.43 | 41.75 | 42.14 |
| Maximum | 35.15 | 29.80 | 61.75 | 61.75 | 61.75 | 61.75 | 61.75 | 54.29 | 39.17 | 37.48 | 33.26 | 30.96 | 32.07 | 33.38 | 30.00 | 31.96 | 33.92 | 41.17 | 45.71 | 43.27 | 43.28 |
| Minimum | 26.35 | 17.71 | 56.55 | 56.55 | 56.55 | 56.55 | 56.55 | 41.97 | 30.22 | 31.30 | 20.30 | 25.14 | 24.62 | 27.47 | 23.43 | 28.23 | 28.12 | 25.95 | 36.37 | 36.17 | 38.72 |

Notes: 1. GWE, '---', and ft-AMSL means groundwater elevation, data not recorded, and feet above mean sea level, respectively.
2. GWE data with '+' sign is identified as high outlier.
3. "DRY" or "Water Not Detected" observation for A-6 and B-1 GWM wells has been replaced with the well bottom elevation.
Depressed groundwater conditions.
Elevated groundwater conditions.

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676



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CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

**B. OTHER GWM WELLS**

| Date | B-4 | B-6R | B-7 | B-8 | B-9 | B-10 | NES-1D | NES-1S | NES-2D | NES-2DD | NES-2S | NES-3 | NES-4 | NES-5 | NES-6D | NES-6S | NES-7S | NES-8S | PP-1A | PP-1B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | |
| 1/5/2005 | 50.00 | --- | 69.51 | 79.35 | 81.10 | 78.82 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.67 | 31.56 |
| 2/11/2005 | 49.32 | 56.65 | 69.56 | 79.49 | 81.56 | 80.04 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.55 | 31.45 |
| 3/24/2005 | 50.98 | --- | 69.84 | 81.49 | 81.84 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 33.22 | 33.12 |
| 4/21/2005 | 50.10 | --- | 69.59 | 79.31 | 81.35 | 80.83 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.40 | 31.30 |
| 5/24/2005 | 50.50 | --- | 69.80 | 79.54 | 81.65 | 81.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.55 | 31.46 |
| 6/8/2005 | 50.08 | --- | 69.71 | 79.70 | 81.66 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.55 | 31.43 |
| 7/1/2005 | 49.53 | 50.96 | 69.41 | 78.85 | 80.47 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.60 | 30.50 |
| 8/15/2005 | 49.54 | 55.76 | 69.34 | 79.47 | 80.52 | 79.77 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.02 | 30.91 |
| 9/7/2005 | 49.28 | --- | 69.06 | 79.18 | 77.08 | 79.27 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 29.97 | 30.18 |
| 11/18/2005 | 50.32 | --- | 69.19 | 79.47 | 80.57 | 78.52 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.52 | 31.40 |
| 12/27/2005 | 50.58 | --- | 69.54 | 78.87 | 81.16 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.52 | 30.98 |
| 2/6/2006 | 50.64 | 56.50 | 69.82 | 81.42 | 81.85 | 79.18 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.88 | 31.74 |
| 3/24/2006 | 50.01 | 56.03 | 69.15 | 78.86 | 79.91 | 79.04 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.58 | 31.28 |
| 4/6/2006 | 49.98 | 55.95 | 69.16 | 78.85 | 80.02 | 78.92 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.27 | 31.18 |
| 5/4/2006 | 49.43 | 55.75 | 68.94 | 79.98 | 79.87 | 78.87 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.32 | 31.38 |
| 6/12/2006 | 49.98 | 61.75+ | 68.31 | 78.97 | 79.56 | 78.65 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.41 | 31.37 |
| 7/25/2006 | 49.83 | 61.25+ | 67.96 | 78.70 | 79.51 | 78.47 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.17 | 30.98 |
| 8/28/2006 | 49.32 | 55.44 | 68.64 | 78.81 | 79.14 | 78.22 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.10 | 29.99 |
| 9/11/2006 | 49.83 | 55.45 | 68.94 | 78.87 | 79.87 | 78.46 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.34 | 30.93 |
| 10/31/2006 | 50.05 | 56.22 | 69.36 | 79.10 | 80.37 | 79.87 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.47 | 31.08 |
| 11/10/2006 | 37.88 | 62.45+ | 69.90 | 79.68 | 80.56 | 79.72 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.75 | 31.54 |
| 12/14/2006 | 50.08 | 56.20 | 69.41 | 79.20 | 80.37 | 79.27 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.58 | 31.48 |
| 1/1/2007 | 49.95 | 56.09 | 69.20 | 78.97 | 80.11 | 79.83 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.33 | 30.93 |
| 2/2/2007 | 50.44 | 56.73 | 69.62 | 79.95 | 80.89 | 80.00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.65 | 31.53 |
| 3/7/2007 | 49.98 | 56.13 | 69.24 | 79.00 | 82.16 | 79.88 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.37 | 30.98 |
| 4/7/2007 | 49.92 | 56.08 | 69.22 | 78.97 | 80.12 | 79.86 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.12 | 30.96 |
| 5/7/2007 | 51.54 | 55.95 | 69.26 | 78.89 | 80.16 | 80.25 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.08 | 30.99 |
| 6/1/2007 | 49.98 | 56.15 | 69.27 | 79.02 | 80.19 | 79.89 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.17 | 31.01 |
| 7/1/2007 | 50.98 | 55.53 | 68.66 | 78.65 | 80.01 | 80.12 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.87 | 30.58 |
| 8/7/2007 | 49.76 | 55.59 | 69.19 | 79.38 | 81.24 | 78.98 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.50 | 31.37 |
| 9/7/2007 | 49.83 | 57.32 | 67.96 | 78.70 | 79.51 | 78.47 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.17 | 30.95 |
| 10/7/2007 | 48.99 | 55.32 | 68.74 | 78.95 | 79.47 | 78.04 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 32.00 | 31.87 |
| 11/7/2007 | 49.98 | 61.75+ | 68.31 | 78.97 | 79.56 | 78.65 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.41 | 31.37 |
| 12/7/2007 | 48.98 | 61.75+ | 68.21 | 78.60 | 79.47 | 78.57 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.35 | 30.88 |
| 1/8/2008 | 50.38 | 51.42 | 69.46 | 80.90 | 81.37 | 78.07 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.97 | 30.78 |
| 2/1/2008 | 51.06 | 56.03 | 69.30 | 80.22 | 81.33 | 77.83 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.79 | 31.67 |
| 3/8/2008 | 50.38 | 53.72 | 69.46 | 78.30 | 81.07 | 79.97 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.87 | 31.38 |
| 4/8/2008 | 50.08 | 51.92 | 69.06 | 79.10 | 81.17 | 78.27 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.67 | 31.56 |
| 5/8/2008 | 50.08 | 52.32 | 69.14 | 78.90 | 80.37 | 78.67 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.47 | 31.28 |
| 6/8/2008 | 50.30 | 56.78 | 69.90 | 80.08 | 82.04 | 80.98 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.60 | 31.51 |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150   FAX 703 471-6676



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CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date | B-4 | B-6R | B-7 | B-8 | B-9 | B-10 | NES-1D | NES-1S | NES-2D | NES-2DD | NES-2S | NES-3 | NES-4 | NES-5 | NES-6D | NES-6S | NES-7S | NES-8S | PP-1A | PP-1B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monitored | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | |
| 7/8/2008 | 50.08 | 56.35 | 69.76 | 79.90 | 81.47 | 81.17 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.37 | 31.38 |
| 8/8/2008 | 49.86 | 56.16 | 69.60 | 73.27 | 80.66 | 80.75 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.19 | 31.06 |
| 9/8/2008 | 49.61 | 55.74 | 69.34 | 79.48 | 81.03 | 79.64 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.58 | 31.46 |
| 10/8/2008 | 49.66 | 55.64 | 69.17 | 79.24 | 80.14 | 79.11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.79 | 31.67 |
| 11/8/2008 | 50.04 | 55.76 | 69.13 | 79.31 | 80.08 | 78.75 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.59 | 31.57 |
| 12/8/2008 | 50.67 | 64.9+ | 69.34 | 79.78 | 80.89 | 78.71 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.64 | 31.52 |
| 1/26/2009 | 50.43 | 56.06 | 69.16 | 79.44 | 79.96 | 78.59 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.48 | 31.37 |
| 2/17/2009 | 50.34 | 56.07 | 69.11 | 79.41 | 79.86 | 78.43 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.60 | 31.48 |
| 3/27/2009 | 50.19 | 55.98 | 69.08 | 79.35 | 79.78 | 78.26 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.62 | 31.50 |
| 4/28/2009 | 50.70 | 56.24 | 69.53 | 80.01 | 81.29 | 78.78 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.57 | 31.45 |
| 5/22/2009 | 50.57 | 56.52 | 69.68 | 80.08 | 81.40 | 79.25 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.46 | 31.35 |
| 6/25/2009 | 50.29 | 56.45 | 69.71 | 79.99 | 81.09 | 79.53 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.36 | 31.25 |
| 7/1/2009 | 49.76 | 56.06 | 69.33 | 79.68 | 80.30 | 79.58 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.72 | 30.57 |
| 8/1/2009 | 49.69 | 55.93 | 69.34 | 79.71 | 80.85 | 79.35 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.47 | 31.36 |
| 9/24/2009 | 50.31 | 55.81 | 69.42 | 79.85 | 80.25 | 79.15 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.42 | 31.31 |
| 10/29/2009 | 51.80 | 56.12 | 70.03 | 82.18 | 81.93 | 79.52 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 32.21 | 32.08 |
| 11/25/2009 | 51.37 | 56.63 | 70.38 | 83.59 | 82.47 | 80.47 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 32.25 | 32.12 |
| 12/30/2009 | 51.40 | 57.52 | 70.42 | 80.97 | 81.97 | 81.71 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.66 | 31.55 |
| 1/28/2010 | 50.68 | 57.00 | 70.28 | 80.92 | 82.28 | 82.43 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.71 | 31.60 |
| 3/1/2010 | 51.37 | 57.10 | 70.78 | 81.37 | 82.51 | 83.06 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 32.14 | 32.00 |
| 4/8/2010 | 50.59 | 57.34 | 70.45 | 80.66 | 82.30 | 84.11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.52 | 31.40 |
| 5/28/2010 | 49.98 | 56.42 | 69.93 | 80.06 | 81.48 | 82.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.29 | 31.17 |
| 6/30/2010 | 49.40 | 55.85 | 69.63 | 79.77 | 80.65 | 81.02 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.62 | 30.45 |
| 7/28/2010 | 49.35 | 55.64 | 69.53 | 79.74 | 80.84 | 80.39 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.10 | 30.99 |
| 8/16/2010 | 50.23 | 55.67 | 69.61 | 79.80 | 80.89 | 79.91 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.36 | 31.24 |
| 9/23/2010 | 49.58 | 55.43 | 69.12 | 79.14 | 79.56 | 79.19 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.78 | 30.65 |
| 10/21/2010 | 50.49 | 55.91 | 69.58 | 79.94 | 80.59 | 79.25 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.49 | 31.37 |
| 11/22/2010 | 50.40 | 56.03 | 69.47 | 79.86 | 80.26 | 78.99 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.46 | 31.34 |
| 12/16/2010 | 50.68 | 56.06 | 69.57 | 80.10 | 80.53 | 78.83 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.55 | 31.42 |
| 1/6/2011 | 50.32 | 56.05 | 69.33 | 79.67 | 79.85 | 78.73 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.49 | 31.37 |
| 2/7/2011 | 51.05 | 56.13 | 69.70 | 80.46 | 81.42 | 78.64 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.80 | 31.66 |
| 3/3/2011 | 50.57 | 56.26 | 69.51 | 79.99 | 80.61 | 78.55 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.54 | 31.42 |
| 4/7/2011 | 50.58 | 56.78 | 69.74 | 80.14 | 81.20 | 79.44 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.48 | 31.37 |
| 5/3/2011 | 50.42 | 56.63 | 69.75 | 80.05 | 81.14 | 79.70 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.44 | 31.33 |
| 6/24/2011 | 49.64 | 55.92 | 69.29 | 79.42 | 79.88 | 79.22 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.77 | 30.65 |
| 7/25/2011 | 49.02 | 55.50 | 68.85 | 78.92 | 79.44 | 78.77 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.21 | 30.10 |
| 8/15/2011 | 48.77 | 55.42 | 68.94 | 79.22 | 80.22 | 78.47 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.65 | 30.53 |
| 9/26/2011 | 50.96 | 57.24 | 70.38 | 80.65 | 81.69 | 80.45 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.60 | 31.45 |
| 10/27/2011 | 50.43 | 56.69 | 70.00 | 80.05 | 80.85 | 80.47 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.42 | 31.28 |
| 11/18/2011 | 50.40 | 56.50 | 69.92 | 80.07 | 81.21 | 80.20 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.41 | 31.27 |
| 12/20/2011 | 50.70 | 57.04 | 70.02 | 80.22 | 81.08 | 80.88 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.38 | 31.24 |
| 1/16/2012 | 50.57 | 56.72 | 70.01 | 80.33 | 81.24 | 80.86 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.39 | 31.16 |
| 2/13/2012 | 50.35 | 56.57 | 69.82 | 80.06 | 81.08 | 80.73 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.32 | 31.18 |
| 3/5/2012 | 50.89 | 56.51 | 70.00 | 80.50 | 80.59 | 81.51 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.52 | 31.38 |

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Reston, VA 20190
703 471-6150 FAX 703 471-6676

APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date Monitored | B-4 | B-6R | B-7 | B-8 | B-9 | B-10 | NES-1D | NES-1S | NES-2D | NES-2DD | NES-2S | NES-3 | NES-4 | NES-5 | NES-6D | NES-6S | NES-7S | NES-8S | PP-1A | PP-1B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | |
| 4/18/2012 | 50.11 | 56.33 | 69.55 | 79.59 | 80.11 | 80.06 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.10 | 30.96 |
| 5/7/2012 | 50.06 | 56.19 | 69.50 | 79.57 | 80.09 | 79.81 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.14 | 31.01 |
| 6/11/2012 | 49.63 | 55.86 | 69.23 | 79.30 | 79.75 | 79.34 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.85 | 30.72 |
| 7/27/2012 | 48.93 | 55.44 | 68.83 | 78.98 | 79.22 | 78.75 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.85 | 30.73 |
| 8/13/2012 | 48.63 | 55.31 | 68.80 | 78.95 | 78.88 | 78.51 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.91 | 30.78 |
| 9/21/2012 | 48.19 | 55.25 | 68.70 | 78.89 | 78.84 | 77.94 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.02 | 30.88 |
| 10/4/2012 | 48.26 | 55.24 | 68.44 | 78.58 | 78.37 | 77.74 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.07 | 30.93 |
| 11/15/2012 | 50.30 | 55.61 | 68.81 | 79.04 | 78.74 | 77.59 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.25 | 31.10 |
| 12/12/2012 | 50.04 | 55.62 | 68.50 | 78.79 | 78.31 | 77.22 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.30 | 31.14 |
| 1/29/2013 | 50.37 | 55.80 | 65.78 | 79.24 | 78.87 | 77.37 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.38 | 31.23 |
| 2/11/2013 | 50.53 | 55.93 | 69.04 | 79.64 | 79.65 | 77.55 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.93 | 31.73 |
| 3/21/2013 | 50.53 | 56.28 | 69.20 | 79.58 | 79.73 | 78.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.34 | 31.19 |
| 4/8/2013 | 50.31 | 56.37 | 69.11 | 79.44 | 79.58 | 77.96 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.29 | 31.16 |
| 5/14/2013 | 50.21 | 56.19 | 69.27 | 79.65 | 80.30 | 78.11 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.29 | 31.13 |
| 6/14/2013 | 50.85 | 56.10 | 69.47 | 79.88 | 80.47 | 78.33 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.32 | 31.18 |
| 7/9/2013 | 50.18 | 55.98 | 69.44 | 79.64 | 80.19 | 78.69 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.99 | 30.86 |
| 7/29/2013 | 49.98 | 56.36 | 69.41 | 79.50 | 79.89 | 78.95 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.78 | 30.64 |
| 8/15/2013 | 49.62 | 55.86 | 69.25 | 73.32 | 79.69 | 78.87 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.78 | 30.64 |
| 9/11/2013 | 49.03 | 55.54 | 68.76 | 78.88 | 79.03 | 78.65 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.58 | 30.44 |
| 10/25/2013 | 50.42 | 55.78 | 69.25 | 79.39 | 79.47 | 78.59 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.12 | 30.97 |
| 11/7/2013 | 50.17 | 55.79 | 69.14 | 73.23 | 79.06 | 78.41 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.22 | 31.07 |
| 12/13/2013 | 51.14 | 55.91 | 69.61 | 80.22 | 80.20 | 78.54 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.71 | 31.52 |
| 1/17/2014 | 50.97 | 56.33 | 69.82 | 80.37 | 43.27 | 79.16 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.73 | 31.56 |
| 2/11/2014 | 50.89 | 56.57 | 69.73 | 79.74 | 80.50 | 79.27 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.42 | 31.26 |
| 3/24/2014 | 48.10 | 56.86 | 70.00 | 77.93 | 80.95 | 77.39 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 28.95 | 28.77 |
| 4/25/2014 | 50.46 | 56.93 | 69.96 | 80.08 | 81.05 | 80.84 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.26 | 31.11 |
| 5/15/2014 | 50.40 | 57.18 | 70.03 | 79.99 | 81.25 | 81.68 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 31.10 | 30.95 |
| 6/24/2014 | 49.89 | 56.29 | 69.80 | 79.71 | 80.75 | 81.37 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.76 | 30.59 |
| 7/9/2014 | 49.63 | 56.02 | 69.63 | 79.51 | 83.29 | 80.96 | 54.52 | 55.21 | 28.95 | --- | 26.57 | 25.74 | 47.40 | 57.27 | --- | --- | --- | --- | 30.75 | 30.60 |
| 8/13/2014 | 51.48 | 55.80 | 69.92 | 80.36 | 81.47 | 80.26 | 54.62 | 55.27 | 29.77 | --- | 28.42 | 27.89 | 49.93 | 57.28 | --- | --- | --- | --- | 32.01 | 31.85 |
| 9/22/2014 | 49.67 | 55.47 | 69.17 | 79.07 | 79.36 | 79.48 | 54.00 | 54.66 | 28.19 | --- | 25.95 | 25.43 | 46.90 | 56.72 | --- | --- | --- | --- | 30.61 | 30.46 |
| 10/27/2014 | 49.75 | 55.53 | 69.19 | 79.19 | 79.60 | 78.91 | 54.07 | 54.81 | 29.08 | --- | 27.50 | 27.25 | 47.46 | 56.79 | --- | --- | --- | --- | 30.98 | 30.81 |
| 11/14/2014 | 49.79 | 55.56 | 69.06 | 79.14 | 79.11 | 78.66 | 54.12 | 54.87 | 29.13 | --- | 27.63 | 27.28 | 47.67 | 56.84 | --- | --- | --- | --- | 31.03 | 30.87 |
| 12/17/2014 | 50.64 | 55.71 | 69.55 | 80.02 | 80.52 | 78.67 | 54.34 | 55.07 | 29.78 | --- | 28.12 | 27.86 | 48.46 | 57.03 | --- | --- | --- | --- | 31.79 | 31.58 |
| 1/15/2015 | 50.85 | 55.84 | 69.70 | 80.45 | 80.66 | 78.68 | 54.48 | 55.20 | 29.99 | --- | 28.28 | 27.91 | 49.51 | 57.20 | --- | --- | --- | --- | 31.73 | 31.56 |
| 2/5/2015 | 50.83 | 56.01 | 69.71 | 80.20 | 80.56 | 79.01 | 54.58 | 55.36 | 29.99 | --- | 28.24 | 27.86 | 49.55 | 57.29 | --- | --- | --- | --- | 31.56 | 31.38 |
| 3/16/2015 | 51.24 | 56.29 | 70.11 | 81.21 | 81.51 | 79.02 | 54.59 | 55.67 | 30.31 | --- | 28.49 | 27.96 | 50.05 | 57.77 | --- | --- | --- | --- | 31.88 | 31.68 |
| 4/28/2015 | 50.62 | 56.64 | 69.84 | 80.06 | 80.69 | 79.41 | 55.07 | 55.94 | 30.19 | --- | 28.28 | 27.68 | 49.70 | 57.92 | --- | --- | --- | --- | 30.96 | 31.34 |
| 5/29/2015 | 49.88 | 56.23 | 69.50 | 79.27 | 80.09 | 79.37 | 54.73 | 55.47 | 29.41 | --- | 27.46 | 26.85 | 48.61 | 57.60 | --- | --- | --- | --- | 30.78 | 30.61 |
| 6/22/2015 | 50.33 | 56.04 | 69.85 | 80.30 | 81.01 | 79.51 | 54.74 | 55.43 | 30.04 | --- | 28.32 | 27.90 | 49.04 | 57.55 | --- | --- | --- | --- | 31.72 | 31.55 |
| 7/30/2015 | 49.85 | 55.88 | 69.63 | 79.65 | 80.13 | 79.93 | 54.47 | 55.11 | 28.90 | --- | 26.65 | 25.88 | 47.75 | 57.32 | --- | --- | --- | --- | 30.61 | 30.46 |
| 8/17/2015 | 49.39 | 55.63 | 69.39 | 79.35 | 79.63 | 79.62 | 54.17 | 54.77 | 29.14 | --- | 25.90 | 25.11 | 46.80 | 56.89 | --- | --- | --- | --- | 30.45 | 30.30 |
| 9/16/2015 | 48.66 | 55.32 | 68.97 | 78.79 | 78.96 | 79.11 | 53.78 | 54.48 | 27.31 | --- | 25.24 | 24.32 | 46.03 | 56.54 | --- | --- | --- | --- | 30.31 | 30.17 |
| 10/8/2015 | 50.13 | 55.59 | 69.59 | 79.71 | 79.99 | 78.97 | 54.17 | 54.89 | 29.22 | --- | 27.81 | 27.45 | 47.97 | 56.88 | --- | --- | --- | --- | 31.13 | 30.96 |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-C

CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date Monitored | B-4 | B-6R | B-7 | B-8 | B-9 | B-10 | NES-1D | NES-1S | NES-2D | NES-2DD | NES-2S | NES-3 | NES-4 | NES-5 | NES-6D | NES-6S | NES-7S | NES-8S | PP-1A | PP-1B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | |
| 11/9/2015 | 50.01 | 55.65 | 69.25 | 79.28 | 79.25 | 78.66 | 54.18 | 54.99 | 29.35 | --- | 27.80 | 27.35 | 48.02 | 56.92 | --- | --- | --- | --- | 31.06 | 30.88 |
| 12/3/2015 | 50.17 | 55.75 | 69.85 | 81.83 | 80.60 | 78.55 | 54.39 | 55.14 | 29.89 | 30.33 | 28.56 | 27.91 | 48.63 | 57.05 | 28.29 | 27.58 | --- | --- | 31.85 | 31.64 |
| 1/6/2016 | 50.57 | 55.84 | 69.64 | 79.92 | 80.05 | 78.43 | 54.35 | 55.20 | 29.93 | 30.40 | 28.43 | 27.63 | 49.60 | 57.05 | 28.11 | 27.43 | --- | --- | 31.19 | 31.01 |
| 2/8/2016 | 51.07 | 56.21 | 70.12 | 80.76 | 81.37 | 79.12 | 54.78 | 55.61 | 30.40 | 30.89 | 28.84 | 27.91 | 49.95 | 57.69 | 28.38 | 27.46 | --- | --- | 31.65 | 31.49 |
| 3/18/2016 | 50.31 | 56.68 | 69.66 | 79.88 | 80.32 | 79.38 | 55.00 | 55.99 | 30.04 | 30.50 | 28.42 | 27.49 | 49.36 | 58.06 | 28.17 | 27.13 | --- | --- | 31.08 | 30.91 |
| 4/25/2016 | 50.02 | 56.28 | 69.44 | 79.49 | 79.73 | 79.09 | 54.75 | 55.55 | 29.53 | 29.97 | 27.91 | 26.96 | 49.16 | 57.64 | 25.90 | 26.65 | --- | --- | 30.85 | 30.69 |
| 5/31/2016 | 50.25 | 56.14 | 69.74 | 79.99 | 81.13 | 79.10 | 54.91 | 55.45 | 30.15 | 30.62 | 28.57 | 27.88 | 49.33 | 57.63 | 28.35 | 27.34 | --- | --- | 31.28 | 31.12 |
| 6/13/2016 | 49.91 | 56.04 | 69.43 | 79.59 | 80.14 | 79.08 | 54.47 | 55.30 | 29.36 | 29.84 | 27.52 | 26.53 | 49.73 | 57.26 | 27.42 | 26.28 | --- | --- | 30.48 | 30.39 |
| 7/7/2016 | 49.62 | 55.89 | 69.40 | 79.63 | 80.42 | 78.83 | 54.42 | 55.13 | 29.64 | 30.14 | 28.16 | 27.35 | 47.79 | 56.15 | 27.99 | 27.07 | --- | --- | 30.66 | 30.51 |
| 8/8/2016 | 49.48 | 55.59 | 69.19 | 79.26 | 79.64 | 78.55 | 54.13 | 54.79 | 29.36 | 29.80 | 27.87 | 26.72 | 47.27 | 56.82 | 27.73 | 26.76 | --- | --- | 30.54 | 30.38 |
| 9/9/2016 | 48.82 | 55.28 | 68.68 | 78.68 | 78.85 | 78.22 | 53.75 | 54.47 | 28.24 | 28.70 | 26.28 | 25.54 | 46.27 | 56.50 | 26.59 | 25.57 | --- | --- | 30.41 | 30.26 |
| 10/28/2016 | 50.17 | 55.61 | 69.02 | 79.10 | 78.99 | 77.94 | 54.10 | 54.91 | 29.38 | 29.84 | 27.97 | 27.14 | 47.65 | 56.77 | 27.77 | 26.97 | --- | --- | 30.73 | 30.56 |
| 11/22/2016 | 50.05 | 55.59 | 68.57 | 78.50 | 78.39 | 77.65 | 54.08 | 54.94 | 28.97 | 29.41 | 27.69 | 26.87 | 47.73 | 56.73 | 27.57 | 26.76 | --- | --- | 30.69 | 30.51 |
| 12/6/2016 | 49.99 | 55.57 | 68.65 | 78.64 | 78.26 | 77.16 | 54.08 | 54.91 | 29.18 | 29.58 | 28.04 | 27.35 | 47.77 | 56.75 | 27.83 | 27.11 | --- | --- | 30.83 | 30.65 |
| 1/5/2017 | 50.64 | 55.63 | 69.17 | 80.08 | 79.20 | 76.97 | 54.20 | 55.05 | 29.64 | 30.27 | 28.62 | 28.07 | 48.16 | 56.91 | 27.95 | 27.39 | --- | --- | 31.72 | 31.46 |
| 2/20/2017 | 50.25 | 55.68 | 68.68 | 78.50 | 78.56 | 77.32 | 54.10 | 58.77+ | 29.22 | 29.66 | 27.93 | 27.61 | 48.86 | 56.77 | 28.11 | 27.19 | --- | --- | 30.82 | 30.64 |
| 3/17/2017 | 50.03 | 55.69 | 69.03 | 79.59 | 78.88 | 77.09 | 54.17 | 55.09 | 29.78 | 30.19 | 28.47 | 27.84 | 48.82 | 56.76 | 28.25 | 27.34 | --- | --- | 31.50 | 31.26 |
| 4/13/2017 | 50.64 | 55.88 | 69.16 | 79.51 | 79.30 | 77.62 | 54.33 | 55.29 | 29.97 | 30.42 | 28.50 | 27.69 | 49.65 | 57.04 | 28.17 | 27.31 | --- | --- | 31.01 | 30.84 |
| 5/4/2017 | 50.19 | 55.90 | 69.05 | 79.31 | 79.29 | 77.62 | 54.32 | 55.21 | 29.69 | 30.15 | 28.18 | 27.21 | 49.09 | 57.07 | 27.97 | 27.00 | --- | --- | 30.68 | 30.51 |
| 6/15/2017 | 49.98 | 55.64 | 71.10 | 77.39 | 77.99 | 76.81 | 54.25 | 55.05 | 29.14 | 29.62 | 27.38 | 26.38 | 48.20 | 56.98 | 27.73 | 26.22 | --- | --- | 28.90 | 28.97 |
| 7/24/2017 | 49.18 | 55.21 | 70.90 | 77.29 | 77.89 | 75.88 | 53.95 | 54.69 | 29.19 | 29.56 | 27.85 | 28.23 | 46.82 | 56.64 | 28.03 | 27.86 | 27.43 | 29.75 | 30.54 | 30.59 |
| 8/31/2017 | 50.09 | 55.38 | 70.75 | 77.04 | 77.57 | 76.20 | 54.04 | 54.83 | 29.17 | 29.65 | 27.77 | 27.10 | 48.06 | 56.33 | 27.66 | 26.72 | 26.38 | 30.17 | 28.71 | 28.77 |
| 9/22/2017 | 49.96 | 55.28 | 70.95 | 77.21 | 77.62 | 76.48 | 53.88 | 54.69 | 29.28 | 29.73 | 27.87 | 26.97 | 47.46 | 56.57 | 27.67 | 26.75 | 26.41 | 30.31 | 29.58 | 29.03 |
| 10/23/2017 | 49.71 | 55.11 | 70.62 | 76.67 | 76.92 | 76.08 | 53.74 | 54.53 | 28.60 | 29.04 | 27.28 | 26.46 | 47.27 | 56.51 | 27.07 | 26.27 | 26.15 | 29.64 | 29.01 | 29.06 |
| 11/30/2017 | 50.17 | 55.28 | 70.59 | 77.27 | 76.95 | 75.91 | 53.85 | 54.81 | 29.34 | 29.76 | 28.13 | 27.35 | --- | 56.58 | 27.79 | 27.05 | 26.70 | 30.39 | 29.24 | 29.28 |
| 1/29/2018 | 49.97 | 55.25 | 70.33 | 76.62 | 76.68 | 75.47 | 53.88 | 54.80 | 29.40 | 29.70 | 28.35 | 27.74 | 47.90 | 56.64 | 27.98 | 27.18 | 26.86 | 30.40 | 30.25 | 29.61 |
| 2/12/2018 | 51.85 | 55.47 | 71.37 | 81.94 | 78.04 | 75.60 | 54.25 | 55.21 | 30.41 | 30.76 | 29.23 | 28.16 | 50.74 | 56.84 | 28.77 | 27.59 | 27.15 | 31.73 | 31.58 | 30.71 |
| 3/15/2018 | 50.51 | 55.76 | 71.09 | 77.45 | 77.64 | 76.52 | 54.28 | 55.28 | 29.97 | 30.42 | 28.69 | 27.81 | 49.28 | 57.19 | 28.28 | 27.30 | 26.90 | 31.15 | 29.53 | 29.59 |
| 4/6/2018 | 50.54 | 55.89 | 71.20 | 77.50 | 77.79 | 76.61 | 54.38 | 55.41 | 30.01 | 30.46 | 28.56 | 27.71 | 49.46 | 57.37 | 28.27 | 27.29 | 26.89 | 31.26 | 29.45 | 29.51 |
| 5/31/2018 | 50.65 | 56.48 | 71.65 | 77.81 | 78.75 | 77.27 | 54.88 | 54.95 | 30.21 | 30.69 | 28.58 | 27.59 | 49.62 | 58.26 | 28.21 | 27.13 | 26.75 | 31.74 | 29.26 | 29.32 |
| 6/13/2018 | 50.72 | 56.84 | 72.05 | 78.62 | 79.76 | 77.80 | 55.17 | 56.24 | 30.53 | 31.04 | 28.81 | 27.96 | 49.60 | 58.64 | 28.50 | 27.31 | 26.95 | 32.05 | 29.65 | 29.68 |
| 7/6/2018 | 50.04 | 56.19 | 71.36 | 77.38 | 78.37 | 77.74 | 54.62 | 55.63 | 29.22 | 29.70 | 27.34 | 26.30 | 48.05 | 57.73 | 27.68 | 25.72 | 26.24 | 30.57 | 28.76 | 29.20 |
| 8/23/2018 | 50.32 | 56.16 | 72.14 | 78.23 | 79.89 | 78.82 | 54.88 | 55.60 | 30.42 | 30.74 | 28.73 | 27.95 | 48.87 | 58.23 | 28.42 | 26.73 | 26.94 | 31.50 | 29.55 | 29.60 |
| 9/11/2018 | 50.33 | 55.96 | 72.38 | 78.75 | 80.23 | 78.84 | 54.72 | 55.44 | 30.23 | 30.71 | 28.71 | 28.03 | 48.37 | 57.32 | 28.42 | 27.56 | 26.96 | 31.46 | 30.27 | 29.87 |
| 10/16/2018 | 50.77 | 55.94 | 72.29 | 78.54 | 80.05 | 79.43 | 54.75 | 55.45 | 30.41 | 30.89 | 29.32 | 27.99 | 49.64 | 57.38 | 28.43 | 27.22 | 27.01 | 31.75 | 29.57 | 29.48 |
| 11/14/2018 | 51.63 | 56.17 | 72.73 | 80.20 | 80.74 | 80.08 | 55.00 | 55.70 | 30.77 | 31.26 | 29.22 | 28.21 | 49.98 | 57.61 | 28.84 | 27.53 | 27.11 | 32.35 | 32.53 | 30.26 |
| 12/5/2018 | 50.67 | 56.57 | 72.43 | 78.83 | 80.49 | 80.63 | 55.16 | 56.03 | 30.63 | 31.08 | 29.06 | 28.11 | 49.64 | 57.90 | 28.58 | 27.48 | 27.08 | 32.05 | 29.65 | 29.58 |
| 1/17/2019 | 50.16 | 56.83 | 72.48 | 78.79 | 80.76 | 81.46 | 55.25 | 56.23 | 30.62 | 31.09 | 29.11 | 28.13 | 49.51 | 58.12 | 28.61 | 27.48 | 26.36 | 31.98 | 29.51 | 29.55 |
| 2/4/2019 | 50.71 | 56.92 | 72.59 | 78.82 | 80.79 | 81.91 | 55.30 | 56.32 | 30.56 | 31.14 | 29.20 | 28.25 | 49.69 | 58.26 | 28.67 | 27.48 | 27.18 | 29.08 | 29.72 | 29.79 |
| 3/4/2019 | 51.37 | 57.00 | 73.19 | 82.47 | 81.45 | 82.75 | 55.48 | 56.46 | 31.23 | 31.84 | 29.70 | 28.57 | 50.02 | 58.50 | 29.12 | 27.96 | 27.60 | 32.90 | 31.08 | 30.88 |
| 4/18/2019 | 50.26 | 56.80 | 72.54 | 78.57 | 80.95 | 81.96 | 55.20 | 56.11 | 30.48 | 30.97 | 28.92 | 27.92 | 49.36 | 58.13 | 28.48 | 27.08 | 26.82 | 31.71 | 29.25 | 29.34 |
| 5/13/2019 | 50.33 | 56.59 | 73.12 | 81.17 | 81.56 | 81.73 | 55.17 | 55.87 | 30.94 | 31.42 | 29.56 | 27.88 | 49.19 | 58.02 | 29.19 | 27.98 | --- | --- | 31.07 | 30.92 |
| 6/4/2019 | 50.05 | 56.29 | 72.29 | 75.92 | 78.41 | 78.59 | 54.77 | 55.58 | 29.64 | 28.45 | 28.10 | 26.96 | 48.46 | 57.55 | 27.64 | 26.89 | 26.12 | 30.83 | 28.41 | 28.92 |
| 7/9/2019 | 48.43 | 55.54 | 70.35 | 77.38 | 80.47 | 80.27 | 54.32 | 54.95 | 30.66 | 31.00 | 29.29 | 28.37 | 48.59 | 55.30 | 28.85 | 28.42 | --- | 31.42 | 29.93 | 29.82 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150   FAX 703 471-6676



CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

| Date Monitored | B-4 | B-6R | B-7 | B-8 | B-9 | B-10 | NES-1D | NES-1S | NES-2D | NES-2DD | NES-2S | NES-3 | NES-4 | NES-5 | NES-6D | NES-6S | NES-7S | NES-8S | PP-1A | PP-1B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Groundwater Elevation (ft-AMSL) | | | | | | | | | | | | | | | | | | | |
| 8/26/2019 | 49.66 | 55.46 | 71.91 | 77.86 | 79.33 | 79.25 | 54.23 | 54.85 | 29.44 | 29.10 | 28.15 | 27.65 | 47.35 | 57.00 | 27.98 | 27.03 | 26.58 | 29.94 | 28.76 | 28.82 |
| 9/16/2019 | 49.21 | 55.26 | 71.65 | 77.43 | 78.67 | 78.82 | 53.97 | 54.58 | 28.41 | 28.84 | 26.82 | 26.17 | 46.84 | 56.81 | 26.67 | 25.45 | 25.22 | 29.25 | 28.47 | 28.55 |
| 10/10/2019 | 47.98 | 54.60 | 70.83 | 76.51 | 77.66 | 76.11 | 53.24 | 53.94 | 27.19 | 27.72 | 25.72 | 25.23 | 45.93 | 56.05 | 25.30 | 24.00 | 23.77 | 28.25 | 27.81 | 27.89 |
| 11/14/2019 | 50.25 | 55.46 | 71.55 | 77.64 | 78.58 | 77.91 | 54.08 | 54.91 | 30.53 | 29.97 | 28.33 | 27.70 | 47.93 | 56.91 | 28.99 | 26.99 | 26.61 | 30.27 | 28.98 | 29.05 |
| 12/5/2019 | 50.40 | 55.50 | 71.81 | 78.22 | 79.19 | 77.74 | 54.21 | 55.05 | 29.92 | 30.38 | 28.75 | 28.03 | 48.10 | 56.87 | 28.15 | 27.38 | 26.97 | 30.76 | 29.68 | 29.53 |
| 1/21/2020 | 50.55 | 55.75 | 71.93 | 78.33 | 79.24 | 77.96 | 54.42 | 55.27 | 30.25 | 30.74 | 28.97 | 28.07 | 49.64 | 57.21 | 28.30 | 27.37 | 26.94 | 31.43 | 29.43 | 29.47 |
| 2/18/2020 | 50.92 | 56.00 | 72.24 | 78.72 | 80.05 | 78.47 | 54.73 | 55.62 | 30.61 | 31.07 | 29.19 | 28.12 | 49.91 | 57.58 | 28.55 | 27.47 | 27.00 | 32.08 | 29.64 | 29.65 |
| 3/16/2020 | 50.28 | 56.12 | 71.73 | 78.00 | 79.13 | 78.12 | 54.68 | 55.55 | 30.17 | 30.62 | 28.82 | 27.80 | 49.38 | 57.48 | 28.27 | 27.19 | 26.81 | 31.41 | 29.15 | 29.19 |
| 4/2/2020 | 50.60 | 56.20 | 72.03 | 78.54 | 80.11 | 78.43 | --- | --- | --- | --- | --- | --- | 49.63 | 57.72 | --- | --- | --- | --- | --- | --- |
| 5/5/2020 | 51.35 | 56.44 | 72.62 | 79.67 | 80.71 | 78.87 | --- | --- | --- | --- | --- | --- | 50.29 | 57.99 | --- | --- | --- | --- | --- | --- |
| 6/11/2020 | 50.02 | 56.26 | 71.82 | 77.99 | 82.53 | 78.77 | 54.79 | 55.67 | 29.94 | 30.42 | 28.54 | 27.61 | 48.79 | 57.48 | 28.07 | 27.05 | 26.77 | 31.14 | 28.80 | 28.85 |
| 7/9/2020 | 50.82 | 55.93 | 72.04 | 78.39 | 80.02 | 78.50 | 54.68 | 55.40 | 30.61 | 30.79 | 28.95 | 28.12 | 49.66 | 57.37 | 28.55 | 27.45 | 27.03 | 31.39 | 29.42 | 29.47 |
| 8/14/2020 | 50.91 | 55.89 | 72.60 | 80.42 | 80.73 | 77.96 | 54.79 | 55.38 | 30.84 | 31.34 | 29.46 | 28.35 | 49.71 | 57.41 | 28.92 | 27.67 | 27.18 | 31.99 | 30.89 | 30.26 |
| 9/11/2020 | 50.55 | 56.01 | 72.63 | 80.17 | 80.73 | 79.43 | 54.83 | 55.47 | 31.12 | 31.48 | 29.63 | 28.69 | 49.33 | 57.53 | 29.39 | 29.40 | 28.15 | 32.17 | 30.99 | 30.67 |
| 10/29/2020 | 51.88 | 55.98 | 72.81 | 84.49+ | 81.57 | 79.66 | 54.99 | 55.55 | 30.66 | 31.14 | 29.51 | 28.74 | 49.17 | 57.97 | 28.56 | 27.66 | 27.21 | 31.78 | 31.39 | 31.05 |
| 11/24/2020 | 50.63 | 56.35 | 72.26 | 78.67 | 80.25 | 80.35 | 55.03 | 55.80 | 30.55 | 31.06 | 29.06 | 28.13 | 49.63 | 57.84 | 28.58 | 27.47 | 27.14 | 32.03 | 29.16 | 29.20 |
| 12/14/2020 | 50.73 | 56.67 | 72.45 | 79.26 | 80.79 | 80.63 | 55.29 | 56.12 | 30.66 | 31.21 | 28.45 | 28.32 | 49.72 | 58.24 | 27.02 | 29.21 | 27.23 | 32.16 | 29.52 | 29.53 |
| Maximum | 51.88 | 57.52 | 73.19 | 83.59 | 83.29 | 84.11 | 55.48 | 56.46 | 31.23 | 31.84 | 29.70 | 28.74 | 50.74 | 58.64 | 29.39 | 29.40 | 28.15 | 32.90 | 33.22 | 33.12 |
| Minimum | 37.88 | 50.96 | 65.78 | 73.23 | 43.27 | 75.47 | 53.24 | 53.94 | 27.19 | 27.72 | 25.24 | 24.32 | 45.93 | 55.30 | 25.30 | 24.00 | 23.77 | 28.25 | 27.81 | 27.89 |

Notes: 1. GWE, '---', and ft-AMSL means groundwater elevation, data not recorded, and feet above mean sea level, respectively.
2. GWE data with '+" sign is identified as high outlier.

- Depressed groundwater conditions.
- Elevated groundwater conditions.

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676



CALCULATED BY: __GRI/BSP_
CHECKED BY: __BSP/DDD/PS_
DATE __12/20/2021__

**Table II-C-2 Box-Whisker Plot and Rosner's (Generalized ESD) Outlier Test Results (Brown Station Road Sanitary Landfill)**

| GWM Well ID | Number of Outliers from Box-Whisker Plot | | | | Number of Outliers from Rosner's Test | |
|---|---|---|---|---|---|---|
| | Mild Outliers | | Extreme Outliers | | | |
| | Low | High | Low | High | Low | High |
| **A. CRITICAL WELLS SUBSET** | | | | | | |
| A-1 | 4 | 1 | 0 | 3 | 0 | 3 |
| A-4 | 0 | 0 | 0 | 0 | --- | --- |
| A-11 | 0 | 0 | 1 | 4 | 1 | 4 |
| A-12 | 0 | 0 | 0 | 0 | --- | --- |
| A-13 | 5 | 3 | 4 | 0 | 6 | 3 |
| A-14 | 0 | 0 | 0 | 1 | 0 | 1 |
| A-21 | 2 | 2 | 0 | 1 | 1 | 1 |
| PP-2A | 2 | 1 | 1 | 0 | 1 | 1 |
| PP-2B | 2 | 2 | 1 | 0 | 1 | 1 |
| PP-5A | 2 | 0 | 0 | 0 | --- | --- |
| PP-5B | 1 | 0 | 0 | 0 | --- | --- |
| PP-6A | 1 | 2 | 0 | 0 | 1 | 0 |
| PP-6B | 18 | 2 | 2 | 0 | 1 | 0 |
| PP-8 | 0 | 28 | 0 | 2 | 0 | 0 |
| Reference | Exhibit II-C-2 and II-C-3 | | | | Exhibit II-C-9 | |
| **B. OTHER WELLS SUBSET** | | | | | | |
| A-2 | 1 | 1 | 1 | 0 | 1 | 0 |
| A-3 | 1 | 20 | 2 | 3 | 2 | 0 |
| A-10 | 0 | 1 | 8 | 0 | 8 | 1 |
| A-15 | 2 | 1 | 3 | 0 | 5 | 0 |
| A-16 | 1 | 1 | 0 | 0 | -- | -- |
| A-17 | 4 | 1 | 1 | 0 | 2 | 0 |
| A-18 | 2 | 0 | 0 | 1 | 1 | 1 |
| A-19 | 2 | 3 | 0 | 1 | 1 | 1 |
| A-20 | 2 | 10 | 0 | 2 | 0 | 2 |
| A-22 | 12 | 0 | 3 | 0 | 2 | 0 |
| A-22D | 0 | 0 | 0 | 0 | --- | --- |
| A-23 | 11 | 0 | 0 | 0 | --- | --- |
| B-1 | 0 | 1 | 5 | 0 | 5 | 1 |
| B-2 | 0 | 0 | 0 | 0 | --- | --- |
| B-2R | 4 | 0 | 1 | 0 | 2 | 0 |
| B-3 | 2 | 0 | 0 | 3 | 0 | 3 |
| B-4 | 7 | 3 | 1 | 0 | 1 | 0 |
| B-6R | 1 | 1 | 4 | 6 | 4 | 6 |

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| GWM Well ID | Number of Outliers from Box-Whisker Plot | | | | Number of Outliers from Rosner's Test | |
|---|---|---|---|---|---|---|
| | Mild Outliers | | Extreme Outliers | | | |
| | Low | High | Low | High | Low | High |
| B-7 | 0 | 21 | 1 | 0 | 0 | 0 |
| B-8 | 4 | 4 | 3 | 2 | 3 | 2 |
| B-9 | 4 | 1 | 1 | 0 | 1 | 0 |
| B-10 | 7 | 5 | 0 | 0 | -- | -- |
| PP-1A | 15 | 1 | 1 | 0 | 0 | 0 |
| PP-1B | 11 | 1 | 0 | 0 | -- | -- |
| NES-1D | 0 | 0 | 0 | 0 | --- | --- |
| NES-1S | 0 | 0 | 0 | 1 | 0 | 1 |
| NES-2D | 2 | 0 | 0 | 0 | --- | --- |
| NES-2DD | 1 | 0 | 0 | 0 | --- | --- |
| NES-2S | 5 | 0 | 0 | 0 | --- | --- |
| NES-3 | 5 | 0 | 0 | 0 | --- | --- |
| NES-4 | 0 | 0 | 0 | 0 | --- | --- |
| NES-5 | 1 | 0 | 0 | 0 | --- | --- |
| NES-6D | 1 | 0 | 1 | 0 | 6 | 1 |
| NES-6S | 3 | 1 | 1 | 2 | 4 | 2 |
| NES-7S | 1 | 1 | 1 | 0 | 2 | 0 |
| NES-8S | 0 | 0 | 0 | 0 | --- | --- |
| Reference | Exhibits II-C-4 through C-8 | | | | Exhibits II-C-9 and C-10 | |

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# EXHIBIT II-C-1. OUTLIER ANALYSES

Potential outliers are the extreme, unusual-looking, large or small measurements relative to the rest of data. These extremely large or too small measurements are suspected of misrepresting the population from which the data was collected.  Outliers generally result from transcription or data-coding errors, inaccurate measurement due to measuring-system/instrument errors or problems.

Potential outliers are identified by using either graphical or statistical (parametric or non-parametric) methods. We used:

A. Box Whisker Plot (a graphical method) for initial screening of outliers.
B. The generalized ESD (extreme Studentized deviate) test developed by Rosner in 1983.  This is parametric test which helps in identify up to 10 outliers.

## A. IDENTIFYING OUTLIERS USING BOX AND WHISKER PLOT

EPA's document "Data Quality Assessment: Statistical Methods for Practitioners, EPA QA/G-9S (EPA/240/B-06/003, February 2006"[15] provides guidance on plotting and using Box and Whisker plot to identify outliers. According to this document, data that is outside the range (1$^{st}$ quartile ($Q_1$)- 1.5 x interquartile range(IQR)) and (3$^{rd}$ quartile (Q3) + 1.5 x IQR) is considered as an outlier.

However, the e-Handbook of Statistical Methods, NIST/SEMATECH, April 2012, accessed on March 1, 2021 with revision up to February 2021[17] and EPA's document "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (EPA 530/R-09-007), March 2009"[14], describe two types of fences for finding outliers and two different types of outliers based on these fences.  The fences and outlier are described below:

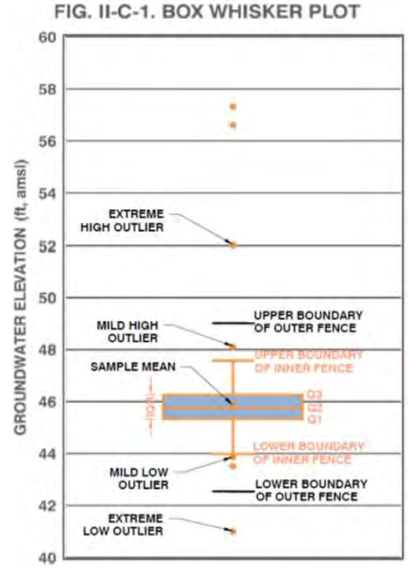
### 1. Fences:

Fences and their boundaries and outliers (Figure II-C-1) are described below.

(a) **Inner fence** or first pair of boundaries' lower and upper bounds are given below.
  Lower boundary ($LB_1$) of inner fence = Q1 - 1.5*IQR
  Upper boundary ($UB_1$) of inner fence = Q3 + 1.5*IQR
  where: Q1 = 1$^{st}$ quartile (25$^{th}$ percentile)
  Q3 = 3$^{rd}$ quartile (75$^{th}$ percentile), and
  IQR = inter quartile range = Q3 - Q1

(b) **Outer fence** or second pair of boundaries' lower and upper bounds are given below.
  Lower boundary ($LB_2$) of outer fence = Q1 - 3*IQR
  Upper boundary ($UB_2$) of outer fence = Q3 + 3*IQR

FIG. II-C-1. BOX WHISKER PLOT




### 2. Outliers:

**Mild Low Outlier**: Data point(s) between $LB_1$ and $LB_2$.
**Extreme Low Outlier**: Data point(s) below $LB_2$.
**Mild High Outlier**: Data point(s) between $UB_1$ and $UB_2$.
**Extreme High Outlier**: Data point(s) above $UB_2$.

We determined both mild low/high and extreme low/high outliers for each well. The results of are presented in Exhibits II-C-2 through II-C-8. The figures in these exhibits show inner fence only.

## B. IDENTIFYING OUTLIERS USING THE GENERALIZED ESD TEST (ROSNER, 1983)

The generalized ESD (Extreme Studentized Deviate) test (Rosner, 1983[16]) or Rosner's test is used to detect multiple outliers in the univariate data set and it assumes that the data set follows an approximately normal distribution. Given an upper bound (r) on number of outliers, the generalized ESD test performs r separate tests: a test for one outlier, a test for two outliers, and so on. The test is briefly described below:

The hypothesis for Rosner's test is as defined below:

$H_0$: There are no outliers in the data set
$H_A$: There are up to r outliers in the data set

**TEST:**

Assume that data contains n observations. Compute $R_i$ statistics for all $n$ observation, as below:

$$R_i = \frac{MAX\ |x_{i} - \bar{x}|}{s}$$

where; $x_i$ = $i$'th data
$\bar{x}$ = sample mean
s = sample standard deviation

Sort and remove the observation that maximizes Ri, recompute $R_i$ statistics for n-1 observation and sort and remove observation that maximizes $R_i$. Continue this process until $r$ observations have been removed. This would result in $r$ numbers of test statistics ($R_1$, $R_2$, .... $R_r$). Corresponding to these $r$ numbers of test statistics, compute the following critical values ($\lambda_k$).

$$\lambda_k = \frac{(n-i)\ t_{p,(n-k-1)}}{\sqrt{\left(n-k-1+t^2_{p,(n-k-1)}\right)(n-k+1)}}$$

where; $k$ = 1, 2, 3, .... r
$t_{p,(n-k-1)}$ = is the critical value at $p$ percentage point from $t$ distribution with $(n-k-1)$ degree of freedom

$$p = 1 - \frac{\alpha}{2\,(n-k+1)}$$ and

$\alpha$ = significance level

The number of outliers are determined by finding the largest $k$ such that $R_k > \lambda_k$

The outlier test statistics are presented in Exhibits II-C-9 and C-10.

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APPENDIX II-C

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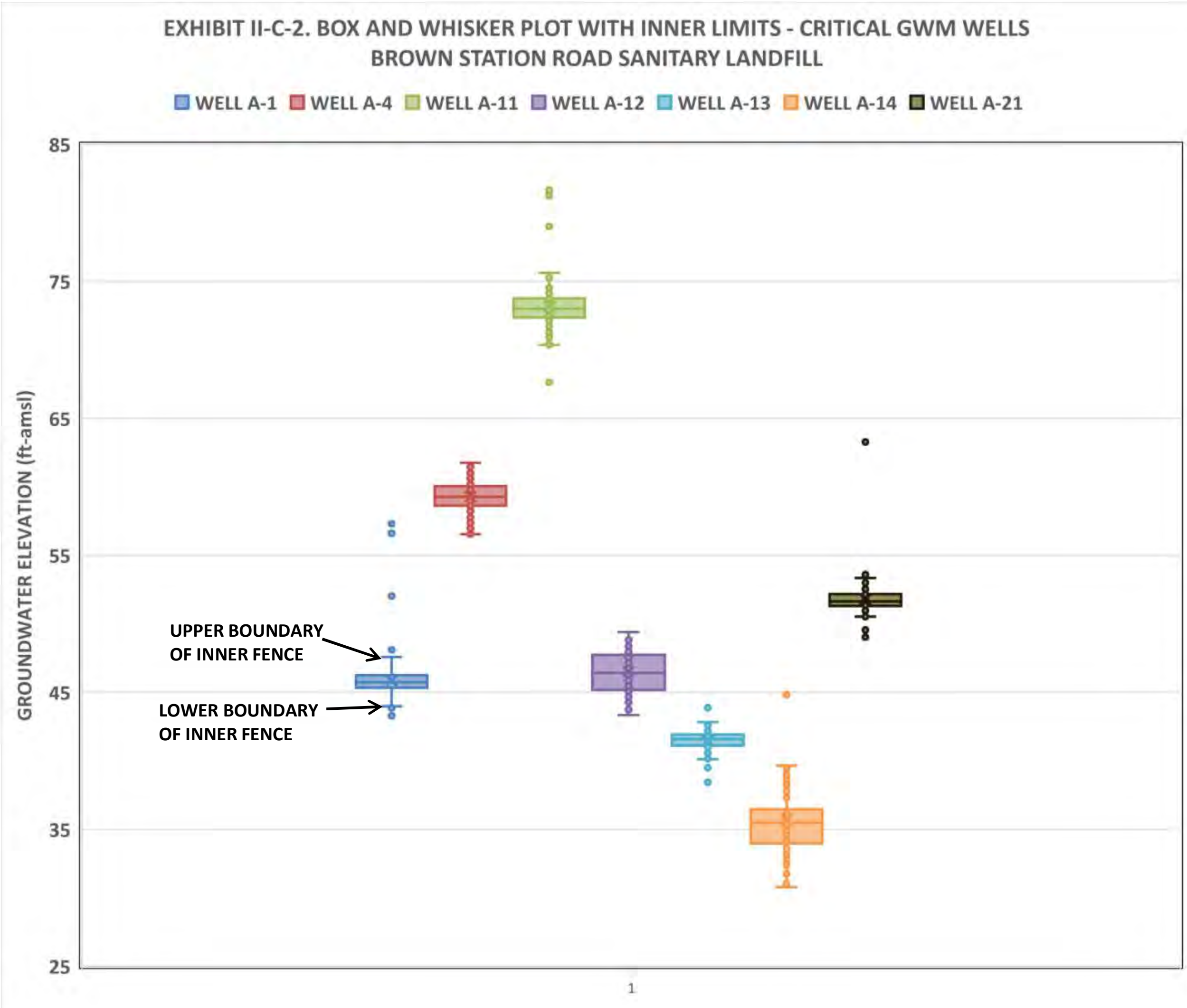


| WELL A-1 | | WELL A-4 | | WELL A-11 | | WELL A-12 | | WELL A-13 | | WELL A-14 | | WELL A-21 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 43.28 | Minimum | 56.55 | Minimum | 67.62 | Minimum | 43.33 | Minimum | 38.43 | Minimum | 30.77 | Minimum | 49.03 |
| Maximum | 57.31 | Maximum | 61.75 | Maximum | 82.02 | Maximum | 49.39 | Maximum | 44.19 | Maximum | 44.82 | Maximum | 63.27 |
| Sample Size | 187 | Sample Size | 187 | Sample Size | 189 | Sample Size | 189 | Sample Size | 189 | Sample Size | 188 | Sample Size | 186 |
| Mean | 45.86 | Mean | 59.28 | Mean | 73.16 | Mean | 46.49 | Mean | 41.45 | Mean | 35.65 | Mean | 51.78 |
| Q1 | 45.33 | Q1 | 58.63 | Q1 | 72.37 | Q1 | 45.18 | Q1 | 41.12 | Q1 | 33.97 | Q1 | 51.30 |
| Median | 45.74 | Median | 59.27 | Median | 73.00 | Median | 46.42 | Median | 41.58 | Median | 35.48 | Median | 51.65 |
| Q3 | 46.25 | Q3 | 60.05 | Q3 | 73.75 | Q3 | 47.73 | Q3 | 41.93 | Q3 | 36.45 | Q3 | 52.16 |
| IQR | 0.92 | IQR | 1.42 | IQR | 1.38 | IQR | 2.56 | IQR | 0.80 | IQR | 2.48 | IQR | 0.86 |
| $LB_1$ | 43.95 | $LB_1$ | 56.50 | $LB_1$ | 70.30 | $LB_1$ | 41.34 | $LB_1$ | 39.91 | $LB_1$ | 30.26 | $LB_1$ | 50.00 |
| $UB_1$ | 47.63 | $UB_1$ | 62.18 | $UB_1$ | 75.82 | $UB_1$ | 51.56 | $UB_1$ | 43.13 | $UB_1$ | 40.17 | $UB_1$ | 53.45 |
| **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | |
| Low | 4 | Low | 0 | Low | 0 | Low | 0 | Low | 5 | Low | 0 | Low | 2 |
| High | 1 | High | 0 | High | 0 | High | 0 | High | 3 | High | 0 | High | 2 |
| $LB_2$ | 42.57 | $LB_2$ | 54.37 | $LB_2$ | 68.23 | $LB_2$ | 37.51 | $LB_2$ | 38.71 | $LB_2$ | 26.54 | $LB_2$ | 48.71 |
| $UB_2$ | 49.01 | $UB_2$ | 64.31 | $UB_2$ | 77.89 | $UB_2$ | 55.40 | $UB_2$ | 44.34 | $UB_2$ | 43.88 | $UB_2$ | 54.75 |
| **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | |
| Low | 0 | Low | 0 | Low | 1 | Low | 0 | Low | 4 | Low | 0 | Low | 0 |
| High | 3 | High | 0 | High | 4 | High | 0 | High | 0 | High | 1 | High | 1 |

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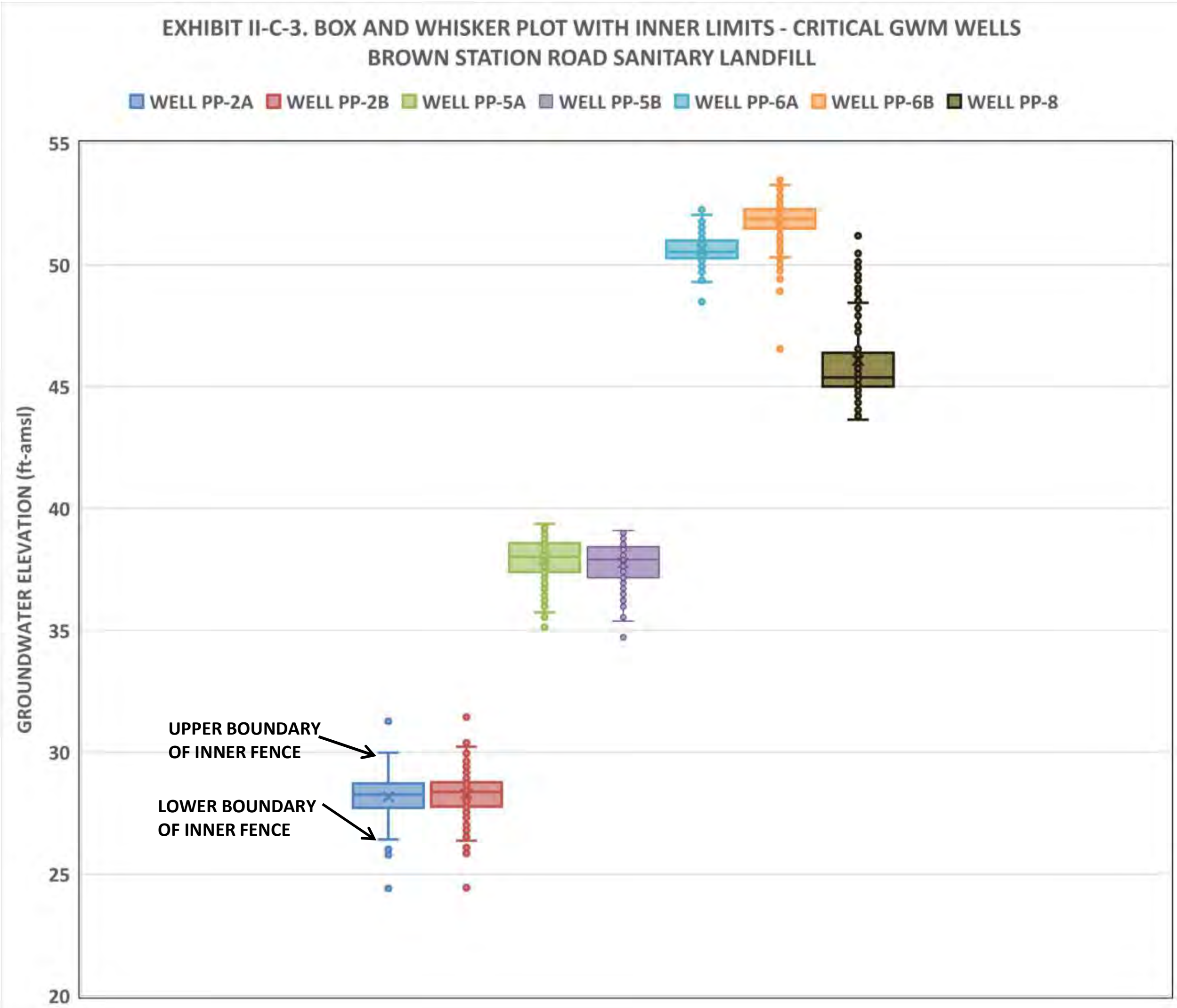


| | WELL PP-2A | WELL PP-2B | WELL PP-5A | WELL PP-5B | WELL PP-6A | WELL PP-6B | WELL PP-8 |
|---|---|---|---|---|---|---|---|
| Minimum | 24.41 | 24.44 | 35.13 | 34.71 | 48.49 | 46.55 | 43.65 |
| Maximum | 31.27 | 31.44 | 39.37 | 39.10 | 52.29 | 53.69 | 51.19 |
| Sample Size | 186 | 187 | 187 | 187 | 186 | 186 | 183 |
| Mean | 28.17 | 28.29 | 37.92 | 37.77 | 50.62 | 51.70 | 46.07 |
| Q1 | 27.71 | 27.77 | 37.39 | 37.16 | 50.27 | 51.49 | 45.00 |
| Median | 28.26 | 28.37 | 38.02 | 37.90 | 50.54 | 51.89 | 45.38 |
| Q3 | 28.72 | 28.76 | 38.58 | 38.43 | 51.00 | 52.29 | 46.39 |
| IQR | 1.01 | 0.99 | 1.19 | 1.27 | 0.73 | 0.79 | 1.39 |
| $LB_1$ | 26.20 | 26.29 | 35.61 | 35.26 | 49.17 | 50.30 | 42.92 |
| $UB_1$ | 30.22 | 30.25 | 40.37 | 40.34 | 52.09 | 53.48 | 48.48 |
| **Mild Outliers:** | | | | | | | |
| Low | 2 | 2 | 2 | 1 | 1 | 18 | 0 |
| High | 1 | 2 | 0 | 0 | 2 | 2 | 28 |
| $LB_2$ | 24.70 | 24.80 | 33.82 | 33.35 | 48.08 | 49.11 | 40.83 |
| $UB_2$ | 31.73 | 31.73 | 42.15 | 42.24 | 53.19 | 54.67 | 50.56 |
| **Extreme Outliers:** | | | | | | | |
| Low | 1 | 1 | 0 | 0 | 0 | 2 | 0 |
| High | 0 | 0 | 0 | 0 | 0 | 0 | 2 |

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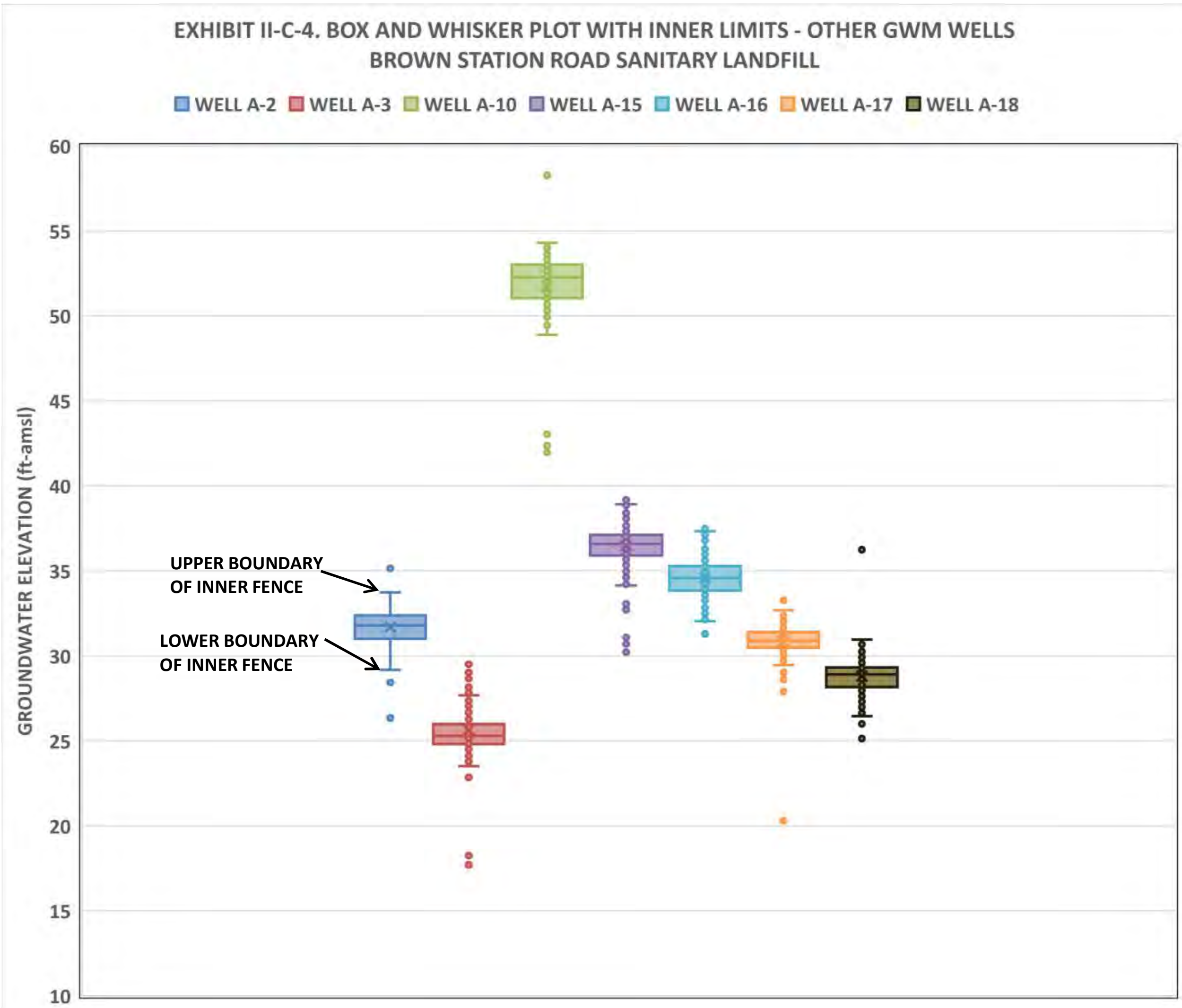


| WELL A-2 | | WELL A-3 | | WELL A-10 | | WELL A-15 | | WELL A-16 | | WELL A-17 | | WELL A-18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 26.35 | Minimum | 17.71 | Minimum | 41.97 | Minimum | 30.22 | Minimum | 31.30 | Minimum | 20.30 | Minimum | 25.14 |
| Maximum | 35.15 | Maximum | 29.80 | Maximum | 58.27 | Maximum | 39.17 | Maximum | 37.48 | Maximum | 33.26 | Maximum | 36.25 |
| Sample Size | 187 | Sample Size | 187 | Sample Size | 187 | Sample Size | 188 | Sample Size | 187 | Sample Size | 187 | Sample Size | 187 |
| Mean | 31.69 | Mean | 25.64 | Mean | 51.75 | Mean | 36.47 | Mean | 34.60 | Mean | 30.86 | Mean | 28.81 |
| Q1 | 31.02 | Q1 | 24.82 | Q1 | 51.04 | Q1 | 35.91 | Q1 | 33.85 | Q1 | 30.48 | Q1 | 28.17 |
| Median | 31.80 | Median | 25.29 | Median | 52.27 | Median | 36.59 | Median | 34.59 | Median | 30.88 | Median | 28.91 |
| Q3 | 32.38 | Q3 | 26.00 | Q3 | 53.02 | Q3 | 37.12 | Q3 | 35.29 | Q3 | 31.40 | Q3 | 29.32 |
| IQR | 1.36 | IQR | 1.18 | IQR | 1.98 | IQR | 1.22 | IQR | 1.44 | IQR | 0.92 | IQR | 1.15 |
| $LB_1$ | 28.98 | $LB_1$ | 23.05 | $LB_1$ | 48.07 | $LB_1$ | 34.08 | $LB_1$ | 31.69 | $LB_1$ | 29.10 | $LB_1$ | 26.45 |
| $UB_1$ | 34.42 | $UB_1$ | 27.77 | $UB_1$ | 55.99 | $UB_1$ | 38.94 | $UB_1$ | 37.45 | $UB_1$ | 32.78 | $UB_1$ | 31.05 |
| **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | |
| Low | 1 | Low | 1 | Low | 0 | Low | 2 | Low | 1 | Low | 4 | Low | 2 |
| High | 1 | High | 20 | High | 1 | High | 1 | High | 1 | High | 1 | High | 0 |
| $LB_2$ | 26.94 | $LB_2$ | 21.28 | $LB_2$ | 45.10 | $LB_2$ | 32.26 | $LB_2$ | 29.53 | $LB_2$ | 27.72 | $LB_2$ | 24.72 |
| $UB_2$ | 36.46 | $UB_2$ | 29.54 | $UB_2$ | 58.96 | $UB_2$ | 40.77 | $UB_2$ | 39.61 | $UB_2$ | 34.16 | $UB_2$ | 32.77 |
| **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | |
| Low | 1 | Low | 2 | Low | 8 | Low | 3 | Low | 0 | Low | 1 | Low | 0 |
| High | 0 | High | 3 | High | 0 | High | 0 | High | 0 | High | 0 | High | 1 |

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APPENDIX II-C

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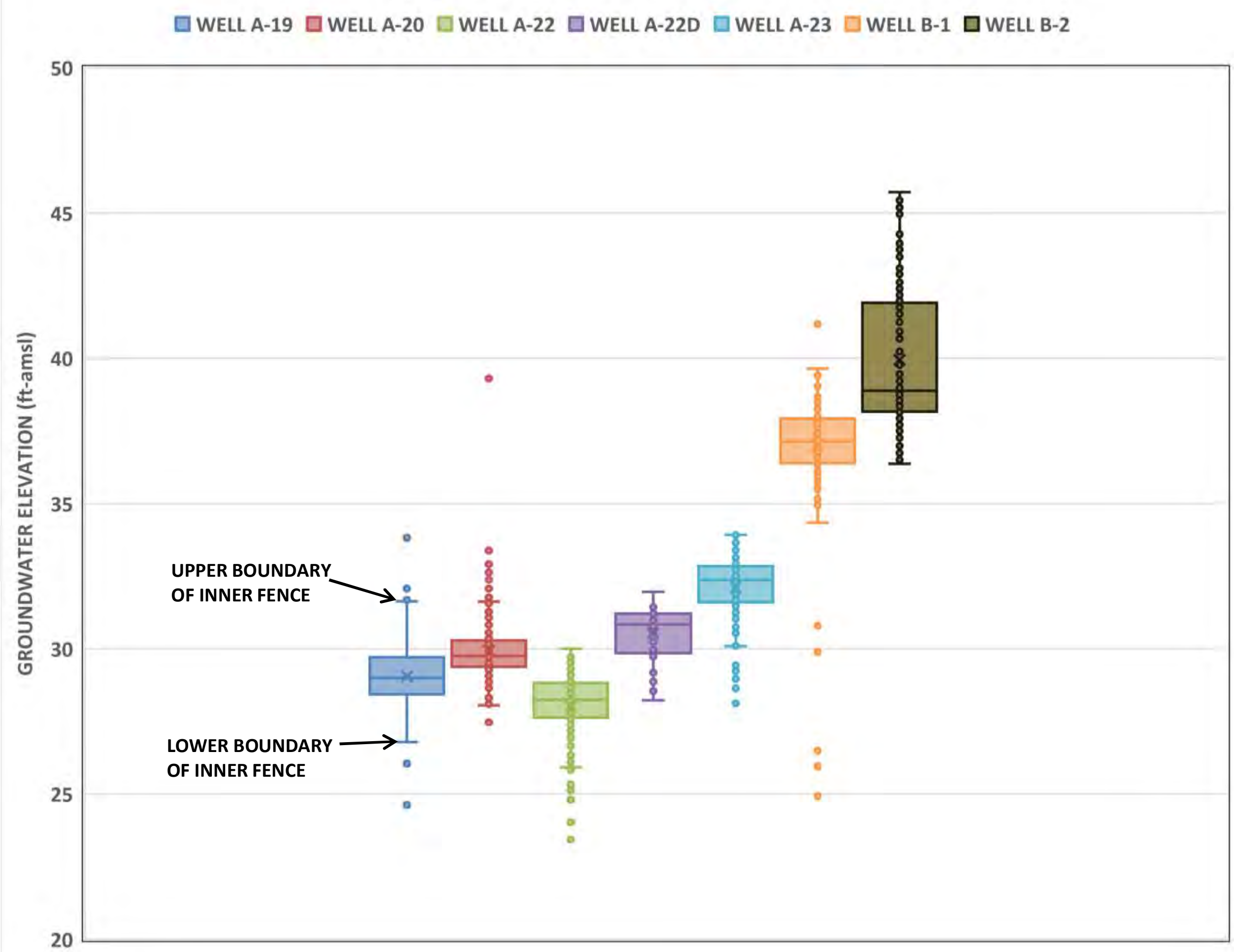
**EXHIBIT II-C-5. BOX AND WHISKER PLOT WITH INNER LIMITS - OTHER GWM WELLS**
**BROWN STATION ROAD SANITARY LANDFILL**




| WELL A-19 | | WELL A-20 | | WELL A-22 | | WELL A-22D | | WELL A-23 | | WELL B-1 | | WELL B-2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 24.62 | Minimum | 27.47 | Minimum | 23.43 | Minimum | 28.23 | Minimum | 28.12 | Minimum | 24.93 | Minimum | 36.37 |
| Maximum | 33.82 | Maximum | 39.30 | Maximum | 30.00 | Maximum | 31.96 | Maximum | 33.92 | Maximum | 41.17 | Maximum | 45.71 |
| Sample Size | 187 | Sample Size | 187 | Sample Size | 179 | Sample Size | 42 | Sample Size | 171 | Sample Size | 188 | Sample Size | 185 |
| Mean | 29.05 | Mean | 29.93 | Mean | 28.01 | Mean | 30.52 | Mean | 32.11 | Mean | 37.01 | Mean | 39.94 |
| Q1 | 28.43 | Q1 | 29.38 | Q1 | 27.63 | Q1 | 29.85 | Q1 | 31.60 | Q1 | 36.39 | Q1 | 38.16 |
| Median | 29.00 | Median | 29.75 | Median | 28.24 | Median | 30.84 | Median | 32.37 | Median | 37.13 | Median | 38.88 |
| Q3 | 29.71 | Q3 | 30.28 | Q3 | 28.82 | Q3 | 31.21 | Q3 | 32.84 | Q3 | 37.92 | Q3 | 41.91 |
| IQR | 1.28 | IQR | 0.90 | IQR | 1.19 | IQR | 1.36 | IQR | 1.24 | IQR | 1.53 | IQR | 3.75 |
| $LB_1$ | 26.51 | $LB_1$ | 28.03 | $LB_1$ | 25.85 | $LB_1$ | 27.81 | $LB_1$ | 29.74 | $LB_1$ | 34.09 | $LB_1$ | 32.54 |
| $UB_1$ | 31.63 | $UB_1$ | 31.63 | $UB_1$ | 30.61 | $UB_1$ | 33.26 | $UB_1$ | 34.70 | $UB_1$ | 40.21 | $UB_1$ | 47.54 |
| **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | |
| Low | 2 | Low | 2 | Low | 12 | Low | 0 | Low | 11 | Low | 0 | Low | 0 |
| High | 3 | High | 10 | High | 0 | High | 0 | High | 0 | High | 1 | High | 0 |
| $LB_2$ | 24.59 | $LB_2$ | 26.68 | $LB_2$ | 24.06 | $LB_2$ | 25.76 | $LB_2$ | 27.88 | $LB_2$ | 31.80 | $LB_2$ | 26.91 |
| $UB_2$ | 33.55 | $UB_2$ | 32.98 | $UB_2$ | 32.39 | $UB_2$ | 35.30 | $UB_2$ | 36.56 | $UB_2$ | 42.51 | $UB_2$ | 53.16 |
| **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | |
| Low | 0 | Low | 0 | Low | 3 | Low | 0 | Low | 0 | Low | 5 | Low | 0 |
| High | 1 | High | 2 | High | 0 | High | 0 | High | 0 | High | 0 | High | 0 |

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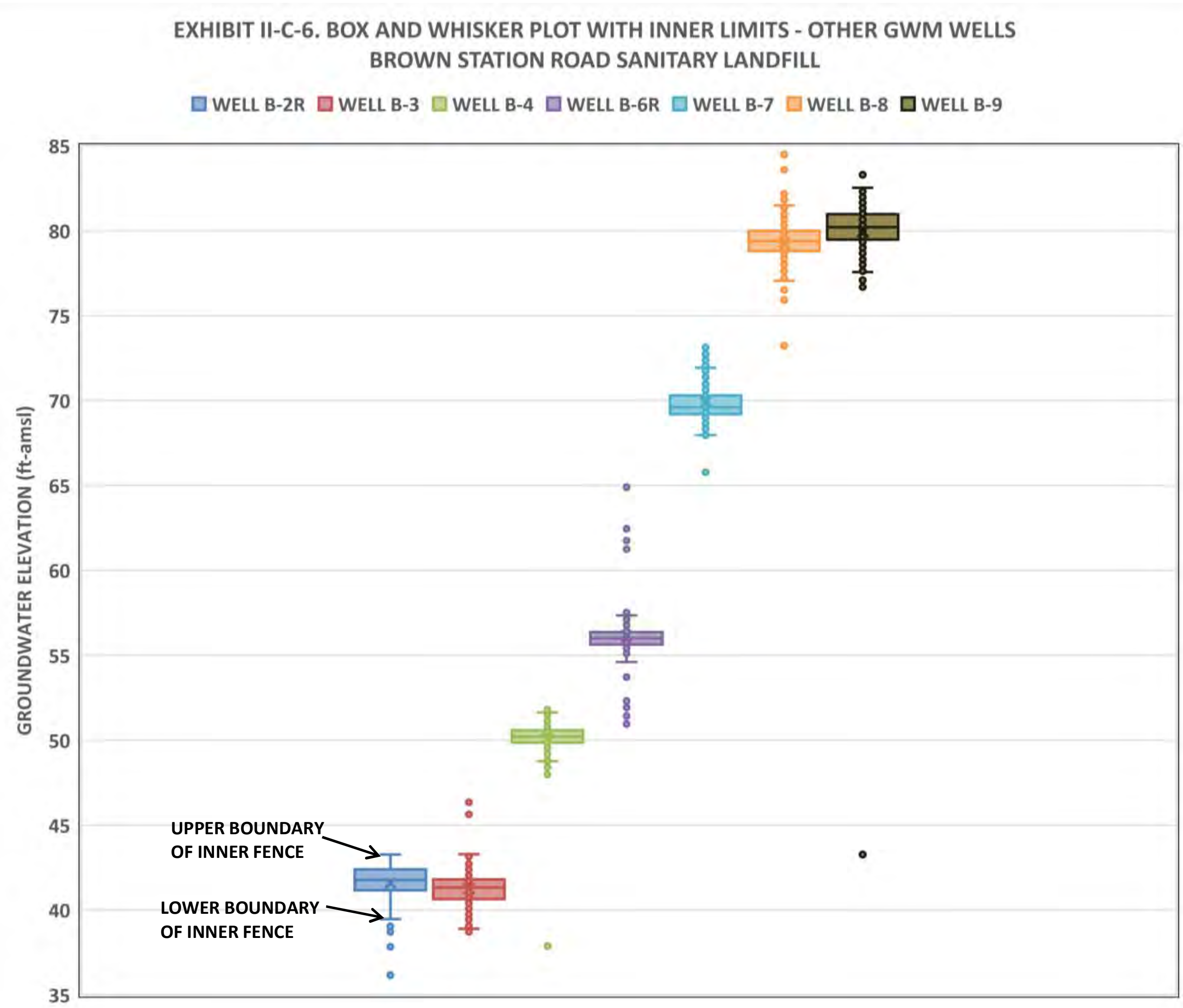


| WELL B-2R | | WELL B-3 | | WELL B-4 | | WELL B-6R | | WELL B-7 | | WELL B-8 | | WELL B-9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 36.17 | Minimum | 38.72 | Minimum | 37.88 | Minimum | 50.96 | Minimum | 65.78 | Minimum | 73.23 | Minimum | 43.27 |
| Maximum | 43.27 | Maximum | 46.35 | Maximum | 51.88 | Maximum | 64.90 | Maximum | 73.19 | Maximum | 84.49 | Maximum | 83.29 |
| Sample Size | 150 | Sample Size | 189 | Sample Size | 189 | Sample Size | 181 | Sample Size | 189 | Sample Size | 189 | Sample Size | 189 |
| Mean | 41.58 | Mean | 41.26 | Mean | 50.12 | Mean | 56.14 | Mean | 69.92 | Mean | 79.29 | Mean | 79.95 |
| Q1 | 41.17 | Q1 | 40.65 | Q1 | 49.86 | Q1 | 55.64 | Q1 | 69.19 | Q1 | 78.80 | Q1 | 79.47 |
| Median | 41.78 | Median | 41.33 | Median | 50.21 | Median | 56.01 | Median | 69.58 | Median | 79.39 | Median | 80.20 |
| Q3 | 42.39 | Q3 | 41.82 | Q3 | 50.59 | Q3 | 56.37 | Q3 | 70.31 | Q3 | 79.99 | Q3 | 80.98 |
| IQR | 1.22 | IQR | 1.17 | IQR | 0.73 | IQR | 0.73 | IQR | 1.12 | IQR | 1.19 | IQR | 1.51 |
| $LB_1$ | 39.35 | $LB_1$ | 38.89 | $LB_1$ | 48.76 | $LB_1$ | 54.54 | $LB_1$ | 67.52 | $LB_1$ | 77.02 | $LB_1$ | 77.21 |
| $UB_1$ | 44.22 | $UB_1$ | 43.57 | $UB_1$ | 51.68 | $UB_1$ | 57.46 | $UB_1$ | 71.98 | $UB_1$ | 81.78 | $UB_1$ | 83.25 |
| **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | |
| Low | 4 | Low | 2 | Low | 7 | Low | 1 | Low | 0 | Low | 4 | Low | 4 |
| High | 0 | High | 0 | High | 3 | High | 1 | High | 21 | High | 4 | High | 1 |
| $LB_2$ | 37.52 | $LB_2$ | 37.14 | $LB_2$ | 47.67 | $LB_2$ | 53.45 | $LB_2$ | 65.85 | $LB_2$ | 75.23 | $LB_2$ | 74.94 |
| $UB_2$ | 46.04 | $UB_2$ | 45.33 | $UB_2$ | 52.78 | $UB_2$ | 58.56 | $UB_2$ | 73.65 | $UB_2$ | 83.56 | $UB_2$ | 85.51 |
| **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | |
| Low | 1 | Low | 0 | Low | 1 | Low | 4 | Low | 1 | Low | 3 | Low | 1 |
| High | 0 | High | 3 | High | 0 | High | 6 | High | 0 | High | 2 | High | 0 |

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APPENDIX II-C

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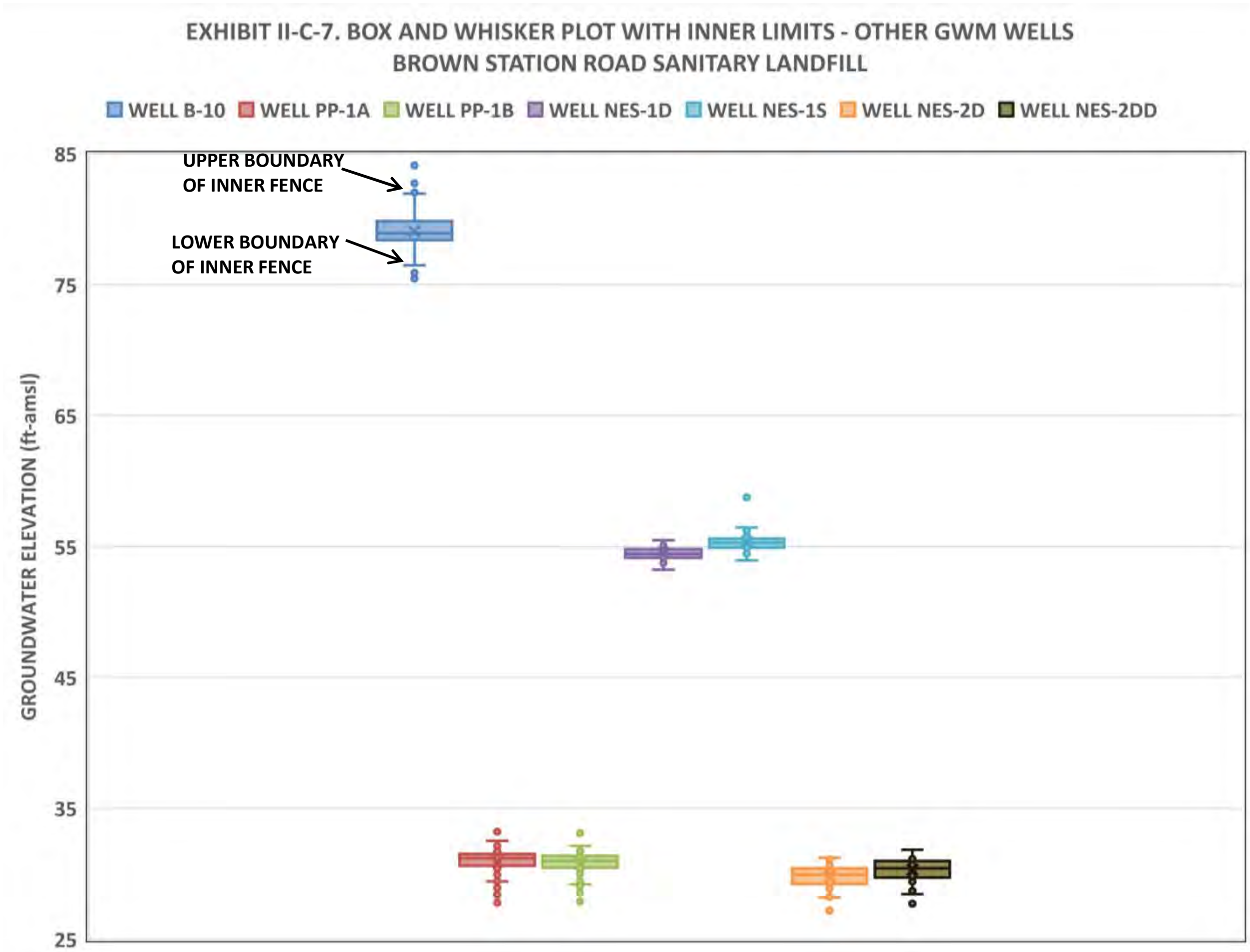


| WELL B-10 | | WELL PP-1A | | WELL PP-1B | | WELL NES-1D | | WELL NES-1S | | WELL NES-2D | | WELL NES-2DD | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 75.47 | Minimum | 27.81 | Minimum | 27.89 | Minimum | 53.24 | Minimum | 53.94 | Minimum | 27.19 | Minimum | 27.72 |
| Maximum | 84.11 | Maximum | 33.22 | Maximum | 33.12 | Maximum | 55.48 | Maximum | 58.77 | Maximum | 31.23 | Maximum | 31.84 |
| Sample Size | 185 | Sample Size | 187 | Sample Size | 187 | Sample Size | 75 | Sample Size | 78 | Sample Size | 75 | Sample Size | 58 |
| Mean | 79.07 | Mean | 30.93 | Mean | 30.78 | Mean | 54.48 | Mean | 55.34 | Mean | 29.77 | Mean | 30.30 |
| Q1 | 78.42 | Q1 | 30.62 | Q1 | 30.46 | Q1 | 54.13 | Q1 | 54.91 | Q1 | 29.22 | Q1 | 29.72 |
| Median | 78.92 | Median | 31.19 | Median | 30.98 | Median | 54.42 | Median | 55.28 | Median | 29.92 | Median | 30.42 |
| Q3 | 79.87 | Q3 | 31.52 | Q3 | 31.38 | Q3 | 54.79 | Q3 | 55.60 | Q3 | 30.41 | Q3 | 30.98 |
| IQR | 1.45 | IQR | 0.90 | IQR | 0.92 | IQR | 0.66 | IQR | 0.69 | IQR | 1.19 | IQR | 1.26 |
| $LB_1$ | 76.25 | $LB_1$ | 29.27 | $LB_1$ | 29.08 | $LB_1$ | 53.14 | $LB_1$ | 53.87 | $LB_1$ | 27.44 | $LB_1$ | 27.84 |
| $UB_1$ | 82.03 | $UB_1$ | 32.87 | $UB_1$ | 32.76 | $UB_1$ | 55.78 | $UB_1$ | 56.64 | $UB_1$ | 32.20 | $UB_1$ | 32.86 |
| **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | |
| Low | 7 | Low | 15 | Low | 11 | Low | 0 | Low | 0 | Low | 2 | Low | 1 |
| High | 5 | High | 1 | High | 1 | High | 0 | High | 0 | High | 0 | High | 0 |
| $LB_2$ | 74.09 | $LB_2$ | 27.92 | $LB_2$ | 27.70 | $LB_2$ | 52.15 | $LB_2$ | 52.83 | $LB_2$ | 25.65 | $LB_2$ | 25.96 |
| $UB_2$ | 84.20 | $UB_2$ | 34.22 | $UB_2$ | 34.14 | $UB_2$ | 56.77 | $UB_2$ | 57.68 | $UB_2$ | 33.98 | $UB_2$ | 34.74 |
| **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | |
| Low | 0 | Low | 1 | Low | 0 | Low | 0 | Low | 0 | Low | 0 | Low | 0 |
| High | 0 | High | 0 | High | 0 | High | 0 | High | 1 | High | 0 | High | 0 |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

APPENDIX II-C

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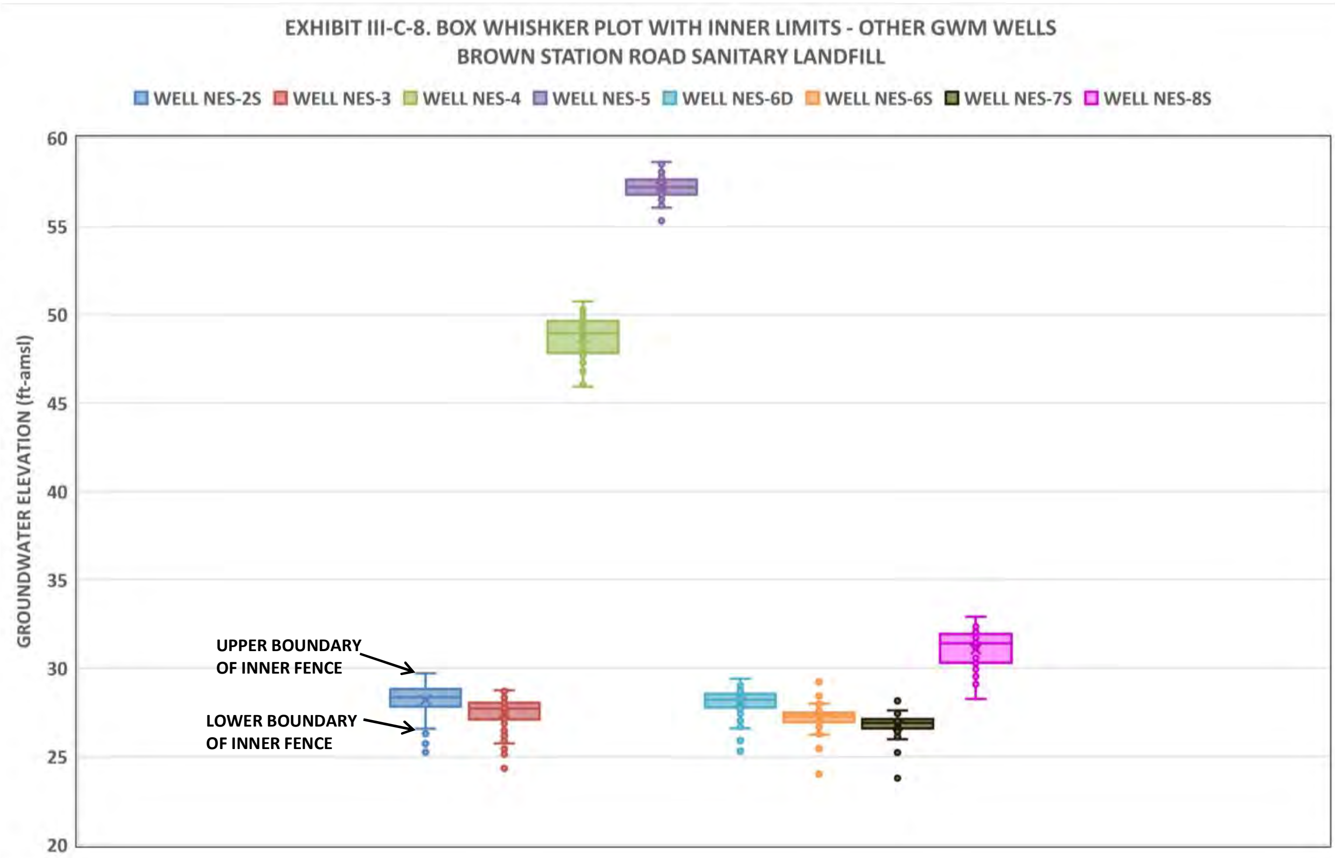


| WELL NES-2S | | WELL NES-3 | | WELL NES-4 | | WELL NES-5 | | WELL NES-6D | | WELL NES-6S | | WELL NES-7S | | WELL NES-8S | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 25.24 | Minimum | 24.32 | Minimum | 45.93 | Minimum | 55.30 | Minimum | 25.30 | Minimum | 24.00 | Minimum | 23.77 | Minimum | 28.25 |
| Maximum | 29.70 | Maximum | 28.74 | Maximum | 50.74 | Maximum | 58.64 | Maximum | 29.39 | Maximum | 29.40 | Maximum | 28.15 | Maximum | 32.90 |
| Sample Size | 75 | Sample Size | 75 | Sample Size | 76 | Sample Size | 79 | Sample Size | 58 | Sample Size | 58 | Sample Size | 39 | Sample Size | 40 |
| Mean | 28.21 | Mean | 27.44 | Mean | 48.69 | Mean | 57.23 | Mean | 28.08 | Mean | 27.16 | Mean | 26.76 | Mean | 31.05 |
| Q1 | 27.81 | Q1 | 27.10 | Q1 | 47.82 | Q1 | 56.79 | Q1 | 27.76 | Q1 | 26.95 | Q1 | 26.58 | Q1 | 30.30 |
| Median | 28.35 | Median | 27.71 | Median | 48.96 | Median | 57.21 | Median | 28.19 | Median | 27.26 | Median | 26.90 | Median | 31.40 |
| Q3 | 28.82 | Q3 | 28.03 | Q3 | 49.63 | Q3 | 57.64 | Q3 | 28.55 | Q3 | 27.48 | Q3 | 27.11 | Q3 | 31.93 |
| IQR | 1.01 | IQR | 0.93 | IQR | 1.81 | IQR | 0.85 | IQR | 0.79 | IQR | 0.53 | IQR | 0.53 | IQR | 1.64 |
| $LB_1$ | 26.30 | $LB_1$ | 25.71 | $LB_1$ | 45.10 | $LB_1$ | 55.52 | $LB_1$ | 26.58 | $LB_1$ | 26.16 | $LB_1$ | 25.79 | $LB_1$ | 27.84 |
| $UB_1$ | 30.34 | $UB_1$ | 29.43 | $UB_1$ | 52.35 | $UB_1$ | 58.92 | $UB_1$ | 29.74 | $UB_1$ | 28.28 | $UB_1$ | 27.91 | $UB_1$ | 34.38 |
| **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | | **Mild Outliers:** | |
| Low | 5 | Low | 5 | Low | 0 | Low | 1 | Low | 1 | Low | 3 | Low | 1 | Low | 0 |
| High | 0 | High | 0 | High | 0 | High | 0 | High | 0 | High | 1 | High | 1 | High | 0 |
| $LB_2$ | 24.78 | $LB_2$ | 24.31 | $LB_2$ | 42.38 | $LB_2$ | 54.24 | $LB_2$ | 25.39 | $LB_2$ | 25.36 | $LB_2$ | 24.99 | $LB_2$ | 25.39 |
| $UB_2$ | 31.85 | $UB_2$ | 30.82 | $UB_2$ | 55.07 | $UB_2$ | 60.19 | $UB_2$ | 30.92 | $UB_2$ | 29.07 | $UB_2$ | 28.70 | $UB_2$ | 36.84 |
| **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | | **Extreme Outliers:** | |
| Low | 0 | Low | 0 | Low | 0 | Low | 0 | Low | 1 | Low | 1 | Low | 1 | Low | 0 |
| High | 0 | High | 0 | High | 0 | High | 0 | High | 0 | High | 2 | High | 0 | High | 0 |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676



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# EXIHIBIT II-C-9. ROSNER'S (GENERALIZED ESD) TEST RESULTS - CRITICAL WELL SET
## BROWN STATION ROAD SANITARY LANDFILL

WELL A-1

Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 10/28/2016 | 57.31 | 7.854159 | 3.58523 | YES |
| 2 | 1/16/2012 | 56.61 | 9.059145 | 3.583602 | YES |
| 3 | 8/8/2008 | 52.02 | 7.049797 | 3.581963 | YES |
| 4 | 6/4/2019 | 43.28 | 3.185417 | 3.580313 | |
| 5 | 1/5/2005 | 48.10 | 3.203557 | 3.578653 | |
| 6 | 10/10/2019 | 43.52 | 3.025124 | 3.576983 | |
| 7 | 4/8/2010 | 47.58 | 2.632409 | 3.575301 | |
| 8 | 8/31/2017 | 43.86 | 2.662547 | 3.573609 | |
| 9 | 10/23/2017 | 43.93 | 2.622197 | 3.571906 | |
| 10 | 7/24/2017 | 43.98 | 2.60762 | 3.570191 | |

WELL A-11

Sample Size = 189

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 10/28/2016 | 82.02 | 5.574563 | 3.588458 | YES |
| 2 | 4/6/2018 | 81.66 | 5.873552 | 3.586849 | YES |
| 3 | 7/24/2017 | 81.26 | 6.221511 | 3.58523 | YES |
| 4 | 11/10/2006 | 79.01 | 5.098634 | 3.583602 | YES |
| 5 | 2/11/2005 | 67.62 | 4.923436 | 3.581963 | YES |
| 6 | 10/10/2019 | 70.36 | 2.611089 | 3.580313 | |
| 7 | 1/29/2018 | 70.38 | 2.648681 | 3.578653 | |
| 8 | 2/12/2018 | 70.57 | 2.516126 | 3.576983 | |
| 9 | 4/8/2010 | 75.63 | 2.644188 | 3.575301 | |
| 10 | 3/21/2013 | 75.43 | 2.495231 | 3.573609 | |

WELL A-13

Sample Size = 189

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 11/10/2006 | 38.43 | 3.610336 | 3.588458 | YES |
| 2 | 7/25/2006 | 38.59 | 3.554985 | 3.586849 | |
| 3 | 9/7/2007 | 38.59 | 3.692059 | 3.58523 | YES |
| 4 | 12/7/2007 | 38.64 | 3.780078 | 3.583602 | YES |
| 5 | 3/24/2005 | 44.19 | 3.689745 | 3.581963 | YES |
| 6 | 6/12/2006 | 38.78 | 3.870465 | 3.580313 | YES |
| 7 | 11/7/2007 | 38.78 | 4.051273 | 3.578653 | YES |
| 8 | 1/5/2005 | 43.95 | 3.767617 | 3.576983 | YES |
| 9 | 2/11/2005 | 43.87 | 3.807277 | 3.575301 | YES |
| 10 | 3/24/2014 | 39.50 | 3.351585 | 3.573609 | |

WELL A-14

Sample Size = 188

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 5/13/2019 | 44.82 | 4.193614 | 3.586849 | YES |
| 2 | 7/25/2011 | 30.77 | 2.318215 | 3.58523 | |
| 3 | 8/15/2011 | 31.06 | 2.218178 | 3.583602 | |
| 4 | 10/29/2020 | 39.65 | 1.959824 | 3.581963 | |
| 5 | 9/11/2006 | 39.64 | 1.98112 | 3.580313 | |
| 6 | 5/4/2006 | 31.74 | 1.930191 | 3.578653 | |
| 7 | 2/12/2018 | 39.44 | 1.912518 | 3.576983 | |
| 8 | 11/14/2018 | 39.39 | 1.912244 | 3.575301 | |
| 9 | 3/4/2019 | 39.39 | 1.93741 | 3.573609 | |
| 10 | 8/14/2020 | 39.38 | 1.958457 | 3.571906 | |

WELL A-21

Sample Size = 186

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 12/7/2007 | 63.27 | 10.60461 | 3.583602 | YES |
| 2 | 2/11/2005 | 49.03 | 3.970448 | 3.581963 | YES |
| 3 | 9/11/2006 | 49.55 | 3.363718 | 3.580313 | |
| 4 | 2/4/2019 | 53.59 | 2.924539 | 3.578653 | |
| 5 | 3/4/2019 | 53.59 | 3.004358 | 3.576983 | |
| 6 | 4/8/2010 | 53.35 | 2.693179 | 3.575301 | |
| 7 | 1/17/2019 | 53.30 | 2.672647 | 3.573609 | |
| 8 | 12/5/2018 | 53.16 | 2.494983 | 3.571906 | |
| 9 | 12/14/2020 | 53.08 | 2.4076 | 3.570191 | |
| 10 | 5/15/2014 | 53.01 | 2.33132 | 3.568466 | |

WELL PP-2A

Sample Size = 186

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 6/4/2019 | 24.41 | 4.333993 | 3.583602 | YES |
| 2 | 3/24/2005 | 31.27 | 3.734717 | 3.581963 | YES |
| 3 | 10/10/2019 | 25.78 | 3.013186 | 3.580313 | |
| 4 | 3/24/2014 | 26.01 | 2.80351 | 3.578653 | |
| 5 | 11/25/2009 | 29.98 | 2.337983 | 3.576983 | |
| 6 | 9/16/2019 | 26.42 | 2.352616 | 3.575301 | |
| 7 | 7/6/2018 | 26.46 | 2.342569 | 3.573609 | |
| 8 | 6/15/2017 | 26.47 | 2.372491 | 3.571906 | |
| 9 | 8/13/2014 | 29.87 | 2.283171 | 3.570191 | |
| 10 | 8/31/2017 | 26.49 | 2.406491 | 3.568466 | |

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APPENDIX II-C

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WELL PP-2B

Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 6/4/2019 | 24.44 | 4.297783 | 3.58523 | YES |
| 2 | 3/24/2005 | 31.44 | 3.679977 | 3.583602 | YES |
| 3 | 10/10/2019 | 25.85 | 2.969536 | 3.581963 | |
| 4 | 3/24/2014 | 26.09 | 2.753416 | 3.580313 | |
| 5 | 2/6/2006 | 30.39 | 2.629251 | 3.578653 | |
| 6 | 10/29/2009 | 30.23 | 2.482069 | 3.576983 | |
| 7 | 9/22/2017 | 26.37 | 2.51511 | 3.575301 | |
| 8 | 11/25/2009 | 30.10 | 2.384601 | 3.573609 | |
| 9 | 7/6/2018 | 26.53 | 2.37374 | 3.571906 | |
| 10 | 9/16/2019 | 26.53 | 2.419177 | 3.570191 | |

WELL PP-6B

Sample Size = 186

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 8/8/2008 | 46.55 | 5.378369 | 3.583602 | YES |
| 2 | 9/22/2017 | 48.92 | 3.183226 | 3.581963 | |
| 3 | 2/12/2018 | 49.41 | 2.713136 | 3.580313 | |
| 4 | 1/29/2018 | 49.46 | 2.717933 | 3.578653 | |
| 5 | 10/10/2019 | 49.52 | 2.710258 | 3.576983 | |
| 6 | 11/30/2017 | 49.54 | 2.750305 | 3.575301 | |
| 7 | 7/24/2017 | 49.60 | 2.742888 | 3.573609 | |
| 8 | 10/23/2017 | 49.60 | 2.810531 | 3.571906 | |
| 9 | 3/15/2018 | 49.75 | 2.688037 | 3.570191 | |
| 10 | 8/31/2017 | 49.76 | 2.739406 | 3.568466 | |

WELL PP-8

Sample Size = 183

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 7/30/2015 | 51.19 | 2.830058 | 3.578653 | |
| 2 | 10/29/2020 | 50.61 | 2.575783 | 3.576983 | |
| 3 | 3/4/2019 | 50.49 | 2.563071 | 3.575301 | |
| 4 | 12/14/2020 | 50.47 | 2.607001 | 3.573609 | |
| 5 | 5/13/2019 | 50.24 | 2.529512 | 3.571906 | |
| 6 | 2/4/2019 | 50.13 | 2.517579 | 3.570191 | |
| 7 | 1/17/2019 | 50.06 | 2.528633 | 3.568466 | |
| 8 | 9/11/2020 | 50.04 | 2.570995 | 3.566728 | |
| 9 | 8/14/2020 | 50.02 | 2.616091 | 3.56498 | |
| 10 | 11/24/2020 | 50.02 | 2.677039 | 3.563219 | |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676



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# EXIHIBIT II-C-10. ROSNER'S (GENERALIZED ESD) TEST RESULTS - OTHER WELLS
## BROWN STATION ROAD SANITARY LANDFILL

WELL A-2
Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 4/21/2005 | 26.35 | 5.055426 | 3.58523 | YES |
| 2 | 2/4/2019 | 35.15 | 3.482071 | 3.5836 | |
| 3 | 10/10/2019 | 28.44 | 3.423219 | 3.58196 | |
| 4 | 6/4/2019 | 29.17 | 2.7589 | 3.58031 | |
| 5 | 9/9/2016 | 29.41 | 2.56183 | 3.57865 | |
| 6 | 9/16/2019 | 29.51 | 2.504835 | 3.57698 | |
| 7 | 7/24/2017 | 29.73 | 2.306852 | 3.5753 | |
| 8 | 3/1/2010 | 33.74 | 2.261276 | 3.57361 | |
| 9 | 5/4/2006 | 29.83 | 2.247097 | 3.57191 | |
| 10 | 9/16/2015 | 29.87 | 2.239138 | 3.57019 | |

WELL A-3
Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 9/7/2005 | 17.71 | 5.026196 | 3.58523 | YES |
| 2 | 9/23/2010 | 18.26 | 5.049296 | 3.5836 | YES |
| 3 | 9/11/2020 | 29.80 | 2.98151 | 3.58196 | |
| 4 | 3/4/2019 | 29.71 | 2.997652 | 3.58031 | |
| 5 | 5/13/2019 | 29.69 | 3.067562 | 3.57865 | |
| 6 | 7/9/2019 | 29.51 | 3.018199 | 3.57698 | |
| 7 | 8/14/2020 | 29.20 | 2.857658 | 3.5753 | |
| 8 | 2/12/2018 | 29.03 | 2.79416 | 3.57361 | |
| 9 | 11/14/2018 | 29.03 | 2.865454 | 3.57191 | |
| 10 | 10/29/2020 | 28.75 | 2.703968 | 3.57019 | |

WELL A-10
Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 9/11/2006 | 41.97 | 4.161707 | 3.58523 | YES |
| 2 | 4/7/2007 | 42.10 | 4.325074 | 3.5836 | YES |
| 3 | 6/1/2007 | 42.15 | 4.55204 | 3.58196 | YES |
| 4 | 10/31/2006 | 42.26 | 4.792328 | 3.58031 | YES |
| 5 | 1/1/2007 | 42.27 | 5.135299 | 3.57865 | YES |
| 6 | 3/7/2007 | 42.37 | 5.513938 | 3.57698 | YES |
| 7 | 12/14/2006 | 42.57 | 5.939841 | 3.5753 | YES |
| 8 | 11/10/2006 | 43.04 | 6.320065 | 3.57361 | YES |
| 9 | 7/8/2008 | 58.27 | 4.80754 | 3.57191 | YES |
| 10 | 10/10/2019 | 48.88 | 2.744548 | 3.57019 | |

WELL A-15
Sample Size = 188

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 5/4/2006 | 30.22 | 5.185062 | 3.58685 | YES |
| 2 | 4/6/2006 | 30.70 | 5.191825 | 3.58523 | YES |
| 3 | 12/7/2007 | 31.09 | 5.255965 | 3.5836 | YES |
| 4 | 4/8/2008 | 32.72 | 4.015869 | 3.58196 | YES |
| 5 | 9/11/2013 | 33.06 | 3.846294 | 3.58031 | YES |
| 6 | 2/12/2018 | 39.17 | 2.903643 | 3.57865 | |
| 7 | 10/10/2019 | 34.15 | 2.831052 | 3.57698 | |
| 8 | 7/1/2007 | 34.22 | 2.821517 | 3.5753 | |
| 9 | 10/29/2009 | 38.91 | 2.757809 | 3.57361 | |
| 10 | 11/25/2009 | 38.85 | 2.752801 | 3.57191 | |

WELL A-17
Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 11/10/2006 | 20.30 | 9.823367 | 3.58523 | YES |
| 2 | 7/29/2013 | 27.90 | 4.050562 | 3.5836 | YES |
| 3 | 11/7/2013 | 28.61 | 3.260838 | 3.58196 | |
| 4 | 3/24/2014 | 28.64 | 3.325785 | 3.58031 | |
| 5 | 3/24/2005 | 33.26 | 3.403444 | 3.57865 | |
| 6 | 10/10/2019 | 29.04 | 2.916802 | 3.57698 | |
| 7 | 10/29/2020 | 32.69 | 2.698145 | 3.5753 | |
| 8 | 5/13/2019 | 32.63 | 2.667034 | 3.57361 | |
| 9 | 10/29/2009 | 32.60 | 2.681023 | 3.57191 | |
| 10 | 11/25/2009 | 32.50 | 2.580223 | 3.57019 | |

WELL A-18
Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 11/10/2006 | 36.25 | 6.573983 | 3.58523 | YES |
| 2 | 11/8/2008 | 25.14 | 3.660315 | 3.5836 | YES |
| 3 | 10/10/2019 | 26.00 | 2.914425 | 3.58196 | |
| 4 | 1/5/2005 | 26.46 | 2.502516 | 3.58031 | |
| 5 | 3/24/2014 | 26.64 | 2.359015 | 3.57865 | |
| 6 | 6/4/2019 | 26.70 | 2.336964 | 3.57698 | |
| 7 | 9/16/2019 | 26.71 | 2.368664 | 3.5753 | |
| 8 | 10/23/2017 | 26.73 | 2.390844 | 3.57361 | |
| 9 | 11/7/2013 | 30.96 | 2.381242 | 3.57191 | |
| 10 | 6/15/2017 | 26.78 | 2.398668 | 3.57019 | |

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11260 Roger Bacon Drive
Reston, VA 20190
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APPENDIX II-C

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WELL A-19

Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 11/10/2006 | 33.82 | 4.126238 | 3.58523 | YES |
| 2 | 12/7/2007 | 24.62 | 3.982188 | 3.5836 | YES |
| 3 | 10/29/2009 | 32.07 | 2.855364 | 3.58196 | |
| 4 | 10/10/2019 | 26.05 | 2.868555 | 3.58031 | |
| 5 | 11/25/2009 | 31.87 | 2.776827 | 3.57865 | |
| 6 | 12/3/2015 | 31.68 | 2.655339 | 3.57698 | |
| 7 | 3/1/2010 | 31.63 | 2.665398 | 3.5753 | |
| 8 | 3/24/2005 | 31.49 | 2.582226 | 3.57361 | |
| 9 | 3/16/2015 | 31.22 | 2.354675 | 3.57191 | |
| 10 | 10/23/2017 | 26.79 | 2.332274 | 3.57019 | |

WELL A-20

Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 4/8/2008 | 39.30 | 8.233228 | 3.58523 | YES |
| 2 | 12/13/2013 | 33.38 | 3.855539 | 3.5836 | YES |
| 3 | 3/4/2019 | 32.91 | 3.494125 | 3.58196 | |
| 4 | 5/13/2019 | 32.66 | 3.331163 | 3.58031 | |
| 5 | 9/11/2020 | 32.63 | 3.410445 | 3.57865 | |
| 6 | 7/9/2019 | 32.38 | 3.221758 | 3.57698 | |
| 7 | 2/12/2018 | 32.22 | 3.121882 | 3.5753 | |
| 8 | 3/24/2014 | 27.47 | 3.055124 | 3.57361 | |
| 9 | 8/14/2020 | 32.07 | 3.07752 | 3.57191 | |
| 10 | 7/1/2005 | 27.55 | 3.097176 | 3.57019 | |

WELL A-22

Sample Size = 179

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 12/14/2006 | 23.43 | 3.828645 | 3.57191 | YES |
| 2 | 12/7/2007 | 23.45 | 3.812012 | 3.57019 | YES |
| 3 | 5/4/2006 | 24.03 | 3.488854 | 3.56847 | |
| 4 | 11/10/2006 | 24.11 | 3.555505 | 3.56673 | |
| 5 | 11/7/2007 | 24.81 | 3.053906 | 3.56498 | |
| 6 | 6/12/2006 | 24.81 | 3.148663 | 3.56322 | |
| 7 | 3/24/2006 | 24.91 | 3.155249 | 3.56145 | |
| 8 | 7/25/2006 | 24.93 | 3.240641 | 3.55966 | |
| 9 | 4/6/2006 | 24.93 | 3.355333 | 3.55787 | |
| 10 | 3/8/2008 | 25.13 | 3.270121 | 3.55606 | |

WELL B-1

Sample Size = 188

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 5/28/2010 | 24.93 | 6.350666 | 3.58685 | YES |
| 2 | 12/16/2010 | 25.95 | 6.590852 | 3.58523 | YES |
| 3 | 12/27/2005 | 26.49 | 7.189845 | 3.5836 | YES |
| 4 | 9/7/2005 | 29.89 | 5.800493 | 3.58196 | YES |
| 5 | 11/18/2005 | 30.79 | 5.648707 | 3.58031 | YES |
| 6 | 11/14/2018 | 41.17 | 3.759615 | 3.57865 | YES |
| 7 | 10/10/2019 | 34.34 | 2.905572 | 3.57698 | |
| 8 | 12/7/2007 | 39.64 | 2.430927 | 3.5753 | |
| 9 | 7/1/2007 | 34.94 | 2.39105 | 3.57361 | |
| 10 | 10/29/2009 | 39.53 | 2.38357 | 3.57191 | |

WELL B-2R

Sample Size = 150

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 9/21/2012 | 36.17 | 4.975003 | 3.51701 | YES |
| 2 | 10/10/2019 | 37.84 | 3.791614 | 3.5149 | YES |
| 3 | 9/16/2019 | 38.72 | 3.077329 | 3.51277 | |
| 4 | 5/13/2019 | 39.04 | 2.84527 | 3.51062 | |
| 5 | 8/26/2019 | 39.05 | 2.926979 | 3.50846 | |
| 6 | 9/16/2015 | 39.46 | 2.55892 | 3.50628 | |
| 7 | 11/14/2019 | 39.55 | 2.523469 | 3.50408 | |
| 8 | 6/11/2020 | 39.66 | 2.459942 | 3.50187 | |
| 9 | 8/8/2008 | 39.81 | 2.341267 | 3.49963 | |
| 10 | 3/24/2014 | 39.81 | 2.396885 | 3.49738 | |

WELL B-3

Sample Size = 189

| Outlier | Date | GWE (ft-amsl) | R Statistics | $l_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 5/7/2007 | 46.35 | 4.645907 | 3.58846 | YES |
| 2 | 5/4/2006 | 45.72 | 4.342815 | 3.58685 | YES |
| 3 | 7/1/2007 | 45.63 | 4.501773 | 3.58523 | YES |
| 4 | 10/10/2019 | 38.72 | 2.655531 | 3.5836 | |
| 5 | 9/22/2014 | 38.81 | 2.616663 | 3.58196 | |
| 6 | 7/9/2019 | 38.90 | 2.574072 | 3.58031 | |
| 7 | 9/16/2015 | 39.07 | 2.437164 | 3.57865 | |
| 8 | 11/25/2009 | 43.28 | 2.341558 | 3.57698 | |
| 9 | 10/29/2009 | 43.23 | 2.326525 | 3.5753 | |
| 10 | 3/1/2010 | 43.20 | 2.333762 | 3.57361 | |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

APPENDIX II-C

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DATE __12/20/2021__

WELL B-4

Sample Size = 189

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 11/10/2006 | 37.88 | 10.84912 | 3.58846 | YES |
| 2 | 10/10/2019 | 47.98 | 3.199912 | 3.58685 | |
| 3 | 3/24/2014 | 48.10 | 3.121734 | 3.58523 | |
| 4 | 9/21/2012 | 48.19 | 3.078501 | 3.5836 | |
| 5 | 10/4/2012 | 48.26 | 3.060022 | 3.58196 | |
| 6 | 7/9/2019 | 48.43 | 2.877803 | 3.58031 | |
| 7 | 10/29/2020 | 51.88 | 2.683502 | 3.57865 | |
| 8 | 2/12/2018 | 51.85 | 2.696116 | 3.57698 | |
| 9 | 8/13/2012 | 48.63 | 2.690976 | 3.5753 | |
| 10 | 10/29/2009 | 51.80 | 2.708163 | 3.57361 | |

WELL B-6R

Sample Size = 181

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 12/8/2008 | 64.90 | 6.107994 | 3.5753 | YES |
| 2 | 11/10/2006 | 62.45 | 4.969694 | 3.57361 | YES |
| 3 | 6/12/2006 | 61.75 | 4.782181 | 3.57191 | YES |
| 4 | 11/7/2007 | 61.75 | 5.138976 | 3.57019 | YES |
| 5 | 12/7/2007 | 61.75 | 5.589791 | 3.56847 | YES |
| 6 | 7/25/2006 | 61.25 | 5.650963 | 3.56673 | YES |
| 7 | 7/1/2005 | 50.96 | 5.852241 | 3.56498 | YES |
| 8 | 1/8/2008 | 51.42 | 5.949892 | 3.56322 | YES |
| 9 | 4/8/2008 | 51.92 | 5.96176 | 3.56145 | YES |
| 10 | 5/8/2008 | 52.32 | 6.059975 | 3.55966 | YES |

WELL B-7

Sample Size = 189

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 1/29/2013 | 65.78 | 3.442429 | 3.58846 | |
| 2 | 3/4/2019 | 73.19 | 2.786634 | 3.58685 | |
| 3 | 5/13/2019 | 73.12 | 2.793105 | 3.58523 | |
| 4 | 10/29/2020 | 72.81 | 2.585614 | 3.5836 | |
| 5 | 11/14/2018 | 72.73 | 2.568633 | 3.58196 | |
| 6 | 9/11/2020 | 72.63 | 2.531436 | 3.58031 | |
| 7 | 5/5/2020 | 72.62 | 2.57488 | 3.57865 | |
| 8 | 8/14/2020 | 72.60 | 2.611581 | 3.57698 | |
| 9 | 2/4/2019 | 72.59 | 2.660179 | 3.5753 | |
| 10 | 4/18/2019 | 72.54 | 2.67285 | 3.57361 | |

WELL B-8

Sample Size = 189

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 11/7/2013 | 73.23 | 4.418427 | 3.58846 | YES |
| 2 | 8/8/2008 | 73.27 | 4.650455 | 3.58685 | YES |
| 3 | 8/15/2013 | 73.32 | 4.919319 | 3.58523 | YES |
| 4 | 10/29/2020 | 84.49 | 4.446784 | 3.5836 | YES |
| 5 | 11/25/2009 | 83.59 | 3.891303 | 3.58196 | YES |
| 6 | 6/4/2019 | 75.92 | 3.275637 | 3.58031 | |
| 7 | 3/4/2019 | 82.47 | 3.066472 | 3.57865 | |
| 8 | 10/29/2009 | 82.18 | 2.86537 | 3.57698 | |
| 9 | 10/10/2019 | 76.51 | 2.898469 | 3.5753 | |
| 10 | 1/29/2018 | 76.62 | 2.861444 | 3.57361 | |

WELL B-9

Sample Size = 189

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 1/17/2014 | 43.27 | 12.5105 | 3.58846 | YES |
| 2 | 1/29/2018 | 76.68 | 2.921827 | 3.58685 | |
| 3 | 10/23/2017 | 76.92 | 2.792818 | 3.58523 | |
| 4 | 11/30/2017 | 76.95 | 2.834948 | 3.5836 | |
| 5 | 9/7/2005 | 77.08 | 2.79056 | 3.58196 | |
| 6 | 7/9/2014 | 83.29 | 2.797118 | 3.58031 | |
| 7 | 8/31/2017 | 77.57 | 2.444524 | 3.57865 | |
| 8 | 9/22/2017 | 77.62 | 2.4456 | 3.57698 | |
| 9 | 3/15/2018 | 77.64 | 2.474992 | 3.5753 | |
| 10 | 10/10/2019 | 77.66 | 2.506021 | 3.57361 | |

WELL PP-1A

Sample Size = 187

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 10/10/2019 | 27.81 | 3.441506 | 3.58523 | |
| 2 | 6/4/2019 | 28.41 | 2.884742 | 3.5836 | |
| 3 | 9/16/2019 | 28.47 | 2.89059 | 3.58196 | |
| 4 | 8/31/2017 | 28.71 | 2.68267 | 3.58031 | |
| 5 | 3/24/2005 | 33.22 | 2.690563 | 3.57865 | |
| 6 | 7/6/2018 | 28.76 | 2.717268 | 3.57698 | |
| 7 | 8/26/2019 | 28.76 | 2.782384 | 3.5753 | |
| 8 | 6/11/2020 | 28.80 | 2.801482 | 3.57361 | |
| 9 | 6/15/2017 | 28.90 | 2.74342 | 3.57191 | |
| 10 | 3/24/2014 | 28.95 | 2.74531 | 3.57019 | |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

APPENDIX II-C

CALCULATED BY: __GRI_
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WELL NES-1S

Sample Size = 68

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 2/20/2017 | 58.77 | 9.630671 | 3.24686 | YES |
| 2 | 10/10/2019 | 53.94 | 3.409804 | 3.24135 | YES |
| 3 | 3/4/2019 | 56.46 | 3.393922 | 3.23573 | YES |
| 4 | 2/4/2019 | 56.32 | 3.015937 | 3.23001 | |
| 5 | 6/13/2018 | 56.24 | 2.799946 | 3.22418 | |
| 6 | 1/17/2019 | 56.23 | 2.772947 | 3.21823 | |
| 7 | 6/6/2018 | 56.20 | 2.691951 | 3.21217 | |
| 8 | 12/14/2020 | 56.12 | 2.475959 | 3.20598 | |
| 9 | 4/18/2019 | 56.11 | 2.44896 | 3.19966 | |
| 10 | 12/5/2018 | 56.03 | 2.232969 | 3.19321 | |

WELL NES-6D

Sample Size = 48

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 10/10/2019 | 25.3 | 7.865678 | 3.1118 | YES |
| 2 | 4/25/2016 | 25.90 | 6.255303 | 3.10324 | YES |
| 3 | 9/9/2016 | 26.59 | 4.403371 | 3.09446 | YES |
| 4 | 9/16/2019 | 26.67 | 4.188654 | 3.08542 | YES |
| 5 | 12/14/2020 | 27.02 | 3.249268 | 3.07613 | YES |
| 6 | 10/23/2017 | 27.07 | 3.11507 | 3.06657 | YES |
| 7 | 9/11/2020 | 29.39 | 3.111715 | 3.05672 | YES |
| 8 | 5/13/2019 | 29.19 | 2.574924 | 3.04657 | |
| 9 | 3/4/2019 | 29.12 | 2.387046 | 3.0361 | |
| 10 | 6/13/2016 | 27.42 | 2.175685 | 3.02528 | |

WELL NES-6S

Sample Size = 58

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 10/10/2019 | 24.00 | 3.969957 | 3.18663 | YES |
| 2 | 9/11/2020 | 29.40 | 3.206776 | 3.1799 | YES |
| 3 | 12/14/2020 | 29.21 | 3.280695 | 3.17302 | YES |
| 4 | 9/16/2019 | 25.45 | 3.020952 | 3.16599 | |
| 5 | 9/9/2016 | 25.57 | 3.116711 | 3.15879 | |
| 6 | 7/6/2018 | 25.72 | 3.167292 | 3.15143 | YES |
| 7 | 7/9/2019 | 28.42 | 2.809343 | 3.14389 | |
| 8 | 6/15/2017 | 26.22 | 2.514955 | 3.13616 | |
| 9 | 10/23/2017 | 26.27 | 2.585948 | 3.12825 | |
| 10 | 6/13/2016 | 26.28 | 2.786175 | 3.12013 | |

WELL NES-7S

Sample Size = 39

| Outlier | Date | GWE (ft-amsl) | R Statistics | $I_i$ at a 5% | Outlier |
|---|---|---|---|---|---|
| 1 | 10/10/2019 | 23.77 | 4.301384 | 3.02528 | YES |
| 2 | 9/16/2019 | 25.22 | 3.243843 | 3.01411 | YES |
| 3 | 9/11/2020 | 28.15 | 2.999342 | 3.00255 | |
| 4 | 7/11/2017 | 25.97 | 2.350321 | 2.99059 | |
| 5 | 6/4/2019 | 26.12 | 2.167938 | 2.97818 | |
| 6 | 10/23/2017 | 26.15 | 2.281392 | 2.96532 | |
| 7 | 3/4/2019 | 27.60 | 2.2886 | 2.95195 | |
| 8 | 7/6/2018 | 26.24 | 2.330452 | 2.93805 | |
| 9 | 1/17/2019 | 26.36 | 2.146863 | 2.92357 | |
| 10 | 8/31/2017 | 26.38 | 2.294468 | 2.90847 | |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-D

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __3___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE __10/13/2020__

## BROWN STATION ROAD SANITARY LANDFILL
## SOIL BEARING CAPACITY CALCULATIONS

Consideration: To determine the allowable bearing capacity of the foundation soil due to landfill structure, using Terzaghi's Bearing Capacity Equations

**Table 10.2**
$N_c$ Bearing Capacity Factor Multipliers for Various Values of B/L
(See figure 10.3)

| B/L | multiplier |
|---|---|
| 1 (square) | 1.25 |
| 0.5 | 1.12 |
| 0.2 | 1.05 |
| 0.0 | 1.00 |
| 1 (circular) | 1.20 |

**Table 10.3**
Terzaghi Bearing Capacity Factors for General Shear[3]

| $\phi$ | $N_c$ | $N_q$ | $N_\gamma$ |
|---|---|---|---|
| 0 | 5.7 | 1.0 | 0.0 |
| 5 | 7.3 | 1.6 | 0.5 |
| 10 | 9.6 | 2.7 | 1.2 |
| 15 | 12.9 | 4.4 | 2.5 |
| 20 | 17.7 | 7.4 | 5.0 |
| 25 | 25.1 | 12.7 | 9.7 |
| 30 | 37.2 | 22.5 | 19.7 |
| 34 | 52.6 | 36.5 | 35.0 |
| 35 | 57.8 | 41.4 | 42.4 |
| 40 | 95.7 | 81.3 | 100.4 |
| 45 | 172.3 | 173.3 | 297.5 |
| 48 | 258.3 | 287.9 | 780.1 |
| 50 | 347.5 | 415.1 | 1153.2 |

**Table 4-2 Bearing-capacity factors for the Terzaghi equations**
Values of $N_\gamma$ for $\phi$ of 34 and 48° are original Terzaghi values and used to back-compute $K_{p\gamma}$ for forward computations of $N_\gamma$ by author

| $\phi$, deg | $N_c$ | $N_q$ | $N_\gamma$ | $K_{p\gamma}$ |
|---|---|---|---|---|
| 0 | 5.7 | 1.0 | 0.0 | 10.8 |
| 5 | 7.3 | 1.6 | 0.5 | 12.2 |
| 10 | 9.6 | 2.7 | 1.2 | 14.7 |
| 15 | 12.9 | 4.4 | 2.5 | 18.6 |
| 20 | 17.7 | 7.4 | 5.0 | 25.0 |
| 25 | 25.1 | 12.7 | 9.7 | 35.0 |
| 30 | 37.2 | 22.5 | 19.7 | 52.0 |
| 34 | 52.6 | 36.5 | 36.0 | |
| 35 | 57.8 | 41.4 | 42.4 | 82.0 |
| 40 | 95.7 | 81.3 | 100.4 | 141.0 |
| 45 | 172.3 | 173.3 | 297.5 | 298.0 |
| 48 | 258.3 | 287.9 | 780.1 | |
| 50 | 347.5 | 415.1 | 1153.2 | 800.0 |

**Table 10.4**
$N_\gamma$ Multipliers for Various Values of B/L
(See figure 10.3)

| B/L | multiplier |
|---|---|
| 1.0 (square) | 0.85 |
| 1.0 (circular) | 0.70 |
| 0.5 | 0.90 |
| 0.2 | 0.95 |
| 0.0 | 1.0 |

Ref.: Michael R. Lindeburg, PE, 4th edition, 1986. Civil Engineering Reference Manual. Professional Publication, Inc., pp. 10-3 & 10-4. (Tables 10-2, 10-3, & 10-4)
Joseph E. Bowles. Third Edition, 1982. Foundation Analysis and Design. McGraw-Hill Book Company, pp.131-136. (Table 4-2)

Parameters:

- L = longest lateral base dimension of the landfill footprint (ft.)
- B = least lateral base dimension of the landfill footprint (ft.)
- $p_g$ = gross (or ultimate) bearing capacity or gross pressure (psf)
- $p_{net}$ = net soil pressure (psf)
- FS = factor of safety, FS = 3 (average conditions)
- $p_a$ = allowable soil pressure (psf)
- ρ = unit weight of the foundation soil (pcf)
- $p_q$ = surface surcharge (psf)
- Nγ = bearing capacity factor

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11260 Roger Bacon Drive
Reston, VA 20190
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# APPENDIX II-D



$N_c$ = bearing capacity factor
$N_q$ = bearing capacity factor
$S\gamma$ = $N\gamma$ multiplier
$S_c$ = $N_c$ multiplier
f = internal friction angle of foundation soil (degrees)
$D_f$ = depth of overburden soil (ft.)
c = cohesion of the foundation soil (psf)
$H_w$ = maximum waste height (ft.)
$\gamma_w$ = unit weight of wet waste (pcf)
$Q_r$ = Maximum total waste overburden pressure required (psf)
DR = design ratio

**Calculate Allowable Bearing Capacity ($P_a$):**

$$p_g = 1/2\,(\rho B N_\gamma)\,S_\gamma + cN_c\,S_c + (p_q + \rho D_f)\,N_q$$

, where

$$N\gamma = 0.5 \tan\phi\,[(K_{p\gamma}/\cos^2\phi) - 1]$$

$$N_c = (Nq-1)\cot\phi = (Nq-1)/\tan\phi$$

$$N_q = a^2/[2\cos^2(45+\phi/2)]\,(K_{p\gamma}/\cos^2\phi - 1)]$$

$$a = e^{(0.75\pi-\phi/2)\tan\phi}$$

$$p_{net} = p_g - \rho D_f$$

$$p_a = p_{net}/FS$$

$$Q_r = H_w\,\gamma_w$$

$$DR = p_a/Q_r$$

**Input Data:**

| | | | | |
|---|---|---|---|---|
| $\rho$ = | 110.00 | pcf [Appendix E, Table E-1) | | |
| B = | 1,500.00 | ft | | |
| L = | 1,800.00 | ft | | |
| $D_f$ = | 0.00 | ft | | |
| $\phi$ = | 30.00 | ° | or | 0.5236 rad |
| $K_{p\gamma}$ = | 52.00 | | at $\phi$ = 30° | |
| $S\gamma$ = | 0.45 | | | |
| $S_c$ = | 1.12 | | | |
| FS = | 3.00 | | | |
| $p_q$ = | 0.00 | psf | | |
| c = | 0.00 | psf | | |
| Hw = | 210.00 | ft [rounded up the maximum waste depth in Appendix E (= 209 ft) to tens] | | |
| $\gamma_w$ = | 48.15 | pcf [Appendix E, Table E-1) | | |

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# APPENDIX II-D



Calculations:

| | | |
|---|---|---|
| a = | 3.351 | |
| $N\gamma$ = | 19.73 | |
| $N_q$ = | 1534.48 | |
| $N_c$ = | 2656.06 | |
| $p_g$ = | 732,333 | psf |
| $p_{net}$ = | 732,333 | psf |
| $p_a$ = | 244,111 | psf |
| $Q_r$ = | 10,112 | psf |
| DR = | 24.1 | Because DR is greater than 1.5, the subgrade soil has enough bearing capacity |

Results: The design ratio (DR) equals to 24.1 indicating that the soil bearing capacity of the foundation soil is more than adequate to support the weight of the landfill at the maximum waste height of 210 feet.

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11260 Roger Bacon Drive
Reston, VA 20190
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# APPENDIX II-E

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __2___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

## TABLE E-1
## BROWN STATION ROAD SANITARY LANDFILL
## BL SYSTEM SETTLEMENT ANALYSIS FOR AREA C INFILL (NON-OVERLAPPING AREAS)

| Cross-Section | Station (ft) | Existing Grade (ft) | Conceptual Subgrade (ft) | Cut/Fill[1] (ft) | Stress Change from Earthwork[2] (psf) | Conceptual Final Grade (ft) | Waste + LSB + Final Cover Loading[3,4] (psf) | Initial Loading on subgrade[8] (psf) | Total BL System Settlement[5,6,7] (ft) | (inch) |
|---|---|---|---|---|---|---|---|---|---|---|
| Section A-A' | 9.8 | 40.42 | 55.43 | 13.01 | 1432 | 55.93 | 399 | 2,200 | 0.32 | 3.8 |
| | 39.7 | 40.42 | 46.65 | 4.24 | 466 | 64.53 | 1,235 | 2,200 | 0.30 | 3.6 |
| | 100 | 40.42 | 47.14 | 4.72 | 519 | 81.82 | 2,044 | 2,200 | 0.41 | 4.9 |
| | 200 | 40.42 | 47.60 | 5.18 | 570 | 110.51 | 3,404 | 2,200 | 0.55 | 6.6 |
| | 300 | 40.42 | 48.06 | 5.64 | 620 | 139.19 | 4,763 | 2,200 | 0.66 | 7.9 |
| | 400 | 43.72 | 48.64 | 2.92 | 321 | 169.87 | 6,212 | 2,200 | 0.73 | 8.8 |
| | 500 | 44.32 | 49.25 | 2.93 | 322 | 201.28 | 7,695 | 2,200 | 0.81 | 9.8 |
| | 600 | 44.48 | 49.86 | 3.38 | 371 | 230.42 | 9,068 | 2,200 | 0.88 | 10.6 |
| | 700 | 44.66 | 50.47 | 3.81 | 419 | 235.13 | 9,266 | 2,200 | 0.89 | 10.7 |
| | 800 | 46.05 | 51.08 | 3.03 | 333 | 239.85 | 9,463 | 2,200 | 0.90 | 10.8 |
| | 900 | 47.91 | 51.69 | 1.78 | 196 | 244.44 | 9,655 | 2,200 | 0.90 | 10.8 |
| | 1000 | 49.46 | 52.30 | 0.85 | 93 | 248.98 | 9,844 | 2,200 | 0.90 | 10.9 |
| | 1100 | 50.06 | 52.71 | 0.66 | 72 | 253.52 | 10,043 | 2,200 | 0.91 | 11.0 |
| | 1167.7 | 48.91 | 52.79 | 1.88 | 207 | 256.59 | 10,187 | 2,200 | 0.92 | 11.1 |
| | 1176.2 | 48.98 | 56.80 | 5.82 | 641 | 256.98 | 10,013 | 2,200 | 0.94 | 11.2 |
| | 1184.4 | 49.04 | 52.81 | 1.77 | 195 | 257.35 | 10,223 | 2,200 | 0.93 | 11.1 |
| | 1200 | 49.08 | 52.90 | 1.82 | 201 | 258.06 | 10,253 | 2,200 | 0.93 | 11.1 |
| | 1243.3 | 49.01 | 53.30 | 2.29 | 252 | 260.02 | 10,328 | 2,200 | 0.93 | 11.2 |
| | 1300 | 49.32 | 53.83 | 2.51 | 276 | 260.02 | 10,303 | 2,200 | 0.93 | 11.2 |
| | 1400 | 49.25 | 54.75 | 3.50 | 385 | 260.02 | 10,258 | 2,200 | 0.93 | 11.2 |
| | 1500 | 43.93 | 55.68 | 9.75 | 1072 | 260.02 | 10,213 | 2,200 | 0.96 | 11.5 |
| | 1600 | 45.24 | 56.60 | 9.37 | 1030 | 260.02 | 10,169 | 2,200 | 0.96 | 11.5 |
| | 1622.3 | 47.52 | 56.81 | 7.29 | 802 | 260.02 | 10,159 | 2,200 | 0.95 | 11.4 |
| | 1700 | 59.81 | 58.81 | -3.00 | -330 | 256.78 | 9,907 | 2,200 | 0.89 | 10.7 |
| | 1800 | 64.78 | 63.78 | -3.00 | -330 | 252.74 | 9,473 | 2,200 | 0.87 | 10.4 |
| | 1900 | 68.29 | 67.29 | -3.00 | -330 | 248.85 | 9,116 | 2,200 | 0.85 | 10.2 |
| | 2000 | 69.00 | 68.00 | -3.00 | -330 | 245.04 | 8,899 | 2,200 | 0.84 | 10.1 |
| | 2100 | 70.85 | 69.85 | -3.00 | -330 | 241.13 | 8,622 | 2,200 | 0.83 | 9.9 |
| Section B-B' | 1000 | 70.63 | 63.46 | -9.17 | -1009 | 245.61 | 9,145 | 2,200 | 0.82 | 9.8 |
| | 1100 | 67.22 | 61.04 | -8.18 | -900 | 245.85 | 9,273 | 2,200 | 0.83 | 10.0 |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E


CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

| Cross-Section | Station (ft) | Existing Grade (ft) | Conceptual Subgrade (ft) | Cut/Fill[(1)] (ft) | Stress Change from Earthwork[(2)] (psf) | Conceptual Final Grade (ft) | Waste + LSB + Final Cover Loading[(3,4)] (psf) | Initial Loading on subgrade[(8)] (psf) | Total BL System Settlement[(5,6,7)] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | (ft) | (inch) |
| Section C-C' | 900 | 43.00 | 49.20 | 4.20 | 462 | 235.69 | 9,354 | 2,200 | 0.90 | 10.8 |
| | 1000 | 39.67 | 47.27 | 5.59 | 615 | 236.75 | 9,498 | 2,200 | 0.91 | 10.9 |
| | 1100 | 40.31 | 48.17 | 5.86 | 645 | 237.76 | 9,503 | 2,200 | 0.91 | 11.0 |
| | 1200 | 41.13 | 49.34 | 6.20 | 682 | 238.97 | 9,505 | 2,200 | 0.92 | 11.0 |
| | 1300 | 45.96 | 50.50 | 2.54 | 280 | 240.70 | 9,532 | 2,200 | 0.90 | 10.8 |
| | 1400 | 46.34 | 51.66 | 3.32 | 366 | 242.91 | 9,583 | 2,200 | 0.91 | 10.9 |
| | 1500 | 46.71 | 52.89 | 4.18 | 459 | 245.11 | 9,630 | 2,200 | 0.91 | 10.9 |
| | 1578.0 | 46.33 | 53.85 | 5.52 | 607 | 244.72 | 9,565 | 2,200 | 0.91 | 11.0 |
| | 1588.6 | 46.61 | 57.99 | 9.38 | 1032 | 244.95 | 9,376 | 2,200 | 0.92 | 11.1 |
| | 1599.2 | 46.60 | 54.11 | 5.51 | 606 | 245.17 | 9,574 | 2,200 | 0.92 | 11.0 |
| | 1600 | 46.60 | 54.12 | 5.52 | 608 | 245.19 | 9,574 | 2,200 | 0.92 | 11.0 |
| | 3100 | 44.90 | 54.59 | 7.69 | 846 | 258.87 | 10,210 | 2,200 | 0.95 | 11.4 |
| | 3200 | 48.99 | 52.83 | 1.84 | 202 | 256.47 | 10,179 | 2,200 | 0.92 | 11.1 |
| | 3279.7 | 58.90 | 58.41 | -2.49 | -274 | 254.18 | 9,801 | 2,200 | 0.89 | 10.6 |
| | 3290.7 | 58.32 | 57.99 | -2.33 | -257 | 253.86 | 9,805 | 2,200 | 0.89 | 10.7 |

BL, psf, ft, and in are bottom liner, pounds per square foot, and foot (feet), and inch (inches), respectively.

Notes:

(1) Cut/fill is from bottom of liner subbase grade. Assume 2.0 feet thick bottom liner subbase.

(2) Assume soil density final cover and liner subbase = 110 pcf [Maximum dry density of ML-CL, material recommended for subbase, was 125.4 pcf (Table 3.2, Attachment 2)]

(3) Assume inplace density of new waste = 1,300 pcy [SCS Estimate]

(4) Assume 2.5 feet final cover

(5) Assume subgrade material density = 110 pcf [Maximum dry density of SC (clayey sand), material recommended as subgrade, was 124.4 pcf (Table 3.2, Attachment 2) and G was 2.64]

(6) Assume void ratio of subgrade material (e) = 0.47 and G ≅ 2.6

(7) Compression Index for subgrade material ($C_C$) = 0.045 (Basic Soil Engineering, B.K.Hough, 1969)

(8) Estimate settlement for 40 feet of subgrade material below landfill base.

(9) Liner is conservatively located at the lowest possible location for maximum possible waste load and BL system settlement.

<u>(Primary) Settlement:</u>

$$\Delta H = H \frac{C_c}{1+e} \log\left[1 + \frac{P}{p_i}\right]$$ [Sowers Model (1973)]

where; $\Delta H$ = Settlement, ft
$H$ = Soil depth which will settle, ft
$P$ = Stress change from earthwork + (waste, LSB and final cover) loading [= cut/fill height * soil density + (waste + final cover) * waste density]
$p_i$ = Initial loading at center of soil column, pcf (= soil column height/2*soil density)

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __3___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

## TABLE E-2
## BROWN STATION ROAD SANITARY LANDFILL
## BL SYSTEM SETTLEMENT ANALYSIS FOR AREA C INFILL (OVERLAPPING AREAS)

| | Station (ft) | Average Ground Elevation (ft) | Conceptual Subgrade (ft) | Thickness of Existing Waste[1] (ft) | Stress at Center of Existing Waste[2] (psf) | Conceptual Final Grade (ft) | Thickness of New Waste[3] (ft) | New Waste Load at Center of Existing Waste[4] (psf) | Primary BL System Settlement[5 to 8] (ft) | Median Fill Age ($t_1$)[9,10] (Years) | $t_2$ Age[11] (Years) | Secondary BL System Settlement[9] (ft) | Total BL System Settlement (ft) | Percent Change in Thickness |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Section B-B' | 1200 | 67.22 | 66.95 | 9.73 | 250 | 246.09 | 179.14 | 8,625 | 2.9 | 45 | 65 | 0.04 | 3.0 | 30.4% |
| | 1287.7 | 67.22 | 81.18 | 23.96 | 615 | 246.16 | 164.98 | 7,943 | 5.3 | 45 | 65 | 0.12 | 5.4 | 22.5% |
| | 1298.2 | 67.22 | 80.03 | 22.81 | 585 | 246.18 | 166.15 | 8,000 | 5.1 | 45 | 65 | 0.11 | 5.2 | 23.0% |
| | 1600 | 67.22 | 112.37 | 55.14 | 1,414 | 249.08 | 136.71 | 6,582 | 8.0 | 45 | 65 | 0.30 | 8.3 | 15.0% |
| | 1646.1 | 67.22 | 113.44 | 56.21 | 1,442 | 249.82 | 136.38 | 6,566 | 8.1 | 45 | 65 | 0.30 | 8.4 | 14.9% |
| | 1695 | 67.22 | 119.82 | 62.59 | 1,605 | 250.89 | 131.07 | 6,311 | 8.4 | 45 | 65 | 0.34 | 8.7 | 13.9% |
| | 1700 | 67.22 | 118.32 | 61.10 | 1,567 | 251.01 | 132.69 | 6,389 | 8.3 | 45 | 65 | 0.33 | 8.6 | 14.2% |
| | 1709 | 67.22 | 115.88 | 58.65 | 1,504 | 251.20 | 135.32 | 6,515 | 8.2 | 45 | 65 | 0.32 | 8.5 | 14.6% |
| | 1800 | 67.22 | 117.51 | 60.29 | 1,546 | 253.21 | 135.70 | 6,534 | 8.3 | 45 | 65 | 0.33 | 8.7 | 14.4% |
| | 1900 | 67.22 | 122.71 | 65.48 | 1,680 | 255.41 | 132.70 | 6,389 | 8.6 | 45 | 65 | 0.36 | 9.0 | 13.7% |
| | 1928.5 | 66.44 | 123.73 | 67.29 | 1,726 | 256.04 | 132.30 | 6,370 | 8.7 | 45 | 65 | 0.37 | 9.1 | 13.5% |
| | 1955.6 | 65.70 | 129.39 | 73.70 | 1,890 | 256.64 | 127.24 | 6,127 | 8.9 | 45 | 65 | 0.41 | 9.3 | 12.7% |
| | 2108 | 61.51 | 137.96 | 86.44 | 2,217 | 260.02 | 122.06 | 5,877 | 9.4 | 45 | 65 | 0.48 | 9.9 | 11.4% |
| | 2132.3 | 60.84 | 140.41 | 89.57 | 2,297 | 260.02 | 119.61 | 5,759 | 9.4 | 45 | 65 | 0.50 | 9.9 | 11.1% |
| | 2200 | 58.98 | 146.47 | 97.49 | 2,500 | 257.36 | 110.88 | 5,339 | 9.3 | 45 | 65 | 0.55 | 9.9 | 10.1% |
| | 2225.4 | 58.29 | 147.10 | 98.81 | 2,534 | 256.35 | 109.26 | 5,260 | 9.3 | 45 | 65 | 0.56 | 9.9 | 10.0% |
| | 2251 | 57.57 | 150.60 | 103.03 | 2,643 | 255.38 | 104.78 | 5,045 | 9.2 | 45 | 65 | 0.59 | 9.8 | 9.5% |
| | 2264 | 57.22 | 146.69 | 99.46 | 2,551 | 254.93 | 108.25 | 5,212 | 9.3 | 45 | 65 | 0.57 | 9.8 | 9.9% |
| | 2300 | 56.24 | 145.08 | 98.84 | 2,535 | 253.68 | 108.60 | 5,229 | 9.3 | 45 | 65 | 0.56 | 9.8 | 9.9% |
| | 2400 | 53.49 | 140.36 | 96.87 | 2,485 | 249.92 | 109.56 | 5,275 | 9.2 | 45 | 65 | 0.55 | 9.8 | 10.1% |
| | 2500 | 50.75 | 134.63 | 93.88 | 2,408 | 246.12 | 111.50 | 5,368 | 9.2 | 45 | 65 | 0.53 | 9.7 | 10.4% |
| | 2600 | 48.00 | 127.36 | 89.36 | 2,292 | 242.75 | 115.38 | 5,556 | 9.2 | 45 | 65 | 0.50 | 9.7 | 10.9% |
| | 2700 | 48.00 | 121.35 | 83.35 | 2,138 | 239.98 | 118.63 | 5,712 | 9.1 | 45 | 65 | 0.47 | 9.5 | 11.5% |
| | 2800 | 48.00 | 114.20 | 76.20 | 1,954 | 238.03 | 123.83 | 5,962 | 8.9 | 45 | 65 | 0.42 | 9.4 | 12.3% |
| | 2900 | 48.00 | 106.46 | 68.46 | 1,756 | 236.27 | 129.82 | 6,250 | 8.7 | 45 | 65 | 0.37 | 9.1 | 13.3% |
| | 3000 | 48.00 | 100.77 | 62.77 | 1,610 | 234.81 | 134.04 | 6,454 | 8.5 | 45 | 65 | 0.34 | 8.8 | 14.0% |
| | 3013.5 | 48.00 | 100.21 | 62.21 | 1,596 | 234.61 | 134.40 | 6,471 | 8.4 | 45 | 65 | 0.34 | 8.8 | 14.1% |
| | 3021.9 | 48.00 | 103.90 | 65.90 | 1,690 | 234.49 | 130.59 | 6,288 | 8.6 | 45 | 65 | 0.36 | 8.9 | 13.5% |
| | 3030 | 48.00 | 99.61 | 61.61 | 1,580 | 234.37 | 134.76 | 6,488 | 8.4 | 45 | 65 | 0.33 | 8.7 | 14.2% |
| | 3100 | 48.00 | 96.86 | 58.86 | 1,510 | 233.35 | 136.49 | 6,572 | 8.3 | 45 | 65 | 0.32 | 8.6 | 14.6% |
| | 3200 | 48.00 | 97.09 | 59.09 | 1,516 | 231.41 | 134.31 | 6,467 | 8.2 | 45 | 65 | 0.32 | 8.5 | 14.5% |
| | 3260.2 | 48.00 | 99.16 | 61.16 | 1,569 | 230.02 | 130.86 | 6,300 | 8.3 | 45 | 65 | 0.33 | 8.6 | 14.0% |
| | 3300 | 48.00 | 100.56 | 62.56 | 1,605 | 223.91 | 123.35 | 5,939 | 8.1 | 45 | 65 | 0.34 | 8.5 | 13.5% |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E



| | Station (ft) | Average Ground Elevation (ft) | Conceptual Subgrade (ft) | Thickness of Existing Waste[1] (ft) | Stress at Center of Existing Waste[2] (psf) | Conceptual Final Grade (ft) | Thickness of New Waste[3] (ft) | New Waste Load at Center of Existing Waste[4] (psf) | Primary BL System Settlement[5 to 8] (ft) | Median Fill Age ($t_1$)[9,10] (Years) | $t_2$ Age[11] (Years) | Secondary BL System Settlement[9] (ft) | Total BL System Settlement (ft) | Percent Change in Thickness |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Section B-B' | 3400 | 48.00 | 102.53 | 64.53 | 1,655 | 206.70 | 104.17 | 5,016 | 7.5 | 45 | 65 | 0.36 | 7.9 | 12.2% |
| | 3500 | 48.00 | 107.50 | 69.50 | 1,782 | 183.26 | 75.77 | 3,648 | 6.5 | 45 | 65 | 0.40 | 6.9 | 9.9% |
| | 3600 | 48.00 | 113.20 | 75.20 | 1,929 | 162.09 | 48.88 | 2,354 | 5.0 | 45 | 65 | 0.44 | 5.5 | 7.3% |
| | 3700 | 48.00 | 118.05 | 80.05 | 2,053 | 139.50 | 21.45 | 1,033 | 2.7 | 45 | 65 | 0.49 | 3.2 | 4.0% |
| Section C-C' | 31.8 | 59.2 | 152.7 | 103.52 | 2,655 | 153.2 | 0.50 | 24 | 0.1 | 45 | 65 | 0.65 | 0.7 | 0.7% |
| | 45.0 | 61.9 | 147.5 | 95.63 | 2,453 | 156.3 | 8.76 | 422 | 1.3 | 45 | 65 | 0.59 | 1.9 | 1.9% |
| | 48.8 | 58.5 | 148.3 | 99.89 | 2,562 | 157.1 | 8.79 | 423 | 1.3 | 45 | 65 | 0.62 | 1.9 | 1.9% |
| | 100 | 57.8 | 147.5 | 99.73 | 2,558 | 169 | 21.35 | 1,028 | 2.8 | 45 | 65 | 0.61 | 3.4 | 3.4% |
| | 200 | 56.1 | 143.3 | 97.14 | 2,491 | 189 | 45.84 | 2,207 | 5.2 | 45 | 65 | 0.58 | 5.7 | 5.9% |
| | 300 | 58.5 | 130.4 | 81.97 | 2,102 | 206 | 75.78 | 3,649 | 6.9 | 45 | 65 | 0.47 | 7.4 | 9.0% |
| | 400 | 56.3 | 115.4 | 69.08 | 1,772 | 224 | 108.86 | 5,241 | 8.0 | 45 | 65 | 0.38 | 8.3 | 12.1% |
| | 500 | 54.2 | 99.0 | 54.74 | 1,404 | 232 | 133.35 | 6,421 | 7.9 | 45 | 65 | 0.29 | 8.2 | 14.9% |
| | 541.3 | 52.8 | 90.7 | 47.89 | 1,228 | 233.1 | 142.38 | 6,856 | 7.6 | 45 | 65 | 0.25 | 7.8 | 16.3% |
| | 555.1 | 52.7 | 94.8 | 52.05 | 1,335 | 233.2 | 138.37 | 6,662 | 7.8 | 45 | 65 | 0.28 | 8.1 | 15.5% |
| | 565.0 | 52.5 | 90.3 | 47.80 | 1,226 | 233.2 | 142.94 | 6,882 | 7.6 | 45 | 65 | 0.25 | 7.8 | 16.4% |
| | 600 | 51.6 | 84.9 | 43.29 | 1,110 | 233 | 148.54 | 7,152 | 7.3 | 45 | 65 | 0.23 | 7.5 | 17.3% |
| | 700 | 48.5 | 63.9 | 25.41 | 652 | 234 | 170.13 | 8,192 | 5.5 | 45 | 65 | 0.12 | 5.7 | 22.3% |
| | 800 | 40.0 | 51.1 | 21.13 | 542 | 235 | 183.60 | 8,840 | 5.0 | 45 | 65 | 0.10 | 5.1 | 24.4% |
| | 1700 | 46.0 | 58.9 | 22.89 | 587 | 247 | 188.45 | 9,073 | 5.4 | 45 | 65 | 0.11 | 5.5 | 23.9% |
| | 1800 | 46.3 | 77.9 | 41.63 | 1,068 | 249 | 171.54 | 8,260 | 7.6 | 45 | 65 | 0.21 | 7.8 | 18.7% |
| | 1900 | 46.6 | 94.7 | 58.06 | 1,489 | 252 | 156.94 | 7,556 | 8.8 | 45 | 65 | 0.31 | 9.1 | 15.6% |
| | 2000 | 46.9 | 105.2 | 68.28 | 1,751 | 254 | 148.53 | 7,151 | 9.3 | 45 | 65 | 0.37 | 9.7 | 14.2% |
| | 2100 | 47.2 | 115.6 | 78.38 | 2,010 | 256 | 140.24 | 6,752 | 9.7 | 45 | 65 | 0.43 | 10.1 | 12.9% |
| | 2200 | 47.5 | 127.1 | 89.55 | 2,297 | 257 | 129.93 | 6,256 | 9.9 | 45 | 65 | 0.50 | 10.4 | 11.6% |
| | 2300 | 47.8 | 137.8 | 99.95 | 2,564 | 257 | 118.89 | 5,724 | 9.8 | 45 | 65 | 0.57 | 10.4 | 10.4% |
| | 2398.2 | 48.1 | 146.4 | 108.28 | 2,777 | 256.4 | 109.97 | 5,295 | 9.7 | 45 | 65 | 0.62 | 10.3 | 9.5% |
| | 2400 | 48.2 | 147.3 | 109.19 | 2,800 | 256 | 109.05 | 5,250 | 9.7 | 45 | 65 | 0.62 | 10.3 | 9.4% |
| | 2406.2 | 48.2 | 150.5 | 112.28 | 2,880 | 256.4 | 105.90 | 5,099 | 9.6 | 45 | 65 | 0.64 | 10.2 | 9.1% |
| | 2414.1 | 48.2 | 146.5 | 108.34 | 2,779 | 256.3 | 109.77 | 5,285 | 9.7 | 45 | 65 | 0.62 | 10.3 | 9.5% |
| | 2500 | 48.5 | 140.0 | 101.56 | 2,605 | 256 | 116.34 | 5,601 | 9.8 | 45 | 65 | 0.58 | 10.3 | 10.2% |
| | 2522.5 | 48.5 | 137.5 | 98.94 | 2,538 | 256.4 | 118.91 | 5,725 | 9.8 | 45 | 65 | 0.56 | 10.3 | 10.5% |
| | 2528.8 | 48.6 | 140.4 | 101.88 | 2,613 | 256.4 | 115.95 | 5,583 | 9.8 | 45 | 65 | 0.58 | 10.3 | 10.1% |
| | 2540.7 | 48.6 | 134.6 | 96.04 | 2,463 | 256.4 | 121.76 | 5,862 | 9.8 | 45 | 65 | 0.54 | 10.3 | 10.8% |
| | 2600 | 48.8 | 124.5 | 85.69 | 2,198 | 257 | 132.12 | 6,361 | 9.8 | 45 | 65 | 0.48 | 10.2 | 11.9% |
| | 2700 | 49.1 | 112.2 | 73.12 | 1,875 | 257 | 145.27 | 6,995 | 9.5 | 45 | 65 | 0.40 | 9.9 | 13.6% |
| | 2732.0 | 49.2 | 107.2 | 68.00 | 1,744 | 257.7 | 150.57 | 7,250 | 9.3 | 45 | 65 | 0.37 | 9.7 | 14.3% |
| | 2738.1 | 49.2 | 110.1 | 70.95 | 1,820 | 257.8 | 147.66 | 7,109 | 9.5 | 45 | 65 | 0.39 | 9.8 | 13.9% |
| | 2750.3 | 49.2 | 104.2 | 64.98 | 1,667 | 257.9 | 153.70 | 7,401 | 9.2 | 45 | 65 | 0.35 | 9.6 | 14.7% |
| | 2800 | 49.4 | 97.1 | 57.74 | 1,481 | 258 | 161.22 | 7,763 | 8.9 | 45 | 65 | 0.31 | 9.2 | 15.9% |
| | 2900 | 49.7 | 80.0 | 40.27 | 1,033 | 259 | 178.89 | 8,613 | 7.5 | 45 | 65 | 0.21 | 7.7 | 19.2% |
| | 3000 | 50.0 | 64.9 | 24.92 | 639 | 259 | 193.66 | 9,324 | 5.7 | 45 | 65 | 0.12 | 5.9 | 23.5% |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E

JOB NO. ____02201056.30__
SHEET NO. _3_ OF __3___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

| | Station (ft) | Average Ground Elevation (ft) | Conceptual Subgrade (ft) | Thickness of Existing Waste[1] (ft) | Stress at Center of Existing Waste[2] (psf) | Conceptual Final Grade (ft) | Thickness of New Waste[3] (ft) | New Waste Load at Center of Existing Waste[4] (psf) | Primary BL System Settlement[5 to 8] (ft) | Median Fill Age ($t_1$)[9,10] (Years) | $t_2$ Age[11] (Years) | Secondary BL System Settlement[9] (ft) | Total BL System Settlement (ft) | Percent Change in Thickness |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Section C-C' | 3100 | 44.9 | 54.6 | 19.69 | 505 | 259 | 204.27 | 9,835 | 5.0 | 45 | 65 | 0.09 | 5.1 | 25.8% |
| | 3200 | 49.0 | 52.8 | 13.84 | 355 | 256 | 203.64 | 9,805 | 3.9 | 45 | 65 | 0.06 | 4.0 | 28.5% |
| | 3279.7 | 58.9 | 58.4 | 9.51 | 244 | 254.2 | 195.77 | 9,426 | 2.9 | 45 | 65 | 0.04 | 3.0 | 31.3% |
| | 3290.7 | 58.3 | 58.0 | 9.67 | 248 | 253.9 | 195.87 | 9,431 | 3.0 | 45 | 65 | 0.04 | 3.0 | 31.1% |

BL, psf, ft, and in are bottom liner, pounds per square foot and foot (feet), and inch (inches), respectively.

Notes:

(1) Assume landfill base below average ground elevation ≅ 10 ft

(2) Assume inplace density of existing waste is 1,385 pcy [SCS Estimate]

(3) Assume 2.0 feet bottom liner base and 2.5 feet final cover.

(4) Assume inplace density of new waste = 1,300 pcy [SCS Estimate]

(5) Assume waste void ratio (e) = 1.80 (estimated based on age of waste)

(6) Initial (Primary) Compression Index ($C_C$) = 0.54 (low-middle value; Sowers, 1970)

(7) Secondary Compression Index ($C_S$) = 0.11 (low-middle value; Sowers, 1970)

(8) Primary compression will occur over the time new waste is placed, followed by secondary compression.

(9) Assume average date of waste placement is = 1980 [Area A opened in 1968 and was closed in 1992]

(10) Year when BL system will be installed 2025

(11) Assume $t_2$ extends to 20 years beyond t1

(12) Liner is conservatively located at the lowest possible location for maximum possible waste load and BL system settlement.

<u>Primary Settlement of Existing Waste (Due to Weight of Liner Subbase+New Waste+Final Cover):</u>

$$\Delta H_P = H\frac{C_c}{1+e}\log\left[1+\frac{\Delta P}{p_i}\right]$$ [Sowers Model (1973)]

where; $\Delta H_P$ = Primary settlement, ft
$H$ = Height of existing waste including final cover, ft
$\Delta P$ = Load due to new waste, pcf [= new waste height*new waste density]
$p_i$ = Original loading at center of existing waste, pcf [= existing waste height/2*existing waste density]

<u>Secondary Settlement of Existing Waste (Due to Self Weight and Decomposition of the Existing Waste):</u>

$$\Delta H_S = H\frac{C_S}{1+e}\log\left[\frac{t_2}{t_1}\right]$$ [Sowers Model (1973)]

where; $\Delta H_S$ = Secondary settlement, ft
$t_1$ = Existing waste age at the time of installing BL system [=year when BL system is installed - average date of waste placement]
$t_2$ = Existing waste age at the time of installing BL system plus time elapsed after installing BL system

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __4___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

## TABLE E-3
## BROWN STATION ROAD SANITARY LANDFILL
## BOTTOM LINER ELONGATION ANALYSIS FOR AREA C INFILL (OVERLAPPING AND NON-OVERLAPPING AREAS)

| Cross-Section | Station (ft) | Total BL System Settlement [1] (ft) | BL Elevation (Pre-Settlement) [2] (ft) | BL Elevation (Post-Settlement) [2] (ft) | Horizontal Distance Between Stations (ft) | BL Length (Pre-Settlement) (ft) | BL Length (Post-Settlement) (ft) | Change in BL Length (ft) | Comment [3] | Change in BL Length [4] (%) | Pre- and Post- Settlement BL Slope (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Pre- | Post |
| Section A-A' | 9.8 | 0.32 | 55.43 | 55.11 | | | | | | | | |
| | 39.7 | 0.30 | 46.65 | 46.35 | 29.95 | 31.213 | 31.208 | -0.01 | Compression | -0.03% | -28.13% | -28.07% |
| | 100 | 0.41 | 47.14 | 46.73 | 60.28 | 60.287 | 60.286 | 0.00 | | 0.00% | 0.80% | 0.63% |
| | 200 | 0.55 | 47.60 | 47.05 | 100.00 | 100.001 | 100.001 | 0.00 | | 0.00% | 0.46% | 0.32% |
| | 300 | 0.66 | 48.06 | 47.40 | 100.00 | 100.001 | 100.001 | 0.00 | | 0.00% | 0.46% | 0.35% |
| | 400 | 0.73 | 48.64 | 47.91 | 100.00 | 100.002 | 100.001 | 0.00 | | 0.00% | 0.58% | 0.51% |
| | 500 | 0.81 | 49.25 | 48.43 | 100.00 | 100.002 | 100.001 | 0.00 | | 0.00% | 0.61% | 0.53% |
| | 600 | 0.88 | 49.86 | 48.98 | 100.00 | 100.002 | 100.001 | 0.00 | | 0.00% | 0.61% | 0.54% |
| | 700 | 0.89 | 50.47 | 49.58 | 100.00 | 100.002 | 100.002 | 0.00 | | 0.00% | 0.61% | 0.60% |
| | 800 | 0.90 | 51.08 | 50.18 | 100.00 | 100.002 | 100.002 | 0.00 | | 0.00% | 0.61% | 0.61% |
| | 900 | 0.90 | 51.69 | 50.79 | 100.00 | 100.002 | 100.002 | 0.00 | | 0.00% | 0.61% | 0.61% |
| | 1000 | 0.90 | 52.30 | 51.40 | 100.00 | 100.002 | 100.002 | 0.00 | | 0.00% | 0.61% | 0.61% |
| | 1100 | 0.91 | 52.71 | 51.80 | 100.00 | 100.001 | 100.001 | 0.00 | | 0.00% | 0.41% | 0.40% |
| | 1167.7 | 0.92 | 52.79 | 51.87 | 67.72 | 67.716 | 67.716 | 0.00 | | 0.00% | 0.11% | 0.09% |
| | 1176.2 | 0.94 | 56.80 | 55.87 | 8.47 | 9.368 | 9.363 | -0.01 | Compression | -0.11% | 42.81% | 42.71% |
| | 1184.4 | 0.93 | 52.81 | 51.88 | 8.24 | 9.152 | 9.148 | 0.00 | | 0.00% | -43.62% | -43.53% |
| | 1200 | 0.93 | 52.90 | 51.97 | 15.58 | 15.582 | 15.582 | 0.00 | | 0.00% | 0.58% | 0.57% |
| | 1243.3 | 0.93 | 53.30 | 52.37 | 43.25 | 43.257 | 43.257 | 0.00 | | 0.00% | 0.93% | 0.91% |
| | 1300 | 0.93 | 53.83 | 52.89 | 56.75 | 56.747 | 56.747 | 0.00 | | 0.00% | 0.93% | 0.93% |
| | 1400.0 | 0.93 | 54.75 | 53.82 | 100.00 | 100.004 | 100.004 | 0.00 | | 0.00% | 0.93% | 0.92% |
| | 1500 | 0.96 | 55.68 | 54.72 | 100.00 | 100.004 | 100.004 | 0.00 | | 0.00% | 0.93% | 0.90% |
| | 1600 | 0.96 | 56.60 | 55.65 | 100.00 | 100.004 | 100.004 | 0.00 | | 0.00% | 0.93% | 0.93% |
| | 1622.3 | 0.95 | 56.81 | 55.86 | 22.29 | 22.288 | 22.288 | 0.00 | | 0.00% | 0.93% | 0.97% |
| | 1700 | 0.89 | 58.81 | 57.92 | 77.71 | 77.739 | 77.740 | 0.00 | | 0.00% | 2.57% | 2.65% |
| | 1800 | 0.87 | 63.78 | 62.91 | 100.00 | 100.123 | 100.124 | 0.00 | | 0.00% | 4.96% | 4.98% |
| | 1900 | 0.85 | 67.29 | 66.43 | 100.00 | 100.061 | 100.062 | 0.00 | | 0.00% | 3.51% | 3.52% |
| | 2000 | 0.84 | 68.00 | 67.16 | 100.00 | 100.003 | 100.003 | 0.00 | | 0.00% | 0.71% | 0.73% |
| | 2100 | 0.83 | 69.85 | 69.02 | 100.00 | 100.017 | 100.017 | 0.00 | | 0.00% | 1.85% | 1.86% |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E

JOB NO. ____02201056.30__
SHEET NO. _2_ OF __4___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

| Cross-Section | Station (ft) | Total BL System Settlement [(1)] (ft) | BL Elevation (Pre-Settlement) [(2)] (ft) | BL Elevation (Post-Settlement) [(2)] (ft) | Horizontal Distance Between Stations (ft) | BL Length (Pre-Settlement) (ft) | BL Length (Post-Settlement) (ft) | Change in BL Length (ft) | Comment [(3)] | Change in BL Length [(4)] (%) | Pre- and Post- Settlement BL Slope (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Pre- | Post |
| Section B-B' | 1000 | 0.82 | 63.46 | 62.64 | | | | | | | | |
| | 1100 | 0.83 | 61.04 | 60.21 | 100.00 | 100.029 | 100.029 | 0.00 | | 0.00% | -2.42% | -2.43% |
| | 1200 | 2.95 | 66.95 | 64.00 | 100.10 | 100.279 | 100.177 | -0.10 | Compression | -0.10% | 5.89% | 3.78% |
| | 1288 | 5.40 | 81.18 | 75.78 | 87.64 | 88.786 | 88.426 | -0.36 | Compression | -0.41% | 16.03% | 13.32% |
| | 1298 | 5.24 | 80.03 | 74.79 | 10.45 | 10.508 | 10.492 | -0.02 | Compression | -0.19% | -10.96% | -9.45% |
| | 1600 | 8.30 | 112.37 | 104.07 | 301.81 | 303.539 | 303.229 | -0.31 | Compression | -0.10% | 10.65% | 9.66% |
| | 1646 | 8.37 | 113.44 | 105.06 | 46.06 | 46.072 | 46.071 | 0.00 | | 0.00% | 2.32% | 2.15% |
| | 1695 | 8.71 | 119.82 | 111.11 | 48.61 | 49.031 | 48.989 | -0.04 | Compression | -0.08% | 13.01% | 12.35% |
| | 1700 | 8.65 | 118.32 | 109.67 | 5.33 | 5.533 | 5.517 | -0.02 | Compression | -0.36% | -27.10% | -26.09% |
| | 1709 | 8.54 | 115.88 | 107.34 | 8.67 | 9.010 | 8.982 | -0.03 | Compression | -0.33% | -27.10% | -25.99% |
| | 1800 | 8.68 | 117.51 | 108.84 | 91.33 | 91.342 | 91.339 | 0.00 | | 0.00% | 1.79% | 1.64% |
| | 1900 | 8.96 | 122.71 | 113.74 | 100.00 | 100.135 | 100.120 | -0.02 | Compression | -0.02% | 5.19% | 4.90% |
| | 1928 | 9.08 | 123.73 | 114.66 | 28.47 | 28.493 | 28.489 | 0.00 | | 0.00% | 3.61% | 3.21% |
| | 1956 | 9.33 | 129.39 | 120.07 | 27.11 | 27.695 | 27.645 | -0.05 | Compression | -0.18% | 20.44% | 19.58% |
| | 2108 | 9.86 | 137.96 | 128.10 | 152.29 | 152.529 | 152.500 | -0.03 | Compression | -0.02% | 5.61% | 5.26% |
| | 2132 | 9.92 | 140.41 | 130.50 | 24.45 | 24.573 | 24.567 | -0.01 | Compression | -0.04% | 9.99% | 9.77% |
| | 2200 | 9.88 | 146.47 | 136.59 | 67.68 | 67.948 | 67.951 | 0.00 | | 0.00% | 8.92% | 8.97% |
| | 2225 | 9.86 | 147.10 | 137.24 | 25.42 | 25.432 | 25.432 | 0.00 | | 0.00% | 2.46% | 2.55% |
| | 2251 | 9.80 | 150.60 | 140.80 | 26.04 | 26.277 | 26.285 | 0.01 | Tension | 0.04% | 13.32% | 13.54% |
| | 2264 | 9.84 | 146.69 | 136.85 | 12.74 | 13.328 | 13.338 | 0.01 | Tension | 0.08% | -29.37% | -29.60% |
| | 2300 | 9.83 | 145.08 | 135.25 | 35.79 | 35.829 | 35.829 | 0.00 | | 0.00% | -4.49% | -4.47% |
| | 2400 | 9.79 | 140.36 | 130.57 | 100.00 | 100.111 | 100.109 | 0.00 | | 0.00% | -4.71% | -4.67% |
| | 2500 | 9.75 | 134.63 | 124.88 | 100.00 | 100.164 | 100.162 | 0.00 | | 0.00% | -5.72% | -5.68% |
| | 2600 | 9.71 | 127.36 | 117.65 | 100.00 | 100.263 | 100.261 | 0.00 | | 0.00% | -7.24% | -7.21% |
| | 2700 | 9.55 | 121.35 | 111.81 | 100.00 | 100.181 | 100.171 | -0.01 | Compression | -0.01% | -6.00% | -5.83% |
| | 2800 | 9.35 | 114.20 | 104.85 | 100.00 | 100.256 | 100.242 | -0.01 | Compression | -0.01% | -7.14% | -6.94% |
| | 2900 | 9.07 | 106.46 | 97.38 | 100.00 | 100.299 | 100.278 | -0.02 | Compression | -0.02% | -7.72% | -7.44% |
| | 3000 | 8.81 | 100.77 | 91.96 | 100.00 | 100.162 | 100.147 | -0.02 | Compression | -0.02% | -5.68% | -5.42% |
| | 3013 | 8.78 | 100.21 | 91.43 | 13.47 | 13.477 | 13.475 | 0.00 | | 0.00% | -4.15% | -3.93% |
| | 3022 | 8.93 | 103.90 | 94.98 | 8.41 | 9.186 | 9.130 | -0.06 | Compression | -0.65% | 40.19% | 38.86% |
| | 3030 | 8.75 | 99.61 | 90.86 | 8.12 | 9.183 | 9.102 | -0.08 | Compression | -0.87% | -46.71% | -45.17% |
| | 3100 | 8.59 | 96.86 | 88.27 | 70.00 | 70.057 | 70.051 | -0.01 | Compression | -0.01% | -3.93% | -3.70% |
| | 3200 | 8.54 | 97.09 | 88.55 | 100.00 | 100.000 | 100.000 | 0.00 | | 0.00% | 0.23% | 0.28% |
| | 3260 | 8.59 | 99.16 | 90.57 | 60.21 | 60.242 | 60.240 | 0.00 | | 0.00% | 3.44% | 3.36% |
| | 3300 | 8.45 | 100.56 | 92.11 | 39.79 | 39.819 | 39.824 | 0.00 | | 0.00% | 3.52% | 3.87% |
| | 3400 | 7.89 | 102.53 | 94.64 | 100.00 | 100.019 | 100.032 | 0.01 | Tension | 0.01% | 1.97% | 2.53% |
| | 3500 | 6.88 | 107.50 | 100.62 | 100.00 | 100.123 | 100.178 | 0.05 | Tension | 0.05% | 4.96% | 5.96% |
| | 3600 | 5.46 | 113.20 | 107.74 | 100.00 | 100.163 | 100.253 | 0.09 | Tension | 0.09% | 5.70% | 7.11% |
| | 3700 | 3.22 | 118.05 | 114.83 | 100.00 | 100.117 | 100.251 | 0.13 | Tension | 0.13% | 4.84% | 7.07% |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E

JOB NO. ____02201056.30__
SHEET NO. _3_ OF __4___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

| Cross-Section | Station (ft) | Total BL System Settlement (1) (ft) | BL Elevation (Pre-Settlement) (2) (ft) | BL Elevation (Post-Settlement) (2) (ft) | Horizontal Distance Between Stations (ft) | BL Length (Pre-Settlement) (ft) | BL Length (Post-Settlement) (ft) | Change in BL Length (ft) | Comment (3) | Change in BL Length (4) (%) | Pre- and Post- Settlement BL Slope (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Pre- | Post |
| Section C-C' | 31.8 | 0.73 | 152.72 | 152.00 | | | | | | | | |
| | 45.0 | 1.86 | 147.50 | 145.64 | 13.21 | 14.205 | 14.660 | 0.46 | Tension | 3.24% | -36.75% | -43.36% |
| | 48.8 | 1.90 | 148.35 | 146.45 | 3.80 | 3.891 | 3.884 | -0.01 | Compression | -0.26% | 21.64% | 20.78% |
| | 100.0 | 3.43 | 147.55 | 144.12 | 51.19 | 51.195 | 51.242 | 0.05 | Tension | 0.10% | -1.56% | -4.55% |
| | 200.0 | 5.74 | 143.27 | 137.53 | 100.00 | 100.091 | 100.217 | 0.13 | Tension | 0.13% | -4.27% | -6.57% |
| | 300.0 | 7.38 | 130.43 | 123.05 | 100.00 | 100.822 | 101.044 | 0.22 | Tension | 0.22% | -12.74% | -14.34% |
| | 400.0 | 8.34 | 115.42 | 107.08 | 100.00 | 101.119 | 101.267 | 0.15 | Tension | 0.15% | -14.84% | -15.77% |
| | 500.0 | 8.17 | 98.95 | 90.78 | 100.00 | 101.347 | 101.319 | -0.03 | Compression | -0.03% | -16.25% | -16.09% |
| | 541.3 | 7.81 | 90.69 | 82.88 | 41.30 | 42.115 | 42.046 | -0.07 | Compression | -0.17% | -19.63% | -18.80% |
| | 555.1 | 8.08 | 94.78 | 86.70 | 13.78 | 14.376 | 14.302 | -0.07 | Compression | -0.49% | 28.48% | 26.73% |
| | 565.0 | 7.82 | 90.28 | 82.46 | 9.93 | 10.904 | 10.797 | -0.11 | Compression | -1.01% | -41.28% | -39.22% |
| | 600.0 | 7.50 | 84.89 | 77.39 | 34.99 | 35.404 | 35.358 | -0.05 | Compression | -0.14% | -15.23% | -14.36% |
| | 700.0 | 5.67 | 63.91 | 58.23 | 100.00 | 102.177 | 101.817 | -0.36 | Compression | -0.35% | -20.53% | -18.81% |
| | 800.0 | 5.15 | 51.13 | 45.99 | 100.00 | 100.813 | 100.747 | -0.07 | Compression | -0.07% | -12.67% | -12.16% |
| | 900.0 | 0.90 | 49.20 | 48.30 | 100.00 | 100.019 | 100.027 | 0.01 | Tension | 0.01% | -1.93% | 2.32% |
| | 1000.0 | 0.91 | 47.27 | 46.36 | 100.00 | 100.019 | 100.019 | 0.00 | | 0.00% | -1.93% | -1.95% |
| | 1100.0 | 0.91 | 48.17 | 47.26 | 100.00 | 100.004 | 100.004 | 0.00 | | 0.00% | 0.91% | 0.90% |
| | 1200.0 | 0.92 | 49.34 | 48.42 | 100.00 | 100.007 | 100.007 | 0.00 | | 0.00% | 1.16% | 1.16% |
| | 1300.0 | 0.90 | 50.50 | 49.60 | 100.00 | 100.007 | 100.007 | 0.00 | | 0.00% | 1.16% | 1.18% |
| | 1400.0 | 0.91 | 51.66 | 50.76 | 100.00 | 100.007 | 100.007 | 0.00 | | 0.00% | 1.16% | 1.16% |
| | 1500.0 | 0.91 | 52.89 | 51.98 | 100.00 | 100.008 | 100.007 | 0.00 | | 0.00% | 1.23% | 1.22% |
| | 1578.0 | 0.91 | 53.85 | 52.93 | 78.03 | 78.040 | 78.040 | 0.00 | | 0.00% | 1.23% | 1.23% |
| | 1588.6 | 0.92 | 57.99 | 57.06 | 10.55 | 11.329 | 11.325 | 0.00 | | 0.00% | 36.52% | 36.45% |
| | 1599.2 | 0.92 | 54.11 | 53.19 | 10.64 | 11.326 | 11.323 | 0.00 | | 0.00% | -34.23% | -34.15% |
| | 1600.0 | 0.92 | 54.12 | 53.20 | 0.78 | 0.778 | 0.778 | 0.00 | | 0.00% | 1.23% | 1.22% |
| | 1700.0 | 5.48 | 58.89 | 53.41 | 100.00 | 100.114 | 100.000 | -0.11 | Compression | -0.11% | 4.76% | 0.21% |
| | 1800.0 | 7.77 | 77.94 | 70.17 | 100.00 | 101.798 | 101.394 | -0.40 | Compression | -0.39% | 18.71% | 16.53% |
| | 1900.0 | 9.08 | 94.68 | 85.60 | 100.00 | 101.392 | 101.183 | -0.21 | Compression | -0.21% | 16.51% | 15.25% |
| | 2000.0 | 9.67 | 105.21 | 95.54 | 100.00 | 100.553 | 100.493 | -0.06 | Compression | -0.06% | 10.47% | 9.89% |
| | 2100.0 | 10.10 | 115.61 | 105.52 | 100.00 | 100.540 | 100.497 | -0.04 | Compression | -0.04% | 10.35% | 9.93% |
| | 2200.0 | 10.36 | 127.09 | 116.73 | 100.00 | 100.656 | 100.626 | -0.03 | Compression | -0.03% | 11.40% | 11.14% |
| | 2300.0 | 10.39 | 137.80 | 127.41 | 100.00 | 100.571 | 100.569 | 0.00 | | 0.00% | 10.65% | 10.62% |
| | 2398.2 | 10.30 | 146.43 | 136.14 | 98.18 | 98.559 | 98.567 | 0.01 | Tension | 0.01% | 8.76% | 8.85% |
| | 2400.0 | 10.28 | 147.34 | 137.06 | 1.82 | 2.035 | 2.041 | 0.01 | Tension | 0.49% | 44.73% | 45.26% |
| | 2406.2 | 10.23 | 150.45 | 140.23 | 6.23 | 6.963 | 6.987 | 0.02 | Tension | 0.29% | 44.72% | 45.34% |
| | 2414.1 | 10.29 | 146.54 | 136.25 | 7.83 | 8.758 | 8.784 | 0.03 | Tension | 0.34% | -44.72% | -45.26% |
| | 2500.0 | 10.34 | 140.02 | 129.69 | 85.94 | 86.186 | 86.189 | 0.00 | | 0.00% | -7.56% | -7.62% |
| | 2522.5 | 10.34 | 137.47 | 127.12 | 22.49 | 22.637 | 22.637 | 0.00 | | 0.00% | -11.29% | -11.31% |
| | 2528.8 | 10.33 | 140.43 | 130.10 | 6.28 | 6.945 | 6.949 | 0.00 | | 0.00% | 42.65% | 42.76% |
| | 2540.7 | 10.34 | 134.63 | 124.29 | 11.90 | 13.238 | 13.241 | 0.00 | | 0.00% | -43.83% | -43.86% |

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-E

JOB NO. ____02201056.30__
SHEET NO. _4_ OF __4___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

| Cross-Section | Station (ft) | Total BL System Settlement [1] (ft) | BL Elevation (Pre-Settlement) [2] (ft) | BL Elevation (Post-Settlement) [2] (ft) | Horizontal Distance Between Stations (ft) | BL Length (Pre-Settlement) (ft) | BL Length (Post-Settlement) (ft) | Change in BL Length (ft) | Comment [3] | Change in BL Length [4] (%) | Pre- and Post- Settlement BL Slope (%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Pre- | Post |
| Section C-C' | 2600.0 | 10.23 | 124.46 | 114.23 | 59.33 | 60.191 | 60.174 | -0.02 | Compression | -0.03% | -16.89% | -16.72% |
| | 2700.0 | 9.92 | 112.19 | 102.28 | 100.00 | 100.750 | 100.712 | -0.04 | Compression | -0.04% | -12.18% | -11.87% |
| | 2732.0 | 9.71 | 107.18 | 97.47 | 31.98 | 32.370 | 32.339 | -0.03 | Compression | -0.09% | -15.49% | -14.87% |
| | 2738.1 | 9.84 | 110.15 | 100.31 | 6.16 | 6.841 | 6.786 | -0.06 | Compression | -0.88% | 43.40% | 41.87% |
| | 2750.3 | 9.57 | 104.21 | 94.64 | 12.19 | 13.558 | 13.442 | -0.12 | Compression | -0.89% | -43.81% | -42.18% |
| | 2800.0 | 9.16 | 97.13 | 87.96 | 49.67 | 50.172 | 50.117 | -0.05 | Compression | -0.10% | -14.11% | -13.32% |
| | 2900.0 | 7.74 | 79.96 | 72.22 | 100.00 | 101.463 | 101.232 | -0.23 | Compression | -0.23% | -16.92% | -15.55% |
| | 3000.0 | 5.85 | 64.92 | 59.06 | 100.00 | 101.125 | 100.862 | -0.26 | Compression | -0.26% | -14.88% | -13.04% |
| | 3100.0 | 0.95 | 54.59 | 53.64 | 100.00 | 100.532 | 100.147 | -0.38 | Compression | -0.38% | -10.27% | -5.42% |
| | 3200.0 | 0.92 | 52.83 | 51.91 | 100.00 | 100.016 | 100.015 | 0.00 | | 0.00% | -1.76% | -1.73% |
| | 3279.7 | 0.89 | 58.41 | 57.52 | 79.70 | 79.893 | 79.896 | 0.00 | | 0.00% | 6.98% | 7.03% |
| | 3290.7 | 0.89 | 57.99 | 57.10 | 10.99 | 11.000 | 11.000 | 0.00 | | 0.00% | -3.84% | -3.85% |

Notes:

(1) BL settlement for layover and non-layover areas is the total BL settlement from Table E-1 and Table E-2, respectively.

(2) Liner grades for layover and non-layover areas are from this appendix's Tables E-1 and E-2, respectively.

(3) Compression indicates liner is shortened due to settlement; tension indicates elongation.

(4) +ve or -ve sign with % change in length indicates % elongation or contraction, respectively.

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

**APPENDIX II-F**

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __4___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020, Revised 5/21/2021_

# BROWN STATION ROAD SANITARY LANDFILL
# LCR PIPING STRENGTH CALCULATIONS

Existing LCR piping in Area B will be utilized to collect and remove leachate from Area C Infill that overlaps on to Area B and new LCR piping will be installed in the remainder of Area C Infill. Considering chemical resistance of plastic, HDPE pipe (PE4710) will be selected. Our LCR pipe strength calculations objective(s) were:

- To find dimension ratio (DR) for LCR pipe that will provide sufficient strength and thickness to prevent collapse under pressures exerted by waste, cover material, etc. in Area C Infill that does not overlap on to Area B.
- To check if existing Area B LCR pipe has sufficient strength and thickness to prevent collapse under pressures exerted by additional waste, etc.

Equations used and calculations for estimating LCR pipe strength are provided below.

## A. EQUATIONS USED

Buried LCR pipes carrying leachate is subjected to loads due weight of waste mass, cover soil, other fill materials, equipment used for landfill construction, etc. These loads result in ring-bending due to ring deflection and ring compression and ring buckling due to wall compressive stress. The magnitude of ring deflection depends not only on pipe-material properties but also on properties of the surrounding soil. Ring buckling, ring-compression and ring deflection can be controlled within acceptable limits by selecting proper pipe material and pipe thickness. Below are the equations used for estimating if leachate pipe has enough strength against ring buckling, ring compression and ring deflection.

Equation 1 below was used to calculate pipe ring compressive stress ($S$).

$$S = \frac{(P_E + P_L)\, DR}{2} \qquad (1)$$

For estimating allowable constrained buckling pressure, Luscher Equation gives conservative results than Moore-Selig Equation. Therefore, Luscher Equation, Equation 2 below, was used to calculate allowable constrained ring buckling pressure ($P_{CR}$).

$$P_{WC} = \frac{5.65}{N}\sqrt{R\, B' E' \frac{E}{12\,(DR-1)^3}} \qquad (2)$$

Where;

Buoyancy reduction factor, $$R = 1 - 0.33\,\frac{H_{GW}}{H_W} \qquad (3)$$

Factor, $$B' = \frac{1}{1+4e^{(-0.065 H_W)}} \qquad (4)$$

Spangler's Modified Iowa Formula, Equation 5 below, was used to calculate ring deflection ($\Delta X$).

$$\frac{\Delta X}{D_M} = \frac{K_{BED} L_{DL} P_E + K_{BED} P_L}{\frac{2E}{3}\left\{\frac{1}{DR-1}\right\}^3 + 0.061\, F_S\, E'} \qquad (5)$$

Equation 6 below was used to calculate vertical pressure ($P_E$) due to waste, cover material, etc.

$$P_E = \frac{\gamma_W\, H_W}{27 \times 144} \qquad (6)$$

Where

$S$ = Pipe wall compressive stress, psi
$P_{WC}$ = Allowable constrained buckling pressure, psi
$N$ = Safety factor (=2.0 for thermoplastic pipe)
$R$ = Buoyancy reduction factor
$H_{GW}$ = Height of groundwater above pipe
$\Delta X$ = Ring deflection, in.
$K_{BED}$ = Bedding factor, typically 0.1
$L_{DL}$ = Deflection lag factor
$P_E$ = Vertical soil pressure due to mass of waste, cover material, etc., psi

$P_L$ = Vertical soil pressure due to live load, psi
$E$ = Apparent modulus of elasticity of pipe material, psi
$E'$ = Modulus of reaction of leachate collection (aggregate) layer, psi
$F_S$ = Soil support factor
$DR$ = Dimension ratio of the pipe
$D_M$ = Mean diameter of the pipe, in
$H_W$ = Depth of waste and cover material, ft
$\gamma_W$ = Average density of waste and cover material, pcy

## B. THICKNESS OF THE HDPE LCR PIPE IN AREA C INFILL THAT DOES NOT OVERLAP ON TO AREA B

Maximum waste depth including final cover comes from Appendix II-E

$g_W$ = 1,300 pcy [new waste density, Appendix II-E]
$H_W$ = 210 ft [Maximum depth of waste and cover material is 209 ft {Appendix II-E, Tables E-1 and E-2}]
$H_{GW}$ = 0 ft [Because bottom liner system is installed above groundwater]
$K_{BED}$ = 0.1
$L_{DL}$ = 1.5 [Ranges from 1.25 to 1.5]
$P_E$ = 70.2 psi [by Equation 6]
$P_L$ = 0 psi [Live load is negligible for pipe-cover depth exceeding 8 feet]
$P_{Total}$ = 70.2 psi [Total vertical stress =$P_E + P_L$]
$E$ = 28,000 psi for PE4XXX pipe material [PPI Handbook, $2^{nd}$ Edition]
$E'$ = 3,000 psi [leachate collection (aggregate) layer]
$F_S$ = 1 [Pipe is not installed in a trench]
$N$ = 2 [PPI Handbook, $2^{nd}$ Edition]

### 1. Ring Compression

Pipe wall compressive stress (S) and factor of safety for DR 26, 21, 17, 11, 9 and 7 HDPE pipe is calculated

| DR = | 26 | 21 | 17 | 11 | 9 | 7 |
|---|---|---|---|---|---|---|
| By Equation 1, $S$ (psi) = | 912.8 | 737.3 | 596.8 | 386.2 | 316.0 | 245.8 |
| Factor of Safety [$P_{ca}$ / S] = | 1.3 | 1.6 | 1.9 | 3.0 | 3.6 | 4.7 |

Allowable compressive stress ($P_{ca}$) = 1,150 psi for PE4XXX [PPI Handbook, $2^{nd}$ Edition]

DR26 or thicker PE4XXX HDPE pipe is safe against ring compressive stresses.

### 2. Ring Buckling

$R$ = 1.0 [By Equation 3]
$B'$ = 1.0 [By Equation 4]

Allowable constrained buckling pressure ($P_{WC}$) and factor of safety for DR 26, 21, 17, 11, 9 and 7 HDPE pipe is

| DR = | 26 | 21 | 17 | 11 | 9 | 7 |
|---|---|---|---|---|---|---|
| By Equation 2, $P_{WC}$ (psi) = | 59.8 | 83.6 | 116.8 | 236.4 | 330.3 | 508.6 |
| Factor of Safety [$P_{WC}/P_{Total}$] = | 0.9 | 1.2 | 1.7 | 3.4 | 4.7 | 7.2 |

Allowable constrained buckling pressure for DR17 or thicker HDPE pipe has a factor of safety of 1.3 or more,

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3. Ring Deflection

Ring deflection for DR 26, 21, 17, 11, 9, and 7 HDPE pipe is calculated below.

| DR = | 26 | 21 | 17 | 11 | 9 | 7 |
|---|---|---|---|---|---|---|
| By Equation 5, $\Delta X/D_M$ = | 0.0572 | 0.0568 | 0.0562 | 0.0522 | 0.0480 | 0.0391 |
| or | 5.72% | 5.68% | 5.62% | 5.22% | 4.80% | 3.91% |

Acceptable ring deflection limits for non-pressure applications is 7.5% (PPI Handbook, 2nd Edition). Thus, ring deflection for DR 26 or thicker HDPE pipe is within the acceptable ring deflection limits.

In conclusion, DR26 or thicker PE4XXX, HDPE pipe has sufficient strength and thickness to support weight of waste mass and cover material and prevent collapsing under pressures exerted by waste, cover material and equipment to be used at the landfill. Conservatively, DR17 or thicker HDPE pipe is selected.

C. CHECK EXISTING LCR PIPING IN AREA B (Revised on 5/21/2021)

Maximum depth of waste above LCR pipe in Area B = 125 ft [6]

$g_W$ = 1,300 pcy [See above]

$H_W$ = 170 ft [» (125 ft + 38 ft additional waste; comparing maximum final grade for Area B (222 ft) and Area C Infill (260 ft)]

$P_E$ = 56.8 psi [by Equation 6]

$P_{Total}$ = 56.8 psi [Total vertical stress = $P_E + P_L$]

Pipe material and thickness of the existing LCR pipe and pipe bedding in leachate collection layer and side berm of Area B is given below.

| | Pipe Material | Pipe Thickness | Bedding Material |
|---|---|---|---|
| Leachate Collection Layer | HDPE or PVC | DR21 | Aggregates |
| Side Berm | PVC | DR21 or SCH80 | Well compacted soil |

Existing LCR pipe DR = 21 [Minimum thickness of the existing LCR pipe]

*C-1. CHECK EXISTING HDPE PIPE IN LEACHATE COLLECTION LAYER*

As stated earlier, the existing LCR pipe is DR21 HDPE pipe and pipe bedding material is aggregate. E and E' values have been provided in Section B of this Appendix.

1. Ring Compression

Pipe wall compressive stress, $S$ = 596.8 psi [By Equation 1]

Allowable compressive stress ($P_{ca}$) = 1,000 psi for PE3XXXX, & PE4708 [PPI Handbook, 2nd Edition]

Factor of Safety ($P_{ca}$ / $S$) = 1.68

Because the factor of safety is more than 1.0, the existing DR 21 HDPE pipe has enough strength and thickness against ring compression.

2. Ring Buckling

$R$ = 1.0 [By Equation 3]

$B'$ = 1.00 [By Equation 4]

Allowable constrained buckling pressure, $P_{WC}$ = 83.6 psi [By Equation 2]

Factor of Safety [$P_{WC}/P_{Total}$] = 1.5

Because the factor of safety is more than 1.0, the existing DR 21 HDPE pipe has enough strength and thickness against ring compression.

3. Ring Deflection

By Equation 5, ring deflection $\Delta X/D_M$ = 0.0460 4.60%

Acceptable ring deflection limits for non-pressure applications is 7.5% (PPI Handbook, 2nd Edition). Thus, ring deflection for the existing DR 21 HDPE pipe is within the acceptable ring deflection limits.

In conclusion, the existing thickness DR21 of HDPE pipe for the Area B leachate collection system has enough strength and thickness to support 38 ft of the additional waste mass.

*C-2. CHECK EXISTING PVC PIPE IN SIDE BERMS*

As stated earlier, the existing LCR pipe inside berms of Area B is PVC (minimum) DR21 and pipe bedding material is wellcompacted clean soil. Thus,

$E$ = 360,000 psi for [PVC pipe; Harvel.com and US Pipe Inc.]

$E'$ = 2,000 psi [pipe bedding material is coarse grain soils with fines]

1. Ring Compression

Pipe wall compressive stress, $S$ = 596.8 psi [By Equation 1]

Allowable compressive stress ($P_{ca}$) = 9,600 psi for PVC [Harvel.com]

Factor of Safety ($P_{ca}$ / $S$) = 16.08

Because the factor of safety is more than 1.0, the existing DR 21 PVC pipe has enough strength and thickness against ring compression.

2. Ring Buckling

$R$ = 1.0 [By Equation 3]

$B'$ = 1.00 [By Equation 4]

Allowable constrained buckling pressure, $P_{WC}$ = 299.6 psi [By Equation 2]

Factor of Safety [$P_{WC}/P_{Total}$] = 5.3

Because the factor of safety is more than 1.0, the existing DR 21 PVC pipe has enough strength and thickness against ring buckling.

3. Ring Deflection

By Equation 5, ring deflection $\Delta X/D_M$ = 0.0561 5.61%

Acceptable ring deflection limits for non-pressure applications is 7.5% (PPI Handbook, 2nd Edition). Thus, ring deflection for the existing DR 21 PVC pipe is within the acceptable ring deflection limits.

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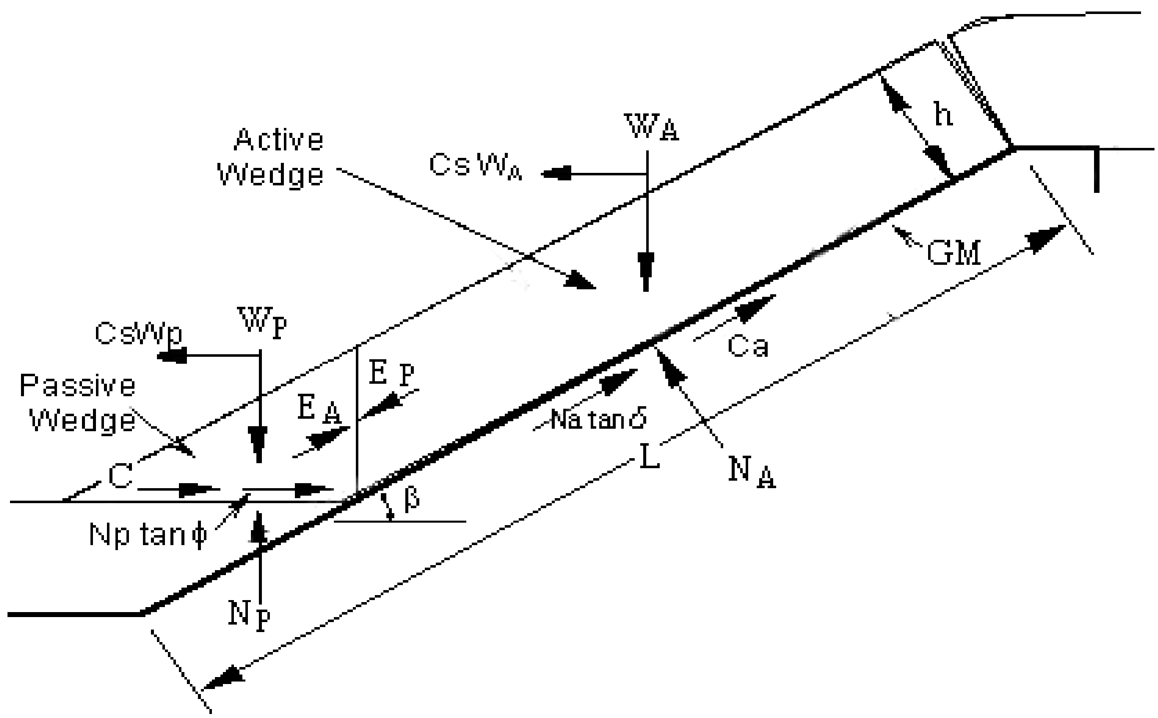
JOB NO. ____02201056.30__
SHEET NO. _1_ OF __7___
CALCULATED BY: __GRI_
CHECKED BY: __BSP_
DATE _10/13/2020_

# TABLE G-1: VENEER STABILITY BY KOERNER AND SOONG METHOD
# BROWN STATION ROAD SANITARY LANDFILL

Consideration: To determine the minimum factor of safety (FS) corresponding to various interfaces of a geosynthetic lined slope of the bottom liner and LCS on the overlay area of the Area C Infill using an analysis as described by Koerner and Soong (1998) referenced below




Ref.: R.M. Koerner, and T-Y.Soong, 1998. "Analysis and Design of Veneer Cover Soils". Proceeding of 6th International Conference on Geosynthetics, Vol. 1, pp. 1-23, Atlanta, Georgia, USA.

Parameters:

| | | |
|---|---|---|
| L | = | length of slope meausured along the geomembrane |
| β | = | soil slope angle beneath the geomembrane |
| FS | = | factor of safety against instability |
| $W_A$ | = | total weight of the active wedge between |
| $W_P$ | = | total weight of the passive wedge |
| $N_A$ | = | effective force normal to the failure plane of the active wedge |
| h | = | thickness of the liner system |
| γ | = | unit weight of the liner system |
| ϕ | = | subbase soil friction angle |
| δ | = | interface friction angle |
| $C_a$ | = | adhesive force between liner soil of the active wedge and the geomembrane |
| $c_a$ | = | adhesion between liner soil of the active wedge and the geomembrane |
| C | = | cohesive force along the failure plane of the passive wedge |
| c | = | cohesion of the liner soil |

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# APPENDIX II-G



Calculate Factor of Safety (FS):

$$FS = \frac{-b + (b^2 - 4ac)^{1/2}}{2a}$$ , where

$$a = (C_S W_A + N_A \sin\beta)(\cos\beta) + C_S W_P(\cos\beta)$$

$$b = -[(C_S W_A + N_A \sin\beta)\sin\beta(\tan\phi) + (N_A \tan\delta + C_a)(\cos^2\beta) + (C + W_P \tan\phi)\cos\beta]$$

$$c = (N_A \tan\delta + C_a)\cos\beta\sin\beta\tan\phi$$ , where

$$W_A = \gamma h^2 [(L/h) - (1/\sin\beta) - (\tan\beta/2)]$$

$$N_A = W_A(\cos\beta)$$

$$W_P = \gamma h^2 / \sin 2\beta$$

$$C_a = c_a(L-(h/\sin\beta))$$

$$C = (ch)/(\sin\beta)$$

Assumptions:
To analyze the veneer stability of the bottom liner for the Area C Infill in the over lay area, longest slope (Section E-E', Exhibit II-G-1) along the existing cover in the Area A1 and Area A2 is considered. The existing Area A1 and A2 does not exceed a slope of 1V:4H and hence a slope angle (β) of 14 degrees is considered. A minimum adheshion ($c_a$) of 20psf and cohesion (c) of 0 psf are assumed for both existing cover and proposed liner soils. A cumulative unitweight (γ) of 110 pcf and internal friction angle (φ) of 25 degrees is conservatively assumed for the existing cover and proposed bottom liner. The following values are adopted for thickness of liner system above each interface (h) and interface friction angle (δ) :

| Interfaces considered | Interface friction angle | Height of cover+liner system above interface (ft) | Height of cover+liner system above interface (mm) | Assumption notes |
|---|---|---|---|---|
| Waste and intermediate cover | 22 | 7.5 | 2,286.0 | SCS experience |
| Intermediate cover and subgrade | 25 | 5.5 | 1,676.4 | SCS experience |
| Subgrade and Geotextile | 30 | 5 | 1,524.0 | GRI # 30 (Assumed NW NP GT - cohesive |
| Geotextile and 40 MIL textured LLDPE | 26 | 5 | 1,524.0 | GRI # 30 (Assumed peak value for NW NP GT - LLDPE-T) |
| 40 MIL textured LLDPE and Geocompos | 26 | 5 | 1,524.0 | GRI # 30 (peak value for NW NP GT - LLDPE-T) |
| Geocomposite and Vegetative cover | 27 | 5 | 1,524.0 | GRI # 30 |
| Vegetative cover and Subbase | 30 | 4 | 1,219.2 | GRI # 30 (Assumed NW NP GT - cohesive soil) |
| Subbase and 60 MIL textured HDPE line | 20 | 2 | 609.6 | Assumed peak value for HDPE-T - Cohesive soil (unsaturated) |
| 60 MIL HDPE liner and Geotextile | 20 | 2 | 609.6 | see above for 40 mil and geocomposite |
| Geotextile and Drainage layer | 24 | 2 | 609.6 | SCS experience |

Geotextile - Drainage Layer Interface

| | | | | | |
|---|---|---|---|---|---|
| γ= | 15.62 | $kN/m^3$ | = | 110 | pcf |
| h = | 609.6 | mm | = | 0.61 | m |
| L = | 225.0 | m | | | |
| β = | 14.00 | ° | = | 0.24 | rad |

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# APPENDIX II-G



| | | | | |
|---|---|---|---|---|
| $C_s$ = | 0.00 | g | | |
| $\phi$ = | 25.00 | ° | = | 0.44 rad |
| $\delta$ = | 24.00 | ° | = | 0.42 rad |
| c = | 0.00 | $kN/m^2$ | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | |

| | | |
|---|---|---|
| $W_A$ = | 2,117.72 | kN |
| $N_A$ = | 2,054.82 | kN |
| $W_P$ = | 12.36 | kN |
| $C_a$ = | 213.58 | kN |
| C = | 0.00 | kN |
| a = | 482.34 | |
| b = | -1,124.07 | |
| c = | 123.52 | |

FS = 2.21

60 MIL HDPE Liner - Geotextile Interface

| | | | | |
|---|---|---|---|---|
| $\gamma$= | 15.62 | $kN/m^3$ | | |
| h = | 609.6 | mm | = | 0.61 m |
| L = | 225.0 | m | | |
| $\beta$ = | 14.00 | ° | = | 0.24 rad |
| $C_s$ = | 0.00 | g | | |
| $\phi$ = | 25.00 | ° | = | 0.44 rad |
| $\delta$ = | 20.00 | ° | = | 0.35 rad |
| c = | 0.00 | $kN/m^2$ | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | |

| | | |
|---|---|---|
| $W_A$ = | 2,117.72 | kN |
| $N_A$ = | 2,054.82 | kN |
| $W_P$ = | 12.36 | kN |
| $C_a$ = | 213.58 | kN |
| C = | 0.00 | kN |
| a = | 482.34 | |
| b = | -966.87 | |
| c = | 105.24 | |

FS = 1.89

Subbase - 60 MIL HDPE Liner Interface

| | | | | |
|---|---|---|---|---|
| $\gamma$= | 15.62 | $kN/m^3$ | | |
| h = | 609.6 | mm | = | 0.61 m |
| L = | 225.0 | m | | |
| $\beta$ = | 14.00 | ° | = | 0.24 rad |
| $C_s$ = | 0.00 | g | | |
| $\phi$ = | 25.00 | ° | = | 0.44 rad |
| $\delta$ = | 20.00 | ° | = | 0.35 rad |

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# APPENDIX II-G



| | | | | |
|---|---|---|---|---|
| c = | 0.00 | $kN/m^2$ | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | |

| | | |
|---|---|---|
| $W_A$ = | 2,117.72 | kN |
| $N_A$ = | 2,054.82 | kN |
| $W_P$ = | 12.36 | kN |
| $C_a$ = | 213.58 | kN |
| C = | 0.00 | kN |
| a = | 482.34 | |
| b = | -966.87 | |
| c = | 105.24 | |

FS = 1.89

Existing Vegetative Cover - Subbase Interface

| | | | | |
|---|---|---|---|---|
| γ= | 15.62 | $kN/m^3$ | | |
| h = | 1,219.2 | mm | = | 1.22 m |
| L = | 225.0 | m | | |
| β = | 14.00 | ° | = | 0.24 rad |
| $C_s$ = | 0.00 | g | | |
| ϕ = | 25.00 | ° | = | 0.44 rad |
| δ = | 30.00 | ° | = | 0.52 rad |
| c = | 0.00 | $kN/m^2$ | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | |

| | | |
|---|---|---|
| $W_A$ = | 4,186.01 | kN |
| $N_A$ = | 4,061.67 | kN |
| $W_P$ = | 49.46 | kN |
| $C_a$ = | 211.16 | kN |
| C = | 0.00 | kN |
| a = | 953.42 | |
| b = | -2,539.79 | |
| c = | 279.80 | |

FS = 2.55

Existing Geocomposite -Existing Vegetative Cover Interface

| | | | | |
|---|---|---|---|---|
| γ= | 15.62 | $kN/m^3$ | | |
| h = | 1524.0 | mm | = | 1.52 m |
| L = | 225.0 | m | | |
| β = | 14.00 | ° | = | 0.24 rad |
| $C_s$ = | 0.00 | g | | |
| ϕ = | 25.00 | ° | = | 0.44 rad |
| δ = | 27.00 | ° | = | 0.47 rad |
| c = | 0.00 | $kN/m^2$ | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | |

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# APPENDIX II-G



| | | |
|---|---|---|
| $W_A$ = | 5,201.62 | kN |
| $N_A$ = | 5,047.11 | kN |
| $W_P$ = | 77.28 | kN |
| $C_a$ = | 209.95 | kN |
| C = | 0.00 | kN |
| a = | 1,184.74 | |
| b = | -2,791.49 | |
| c = | 304.47 | |
| **FS =** | **2.24** | |

Existing 40 MIL LLDPE - Existing Geocomposite Interface

| | | | | | |
|---|---|---|---|---|---|
| γ= | 15.62 | $kN/m^3$ | | | |
| h = | 1,524.0 | mm | = | 1.52 | m |
| L = | 225.0 | m | | | |
| β = | 14.00 | ° | = | 0.24 | rad |
| $C_s$ = | 0.00 | g | | | |
| ϕ = | 25.00 | ° | = | 0.44 | rad |
| δ = | 26.00 | ° | = | 0.45 | rad |
| c = | 0.00 | $kN/m^2$ | | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | | |

| | | |
|---|---|---|
| $W_A$ = | 5,201.62 | kN |
| $N_A$ = | 5,047.11 | kN |
| $W_P$ = | 77.28 | kN |
| $C_a$ = | 209.95 | kN |
| C = | 0.00 | kN |
| a = | 1,184.74 | |
| b = | -2,687.94 | |
| c = | 292.43 | |
| **FS =** | **2.15** | |

Existing Geotextile - Existing 40 MIL LLDPE Interface

| | | | | | |
|---|---|---|---|---|---|
| γ= | 15.62 | $kN/m^3$ | | | |
| h = | 1,524.0 | mm | = | 1.52 | m |
| L = | 225.0 | m | | | |
| β = | 14.00 | ° | = | 0.24 | rad |
| $C_s$ = | 0.00 | g | | | |
| ϕ = | 25.00 | ° | = | 0.44 | rad |
| δ = | 26.00 | ° | = | 0.45 | rad |
| c = | 0.00 | $kN/m^2$ | | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | | |

| | | |
|---|---|---|
| $W_A$ = | 5,201.62 | kN |
| $N_A$ = | 5,047.11 | kN |
| $W_P$ = | 77.28 | kN |

| | | |
|---|---|---|
| $C_a$ = | 209.95 | kN |
| C = | 0.00 | kN |
| a = | 1,184.74 | |
| b = | -2,687.94 | |
| c = | 292.43 | |

**FS = 2.15**

Existing Subgrade - Existing Geotextile Interface

| | | | | | |
|---|---|---|---|---|---|
| γ= | 15.62 | $kN/m^3$ | | | |
| h = | 1,524.0 | mm | = | 1.52 | m |
| L = | 225.0 | m | | | |
| β = | 14.00 | ° | = | 0.24 | rad |
| $C_s$ = | 0.00 | g | | | |
| ϕ = | 25.00 | ° | = | 0.44 | rad |
| δ = | 30.00 | ° | = | 0.52 | rad |
| c = | 0.00 | $kN/m^2$ | | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | | |

| | | |
|---|---|---|
| $W_A$ = | 5,201.62 | kN |
| $N_A$ = | 5,047.11 | kN |
| $W_P$ = | 77.28 | kN |
| $C_a$ = | 209.95 | kN |
| C = | 0.00 | kN |
| a = | 1,184.74 | |
| b = | -3,113.78 | |
| c = | 341.94 | |

**FS = 2.51**

Existing Intermediate Cover - Existing Subgrade Interface

| | | | | | |
|---|---|---|---|---|---|
| γ= | 15.62 | $kN/m^3$ | | | |
| h = | 1,676.4 | mm | = | 1.68 | m |
| L = | 225.0 | m | | | |
| β = | 14.00 | ° | = | 0.24 | rad |
| $C_s$ = | 0.00 | g | | | |
| ϕ = | 25.00 | ° | = | 0.44 | rad |
| δ = | 25.00 | ° | = | 0.44 | rad |
| c = | 0.00 | $kN/m^2$ | | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | | |

| | | |
|---|---|---|
| $W_A$ = | 5,704.78 | kN |
| $N_A$ = | 5,535.33 | kN |
| $W_P$ = | 93.50 | kN |
| $C_a$ = | 209.35 | kN |
| C = | 0.00 | kN |
| a = | 1,299.34 | |
| b = | -2,820.57 | |

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# APPENDIX II-G



c = 305.45

FS = 2.06

Existing Waste - Existing Intermediate Cover Interface

| | | | | | |
|---|---|---|---|---|---|
| $\gamma$= | 15.62 | $kN/m^3$ | | | |
| h = | 2,286.0 | mm | = | 2.29 | m |
| L = | 225.0 | m | | | |
| $\beta$ = | 14.00 | ° | = | 0.24 | rad |
| $C_s$ = | 0.00 | g | | | |
| $\phi$ = | 25.00 | ° | = | 0.44 | rad |
| $\delta$ = | 22.00 | ° | = | 0.38 | rad |
| c = | 0.00 | $kN/m^2$ | | | |
| $c_a$ = | 0.96 | $kN/m^2$ | | | |

| | | |
|---|---|---|
| $W_A$ = | 7,686.56 | kN |
| $N_A$ = | 7,458.24 | kN |
| $W_P$ = | 173.87 | kN |
| $C_a$ = | 206.93 | kN |
| C = | 0.00 | kN |
| a = | 1,750.72 | |
| b = | -3,314.00 | |
| c = | 352.49 | |

FS = 1.78

# APPENDIX II-G

# SLOPE STABILITY BY PCSTABL5M3



**** PCSTABL5M3 ****

by Purdue University 1985
rev. for SCS Engineers HVA 2008
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 08/05/2020
Time of Run: 08:12PM
Run By: GRI
Input Data Filename: C:section ee' veneer static trial 5.in
Output Filename: C:section ee' veneer static trial 5.OUT
Unit: ENGLISH
Plotted Output Filename: C:section ee' veneer static trial 5.PLT
PROBLEM DESCRIPTION Section EE'
veneer- static

BOUNDARY COORDINATES
3 Top Boundaries
24 Total Boundaries

| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
|---|---|---|---|---|---|
| 1 | 442.88 | 76.08 | 974.90 | 140.01 | 1 |
| 2 | 974.90 | 140.01 | 1200.00 | 139.33 | 1 |
| 3 | 1200.00 | 139.33 | 1673.38 | 128.01 | 1 |
| 4 | 442.88 | 74.08 | 974.90 | 138.01 | 2 |
| 5 | 974.90 | 138.01 | 1200.00 | 137.33 | 2 |
| 6 | 1200.00 | 137.33 | 1673.38 | 126.01 | 2 |
| 7 | 442.88 | 74.07 | 974.90 | 138.00 | 3 |
| 8 | 974.90 | 138.00 | 1200.00 | 137.32 | 3 |
| 9 | 1200.00 | 137.32 | 1673.38 | 126.00 | 3 |
| 10 | 442.88 | 71.07 | 974.90 | 136.00 | 4 |
| 11 | 974.90 | 136.00 | 1200.00 | 135.32 | 4 |
| 12 | 1200.00 | 135.32 | 1673.38 | 125.00 | 4 |
| 13 | 442.88 | 71.07 | 974.90 | 136.00 | 5 |
| 14 | 974.90 | 136.00 | 1200.00 | 135.32 | 5 |
| 15 | 1200.00 | 135.32 | 1673.38 | 125.00 | 5 |
| 16 | 442.88 | 71.07 | 974.90 | 136.00 | 6 |
| 17 | 974.90 | 136.00 | 1200.00 | 135.32 | 6 |
| 18 | 1200.00 | 135.32 | 1673.38 | 125.00 | 6 |
| 19 | 442.88 | 70.57 | 974.90 | 135.50 | 7 |
| 20 | 974.90 | 135.50 | 1200.00 | 134.82 | 7 |
| 21 | 1200.00 | 134.82 | 1673.38 | 124.50 | 7 |
| 22 | 442.88 | 68.57 | 974.90 | 133.50 | 8 |
| 23 | 974.90 | 133.50 | 1200.00 | 132.82 | 8 |
| 24 | 1200.00 | 132.82 | 1673.38 | 122.50 | 8 |

ISOTROPIC SOIL PARAMETERS
9 Type(s) of Soil

| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 110.0 | 140.0 | 0.0 | 24.0 | 0.00 | 0.0 | 1 |
| 2 | 100.0 | 100.0 | 0.0 | 20.0 | 0.00 | 0.0 | 1 |
| 3 | 110.0 | 120.0 | 0.0 | 25.0 | 0.00 | 0.0 | 1 |
| 4 | 110.0 | 120.0 | 0.0 | 25.0 | 0.00 | 0.0 | 1 |
| 5 | 100.0 | 100.0 | 0.0 | 20.0 | 0.00 | 0.0 | 1 |
| 6 | 100.0 | 100.0 | 0.0 | 11.0 | 0.00 | 0.0 | 1 |
| 7 | 110.0 | 120.0 | 0.0 | 25.0 | 0.00 | 0.0 | 1 |
| 8 | 110.0 | 120.0 | 0.0 | 22.0 | 0.00 | 0.0 | 1 |
| 9 | 65.0 | 65.0 | 250.0 | 32.0 | 0.00 | 0.0 | 1 |

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 2 Coordinate Points

| Point No. | X-Water (ft) | Y-Water (ft) |
|---|---|---|
| 1 | 150.00 | 59.12 |
| 2 | 1673.38 | 43.30 |

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
200 Trial Surfaces Have Been Generated.
4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is  10.0

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
|---|---|---|---|---|---|
| 1 | 450.00 | 70.57 | 503.00 | 80.00 | 1.00 |
| 2 | 504.00 | 80.00 | 600.00 | 90.00 | 1.00 |
| 3 | 600.10 | 90.00 | 750.00 | 110.00 | 1.00 |
| 4 | 750.10 | 110.00 | 974.90 | 135.50 | 1.00 |

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined.  They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By  6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 479.02 | 80.42 |
| 2 | 484.56 | 76.73 |
| 3 | 585.30 | 88.12 |
| 4 | 617.47 | 91.96 |
| 5 | 902.50 | 127.09 |
| 6 | 906.80 | 131.83 |

*** 2.004 ***

Individual data on the    11  slices

| Slice No. | Width (ft) | Weight (lbs) | Water Force Top (lbs) | Water Force Bot (lbs) | Tie Force Norm (lbs) | Tie Force Tan (lbs) | Earthquake Force Hor (lbs) | Earthquake Force Ver (lbs) | Surcharge Load (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.5 | 279.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 0.0 | 2.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 3.0 | 1044.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4 | 64.2 | 32384.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 36.5 | 19769.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 | 32.2 | 17880.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | 285.0 | 145426.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8 | 0.1 | 34.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | 2.2 | 737.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10 | 0.0 | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11 | 2.0 | 224.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Failure Surface Specified By  6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 453.76 | 77.39 |
| 2 | 461.69 | 72.81 |
| 3 | 589.82 | 88.78 |
| 4 | 623.66 | 93.20 |
| 5 | 942.07 | 131.56 |
| 6 | 946.66 | 136.62 |

*** 2.008 ***

Failure Surface Specified By  6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 494.20 | 82.25 |
| 2 | 499.33 | 79.28 |
| 3 | 521.69 | 82.06 |
| 4 | 615.94 | 91.66 |
| 5 | 899.31 | 126.47 |
| 6 | 904.38 | 131.54 |

*** 2.103 ***

Failure Surface Specified By  6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 470.36 | 79.38 |
| 2 | 476.06 | 74.94 |
| 3 | 543.46 | 84.59 |
| 4 | 602.21 | 90.28 |
| 5 | 951.18 | 132.79 |
| 6 | 954.77 | 137.59 |

*** 2.144 ***

Failure Surface Specified By  6 Coordinate Points

Point      X-Surf      Y-Surf

| No. | (ft) | (ft) |
|---|---|---|
| 1 | 487.31 | 81.42 |
| 2 | 494.35 | 78.10 |
| 3 | 525.23 | 82.52 |
| 4 | 620.00 | 92.36 |
| 5 | 955.90 | 133.65 |
| 6 | 957.00 | 137.86 |

*** 2.149 ***

Failure Surface Specified By 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 486.67 | 81.34 |
| 2 | 490.70 | 77.73 |
| 3 | 557.24 | 85.24 |
| 4 | 631.93 | 93.91 |
| 5 | 937.79 | 131.34 |
| 6 | 941.72 | 136.02 |

*** 2.167 ***

Failure Surface Specified By 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 450.69 | 77.02 |
| 2 | 456.67 | 71.41 |
| 3 | 558.98 | 85.86 |
| 4 | 607.12 | 90.78 |
| 5 | 950.63 | 133.00 |
| 6 | 955.23 | 137.65 |

*** 2.208 ***

Failure Surface Specified By 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 497.44 | 82.64 |
| 2 | 500.94 | 79.68 |
| 3 | 598.85 | 90.01 |
| 4 | 618.13 | 92.37 |
| 5 | 935.97 | 130.71 |
| 6 | 939.44 | 135.75 |

*** 2.213 ***

Failure Surface Specified By 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 445.32 | 76.37 |
| 2 | 450.94 | 70.83 |
| 3 | 569.78 | 86.86 |
| 4 | 612.57 | 91.45 |
| 5 | 903.04 | 126.89 |
| 6 | 905.98 | 131.73 |

*** 2.230 ***

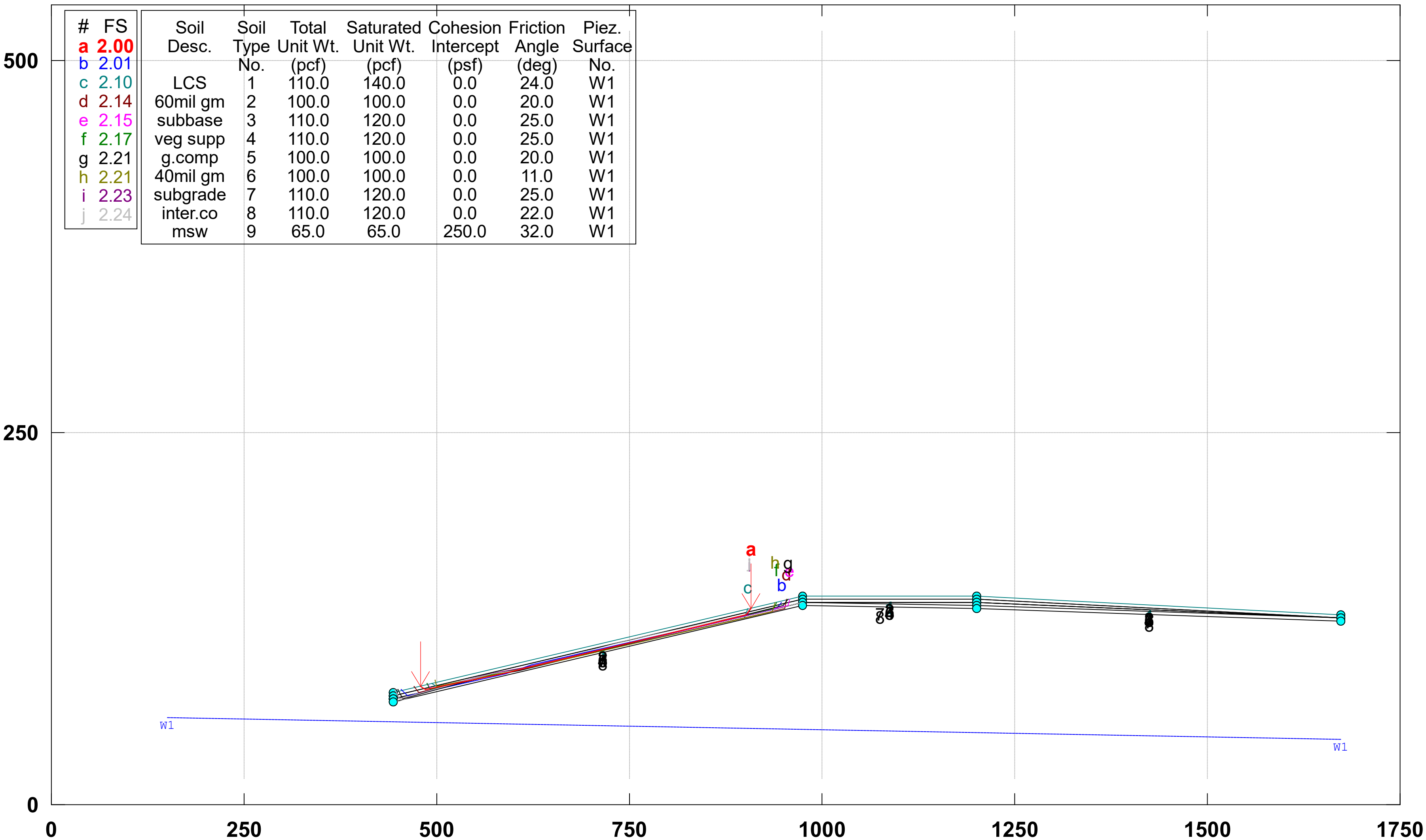
Failure Surface Specified By 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|---|---|---|
| 1 | 445.85 | 76.44 |
| 2 | 451.48 | 71.02 |
| 3 | 571.14 | 87.26 |
| 4 | 601.23 | 90.16 |
| 5 | 900.96 | 126.86 |
| 6 | 905.77 | 131.70 |

*** 2.239 ***

# Section EE' veneer- static

c:\users\4665g_r\documents\areac\veneer stability\section ee' veneer  static trial 5.pl2   Run By: GRI   08/05/2020   08:12PM




| # | FS |
|---|---|
| a | 2.00 |
| b | 2.01 |
| c | 2.10 |
| d | 2.14 |
| e | 2.15 |
| f | 2.17 |
| g | 2.21 |
| h | 2.21 |
| i | 2.23 |
| j | 2.24 |

| Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No. |
|---|---|---|---|---|---|---|
| LCS | 1 | 110.0 | 140.0 | 0.0 | 24.0 | W1 |
| 60mil gm | 2 | 100.0 | 100.0 | 0.0 | 20.0 | W1 |
| subbase | 3 | 110.0 | 120.0 | 0.0 | 25.0 | W1 |
| veg supp | 4 | 110.0 | 120.0 | 0.0 | 25.0 | W1 |
| g.comp | 5 | 100.0 | 100.0 | 0.0 | 20.0 | W1 |
| 40mil gm | 6 | 100.0 | 100.0 | 0.0 | 11.0 | W1 |
| subgrade | 7 | 110.0 | 120.0 | 0.0 | 25.0 | W1 |
| inter.co | 8 | 110.0 | 120.0 | 0.0 | 22.0 | W1 |
| msw | 9 | 65.0 | 65.0 | 250.0 | 32.0 | W1 |

**PCSTABL5M3  FSmin=2.00**
**Safety Factors Are Calculated By The Modified Janbu Method**

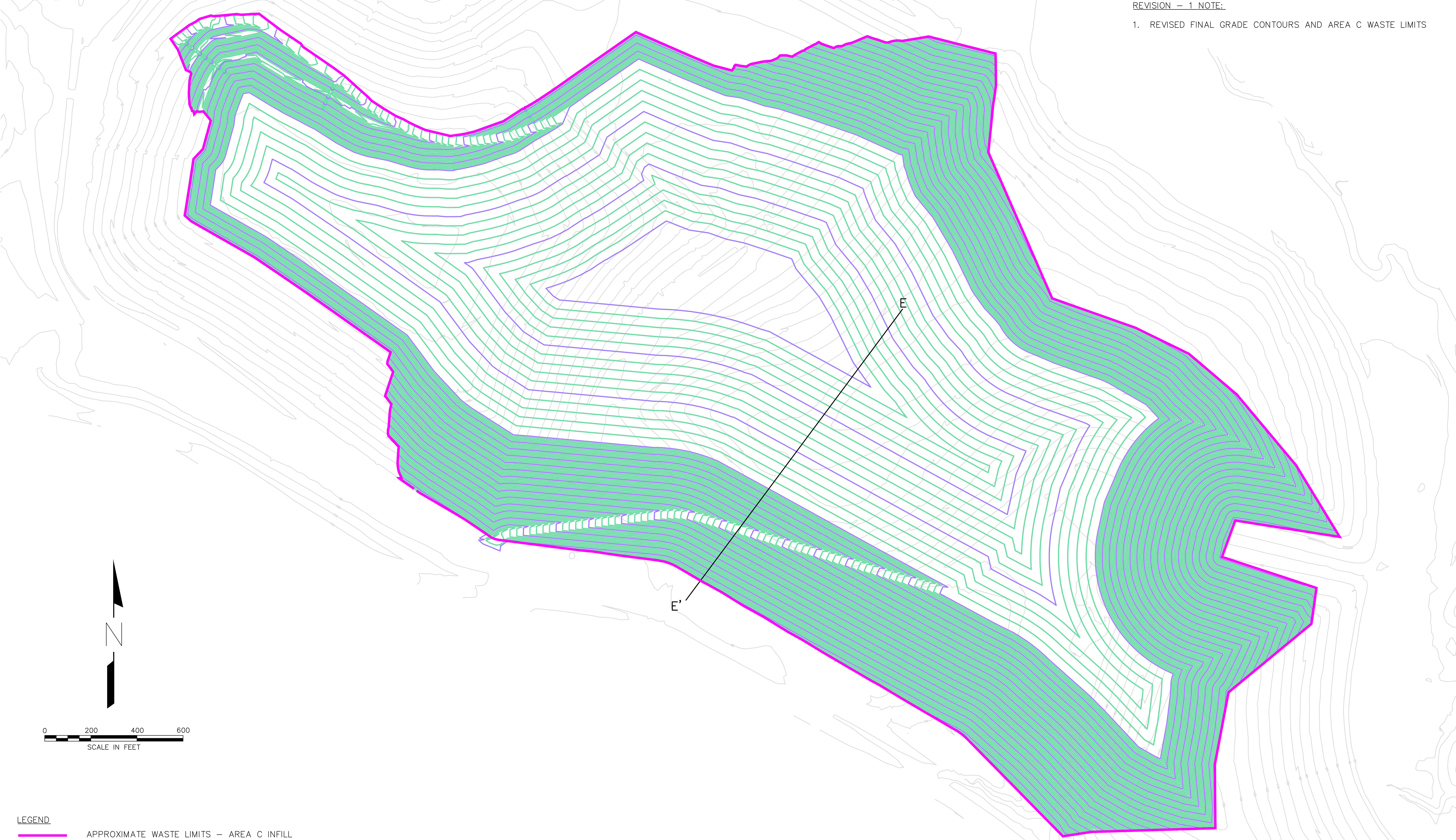
SCS ENGINEERS

"PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 30160, EXPIRATION DATE: 5-17-2022."

STATE OF MARYLAND
DARRIN DOMINIC DILLAH
LIC REG CERT NO 30160
PROFESSIONAL ENGINEER
12.21.21

REVISION – 1 NOTE:

1. REVISED FINAL GRADE CONTOURS AND AREA C WASTE LIMITS




LEGEND

- APPROXIMATE WASTE LIMITS – AREA C INFILL
- EXISTING GRADE
- VENEER STABILITY SECTION

NOTES

1. TOPOGRAPHY IS GENERATED FROM MAP COMPILED FROM AERIAL PHOTOGRAPHY DATED 1–17–2020 BY QUANTUM SPATIAL.

| NO. | REVISION | DATE |
|---|---|---|
| 1 | REVISION – 1 | 5/21/21 |

SHEET TITLE: APPENDIX II - G-1 VENEER STABILITY SECTION

PROJECT TITLE: AREA C INFILL - PHASE - II REPORT
BROWN STATION ROAD SANITARY LANDFILL

CLIENT: PRINCE GEORGE'S COUNTY
3500 BROWN STATION ROAD
UPPER MARLBORO, MARYLAND

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC.

PROJ. NO. 02201056.30 | DWN. BY: GRI | Q/A RVW BY: DDD
DSN. BY: DDD/BSP | CHK. BY: DDD | APP. BY: DDD

CADD FILE:

DATE: MAY 15, 2020

SCALE: AS SHOWN

EXHIBIT NO. II-G

Q:\LF\02201056.30\SOLID WASTE DISPOSAL\ACAD\PHASE II\APPENDIX II–G

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-H GROUNDWATER QUALITY PARAMETERS

JOB NO. ____02201056.30__
SHEET NO. _1_ OF __6___
COMPILED BY: __GRI_
CHECKED BY: __BSP_
DATE __05/17/2021__

**TABLE I PARAMETERS**

| SW-846 Analytical Method | Sample Size - Container | Maximum Holding Time | Preservation |
|---|---|---|---|
| 8260B | 40 mL (3) - glass VOA | 14 days | 4°C; HCl; No head space |
| 8011 | 60 mL (2) - amber VOA | 14 days | 4°C; HCl; No head space |
| **Volatile Organic Compound** | **Current LOD (µg/L)** | **Current LOQ (µg/L)** | **RDP PQL (µg/L)** |
| 1,1,1,2-Tetrachloroethane | 0.4 | 0.4 | 1 |
| 1,1,1-Trichloroethane | 0.6 | 1 | 1 |
| 1,1,2,2-Tetrachloroethane | 0.3 | 0.4 | 1 |
| 1,1,2-Trichloroethane | 0.5 | 1 | 1 |
| 1,1-Dichloroethane | 0.6 | 1 | 1 |
| 1,1-Dichloroethene | 0.7 | 1 | 1 |
| 1,2,3-Trichloropropane | 0.009 | 0.01 | 1 |
| 1,2,3-Trichloropropane | 0.4 | 1 | 1 |
| 1,2-Dibromo-3-chloropropane | 0.005 | 0.01 | 1 |
| 1,2-Dibromoethane | 0.008 | 0.01 | 1 |
| 1,2-Dichlorobenzene | 0.4 | 1 | 1 |
| 1,2-Dichloroethane | 0.7 | 1 | 1 |
| 1,2-Dichloropropane | 0.4 | 1 | 1 |
| 1,4-Dichlorobenzene | 0.4 | 1 | 1 |
| 2-Butanone | 3 | 10 | 5 |
| 2-Hexanone | 2.2 | 5 | 5 |
| 4-Methyl 2-pentanone | 1.5 | 5 | 5 |
| Acetone | 7 | 10 | 5 |
| Acrylonitrile | 1.7 | 5 | 5 |
| Benzene | 0.4 | 1 | 1 |
| Bromochloromethane | 0.5 | 1 | 1 |
| Bromodichloromethane | 0.4 | 0.5 | 1 |
| Bromoform | 0.4 | 1 | 1 |
| Bromomethane | 0.8 | 1 | 1 |
| Carbon disulfide | 1 | 10 | 1 |
| Carbon tetrachloride | 0.5 | 1 | 1 |
| Chlorobenzene | 0.4 | 1 | 1 |
| Chloroethane | 0.7 | 1 | 1 |
| Chloroform | 0.5 | 0.5 | 1 |
| Chloromethane | 0.95 | 1 | 1 |
| cis-1,2-Dichloroethene | 0.4 | 1 | 1 |
| cis-1,3-Dichloropropene | 0.3 | 1 | 1 |
| Dibromochloromethane | 0.35 | 0.5 | 1 |
| Dibromomethane | 0.4 | 1 | 1 |
| Ethyl benzene | 0.4 | 1 | 1 |
| Methyl Iodide | 1.7 | 10 | 1 |
| Methylene chloride | 1 | 4 | 1 |
| Methyl-t-butyl ether | 0.6 | 1 | 2 |
| Styrene | 0.4 | 1 | 1 |
| Tetrachloroethene | 0.4 | 1 | 1 |
| Toluene | 0.5 | 1 | 1 |
| trans-1,2-Dichloroethene | 0.6 | 1 | 1 |
| trans-1,3-Dichloropropene | 0.3 | 1 | 1 |
| trans-1,4-Dichloro-2-butene | 1 | 4 | 5 |
| Trichloroethene | 0.4 | 1 | 1 |
| Trichlorofluoromethane | 0.8 | 1 | 1 |
| Vinyl acetate | 2 | 10 | 1 |
| Vinyl chloride | 0.5 | 0.5 | 1 |
| Xylene | 1 | 3 | 1 |

°C = degrees Celsius
HCl = Hydrochloric Acid
LOD = laboratory's Limit of Detection
LOQ = laboratory's Limit of Quantitation
mL = milliliter
RDP PQL = Refuse Disposal Permit Practical Quantitation Limit
µg/L = microgram per liter

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-H GROUNDWATER QUALITY PARAMETERS

JOB NO. ____02201056.30__
SHEET NO. _2_ OF __6___
COMPILED BY: __GRI_
CHECKED BY: __BSP_
DATE __05/17/2021__

**TABLE II PARAMETERS**

| Parameter | Analytical Method | Sample Size - Container | Maximum Holding Time | Preservation | Current LOD | Current LOQ | RDP PQL |
|---|---|---|---|---|---|---|---|
| **Total Elements (µg/L, unless otherwise noted)** | | | | | | | |
| Antimony | SW-846 6020A | 500 mL - plastic | 90 days | Nitric Acid | 1 | 1 | 2 |
| Arsenic | SW-846 6020A | 500 mL - plastic | 90 days | Nitric Acid | 0.5 | 1 | 2 |
| Barium | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 5 | 10 | 10 |
| Beryllium | SW-846 6020A | 500 mL - plastic | 90 days | Nitric Acid | 0.2 | 1 | 2 |
| Cadmium | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 2 | 4 | 4 |
| Calcium (mg/L) | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 0.4 | 0.5 | 0.08 |
| Chromium | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 4 | 10 | 10 |
| Cobalt | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 2 | 4 | 10 |
| Copper | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 3 | 10 | 10 |
| Iron (mg/L) | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 0.005 | 0.01 | 0.005 |
| Lead | SW-846 6020A | 500 mL - plastic | 90 days | Nitric Acid | 1 | 1 | 2 |
| Magnesium (mg/L) | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 0.1 | 0.1 | 0.004 |
| Manganese | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 2 | 10 | 4 |
| Mercury | SW-846 7470A | 500 mL - plastic | 90 days | Nitric Acid | 0.2 | 0.2 | 0.2 |
| Nickel | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 2 | 10 | 11 |
| Potassium (mg/L) | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 0.5 | 0.5 | 0.39 |
| Selenium | SW-846 6020A | 500 mL - plastic | 90 days | Nitric Acid | 0.85 | 1 | 35 |
| Silver | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 5 | 10 | 10 |
| Sodium (mg/L) | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 0.5 | 0.5 | 0.2 |
| Thallium | SW-846 6020A | 500 mL - plastic | 90 days | Nitric Acid | 1 | 1 | 2 |
| Vanadium | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 8 | 10 | 10 |
| Zinc | SW-846 6010C | 500 mL - plastic | 90 days | Nitric Acid | 10 | 10 | 10 |
| **Indicator Parameters (mg/L, unless otherwise noted)** | | | | | | | |
| Alkalinity | SM22 2320B-2011 | 250 mL - plastic | 28 days | 4°C | 5 | 5 | 1 |
| Ammonia | EPA350.1 R2.0 | 250 mL - plastic | 28 days | 4°C; Sulfuric Acid | 0.1 | 0.1 | 1 |
| Chemical Oxygen Demand | SM22 5220D-2011 | 250 mL - plastic | 28 days | 4°C; Sulfuric Acid | 10 | 10 | 10 |
| Chloride | EPA 300.0 R2.1 | 250 mL - plastic | 28 days | 4°C | 2.5 | 5 | 0.39 |
| Hardness | SM20 2340B-2011 | 500 mL - plastic | 90 days | Nitric Acid | 1.41 | 1.66 | 0.5 |
| Nitrate | SM22 4500-NO3F-2011, SM22 4500-NO2B-2011, Calculation | 250 mL - plastic | 2 days | 4°C | 0.11 | 0.15 | 0.06 |
| ph (s.u.) | Field Measurement | n/a | n/a | 4°C | --- | --- | 0.1 |
| Specific Conductance (µS/cm) | Field Measurement | n/a | n/a | 4°C | --- | --- | 1000 |
| Solids, Total Dissolved | SM22 2540C-2011 | 250 mL - plastic | 7 days | 4°C | 10 | 10 | 10 |
| Sulfate | EPA 300.0 R2.1 | 250 mL - plastic | 28 days | 4°C | 2.5 | 5 | 0.38 |
| Turbidity (NTU) | Field Measurement | n/a | n/a | 4°C | --- | --- | 0.11 |

--- = not applicable
°C = degrees Celsius
LOD = laboratory's Limit of Detection
LOQ = laboratory's Limit of Quantitation
mL = milliliter
NTU = Nephelometric Turbidity Unit
RDP PQL = Refuse Disposal Permit Practical Quantitation Limit
s.u. = Standard Unit
µg/L = microgram per liter
µS/cm = microSiemen per centimeter

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-H GROUNDWATER QUALITY PARAMETERS



**APPENDIX II PARAMETERS (NOT LISTED ON TABLES I AND II)**

| Parameter Group | SW-846 Analytical Method | Sample Size - Container | Maximum Holding Time | Preservation |
|---|---|---|---|---|
| Herbicides | 8151A | 1 L - Glass Amber | 7 days | 4°C |
| Cyanide | 9012B | 250 mL - plastic | 14 day | 4°C in the dark; Sodium Hydroxide |
| Sulfide | 9215 | 1 L - plastic | 7 days | 4°C; Sodium Hydroxide & Zinc Acetate |
| Tin - Total | 6010C | 500 mL - plastic | 90 days | Nitric Acid |
| Polychlorinated Biphenyls | 8082A | 1 L - Glass Amber | 7 days | 4°C |
| Pesticides | 8081B | 1 L - Glass Amber | 7 days | 4°C |
| Semi-Volatile Organic Compounds | 8270D | 1 L - Glass Amber | 7 days | 4°C |
| Volatile Organic Compounds | 8260B | 40 mL (3) - glass VOA | 14 days | 4°C; Hydrochloric Acid; No head space |

| Parameter | Current LOD (µg/L) | Current LOQ (µg/L) |
|---|---|---|
| Cyanide | 10 | 10 |
| Sulfide | 800 | 1000 |
| Tin - Total | 20 | 20 |
| **HERBICIDES** | | |
| 2,4,5-T | 0.1 | 0.5 |
| 2,4,5-TP | 0.1 | 0.5 |
| 2,4-D | 0.2 | 0.5 |
| Dinoseb | 0.1 | 0.5 |
| Pentachlorophenol | 6.06 | 20.2 |
| Pentachlorophenol | 0.2 | 0.5 |
| **POLYCHLORINATED BIPHENYLS** | | |
| Aroclor 1016 | 0.026 | 0.202 |
| Aroclor 1221 | 0.202 | 0.202 |
| Aroclor 1232 | 0.015 | 0.202 |
| Aroclor 1242 | 0.041 | 0.202 |
| Aroclor 1248 | 0.048 | 0.202 |
| Aroclor 1254 | 0.035 | 0.202 |
| Aroclor 1260 | 0.034 | 0.202 |
| **PESTICIDES** | | |
| 4,4-DDD | 0.005 | 0.051 |
| 4,4-DDE | 0.005 | 0.051 |
| 4,4-DDT | 0.005 | 0.051 |
| Aldrin | 0.005 | 0.051 |
| alpha-BHC | 0.005 | 0.051 |
| BHC-Beta | 0.02 | 0.051 |
| Chlordane | 0.202 | 0.202 |
| delta-BHC | 0.005 | 0.051 |
| Dieldrin | 0.005 | 0.051 |
| Endosulfan I | 0.005 | 0.051 |
| Endosulfan II | 0.005 | 0.051 |
| Endosulfan Sulfate | 0.005 | 0.051 |
| Endrin | 0.005 | 0.051 |
| Endrin aldehyde | 0.005 | 0.051 |
| gamma-BHC | 0.005 | 0.051 |
| **Parameter** | **Current LOD (µg/L)** | **Current LOQ (µg/L)** |
| **PESTICIDES** | | |
| Heptachlor | 0.005 | 0.051 |
| Heptachlor epoxide | 0.005 | 0.051 |
| Methoxychlor | 0.005 | 0.051 |
| Toxaphene | 0.202 | 1.01 |

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11260 Roger Bacon Drive
Reston, VA 20190
703 471-6150 FAX 703 471-6676

# APPENDIX II-H
# GROUNDWATER QUALITY PARAMETERS

JOB NO. ____02201056.30__
SHEET NO. _4_ OF __6___
COMPILED BY: __GRI_
CHECKED BY: __BSP_
DATE __05/17/2021__

**APPENDIX II PARAMETERS (NOT LISTED ON TABLES I AND II)**

| Parameter | Current LOD (µg/L) | Current LOQ (µg/L) |
|---|---|---|
| **SEMI-VOLATILE ORGANIC COMPOUNDS** | | |
| 1,2,4,5-Tetrachlorobenzene | 2.02 | 10.1 |
| 1,4-Naphthoquinone | 2.02 | 10.1 |
| 1-Naphthylamine | 1.01 | 10.1 |
| 2,3,4,6-Tetrachlorophenol | 1.01 | 10.1 |
| 2,4,5-Trichlorophenol | 1.01 | 10.1 |
| 2,4,6-Trichlorophenol | 3.03 | 10.1 |
| 2,4-Dichlorophenol | 3.03 | 10.1 |
| 2,4-Dimethylphenol | 0.51 | 0.51 |
| 2,4-Dinitrophenol | 8.08 | 50.5 |
| 2,4-Dinitrotoluene | 2.53 | 10.1 |
| 2,6-Dichlorophenol | 1.01 | 10.1 |
| 2,6-Dinitrotoluene | 4.04 | 10.1 |
| 2-Acetylaminofluorene | 2.53 | 2.53 |
| 2-Chloronaphthalene | 4.55 | 10.1 |
| 2-Chlorophenol | 3.54 | 10.1 |
| 2-Methylnaphthalene | 2.02 | 10.1 |
| 2-Methylphenol | 8.08 | 10.1 |
| 2-Naphthylamine | 2.02 | 10.1 |
| 2-Nitroaniline | 2.02 | 20.2 |
| 2-Nitrophenol | 3.03 | 10.1 |
| 3,3-Dichlorobenzidine | 4.04 | 10.1 |
| 3,3-Dimethylbenzidine | 2.53 | 2.53 |
| 3-Methylcholanthrene | 1.01 | 10.1 |
| 3-Nitroaniline | 2.02 | 20.2 |
| 4,6-Dinitro-2-methylphenol | 8.08 | 50.5 |
| 4-Aminobiphenyl | 2.02 | 10.1 |
| 4-Bromophenyl phenyl ether | 3.54 | 10.1 |
| 4-Chloro-3-methylphenol | 3.03 | 10.1 |
| 4-Chloroaniline | 2.02 | 10.1 |
| 4-Chlorophenyl phenyl ether | 3.54 | 10.1 |
| 4-Nitroaniline | 2.02 | 20.2 |
| 4-Nitrophenol | 2.02 | 50.5 |
| 5-Nitro-o-toluidine | 2.02 | 10.1 |
| 7,12-Dimethylbenz(a)anthracene | 2.02 | 10.1 |
| Acenaphthene | 4.04 | 10.1 |
| Acenaphthylene | 4.04 | 10.1 |
| Acetophenone | 2.02 | 20.2 |
| Anthracene | 5.05 | 10.1 |
| Benzo(a)anthracene | 0.05 | 0.05 |
| Benzo(a)pyrene | 0.1 | 0.2 |
| Benzo(b)fluoranthene | 4.04 | 10.1 |
| Benzo(ghi)perylene | 2.02 | 10.1 |
| Benzo(k)fluoranthene | 6.06 | 10.1 |
| Benzyl alcohol | 1.01 | 20.2 |

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# APPENDIX II-H
# GROUNDWATER QUALITY PARAMETERS

JOB NO. ____02201056.30__
SHEET NO. _5_ OF __6___
COMPILED BY: __GRI_
CHECKED BY: __BSP_
DATE __05/17/2021__

**APPENDIX II PARAMETERS (NOT LISTED ON TABLES I AND II)**

| Parameter | Current LOD (µg/L) | Current LOQ (µg/L) |
|---|---|---|
| **SEMI-VOLATILE ORGANIC COMPOUNDS** | | |
| bis(2-chloroethoxy) methane | 3.54 | 10.1 |
| bis(2-Chloroethyl) ether | 3.54 | 10.1 |
| bis(2-Chloroisopropyl) ether | 3.03 | 10.1 |
| bis(2-Ethylhexyl) phthalate | 2.53 | 2.53 |
| Butyl benzyl phthalate | 7.07 | 10.1 |
| Chlorobenzilate | 2.53 | 2.53 |
| Chlorpyrifos | 2.02 | 10.1 |
| Chrysene | 4.04 | 10.1 |
| Cresol | 3.03 | 10.1 |
| Diallate | 2.53 | 2.53 |
| Dibenz(a,h)anthracene | 2.02 | 10.1 |
| Dibenzofuran | 2.02 | 5.05 |
| Diethyl phthalate | 3.03 | 10.1 |
| Dimethoate | 2.53 | 2.53 |
| Dimethyl phthalate | 3.54 | 10.1 |
| Di-n-butyl phthalate | 4.04 | 10.1 |
| Dinitrobenzene | 2.53 | 2.53 |
| Di-n-octyl phthalate | 8.08 | 10.1 |
| Diphenylamine | 2.02 | 10.1 |
| Disulfoton | 2.53 | 2.53 |
| Ethyl methanesulfonate | 1.01 | 20.2 |
| Famphur | 2.53 | 2.53 |
| Fluoranthene | 5.05 | 10.1 |
| Fluorene | 4.04 | 10.1 |
| Hexachlorobenzene | 0.05 | 1 |
| Hexachlorobutadiene | 4.55 | 10.1 |
| Hexachlorocyclopentadiene | 1.01 | 10.1 |
| Hexachloroethane | 3.54 | 10.1 |
| Hexachloropropene | 2.02 | 2.53 |
| Indeno(1,2,3-cd)pyrene | 3.03 | 10.1 |
| Isodrin | 1.01 | 10.1 |
| Isophorone | 2.53 | 10.1 |
| Isosafrole | 2.02 | 10.1 |
| Kepone | 2.02 | 2.53 |
| m,p-Cresols | 1.01 | 10.1 |
| Methapyrilene | 1.01 | 10.1 |
| Methyl methanesulfonate | 1.01 | 10.1 |
| Nitrobenzene | 3.03 | 10.1 |
| N-Nitrosodiethylamine | 2.53 | 2.53 |
| N-Nitrosodimethylamine | 3.03 | 10.1 |
| N-Nitrosodi-n-butylamine | 2.02 | 10.1 |
| N-Nitroso-Di-n-propylamine | 3.54 | 10.1 |
| N-Nitrosodiphenylamine | 3.03 | 10.1 |
| N-Nitrosomethyl-ethylamine | 2.02 | 2.53 |
| N-Nitrosopiperidine | 2.02 | 10.1 |
| N-Nitrosopyrrolidine | 2.02 | 2.53 |
| o,o,o-Triethylphosphorothioate | 2.02 | 10.1 |
| o-Toluidine | 2.02 | 2.53 |
| Parathion ethyl | 2.53 | 2.53 |
| **Parameter** | **Current LOD (µg/L)** | **Current LOQ (µg/L)** |
| **SEMI-VOLATILE ORGANIC COMPOUNDS** | | |
| Parathion methyl | 2.02 | 2.53 |
| P-Dimethylaminoazobenzene | 1.01 | 2.53 |
| Pentachlorobenzene | 2.02 | 10.1 |
| Pentachloronitrobenzene | 1.01 | 10.1 |
| Phenacetin | 1.01 | 10.1 |
| Phenanthrene | 5.05 | 10.1 |
| Phenol | 2.53 | 10.1 |
| Phorate | 2.02 | 2.53 |
| p-Phenylenediamine | 2.02 | 10.1 |
| Pronamide | 2.02 | 10.1 |
| Pyrene | 7.07 | 10.1 |
| Safrole | 2.02 | 2.53 |
| sym-Trinitrobenzene | 1.01 | 5.05 |

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11260 Roger Bacon Drive
Reston, VA 20190
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# APPENDIX II-H
# GROUNDWATER QUALITY PARAMETERS



**APPENDIX II PARAMETERS (NOT LISTED ON TABLES I AND II)**

| | | |
|---|---|---|
| **VOLATILE ORGANIC COMPOUNDS** | | |
| 1,1-Dichloropropene | 0.6 | 1 |
| 1,2,4-Trichlorobenzene | 0.5 | 1 |
| 1,3-Dichlorobenzene | 0.3 | 1 |
| 1,3-Dichloropropane | 0.4 | 1 |
| 2,2-Dichloropropane | 0.6 | 2 |
| Acetonitrile | 8 | 40 |
| Acrolein | 6 | 10 |
| Allyl Chloride | 0.6 | 1 |
| Chloroprene | 0.5 | 5 |
| Dichlorodifluoromethane | 0.95 | 1 |
| Ethyl methacrylate | 0.7 | 5 |
| Isobutyl alcohol | 25 | 40 |
| Methacrylonitrile | 1 | 1.5 |
| Methyl methacrylate | 0.7 | 2 |
| Naphthalene | 0.8 | 1 |
| Propionitrile | 7.5 | 40 |

°C = degrees Celsius
HCl = Hydrochloric Acid
LOD = laboratory's Limit of Detection
LOQ = laboratory's Limit of Quantitation
mL = milliliter

ATTACHMENTS

(Electronic Copy)