

GROUNDWATER MONITORING PLAN

PLANT BRANCH
ASH POND BCD
PUTNAM COUNTY, GEORGIA

FOR



Georgia
Power

NOVEMBER 2018



GOLDER

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CERTIFICATION

This *Groundwater Monitoring Plan, Georgia Power Company - Plant Branch Ash Pond AP-BCD* has been prepared to meet the requirements of the Georgia Solid Waste Management Rule by a qualified groundwater scientist or engineer with Golder Associates Inc. References to the appropriate 391-3-4 Rules are incorporated throughout this document.

I hereby certify that this *Groundwater Monitoring Plan, Georgia Power Company - Plant Branch Ash Pond AP-BCD* was prepared by, or under the direct supervision of, a “Qualified Groundwater Scientist,” in accordance with the Rules of Solid Waste Management. According to 391-3-4-.01(57), a Qualified Groundwater Scientist is “a professional engineer or geologist registered to practice in Georgia who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields that enable individuals to make sound professional judgments regarding groundwater monitoring, contaminant fate and transport, and corrective action.” The design of the groundwater monitoring system was developed in compliance with the Georgia Environmental Protection Division (EPD) Rules of Solid Waste Management, Chapter 391-3-4.10(6).

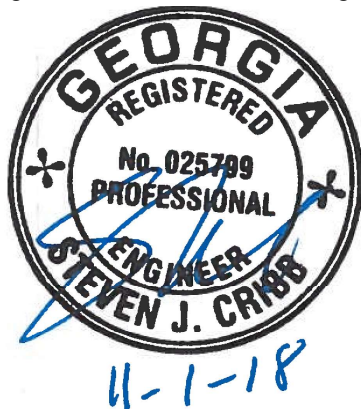
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1.0 INTRODUCTION

Groundwater monitoring is required by the Georgia Environmental Protection Division (EPD) to detect and quantify potential changes in groundwater chemistry. This Groundwater Monitoring Plan (plan) describes the groundwater monitoring program for the site. This plan meets the requirements of EPD rules and uses EPD's Manual for Ground Water Monitoring dated September 1991 as a guide. Groundwater monitoring well locations are presented on Figure A1 in Appendix A and well construction details on Table A3 of Appendix A for Ash Pond B, Ash Pond C, and Ash Pond D (AP-BCD), collectively.

Monitoring will occur in accordance with 391-3-4-.10 of the Georgia Solid Waste Management Rules. If the monitoring requirements specified in this plan conflict with EPD rules (391-3-4), the EPD rules will take precedent.

In accordance with the United States Environmental Protection Agency (USEPA) Coal Combustion Rule (§257.90), which is incorporated by Georgia State CCR Rule by reference, a detection monitoring well network for AP-BCD has been installed. The existing monitoring wells were installed following the guidelines presented herein. Additionally, this plan documents the methods for future monitoring well installation and/or replacement, and procedures for well abandonment. As required by 391-3-4.10(6)(g), a minor modification will be submitted to the EPD prior to the unscheduled installation or abandonment of monitoring wells. Well installation and/or abandonment must be directed by a qualified groundwater scientist.

2.0 GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

Geologic and hydrogeologic conditions for this site are described in a report, *Geological and Hydrogeological Summary Report*, prepared by Golder, October 2018 and submitted as part of this Design and Operations plan set. Key elements of this report are summarized below.

2.1 Site Geology

The site is underlain by biotite gneiss with local mafic lithologic variations represented by amphibolite/hornblende gneiss and diabase. Based on review of site-specific geologic mapping, the Plant property is primarily underlain by a fine- to medium-grained, poorly jointed biotite- quartz-feldspar gneiss that has been deeply and uniformly weathered. The gneiss is well-banded and well foliated with a planar, northeast-trending fabric and weathering develops a relatively thick, clay-rich, vermiculitic soil. The gneiss is locally interlayered with a zone of highly concentrated hornblende gneiss/amphibolite that trends northeast across the northern portion of Pond BCD.

Three small mafic intrusive masses were observed north of Pond B as well: two occur southeast of the pond and the third occurs northwest of the pond. These discontinuous masses are resistant to weathering, standing out in relief relative to the surrounding differentially-weathered biotite gneiss. The intrusives consist of spheroidal-weathered, medium-grained, equigranular diabase that is well jointed and massive. Weathering of the diabase yields a massive, fat-clay with relict feldspar phenocrysts.

The southern end of the site is underlain by migmatitic gneiss with large amphibole crystals and discontinuous pods of amphibolite as observed along with entrance road on the southern end of the property. Exposures of this unit are chaotically folded. Based on lack of exposure, contact relationship between the migmatitic gneiss and biotite gneiss was not determined.

Based on review of available information, micaceous, locally saprolitic soils, consisting primarily of clay, silty clay, silt, and sandy clay occur as a variably-thick blanket of residuum overlying bedrock across most of the site. The thickness of residual soils encountered in the borings is variable, ranging from a minimum of 11 feet to as much

as 74 feet. In the Piedmont, partially weathered rock (PWR) is described by Standard Penetration Test (SPT) blow counts that exceed 50 blows/foot. In the absence of SPT data, transitionally weathered rock (TWR) is defined based on the presence of saprolitic structures, rock fragments, and denser materials. Where data were available to determine the thickness of TWR, it is relatively thin (i.e., 10 feet or less), if present, except for a few locations where the thickness exceeds 20 feet.

Bedrock beneath the overburden is primarily characterized by poorly-jointed, feldspathic biotite gneiss with a localized zone of highly concentrated layers of amphibolite/hornblende gneiss interlayered with the biotite gneiss. Isolated diabase intrusive masses are also present on site. Lineaments identified around the site are consistent in orientation with structural features observed during geologic mapping, indicating that development of surface lineations is likely controlled by preferential weathering related to discontinuities in bedrock. The top of rock surface generally mimics site topography.

2.2 Site Hydrogeology

A regional, unconfined aquifer system is present at the site, consisting of residual soils and transitionally weathered rock. Interconnected fractures in the transition zone transmit groundwater stored in the overburden soils to underlying bedrock, similar to the conceptual model for groundwater flow described in the Piedmont by LeGrand (2004). Overall, groundwater recharge is thought to occur in the uplands and groundwater discharge near onsite surface water bodies. The water level trends noted at Plant Branch are comparable to similar hydrogeologic settings in the Piedmont region of southeastern US (e.g., Chapman and others, 2007). Additionally, the relationship between groundwater levels and the site topography is consistent with the slope-aquifer conceptual model for groundwater flow in the Piedmont (Robinson and others, 1996; LeGrand, 2004).

The site is directly underlain by up to a 74-foot thick blanket of overburden, which is comprised of residual soils and transitionally weathered rock. Based on field hydraulic conductivity tests and laboratory permeability tests, the overburden hydraulic conductivity ranges from 10^{-3} to 10^{-5} cm/s.

Boring logs and monitoring/piezometer installation logs were used to evaluate hydrostratigraphy of the site. Material types identified included residual soils, saprolitic soil, saprolitic and/or transitionally weathered rock (or PWR if blow counts were provided), and competent bedrock. Based on review of the logs, the screen/filter pack interval for most of the piezometers and monitoring wells installed on site provides connection to overburden that is saturated, indicating that the site is underlain by a regional groundwater aquifer that occurs within the overburden.

In general, the hydrogeology at the site is likely fairly uniform as noted by similar lithologic characteristics in the subsurface with the exception of local mafic units within the gneiss. These differing rock types are interlayered such that they are not likely to result in significant geochemical variation in the overburden and groundwater chemistry.

2.3 Uppermost Aquifer

The uppermost aquifer occurs within the overburden and TWR at the site. Although the degree of connection between the overburden/TWR and underlying bedrock aquifer systems is not known, the bedrock is massive with few joints available to receive groundwater from the overlying overburden. Consequently, groundwater flow within the uppermost aquifer is anticipated to occur primarily along the transitionally weathered rock zone which is located at the interface between the overburden residual soils and massive bedrock.

The potentiometric surface for the uppermost aquifer indicates that groundwater flows radially from Ponds B, C and D (refer to Figure A2). Localized groundwater flow directions within this aquifer are influenced by the topography and top of rock variations on site. Locally, the potentiometric surface contours are also influenced by the pond dewatering activities.

Recharge to the uppermost aquifer is primarily through precipitation. Data indicate that there is generally a downward gradient in topographically higher areas and an upward gradient in the topographic lows. Groundwater appears to be supporting surface water flow in these tributaries, as indicated by the local overlap in topographic and groundwater contours of similar elevation. Hydrogeologic conditions at the site indicate that the uppermost aquifer at the site is unconfined and is hydraulically connected to the bedrock through the transitionally-weathered zone.

Based on review of the potentiometric contours, horizontal hydraulic gradient is variable and reflects topography at the site. The horizontal gradient appears to be steeper around the downgradient perimeter of the ponds, particularly along embankments. Generally, most of the groundwater flow across the site occurs laterally in the TWR zone. Because the site is underlain by clay-rich residual soils and relatively massive bedrock, groundwater is expected to move laterally more than vertically within the transitionally weathered rock, which is considered to have a higher hydraulic conductivity relative to the overlying clay-rich and underlying massive bedrock material.

3.0 SELECTION OF WELL LOCATIONS

Groundwater monitoring wells are installed to monitor the uppermost aquifer beneath the site. Locations are selected based on the former extent of the ash pond(s), the final ash pond closure plan, which includes excavation and removal of coal combustion residual (CCR) materials and de-watering of ponds, unit configurations (multi-unit network), and site geologic and hydrogeologic considerations. Locations are chosen to serve as upgradient (BRGWA), lateral or downgradient (BRGWC) based on groundwater flow direction determined by potentiometric evaluation. A more detailed discussion of the conceptual model for groundwater flow and monitoring well placement at the site is included in the *Geological and Hydrogeological Summary Report*, prepared by Golder (October 2018). As flow conditions change after pumping ceases, well designations will continue to be evaluated during each semi-annual event.

Monitoring wells will generally be located outside of areas with frequent auto traffic; however, wells may be installed in heavily trafficked areas when necessary to meet the groundwater monitoring objectives of the EPD rules.

A map depicting monitoring well locations for monitoring Pond-BCD as a multi-unit network is included in Appendix A, Monitoring System Details. Appendix A also includes a tabulated list of individual monitoring wells (Table A1) and piezometers (Table A2) with well construction details such as location coordinates, top-of-casing elevation, well depths and screened intervals. A modification that involves the addition of or a change to the monitoring network will be made by a minor modification to the permit pursuant to 391-3-4-.02(3)(b)6.

4.0 MONITORING WELL DRILLING, CONSTRUCTION, ABANDONMENT & REPORTING

The existing monitoring well network for AP-BCD is in place. Existing monitoring wells were installed following Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division Operating Procedure

for Design and Installation of Monitoring Wells as a general guide for best practices. Monitoring well and piezometer logs for the existing monitoring well network and piezometers, are included in Appendix A.

4.1 Drilling

A variety of well drilling methods are available for installing groundwater wells. Drilling methodology may include, but not be limited to: hollow stem augers, direct push, air rotary, mud rotary, or roto-sonic techniques. The drilling method will minimize the disturbance of subsurface materials and shall not cause impact to the groundwater. Borings will be advanced using an appropriate drilling technology capable of drilling and installing a well in site-specific geology. Drilling equipment shall be decontaminated before use and between borehole locations using the procedures described in the latest version of the *Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division Operating Procedure for Field Equipment Cleaning and Decontamination* as a guide.

Sampling and/or coring may be used to help determine the stratigraphy and geology. Samples will be logged under the oversight of a qualified groundwater scientist. Screen depths will be chosen based on the depth of the uppermost aquifer.

Drilling for any subsurface hydrologic investigation, installation or abandonment of groundwater monitoring wells will be performed by a driller that has, at the time of installation, a performance bond on file with the Water Well Standards Advisory Council.

Monitoring wells will be installed using the latest version of the *Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division Operating Procedure for Design and Installation of Monitoring Wells* as a general guide for best practices.

4.2 Design and Construction

Well construction materials will be sufficiently durable to resist chemical and physical degradation and will not interfere with the quality of groundwater samples.

4.2.1 Well Casings and Screens

ASTM, NSF rated, Schedule 40, 2-inch polyvinyl chloride (PVC) pipe with flush threaded connections will be used for the well riser and screens. Compounds that can cause PVC to deteriorate (e.g., organic compounds) are not expected at this facility. If conditions warrant, other appropriate materials may be used for construction with prior written approval from the EPD.

4.2.2 Well Intake Design

The design and construction of the intake of the groundwater wells shall: (1) allow sufficient groundwater flow to the well for sampling; (2) minimize the passage of formation materials (turbidity) into the well; and (3) ensure sufficient structural integrity to prevent the collapse of the intake structure.

Each groundwater monitoring well will include a well screen designed to limit the amount of formation material passing into the well when it is purged and sampled. Screens with 0.010-inch slots have proven effective for the earth materials at the site and will be used unless geologic conditions discovered at the time of installation dictate a different size. Screen length shall not exceed 10 feet without justification as to why a longer screen is necessary (e.g., significant variation in groundwater level). If the above techniques prove ineffective for developing a well with sufficient yield or acceptable turbidity, further steps will be taken to assure that the well screen is

appropriately sized for the formation material. This may include performing sieve analysis of the formation material and determining well screen slot size based on the grain size distribution.

Pre-packed dual-wall well screens may be used for well construction. Pre-packed well screens combine a centralized inner well screen, a developed filter sand pack, and an outer conductor screen in one integrated unit composed of inert materials. Pre-packed well screens will be installed following general industry standards and using the latest version of the *Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division Operating Procedure for Design and Installation of Monitoring Wells* as a general guide. If the dual-wall pre-packed-screened wells do not yield sufficient water or are excessively turbid after development, further steps will be taken to assure that the well screen is appropriately sized for the formation material. This may include performing sieve analysis of the formation material and determining well screen slot size based on the grain size distribution.

4.2.3 Filter Pack and Annular Seal

The materials used to construct the filter pack will be clean quartz sand of a size that is appropriate for the screened formation. Fabric filters will not be used as filter pack material. Sufficient filter material will be placed in the hole and measurements taken to ensure that no bridging occurs. Upon placement of the filter pack, the well may be pumped to assure settlement of the pack. If pumping is performed, the top of filter pack depth will be measured, and additional sand added if necessary. The filter pack will extend approximately one to two feet above the top of the well screen.

The materials used to seal the annular space must prevent hydraulic communication between strata and prevent migration from overlying areas into the well screen interval. A minimum of two feet of bentonite (chips, pellets, or slurry) will be placed immediately above the filter pack. The bentonite seal will extend up to the base of any overlying confining zone or the top of the water-bearing zone to prevent cementitious grout from entering the water-bearing or screened zone. If dry bentonite is used, the bentonite must be hydrated with potable water prior to grouting the remaining annulus.

The annulus above the bentonite seal will be grouted with a cement and bentonite mixture (approximately 94 pounds cement / 3 to 5 pounds bentonite / 6.5 gallons of potable water) placed via tremie pipe from the top of the bentonite seal. During grouting, care will be taken to assure that the bentonite seal is not disturbed by locating the base of the tremie pipe approximately 2 feet above the bentonite seal and injecting grout at low pressure/velocity.

4.2.4 Protective Casing and Well Completion

After allowing the grout to settle, the well will be finished by installing a flush-mount or above-ground protective casing as appropriate, and building a surface cap. The use of flush-mount wells will generally be limited to paved surfaces unless site operations warrant otherwise. The surface cap will extend from the top of the cement grout to ground surface, where it will become a concrete apron extending outward with a radius of at least 3 feet from the edge of the well casing and sloped to drain water away from the well.

Each well will be fitted with a cap that contains a hole or opening to allow the pressure in the well to equalize with atmospheric pressure. In wells with above-ground protection, the space between the well casing and the protective casing may be filled with coarse sand or pea-gravel to within approximately 6 inches of the top of the well casing. A small weep hole will be drilled at the base of the metal casing for the drainage of moisture from the casing. Above ground protective covers will be locked.

Protective bollards may be installed around each above-grade groundwater monitoring well. Well construction in high traffic areas will generally be limited unless site conditions warrant otherwise.

The groundwater monitoring well detail attached in Appendix B, Groundwater Monitoring Well Detail, illustrates the general design and construction details for a monitoring well.

4.2.5 Well Development

After well construction is completed, wells will be developed by alternately purging and surging until relatively clear discharge water with little turbidity is observed. The goal will be to achieve a turbidity of less than 10 nephelometric turbidity units (NTUs); however, formation-specific conditions may not allow this target to be accomplished. Additionally, the stabilization criteria contained in Appendix C, Groundwater Sampling Procedures, should be met. A variety of techniques may be used to develop site groundwater monitoring wells. The method used must create reversals or surges in flow to eliminate bridging by particles around the well screen. These reversals or surges can be created by using surge blocks, bailers, or pumps. The wells will be developed using a pump capable of inducing the stress necessary to achieve the development goals. Development equipment will be decontaminated prior to first use and between wells.

In low yielding wells, potable water may be added to the well to facilitate surging of the well screen interval and removal of fine-grained sediment. If water is added, the volume will be documented and at minimum, an equal volume purged from the well.

Many geologic formations contain clay and silt particles that are small enough to work their way through the wells' filter packs over time. Therefore, the turbidity of the groundwater from the monitoring wells may gradually increase over time after initial well development. As a result, the monitoring wells may have to be redeveloped periodically to remove the silt and clay that has worked its way into the filter pack of the monitoring wells. Each monitoring well should be redeveloped when sample turbidity values have significantly increased since initial development or since prior redevelopment. The redevelopment should be performed as described above.

4.3 Well Abandonment

Monitoring wells will be abandoned using industry-accepted practices and using the Manual for Groundwater Monitoring (1991) and Georgia Water Well Standards Act (1985) as guides. The wells will be abandoned under the direction of a geologist or engineer registered in Georgia. Neat Portland cement or bentonite will be used as appropriate to complete abandonment and seal the well borehole.

4.4 Documentation

The following information documenting the construction and development of each well will be submitted to EPD by a qualified groundwater scientist within 30 days after completing planned well installations.

- Name of drilling contractor and type of drill rig
- Documentation that the driller, at the time the monitoring wells were installed, had a bond on file with the Water Well Standards Advisory Council
- Dates of drilling and initial well emplacement
- Drilling method and drilling fluid if used

- Well location (± 0.5 ft.)
- Borehole diameter and well casing diameter
- Well depth (± 0.1 ft.)
- Lithologic logs
- Well casing materials
- Screen materials and design
- Screen length
- Screen slot size
- Filter pack material/size and volume
- Sealant materials and volume
- Documentation of ground surface elevation (± 0.01 ft.)
- Documentation of top of casing elevation (± 0.01 ft.)
- Schematic of the well with dimensions

5.0 GROUNDWATER MONITORING PARAMETERS AND FREQUENCY

The following describes groundwater sampling requirements with respect to parameters for analysis, sampling frequency, sample preservation and shipment, and analytical methods. Groundwater samples used to provide compliance monitoring data will not be filtered prior to collection.

Table 1, Groundwater Monitoring Parameters and Frequency presents the groundwater monitoring parameters and sampling frequency. A minimum of eight independent samples from each groundwater well will be collected and analyzed for 40 CFR 257, Subpart D, Appendix III and Appendix IV test parameters to establish a background statistical dataset. Subsequently, in accordance with 391-3-4-.10(6), the monitoring frequency for the Appendix III parameters will be at least semi-annual during the active life of the facility and the post-closure care period. If required, assessment monitoring will be performed per Georgia Chapter 391-3-4-.10, Rules for Solid Waste Management. GPC may petition for an alternate monitoring schedule for the site pursuant to applicable rules.

When referenced throughout this plan, Appendix III and Appendix IV parameters refer to the parameters contained in Appendix III and Appendix IV of 40 CFR 257, Subpart D, 80 Fed. Reg. 21468 (April 17, 2015).

As shown on Table 2, Analytical Method, the groundwater samples will be analyzed using methods specified in USEPA Manual SW-846, EPA 600/4-79-020, Standard Methods for the Examination of Water and Wastewater (SM18-20), USEPA Methods for the Chemical Analysis of Water and Wastes (MCAWW), American Society for Testing and Materials (ASTM), or other suitable analytical methods approved by the Georgia EPD. The method used will be able to reach a suitable practical quantification limit to detect natural background conditions at the facility. Field instruments used to measure pH must be accurate and reproducible to within 0.1 Standard Units (S.U.).

Table 1: GROUNDWATER MONITORING PARAMETERS & FREQUENCY

MONITORING PARAMETER		GROUNDWATER MONITORING	
		BACKGROUND	SEMI-ANNUAL EVENT(S)
FIELD PARAMETERS	Temperature	X	X
	pH	X	X
	Specific Conductance	X	X
	ORP	X	X
	Turbidity	X	X
	Dissolved Oxygen	X	X
APPENDIX III (DETECTION)	Boron	X	X
	Calcium	X	X
	Chloride	X	X
	Fluoride	X	X
	pH (field)	X	X
	Sulfate	X	X
	Total Dissolved Solids	X	X
APPENDIX IV (ASSESSMENT)	Antimony	X	Assessment sampling frequency and parameter list determined in accordance with Georgia Chapter 391-3-4-.10(6)
	Arsenic	X	
	Barium	X	
	Beryllium	X	
	Cadmium	X	
	Chromium	X	
	Cobalt	X	
	Fluoride	X	
	Lead	X	
	Lithium	X	
	Mercury	X	
	Molybdenum	X	
	Selenium	X	
	Thallium	X	
Radium 226 & 228	X		

Table 2: ANALYTICAL METHODS

PARAMETERS	EPA METHOD NUMBER
APPENDIX III	
Boron	EPA 6010B/6020
Calcium	EPA 6010B/6020
Chloride	EPA 300.0/300.1/9250/9251/9253/9056A
Fluoride	EPA 300.0/300.1/9214/9056A
pH	150.1 field
Sulfate	EPA 9035/9036/9038300.0/300.1/9056A
Total Dissolved Solids (TDS)	EPA 160/2540C
APPENDIX IV	
Antimony	EPA 7040/7041/6010B/6020
Arsenic	EPA 7060A/7061A/6010B/6020
Barium	EPA 7080A/7081/6010B/6020
Beryllium	EPA 7090/7091/6010B/6020
Cadmium	EPA 7130/7131A/6020
Chromium	EPA 7190/7191/6010B/6020
Cobalt	EPA 7200/7201/6010B/6020
Fluoride	EPA 300.0/300.1/9214/9056/9214
Lead	EPA 7420/7421/6010B/6020
Lithium	EPA 6010/6020B
Mercury	EPA 7470
Molybdenum	EPA 6010/6020B
Selenium	EPA 7740/7741A/6010B/6020
Thallium	EPA 7840/7841/6010/6020
Radium 226 and 228 combined	EPA 903/9320/9315

6.0 SAMPLE COLLECTION

During each sampling event, samples will be collected and handled in accordance with the procedures specified in Appendix C, Groundwater Sampling Procedures. Sampling procedures were developed using standard industry practice and USEPA Region 4 Field Branches Quality System and Technical Procedures as a guide. Low-flow sampling methodology will be utilized for sample collection. Alternative industry accepted sampling techniques may be used when appropriate with prior EPD approval.

For groundwater sampling, positive gas displacement Teflon or stainless-steel bladder pumps will be used for purging. If dedicated bladder pumps are not used, portable bladder pumps or peristaltic pumps (with dedicated or disposable tubing) may be used. When non-dedicated equipment is used, it will be decontaminated prior to use and between wells.

Groundwater wells that are determined to be dry for two consecutive sampling events should be replaced, unless an alternate schedule has been approved by EPD.

7.0 CHAIN-OF-CUSTODY

Samples will be handled under chain-of-custody (COC) procedures beginning in the field. The COC record will contain the following information:

- Sample identification numbers
- Signature of collector
- Date and time of collection
- Sample type
- Sample point identification
- Number of sample containers
- Signature of person(s) involved in the chain of possession
- Dates of possession by each individual

The samples will remain in the custody of assigned personnel, an assigned agent, or the laboratory. If the samples are transferred to other employees for delivery or transport, the sampler or possessor must relinquish possession and the samples must be received by the new owner.

If the samples are being shipped, a hard copy COC will be signed and enclosed within the shipping container.

Samplers must use COC forms provided by the analytical laboratory or use a COC form similarly formatted and containing the information listed above.

8.0 FIELD AND LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

Field quality control samples will be prepared the same as compliance samples with regards to sample volume, containers, and preservation. The following quality control samples will be collected during each sampling event:

Field Equipment Rinsate Blanks - Where sampling equipment is not new or dedicated, an equipment rinsate blank will be collected at a rate of one blank per 20 samples using non-dedicated equipment.

Field Duplicates - Field duplicates are collected by filling additional containers at the same location, and the field duplicate is assigned a unique sample identification number. One blind field duplicate will be collected for every 20 samples.

Field Blanks - Field blanks are collected in the field using the same water source that is used for decontamination. The water is poured directly into the supplied sample containers in the field and submitted to the laboratory for analysis of target constituents. One field blank will be collected for every 20 samples.

The groundwater samples will be analyzed by licensed and accredited laboratories through the National Environmental Laboratory Accreditation Program (NELAP).

9.0 REPORTING RESULTS

A semi-annual groundwater report that documents the results of sampling and analysis will be submitted to EPD. Semi-annual groundwater monitoring reports will be submitted to the EPD within 90 days of receipt of the groundwater analytical data from the laboratory. At a minimum, semi-annual reports will include:

- 1) A narrative describing sampling activities and findings including a summary of the number of samples collected, the dates the samples were collected and whether the samples were required by the detection or assessment monitoring programs
- 2) A brief overview of purging/sampling methodologies
- 3) Discussion of results
- 4) Recommendations for the future monitoring consistent with the Rules
- 5) Potentiometric surface contour map for the aquifer(s) being monitored, signed and sealed by a Georgia-registered PG or PE
- 6) Table of as-built information for groundwater monitoring wells including top of casing elevations, ground elevations, screened elevations, current groundwater elevations and depth to water measurements
- 7) Groundwater flow rate and direction calculations
- 8) Identification of any groundwater wells that were installed or decommissioned during the preceding year, along with a narrative description of why these actions were taken
- 9) A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels
- 10) If applicable, semi-annual assessment monitoring results
- 11) Any alternate source demonstration completed during the previous monitoring period, if applicable
- 12) Laboratory reports
- 13) COC documentation
- 14) Field sampling logs including field instrument calibration, indicator parameters and parameter stabilization data
- 15) Documentation of non-functioning wells
- 16) Table of current analytical results for each well, highlighting statistically significant increases and concentrations above maximum contaminant level (MCL)
- 17) Statistical analyses
- 18) Certification by a qualified groundwater scientist.

10.0 STATISTICAL ANALYSES

Groundwater quality data from each sampling event will be statistically evaluated to determine if there has been a statistically significant change in groundwater chemistry. Historical background data will be used to determine statistical limits.

According to EPD rules (391-3-4-.10(6)(a), which incorporates the statistical analysis requirements of 40 CFR 257.93 by reference), the site must specify in the operating record the statistical methods to be used in evaluating groundwater monitoring data for each constituent. The statistical test chosen shall be conducted separately for each constituent in each well. As authorized by the rule, statistical tests that may be used include:

- 1) A prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper prediction limit. (§257.93(f)(3)).
- 2) A control chart approach that gives control limits for each constituent. ((§257.93(f)(4)).
- 3) Another statistical test method (such as prediction limits or control charts) that meets the performance standards of §257.93(g). A justification for an alternative method will be placed in the operating record and the Director notified of the use of an alternative test. The justification will demonstrate that the alternative method meets the performance standards of §257.93(g).

Based on site-specific conditions, statistical methods may be intra-well, inter-well, or combination of both.

A site-specific statistical analysis plan that provides details regarding the statistical methods to be used will be placed in the site's operating record pursuant to 391-3-4-.10(6). Figure 1, Statistical Analysis Plan Overview, includes a flowchart that depicts the process that will be followed to develop the site-specific plan. Figure 2, Decision Logic for Determining Appropriate Statistical Methods, depicts the decision logic that will be used to determine the appropriate method as required by 391-3-4-.10(6). Figure 3, Decision Logic for Computing Prediction Limits, presents the logic that will be used to calculate site-specific statistical limits and test compliance results against those limits.

Figure 1: STATISTICAL PLAN OVERVIEW

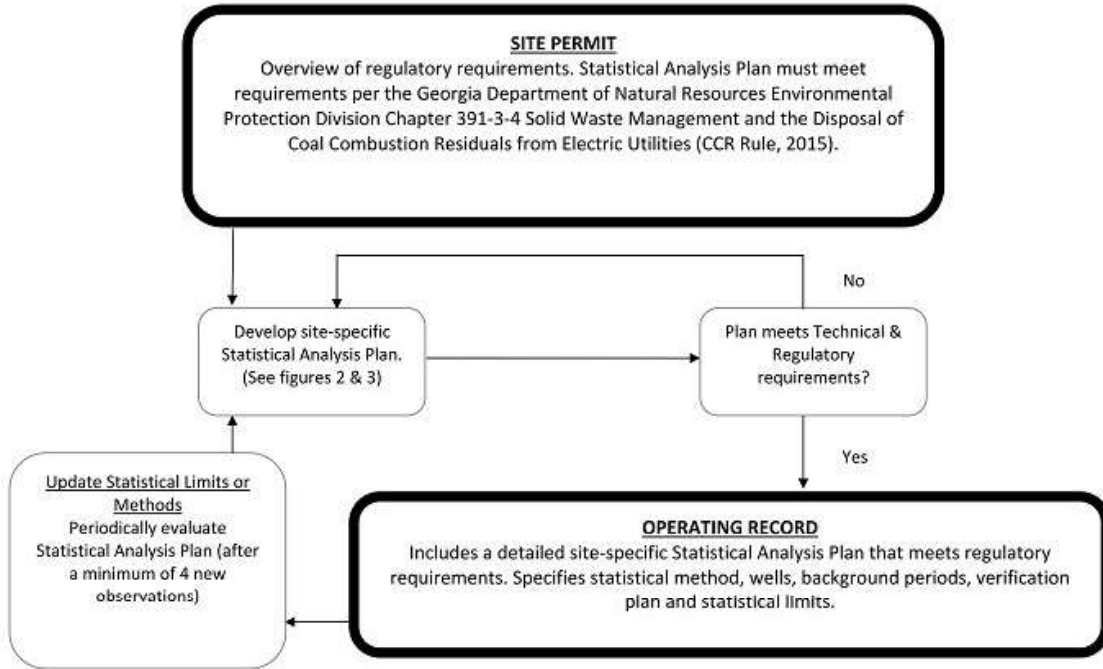


Figure 2: DECISION LOGIC FOR DETERMINING APPROPRIATE STATISTICAL METHOD

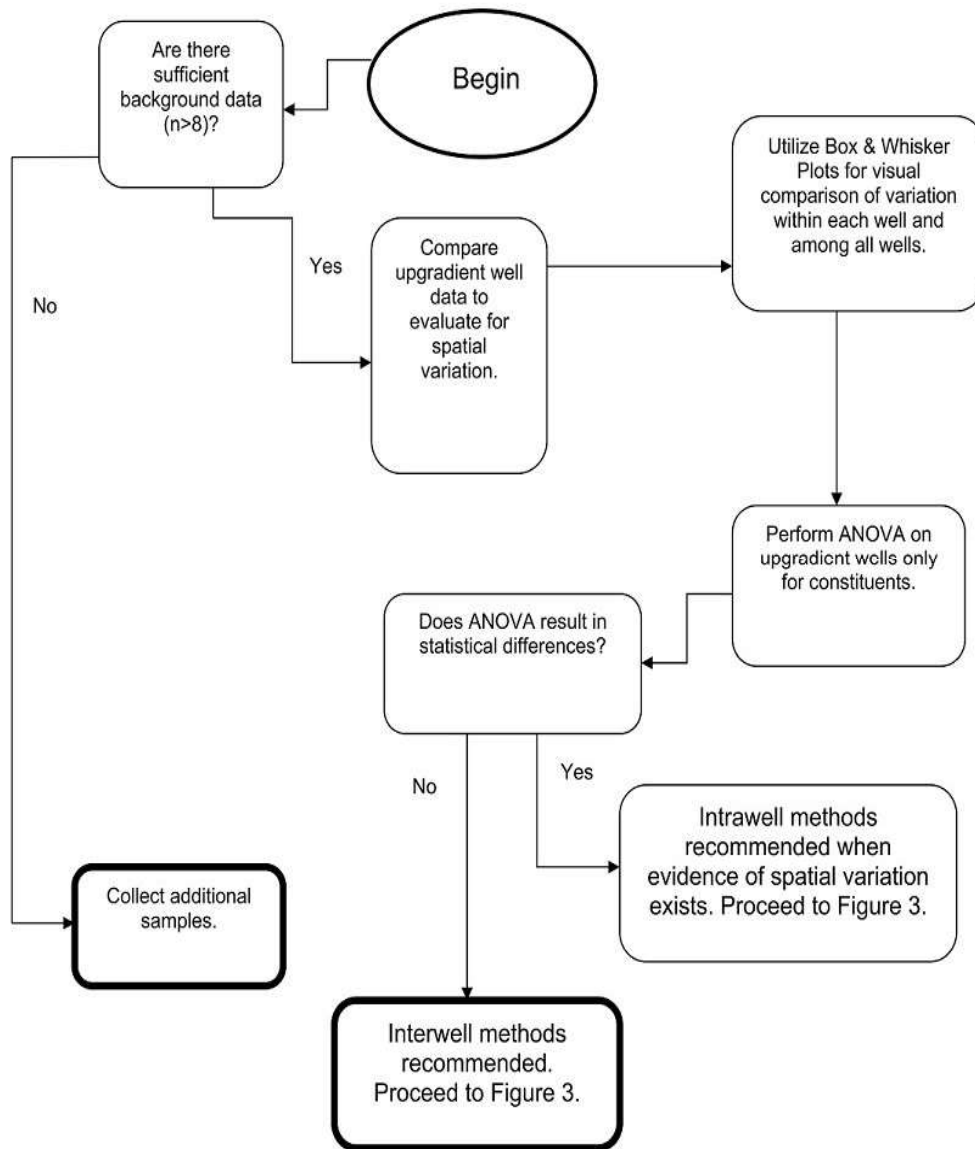
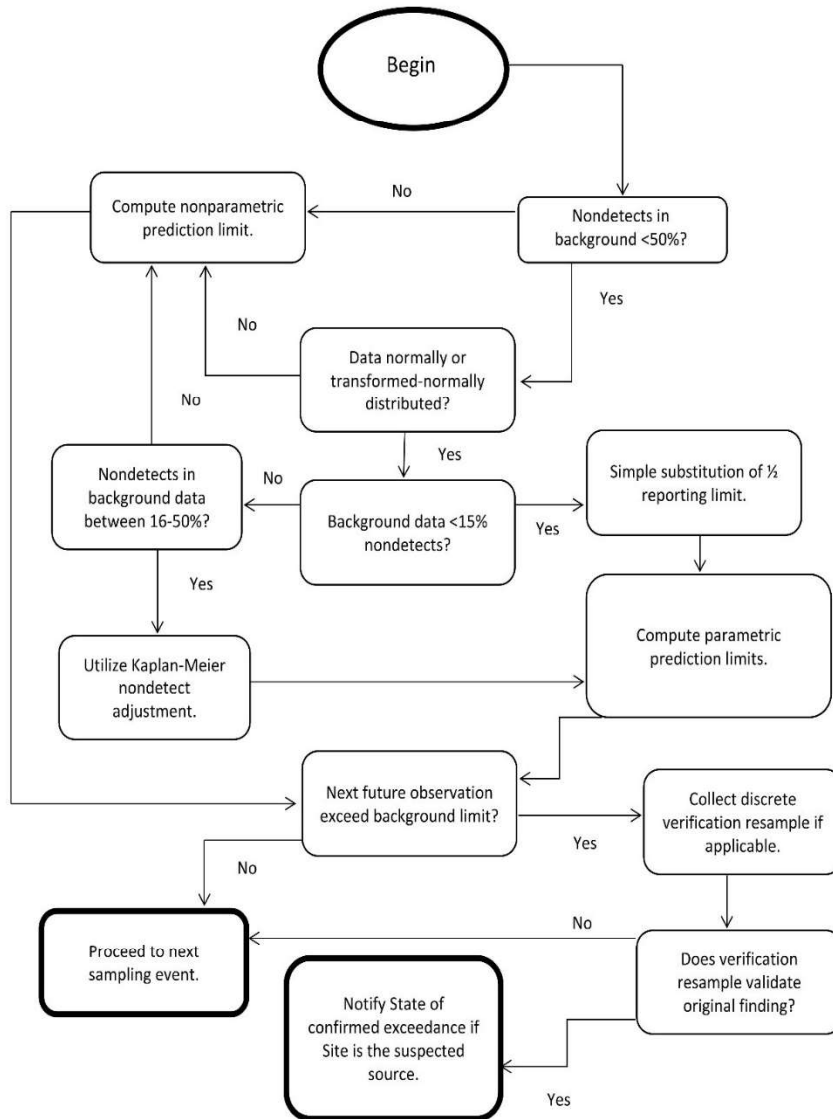


Figure 3: DECISION LOGIC FOR COMPUTING PREDICTION LIMITS



11.0 REFERENCES

American Society for Testing and Materials (ASTM)

Georgia (GA) Department of Natural Resources Environmental Protection Division, Rules of Solid Waste Management, Chapter 391-3-4-.10(6), Georgia Environmental Protection Division.

Georgia Water Well Standards Act (1985)

Golder Associates Inc., *Geological and Hydrogeological Summary Report – Plant Branch*, October 2018

Manual for Groundwater Monitoring (1991)

National Environmental Laboratory Accreditation Program (NELAP)

Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division, Operating Procedure for Design and Installation of Monitoring Wells

Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division, Operating Procedure for Field Equipment Cleaning and Decontamination

Region 4 U.S. Environmental Protection Agency, Field Branches Quality System and Technical Procedures

U.S. Environmental Protection Agency, 40 CFR 257, Subpart D, 80 Fed. Reg. 21468 (April 17, 2015).

U.S. Environmental Protection Agency, Manual SW-846, EPA 600/4-79-020, Standard Methods for the Examination of Water and Wastewater (SM18-20),

U.S. Environmental Protection Agency, Methods for the Chemical Analysis of Water and Wastes (MCAWW),

APPENDIX A

MONITORING SYSTEM DETAILS

- A1 SITE PLAN AND DETECTION MONITORING WELL LOCATION MAP
- A2 POND BCD POTENTIOMETRIC SURFACE ELEVATION CONTOUR MAP
- A3 GROUNDWATER MONITORING NETWORK WELL DETAILS
- A4 GROUNDWATER PIEZOMETER DETAILS
- A5 MONITORING WELL LOGS
- A6 PIEZOMETER WELL LOGS

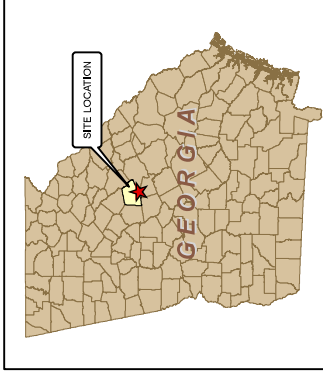


- LEGEND**
- MONITORING WELL
 - PROPERTY BOUNDARY
 - APPROXIMATE ASH POND BOUNDARY
 - APPROXIMATE SURFACE WATER LIMITS

REFERENCE

1. SOURCE: ESRI, DIGITALGLOBE, GEOTRE, EARTHSTAR, GEOGRAPHICS, CHES/ARBUS/US, USDA, USGS, AERGRID, ISN, AND THE GIS USER COMMUNITY.
2. COORDINATE SYSTEM: NAD 1983 STATE PLANNING GEORGIA WEST (U.S. FEET).
3. BORING/PIEZOMETER LOCATIONS AND PROPERTY LINE PROVIDED BY SOUTHERN COMPANY SERVICES.
4. TOPOGRAPHIC CONTOURS PROVIDED BY GEORGIA POWER COMPANY (MARCH 2018).

KEY MAP



CLIENT
GEORGIA POWER COMPANY
 PLANT BRANCH

PROJECT
GROUNDWATER MONITORING PROGRAM

TITLE
 SITE PLAN AND DETECTION MONITORING WELL LOCATION MAP

CONSULTANT	YYY-AM-00	2018-1-0-01
PREPARED	DJC	
DESIGN	DLP	
REVIEW	<i>dtp</i>	
APPROVED	<i>rgp</i>	



PROJECT No. 166625-4H006
 CONTROL 0
 REV. 0

FIGURE A1

LAKE SINCLAIR
 EL. 338.82



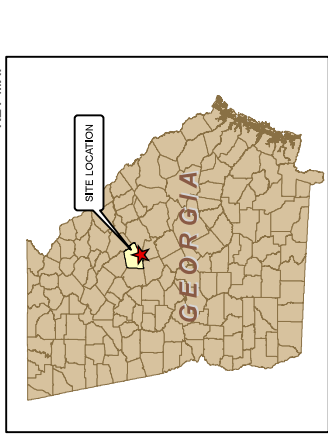
- LEGEND**
- MONITORING WELL AND GROUNDWATER ELEVATION (FEET AMSL)
 - PIEZOMETER AND GROUNDWATER ELEVATION (FEET AMSL)
 - PROPERTY BOUNDARY
 - ESTIMATED GROUNDWATER SURFACE CONTOUR (FEET AMSL)
 - APPROXIMATE ASH POND BOUNDARY
 - APPROXIMATE SURFACE WATER LIMITS

NOTES

1. GROUNDWATER SURFACE CONTOUR INTERVAL = 10 FEET
2. GROUNDWATER CONTOURS BASED ON LINEAR INTERPOLATION BETWEEN AND EXTRAPOLATION FROM KNOWN DATA AND ESTIMATED DATA THEREFORE, CONTOURS MAY NOT REFLECT ACTUAL CONDITIONS.
3. AMSL= ABOVE MEAN SEA LEVEL.
4. GROUNDWATER CONTOURS BASED ON ELEVATIONS MEASURED ON JUNE 25, 2018.
5. PZ-42D* WATER LEVEL NOT USED FOR CONTOURING.

REFERENCE

1. SOURCE: ESRI, DIGITALGLOBE, GEOTYVE, EARTHSTAR, GEOGRAPHICS, CHES/ARBUS/US, USDA, USGS, AERGRID, IBI, AND THE GIS USER COMMUNITY.
2. COORDINATE SYSTEM: NAD 1983 STATE PLANNING GEORGIA WEST (U.S. FEET).
3. BORING/PIEZOMETER LOCATIONS AND PROPERTY LINE PROVIDED BY SOUTHERN COMPANY SERVICES.
4. TOPOGRAPHIC CONTOURS PROVIDED BY GEORGIA POWER COMPANY (MARCH 2018).



500 250 0 500 Feet

Georgia Power
 GEORGIA POWER COMPANY
 PLANT BRANCH

PROJECT
 GROUNDWATER MONITORING PROGRAM

TITLE
 POND BCD POTENTIOMETRIC SURFACE ELEVATION
 CONTOUR MAP

CLIENT	GEORGIA POWER COMPANY
PROJECT	GROUNDWATER MONITORING PROGRAM
CONSULTANT	GOLDER
PROJECT No.	1666254
CONTROL	1666254-HQS-GIS-POIDS-BCD-NERIAL.mxd
REV.	0
PREPARED BY	DUC
DESIGN	DLP
REVIEW	dgp
APPROVED	rygb
FIGURE	A2

ATTACHMENT A3 GROUNDWATER MONITORING NETWORK WELL DETAILS

Georgia Power - Plant Branch
Milledgeville, GA

Well-ID	Location	Geologic Unit Screened ⁽³⁾	Latitude	Longitude	Ground Surface Elevation (feet msl) ⁽¹⁾	Top of Casing Elevation (feet msl) ⁽¹⁾	Total Depth (feet bgs) ⁽²⁾	Screen Interval (feet bgs)	Top of Screen Elevation (feet msl) ⁽¹⁾	Screen Tip Elevation (feet msl) ⁽¹⁾	Screen Length	Date of Installation
POND BCD												
BRGWA-12S	Upgradient BCD	Saprolite	33.197933	-83.314864	436.31	439.69	58.3	48.3	388.01	378.01	10.0	3/4/2014
BRGWA-12I	Upgradient BCD	Biotite gneiss	33.197975	-83.314876	436.18	439.43	77.6	67.6	368.58	358.58	10.0	2/20/2014
BRGWA-23S	Upgradient BCD	Saprolite/TWR	33.194309	-83.312529	425.5	428.42	40.8	30.8	394.70	384.70	10.0	7/26/2016
BRGWC-25I	Downgradient B	Saprolite/TWR/Biotite Gneiss	33.187674	-83.301326	354.95	357.46	20.5	10.5	344.45	334.45	10.0	7/25/2016
BRGWC-27I	Downgradient C	Saprolite	33.185268	-83.306586	364.88	367.99	24.0	14	350.88	340.88	10.0	7/22/2016
BRGWC-29I	Downgradient C	TWR	33.186893	-83.302200	350.37	353.30	20.0	10	340.37	330.37	10.0	7/23/2016
BRGWC-30I	Downgradient D	Saprolite/TWR/Biotite Gneiss	33.190567	-83.313139	349.78	352.33	20.0	10	339.78	329.78	10.0	7/18/2016
BRGWC-32S	Downgradient D	Saprolite	33.187995	-83.310532	403.51	406.51	45.0	35	368.51	358.51	10.0	7/20/2016
BRGWC-45	Downgradient B	Saprolite/TWR	33.192198	-83.302067	381.69	384.61	57.0	46.6	335.09	325.09	10.0	2/3/2018
BRGWC-47	Downgradient D	TWR	33.193531	-83.307344	408.87	411.32	97.0	81.6	327.27	317.27	10.0	1/25/2018
BRGWC-50	Downgradient BCD	TWR/Biotite Gneiss	33.190422	-83.297844	378.79	381.53	67.0	54.6	324.19	314.19	10.0	1/31/2018
BRGWC-52I	Downgradient B	Biotite gneiss	33.189552	-83.298596	380.93	383.83	75.0	63.9	317.03	307.03	10.0	8/6/2018

Notes:

1. feet msl = feet mean sea level
2. feet bgs = feet below ground surface
3. TWR = Transitionally Weathered Rock



ATTACHMENT A4 GROUNDWATER PIEZOMETER DETAILS

Georgia Power - Plant Branch
Milledgeville, GA

Well-ID	Location	Geologic Unit Screened ^[3]	Latitude	Longitude	Ground Surface Elevation (feet msl) ^[1]	Top of Casing Elevation (feet msl) ^[1]	Total Depth (feet bgs) ^[2]	Top of Screen Elevation (feet msl) ^[1]	Screen Tip Elevation (feet msl) ^[1]	Screen Length	Date of Installation
PIEZOMETERS											
PZ-11S	Downgradient BCD	Saprolite	33.192935	-83.315366	395.58	487.22	26.0	469.72	459.72	10.0	2/20/2014
PZ-12D	Upgradient BCD	Biotite Gneiss	33.198005	-83.314886	436.12	439.17	141.7	354.47	294.47	60.0	4/14/2014
PZ-18S	Downgradient BCD	Saprolite	33.188221	-83.312974	363.91	367.27	25.1	350.07	340.07	10.0	3/26/2014
PZ-18I	Downgradient BCD	Biotite Gneiss	33.188246	-83.312980	363.75	366.75	38.8	335.45	325.45	10.0	2/26/2014
PZ-19S	Downgradient BCD	Saprolite	33.185582	-83.309250	372.99	376.31	28.0	363.71	353.71	10.0	3/4/2014
PZ-19I	Downgradient BCD	Biotite Gneiss	33.185560	-83.309234	373.44	376.73	43.7	340.43	330.43	10.0	3/4/2014
PZ-20S	Downgradient BCD	Saprolite	33.184682	-83.305141	367.24	370.71	15.0	362.71	352.71	10.0	3/5/2014
PZ-20I	Downgradient BCD	Biotite Gneiss	33.184696	-83.305131	367.15	370.64	29.5	348.14	338.14	10.0	3/5/2014
PZ-21S	Downgradient BCD	Saprolite	33.187690	-83.301303	360.24	363.60	9.8	356.10	351.10	5.0	3/11/2014
PZ-21I	Downgradient BCD	Biotite Gneiss	33.187687	-83.301280	360.58	363.97	24.4	346.57	336.57	10.0	3/10/2014
PZ-23I	Upgradient BCD	Biotite Gneiss	33.194317	-83.312496	424.95	427.90	67.0	367.90	357.90	10.0	7/29/2016
PZ-26I	Downgradient BCD	Biotite Gneiss	33.187900	-83.300307	368.10	370.93	30.5	347.43	337.43	10.0	7/26/2016
PZ-28I	Downgradient BCD	TWR/Biotite Gneiss	33.184732	-83.305163	362.40	364.88	25.0	347.88	337.88	10.0	7/24/2016
PZ-31S	Downgradient BCD	TWR	33.188716	-83.312240	374.21	376.94	39.5	344.44	334.44	10.0	7/26/2016
PZ-39	Upgradient BCD	Saprolite	33.196253	-83.313844	431.76	434.70	44.7	397.06	387.06	10.0	7/30/2016
PZ-43	Downgradient BCD	Saprolite/TWR/Biotite Gneiss	33.149199	-83.298942	383.75	353.75	41.5	323.75	313.75	10.0	2/7/2018
PZ-44	Downgradient BCD	Saprolite/TWR/Biotite Gneiss	33.190797	-83.300407	380.49	383.12	57.0	333.89	323.89	10.0	2/2/2018



ATTACHMENT A4 GROUNDWATER PIEZOMETER DETAILS

Georgia Power - Plant Branch
Milledgeville, GA

Well-ID	Location	Geologic Unit Screened ^[3]	Latitude	Longitude	Ground Surface Elevation (feet msl) ^[1]	Top of Casing Elevation (feet msl) ^[1]	Total Depth (feet bgs) ^[2]	Top of Screen Elevation (feet msl) ^[1]	Screen Tip Elevation (feet msl) ^[1]	Screen Length	Date of Installation
PIEZOMETERS											
PZ-46	Downgradient BCD	TWR/Biotite Gneiss	33.193656	-83.303741	382.11	384.70	47.0	346.51	336.51	10.0	2/5/2018
PZ-48	Downgradient BCD	Saprolite/TWR/Biotite Gneiss	33.194507	-83.310641	418.3	421.05	67.0	361.70	351.70	10.0	1/24/2018
PZ-49	Downgradient BCD	Sand/Biotite Gneiss	33.195200	-83.301874	382.1	385.06	27.0	375.50	365.50	10.0	1/30/2018
PZ-51S	Downgradient BCD	Saprolite	33.190476	-83.297647	377.63	380.19	50.0	337.63	332.63	5.0	8/2/2018
PZ-51I	Downgradient BCD	TWR/Biotite Gneiss	33.190524	-83.297627	377.79	380.60	65.0	322.89	312.89	10.0	8/1/2018

Notes:

1. feet msl = feet mean sea level
2. feet bgs = feet below ground surface
3. TWR = Transitionally Weathered Rock
4. Piezometers may be used to collect waters levels. They are not considered compliance monitoring locations.





LOG OF TEST BORING

BORING BRGWA-12S/PZ-12S

PAGE 1 OF 2

ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING**PROJECT** Plant Branch Hydrogeologic Study**LOCATION** Milledgeville, GA**DATE STARTED** 3/4/2014 **COMPLETED** 3/4/2014 **SURF. ELEV.** Not Surveyed **COORDINATES:** _____**CONTRACTOR** SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; Casing Advance**DRILLED BY** T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** _____ **ANGLE** _____ **BEARING** _____**BORING DEPTH** 58.3 ft. **GROUND WATER DEPTH: DURING** _____ **COMP.** _____ **DELAYED** 47.5 ft. after 300 hrs.**NOTES** _____

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION		GROUNDWATER OBSERVATIONS	WELL DATA
			Weak	Moderate Strong		
5		- See PZ-12 D and PZ-12 I for material descriptions				Completion: protective aluminum cover with bollards; 4-foot square concrete pad
10						
15						
20						
25						
30						
35						
40						

(Continued Next Page)



LOG OF TEST BORING

BORING BRGWA-12S/PZ-12S
PAGE 2 OF 2
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
					Completion: protective aluminum cover with bollards; 4-foot square concrete pad
45					(CONTINUED) ← Annular Seal: bentonite pellets ← Filter: silica filter sand ← Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack ← Sump: 0.3999999999999999 ft.
50					
55					
60					
65					
70	Bottom of borehole at 58.3 feet.				
75					
80					
85					
90					

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ



LOG OF TEST BORING

BORING BRGWA-12I/PZ-12 I

PAGE 1 OF 2

ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study

LOCATION Milledgeville, GA

DATE STARTED 2/20/2014 COMPLETED 2/20/2014 SURF. ELEV. Not Surveyed COORDINATES: _____

CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core

DRILLED BY T. Milam LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 77.6 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 47.4 ft. after 240 hrs.

NOTES _____

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION		GROUNDWATER OBSERVATIONS	WELL DATA
			Weak	Moderate Strong		
5		- CL: dry, very stiff, sandy CLAY, red with yellow-red mottles, micas				Completion: protective aluminum cover with bollards; 4-foot square concrete pad
10		- CL: dry, very stiff, sandy CLAY, red with yellow-red mottles, micas				
15		- CL: dry, very stiff, silty CLAY, yellow-red with gray-brown mottles, sand, micas				
20		- ML: dry, stiff, clayey SILT, red and pink with yellow and yellow-brown mottles, sand, micas				
25		- ML: dry, medium dense, clayey SILT, brown-yellow with red mottles, white mottles, black mottles, micas				
30		- ML: damp, medium dense, clayey SILT, strong brown and pink with red and white mottles, micas				
35		- ML: damp, stiff, clayey SILT, yellow-red with black mottles, sand, micas				
40		- ML: damp, stiff, clayey SILT, pale brown with white mottles, sand, micas				

(Continued Next Page)



LOG OF TEST BORING

BORING BRGWA-12I/PZ-12I

PAGE 2 OF 2

ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study

LOCATION Milledgeville, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

RECORD OF BOREHOLE BRGWA-23S/PZ-23S

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 41.00 ft
 LOCATION: Milledville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/25/16
 DATE COMPLETED: 7/26/16

NORTHING: 1,162,970.68
 EASTING: 2,557,868.18
 GS ELEVATION: 425.50
 TOC ELEVATION: 428.42 ft

DEPTH W.L.: 27.2 (bgs)
 ELEVATION W.L.: 401.22 (amsl)
 DATE W.L.: 7/25/16
 TIME W.L.: na

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0	425	0.00 - 5.00 SILT, NP, reddish brown, white mottling, highly weathered, massive, friable, relic foliation structure micaceous, SAPROLITE; cohesive, dry, very stiff	ML			1		5.00 5.00		<p>WELL CASING Interval: 0'-30.8' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 30.8'-40.8' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 27.5'-40.0' Type: 27.5'-28.5', 30/45 fine sand; 28.5'-40.0', #1 sand</p> <p>FILTER PACK SEAL Interval: 22.5'-27.5' Type: 22.5'-25.5', 3/8" Bentonite Chips; 25.5'-27.5', Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 2.0'-22.5' Type: Portland Cement (Type I)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: 4-inch Sonic</p>
5	420	5.00 - 19.00 SILT, low plasticity; reddish brown, white mottling, massive, semi-friable, micaceous, SAPROLITE; cohesive, moist, soft			420.5 5.00	2		5.00 5.00		
10	415					3		5.00 5.00		
15	410					4		5.00 5.00		
20	405	19.00 - 20.00 trace fine-coarse subangular sand, pinkish brown 20.00 - 28.00 NP, well graded; reddish brown, light brown, dark grey, white mottling, moderately weathered, massive, micaceous, SAPROLITE; cohesive, moist, very soft			406.5 19.00 405.5 20.00	5		5.00 5.00		
25	400					6		5.00 5.00		
30	395	28.00 - 31.40 silty SAND, fine grained sand, NP, trace coarse subangular grain sand; reddish brown, white mottling, moderately weathered, massive, micaceous, SAPROLITE; cohesive, moist, very soft	SM		397.5 28.00					
35	390	31.40 - 35.00 SAND, poorly graded, very fine grained, few silt, trace subangular medium grain sand; light grey, brown, white mottling, medium weathered, massive, micaceous, SAPROLITE; non-cohesive, moist, loose	SP		394.1 31.40	7		5.00 5.00		
40	385	35.00 - 37.00 SAND, poorly graded, fine grained, trace silt; light grey brown, white mottling, highly weathered quartz nodules, heterogenous, micaceous, SAPROLITE; NC, moist-wet, very loose 37.00 - 40.50 TRANSITIONALLY WEATHERED ROCK, biotite GNEISS, moderately weathered, banded, dark grey, coarsely crystalline, strong rock, iron oxide staining, Sand part of weathered matrix	TWR		390.5 35.00 388.5 37.00	8		2.00 2.00		
45		40.50 - 41.00 BEDROCK, biotite GNEISS, slightly weathered, banded, grey to light tan, medium crystalline, highly competent rock Boring completed at 41.00 ft	GNEISS		385 384.5	9		4.00 4.00		

BOREHOLE RECORD PLAT BRANCH LOGS2.GPJ PIEDMONT.GDT 9/7/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Scotty Vermillon

GA INSPECTOR: Will Ethier
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE BRGWC-25/PZ-25

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 21.00 ft
 LOCATION: Milledville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/24/16
 DATE COMPLETED: 7/25/16

NORTHING: 1,160,584.61
 EASTING: 2,561,315.07
 GS ELEVATION: 354.95
 TOC ELEVATION: 357.46 ft

DEPTH W.L.: 5.5 (bgs)
 ELEVATION W.L.: 351.96 (amsl)
 DATE W.L.: 7/24/16
 TIME W.L.: 9:45

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0		0.00 - 3.30 SILT, NP, trace fine-medium sand, trace roots; reddish brown, highly weathered, massive, micaceous, regolith; cohesive, dry (perched water~2.0'-2.8'), firm	ML		351.65	1		<p>Portland Type 1</p> <p>3/8" Bentonite Chips</p> <p>3/8" Bentonite Pellets</p> <p>#1 30/45 FineSand</p> <p>#1 Coarse Sand</p> <p>0.010" Screen Slot</p> <p>#1 Sand</p>	<p>WELL CASING Interval: 0'-10.5' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 10.5'-20.5' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 7.5'-20.5' Type: 7.5'-8.5': 30/45 fine sand; 8.5'-20.5', #1 sand</p> <p>FILTER PACK SEAL Interval: 2.5'-7.5' Type: 2.5'-5.5': 3/8" Bentonite Chips; 5.5'-7.5', 3/8" Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 2.0'-2.5' Type: Portland Cement (Type I)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: 4-inch Sonic</p>
5	350	3.30 - 4.00 TRANSITIONALLY WEATHERED ROCK, Moderately weathered, massive, opaque white, slightly yellow, very coarsely crystalline, medium strong, biotite GNEISS, veined, quartz, feldspar, vuggy	TWR ML	▽▽▽▽	350.95 4.00 349.95 5.00				
		4.00 - 5.00 SILT, NP, trace fine-medium sand, trace roots; reddish brown, highly weathered, massive, micaceous, regolith; cohesive, dry, firm			347.95				
		5.00 - 7.00 SILT, NP, trace fine-medium sand, trace roots; reddish brown, highly weathered, massive, micaceous, regolith; cohesive, moist, firm	MLS		7.00				
10	345	7.00 - 9.50 sandy SILT, low plasticity, subangular medium-coarse grain; reddish light brown with light brown mottling, moderately weathered, massive, micaceous, SAPROLITE; cohesive, moist, loose	SM		345.45 344.95 10.00	2	5.00 10.00		
		9.50 - 10.00 silty SAND, angular medium-coarse grain, well graded, NP; medium reddish brown, slightly weathered, massive, micaceous, SAPROLITE; NC, moist, very loose			339.95				
15	340	10.00 - 15.00 silty SAND, well graded, angular fine-coarse grain, NP, trace subangular coarse gravel; medium reddish brown, medium weathered, massive, micaceous, SAPROLITE; NC, moist, loose	PWR	▽▽▽▽	15.00 338.95				
		15.00 - 16.00 TRANSITIONALLY WEATHERED ROCK, slightly weathered, foliated, dark grey, pink, opaque off-white, fine-coarsely crystalline, highly competent rock, weathered granitic biotite GNEISS, intensely fractured, saturated rock, discontinuities normal to core axis	GNEISS		16.00	3	5.00 15.00		
		16.00 - 20.00 Fresh, foliated, dark grey, white, medium-coarsely crystalline, strong rock, biotite GNEISS, intensely fractured	GNEISS		334.95				
20	335	20.00 - 21.00 No Recovery	GNEISS		20.00 333.95				
		Boring completed at 21.00 ft							
25	330					4	1.00 16.00		
						5	4.00 21.00		
30	325								
35	320								
40	315								
45	310								

BOREHOLE RECORD PLAT BRANCH LOGS2.GPJ PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Scotty Vermillon

GA INSPECTOR: Will Ethier
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE BRGWC-27/PZ-27S

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 24.00 ft
 LOCATION: Milledville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/21/16
 DATE COMPLETED: 7/22/16

NORTHING: 1,159,696.53
 EASTING: 2,559,712.98
 GS ELEVATION: 364.88
 TOC ELEVATION: 367.99 ft

DEPTH W.L.: 3.45 (bgs)
 ELEVATION W.L.: 364.54 (amsl)
 DATE W.L.: 7/22/16
 TIME W.L.: 15:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC			
0	360	0.00 - 10.00 No Recovery; Hydrovac							<p>Portland Type 1</p> <p>3/8" Bentonite Chips</p> <p>3/8" Bentonite Pellets</p> <p>#1 30/45 FineSand</p> <p>#1 Coarse Sand</p> <p>0.010" Screen Slot</p> <p>#1 Sand</p>	<p>WELL CASING Interval: 0'-14' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 14'-24' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 9.0'-24' Type: 9.0'-10.0', 30/45 fine sand; 10.0'-23.5', #1 sand</p> <p>FILTER PACK SEAL Interval: 4.0'-9.0' Type: 4.0'-7.0'; 3/8" Bentonite Chips; 7.0'-9.0', Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0.0'-4.0' Type: Portland Cement (Type I)</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: N/A</p> <p>Hydrovac left standing water at 3.45'</p>	
5	355	10.00 - 15.00 SAND with CLAY, medium plasticity, medium-coarse sand, trace fine angular gravel; moderate reddish brown (10R 4/6), moderately weathered, massive, micaceous, SAPROLITE; cohesive, wet, firm	SP-SC	[Graphic]	354.88 10.00			1			0.00 10.00
10	350	15.00 - 17.50 lean CLAY, medium plasticity, some silt, trace medium grain angular sand; medium reddish brown (10R 4/6), moderate orange pink (5YR 8/4), moderately weathered, laminated, micaceous, SAPROLITE; cohesive, wet, dense	CL	[Graphic]	349.88 15.00						
15	345	17.50 - 18.30 SILT, non-plastic, coarse angular sand, fine angular gravel; moderate reddish brown (10R 4/6), moderately weathered, massive, micaceous, SAPROLITE; non-cohesive, wet, loose	ML	[Graphic]	347.38 18.30			2			5.00 15.00
20	340	18.30 - 20.00 lean CLAY, medium plasticity, some silt, trace medium grain angular sand; medium reddish brown (10R 4/6), moderate orange pink (5YR 8/4), moderately weathered, laminated, micaceous, SAPROLITE; cohesive, wet, dense	CL	[Graphic]	344.88 20.00						
25	335	20.00 - 22.00 silty SAND, medium-coarse angular sand, NP, trace subrounded cobbles; moderate brown (5YR 4/4), moderately weathered, massive, micaceous, SAPROLITE; NC, wet, very loose	SM	[Graphic]	342.88 341.88						
30	330	22.00 - 22.50 gravelly SAND, fine-coarse grain sand, well graded, coarse sub rounded gravel, trace silt; light brown (5YR 5/6), slightly weathered, massive, quartzitic, micaceous, SAPROLITE; NC, wet, very loose	SW	[Graphic]	340.88 23.00			3			5.00 20.00
35	325	22.50 - 23.00 silty SAND, fine-medium grain, well graded, subrounded, trace subrounded coarse quartz gravel; light brown (5YR 6/4) mottled with pale brown (5YR 5/2), lightly weathered, relic foliation structures, micaceous, SAPROLITE; NC, moist, loose	SM	[Graphic]	340.88						
40	320	23.00 - 24.00 No Recovery						4			4.00 24.00
		Boring completed at 24.00 ft									

BOREHOLE RECORD PLAT BRANCH LOGS2.GPJ PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Scotty Vermillon

GA INSPECTOR: Will Ethier
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE BRGWC-29I/PZ-29I

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 21.00 ft
 LOCATION: Milledgeville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/22/16
 DATE COMPLETED: 7/23/16

NORTHING: 1,160,298.63
 EASTING: 2,561,050.06
 GS ELEVATION: 350.37
 TOC ELEVATION: 353.30 ft

DEPTH W.L.: 6.56 (bgs)
 ELEVATION W.L.: 346.74 (amsl)
 DATE W.L.: 7/24/2016
 TIME W.L.: 06:52

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0	350	0.00 - 1.00 TOPSOIL, SILTY SAND, some organic matter; dark brown; moist	SM		349.37	1		5.00 5.00		WELL CASING Interval: 0.0'-10.0' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded WELL SCREEN Interval: 10.0'-20.0' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC FILTER PACK Interval: 7.0'-21.0' Type: 7.0'-8.0' 30/45 Sand - 8.0'-21.0' #1 Sand FILTER PACK SEAL Interval: 2.0'-7.0' Type: 2.0'-5.0' 3/8" Bentonite Chips - 5.0'-7.0' 3/8" Bentonite Pellets ANNULUS SEAL Interval: 0.0'-2.0' Type: Concrete WELL COMPLETION Pad: 4"x4"x4" Protective Casing: Anodized Aluminum DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: N/A
		1.00 - 7.00 Sandy SILT sub-angular fine sand; brown-orange, relic foliation present, SAPROLITE; moist, loose	ML		1.00					
5	345	7.00 - 8.00 SILTY SAND, micaceous; densely foliated, SAPROLITE; Dense	SM		343.37	2		5.00 5.00		
		8.00 - 20.00 TRANSITIONALLY WEATHERED ROCK, highly weathered (W4), densely foliated, white-black, medium grained, weak (R2) with some strong (W4) fresh sections, BIOTITE GNEISS, with biotite, quartz and some weathered feldspars	TWR		7.00 342.37 8.00					
10	340					3		2.50 5.00		
15	335					4		1.00 5.00		
20	330	20.00 - 21.00 No recovery			330.37	5		0.00 1.00		
		Boring completed at 21.00 ft							20.00 329.37	
25	325									
30	320									
35	315									
40	310									
45										

BOREHOLE RECORD PLAT BRANCH LOGS.GPJ - PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Ray Whitt

GA INSPECTOR: Mike Smalley, P.G.
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE BRGWC-30I/PZ-30I

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 20.25 ft
 LOCATION: Milledville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/18/16
 DATE COMPLETED: 7/18/16

NORTHING: 1,161,608.18
 EASTING: 2,557,692.53
 GS ELEVATION: 349.78
 TOC ELEVATION: 352.33 ft

DEPTH W.L.: 1.55 (bgs)
 ELEVATION W.L.: 350.78 (amsl)
 DATE W.L.: 7/20/2016
 TIME W.L.: 08:57

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0		0.00 - 4.70 Sandy CLAYEY SILT, low plasticity fines, fine to medium sub-angular sand, trace organics (roots); moderate reddish brown (10YR 4/6), cohesive, w<PL, soft	ML	[Pattern]						<p>WELL CASING Interval: 0'-10' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 10'-20' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 2.0'-7.0' Type: 7.0'-8.0' 30/45 Sand - 8.0'-20.25' #1 Sand</p> <p>FILTER PACK SEAL Interval: 2.0'-7.0' Type: 2.0'-5.0' 3/8" Bentonite Chips - 5.0'-7.0' 3/8" Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0'-2' Type: Concrete</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: N/A</p>
5	345	4.70 - 6.60 Sandy SILTY CLAY, medium plasticity fines, fine sand; grayish blue green (5BG 5/2) to light blue gray (5B 7/1) mottled with moderate yellowish brown (10YR 5/4) and white (N9), cohesive, w-PL, firm	CL	[Pattern]	345.08 4.70	1		8.00 10.00		
		6.60 - 6.80 SAND, fine to medium sub-angular sand, non-plastic fines; greenish gray (5G 6/1) to pale olive (10Y 6/2), non-cohesive, moist, loose	SP	[Pattern]	343.18					
		6.80 - 7.40 Sandy SILTY CLAY, medium plasticity fines, fine sand; grayish blue green (5BG 5/2) to light blue gray (5B 7/1) mottled with moderate yellowish brown (10YR 5/4) and white (N9), cohesive, w-PL, firm	CL	[Pattern]	342.38					
		7.40 - 7.40 Sandy SILTY CLAY, medium plasticity fines, fine sand; grayish blue green (5BG 5/2) to light blue gray (5B 7/1) mottled with moderate yellowish brown (10YR 5/4) and white (N9), cohesive, w-PL, firm	SM	[Pattern]	7.40					
		7.40 - 10.50 SILT SAND, fine to coarse well graded sub-angular sand, low plasticity fines, trace fine sub-angular gravels; dark yellowish orange (10YR 6/6) to very pale orange (10YR 8/2), SAPROLITE; non-cohesive, moist, compact	SP	[Pattern]	339.28 338.68					
		10.50 - 11.10 SAND, fine to medium sub-angular sand, trace non-plastic fines, trace fine angular gravels; dusky brown (5YR 2/2) to moderate brown (5YR 4/4), highly weathered (W4), quartz, biotite, and weathered micaceous grains, SAPROLITE; non-cohesive, moist, dense	SP-SM	[Pattern]	11.10					
		10.50 - 11.10 SAND, fine to medium sub-angular sand, trace non-plastic fines, trace fine angular gravels; dusky brown (5YR 2/2) to moderate brown (5YR 4/4), highly weathered (W4), quartz, biotite, and weathered micaceous grains, SAPROLITE; non-cohesive, moist, dense	SW	[Pattern]	335.88 13.90	2		7.00 7.00		
		11.10 - 13.90 SAND, fine angular sand, some non-plastic fines, trace fine angular gravels; dark yellowish orange (10YR 6/6) and grayish orange (10YR 7/4), highly weathered (W4), weathered micaceous grains, quartz, and biotite, SAPROLITE; non-cohesive, wet, very dense	TWR	[Pattern]	15.80 334.38					
		11.10 - 13.90 SAND, fine angular sand, some non-plastic fines, trace fine angular gravels; dark yellowish orange (10YR 6/6) and grayish orange (10YR 7/4), highly weathered (W4), weathered micaceous grains, quartz, and biotite, SAPROLITE; non-cohesive, wet, very dense	GNEISS	[Pattern]	332.98 16.80					
		13.90 - 15.40 SAND, fine to coarse angular sand, trace non-plastic fines, some fine to coarse soft angular gravel (core stones); moderate yellowish brown (10YR 5/4) mottled white (N9) and pale olive (10YR 6/2), moderately to highly weathered (W3 to W4), weathered micaceous grains, quartz, plagioclase, biotite, SAPROLITE; non-cohesive, wet, very dense			329.78	3		2.80 3.00		
		15.40 - 15.80 TRANSITIONALLY WEATHERED ROCK, fine to coarse angular sand, fine to coarse angular gravels (core stones), trace non-plastic fines; light gray (N7), slightly to moderately weathered (W2-W3), quartz, biotite and weathered micaceous grains, non-cohesive, wet, very dense			20.00					
		15.80 - 16.80 Slightly weathered (W2), medium bedded, light olive gray (5Y 5/2) to medium light gray (N7), fine grained, slightly porous, weak rock (R2), GNEISS, some weathering staining, quartz, biotite and weathered micaceous grains.								
		16.80 - 20.00 Slightly weathered (W2), medium to thin wavy foliated, medium to coarse grained, white (N1) and grayish black (N2) with some dark yellowish orange (10YR 6/6) weathered surfaces, slightly porous (fracture surfaces), medium strong to strong (R3 to R4), BIOTITE GNEISS, with biotite, quartz, hornblende, frequent weathering surfaces								
		17.00: (17.0) fresh (W1), occasional weathered surfaces								
		Boring completed at 20.25 ft								

BOREHOLE RECORD: PLAT BRANCH LOGS.GPJ - PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Trenton Herod

GA INSPECTOR: Jeffrey Ingram
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE BRGWC-32S/PZ-32S

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 45.00 ft
 LOCATION: Milledville, GA

DRILL RIG: TS-150 Track Mounted Rig
 DATE STARTED: 7/19/16
 DATE COMPLETED: 7/20/16

NORTHING: 1,160,678.65
 EASTING: 2,558,497.57
 GS ELEVATION: 403.51
 TOC ELEVATION: 406.51 ft

DEPTH W.L.: 30.05 (bgs)
 ELEVATION W.L.: 322.28 (amsl)
 DATE W.L.: 7/22/2016
 TIME W.L.: 08:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0		0.00 - 0.70 TOPSOIL, SILTY SAND, fine poorly graded sand, non-plastic fines, some organics (roots); dark yellowish brown (10YR 4/2); non-cohesive, dry, loose	SM	[Symbol]	402.81 0.70					<p>WELL CASING Interval: 0.0'-35' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 35'-45' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 32.0'-45.15' Type: 32.0'-33.0' 30/45 Sand - 33.0'-45.15' #1 Sand</p> <p>FILTER PACK SEAL Interval: 27.0'-32.0' Type: 27.0'-30.0' 3/8" Bentonite Chips - 30.0'-32.0' 3/8" Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 3'-27' Type: Portland Cement (Type II)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: N/A</p>
400		0.70 - 8.30 non-plastic to low plasticity fines, trace organics (roots); moderate reddish brown (10R 4/6), completely weathered (W5), some weathered micaceous grains, SAPROLITE; non-cohesive, moist, loose				1		8.80 10.00		
395		8.30 - 17.90 fine to coarse well graded angular sand, non-plastic to low plasticity fines, some fine to coarse soft angular gravels (core stones); pale yellowish brown (10YR 6/2), light brown (5YR 5/6) and black (N1), highly to completely weathered (W4 to W5), some relic foliations in core stones, weathered micaceous grains, quartz, biotite, SAPROLITE; non-cohesive, moist, compact			395.21 8.30					
390						2		7.90 10.00		
385		17.90 - 19.10 fine to coarse well graded angular sand, non-plastic to low plasticity fines, some fine to coarse soft angular gravels (core stones); layers of dark yellowish orange (10YR 6/6), pale yellowish brown (10YR 6/2), pale reddish brown (10R 5/4) mottled black (N1) and white (N9), highly weathered (W4), some relic foliations in core stones, weathered micaceous grains, biotite, quartz, SAPROLITE; non-cohesive, moist, compact			385.61 17.90 384.41 19.10					
380		19.10 - 28.50 (SP-SM) SAND, fine to coarse sub-angular sand, non-plastic to low plasticity fines, some soft angular gravels (core stones); pale yellowish brown (10YR 6/2), white (N9), and black (N1), highly weathered (W4), some relic foliations in core stones, weathered micaceous grains, biotite, quartz, SAPROLITE; non-cohesive, moist, Dense 25.00: (25.0) some white (N9) fresh quartz pockets	SP-SM			3		10.00 10.00		
375		28.50 - 30.00 SILTY SAND, fine to medium sub-angular poorly graded sand, non-plastic to low plasticity fines; light brown (5YR 5/6) black (N1), and pale yellowish brown (10YR 6/2), highly weathered (W4), some relic foliations, biotite, quartz, weathered micaceous grains, SAPROLITE; non-cohesive, moist, dense	SM		375.01 28.50 373.51 30.00					
370		30.00 - 32.00 CLAYEY SAND, fine sand, medium plasticity fines; pale yellowish brown (10YR 6/2), to light olive gray (5Y 5/2) mottled black (N1) and white (N9), some relic foliations, weathered micaceous grains, biotite, quartz, SAPROLITE; cohesive, w-PL, hard	SC		371.51 32.00					
365		32.00 - 38.70 SAND, fine sand, non-plastic fines; light brown (5YR 5/6), black (N1) and pale yellowish brown (10YR 6/2), highly weathered (W4), weathered micaceous grains, SAPROLITE; non-cohesive, wet, loose	SP-SM		364.81 38.70 363.51 40.00			10.00 10.00		
40		38.70 - 40.00 SAND, fine to coarse sub-angular sand, trace non-plastic fines; pale yellowish brown (10YR 6/2) mottled white (N9) and Black (N1), moderately weathered (W3), some foliation layers, SAPROLITE; non-cohesive, wet, dense	SW							
360		40.00 - 42.50 SANDY SILT, fine sand, low plasticity fines; light olive gray (5Y 5/2), completely weathered rock (W6), weathered micaceous grains, biotite, quartz, SAPROLITE; cohesive, w>PL, firm	ML		361.01 42.50			5.00 5.15		
45		42.50 - 45.00 SAND, fine to medium angular sand, trace non-plastic fines; pale yellowish brown (10YR 6/2), some relic foliations, weathered micaceous grains, biotite, quartz, SAPROLITE; non-cohesive, wet, dense	SP		358.51					
		Boring completed at 45.00 ft								

BOREHOLE RECORD PLAT BRANCH LOGS.GPJ PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 6.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Trenton Herod

GA INSPECTOR: Jeffrey Ingram
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE BRGWC-45/PZ-45

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 57.00 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/3/18
 DATE COMPLETED: 2/3/18

NORTHING: 1,162,229.18
 EASTING: 2,561,074.89
 GS ELEVATION: 381.69
 TOC ELEVATION: 384.61 ft

DEPTH W.L.: 11.41
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0	380	0.00 - 8.00 Soils removed by Hydrovac from 0-8 feet bgs.						Grout mix with stainless steel casing	WELL CASING Interval: 0-46,6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 46,6-56,6 Material: 0.010 Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 56.6-57 FILTER PACK Interval: 45-57 Type: FilterSil FILTER PACK SEAL Interval: 40-45 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-40 Type: Portland Cement and Quick Gel Bentonite Mix WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5' DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
5	375			373.69					
10	370	8.00 - 33.00 FILL, silty SAND, orangish brown, non-cohesive, moist.		8.00				Portland Cement and Quick Gel Bentonite Mix	
15	365				R1	ROTO SONIC	6.00 10.00		
20	360		SM						
25	355				R2	ROTO SONIC	10.00 10.00		
30	350								
35	345	33.00 - 52.00 SAPROLITE, SAND, reddish brown with white and black relic foliation, non cohesive, moist.		348.69 33.00					
40	340		SP		R3	ROTO SONIC	10.00 10.00		
		Log continued on next page			R4	ROTO	10.00		

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE BRGWC-45/PZ-45

SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 57.00 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/3/18
 DATE COMPLETED: 2/3/18

NORTHING: 1,162,229.18
 EASTING: 2,561,074.89
 GS ELEVATION: 381.69
 TOC ELEVATION: 384.61 ft

DEPTH W.L.: 11.41
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
340		33.00 - 52.00 SAPROLITE, SAND, reddish brown with white and black relic foliation, non cohesive, moist. <i>(Continued)</i>	SP						<p>WELL CASING Interval: 0-46.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 46.6-56.6 Material: 0.010 Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 56.6-57</p> <p>FILTER PACK Interval: 45-57 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 40-45 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-40 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5'</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
45						R4	ROTO SONIC		
335									
50									
330		52.00 - 57.00 TRANSITIONALLY WEATHERED ROCK (BIOTITE GNEISS), moderately weathered to fresh, oxide staining, thinly bedded, black and white, phaneritic, extremely weak to medium strong.	TWR						
55					329.69 52.00				
325		Boring completed at 57.00 ft							
60									
320									
65									
315									
70									
310									
75									
305									
80									

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE BRGWC-47/PZ-47

SHEET 1 of 3

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 97.00 ft
 LOCATION: Between Pond B

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/25/18
 DATE COMPLETED: 1/26/18

NORTHING: 1,162,701.04
 EASTING: 2,559,456.38
 GS ELEVATION: 408.87
 TOC ELEVATION: 411.32 ft

DEPTH W.L.: 25.93
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0		0.00 - 0.50 Ash as sand, fine, dark gray, moist, non-cohesive.	SP		408.37 0.50			Grout Mix with stainless steel casing	WELL CASING Interval: 0-81.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 81.6-91.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 91.6-92 FILTER PACK Interval: 80-93 Type: FilterSil FILTER PACK SEAL Interval: 75-80 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-75 Type: Portland Cement and Quick Gel Bentonite Mix WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5" DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
405		0.50 - 15.00 RESIDUUM, silty SAND, sands fine to medium, reddish brown, micaceous, moist, non-cohesive.							
5			SM						
10					R1	ROTO SONIC	9.00		
15		15.00 - 75.00 SAPROLITE, silty SAND, reddish brown to grayish brown with intermediate white mottling, relic structure, micaceous, dry to moist, non							
15									
395									
15									
390					R2	ROTO SONIC	10.00		
20									
385									
25			SM						
380					R3	ROTO SONIC	10.00		
30							Portland Cement and Quick Gel Bentonite Mix		
375									
370					R4	ROTO SONIC	10.00		
40									

Log continued on next page

BOREHOLE RECORD 1666254-01.GPJ, PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE BRGWC-47/PZ-47

SHEET 2 of 3

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 97.00 ft
 LOCATION: Between Pond B

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/25/18
 DATE COMPLETED: 1/26/18

NORTHING: 1,162,701.04
 EASTING: 2,559,456.38
 GS ELEVATION: 408.87
 TOC ELEVATION: 411.32 ft

DEPTH W.L.: 25.93
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE			REC	
<div style="display: flex; flex-direction: column; justify-content: space-between;"> 365 45 360 50 355 55 350 60 345 65 340 70 335 75 330 80 </div>		15.00 - 75.00 SAPROLITE, silty SAND, reddish brown to grayish brown with intermediate white mottling, relic structure, micaceous, dry to moist, non (Continued)	SM		333.87	75.00	R5	ROTO SONIC	10.00	3/8" PEL-PLUG Bentonite Pellets FilterSil -	WELL CASING Interval: 0-81.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 81.6-91.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 91.6-92 FILTER PACK Interval: 80-93 Type: FilterSil FILTER PACK SEAL Interval: 75-80 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-75 Type: Portland Cement and Quick Gel Bentonite Mix WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5' DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
				TWR			R6	ROTO SONIC	10.00		
							R7	ROTO SONIC	10.00		
							R8	ROTO SONIC	10.00		

Log continued on next page

BOREHOLE RECORD 1666254-01.GPJ, PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE BRGWC-47/PZ-47

SHEET 3 of 3

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 97.00 ft
 LOCATION: Between Pond B

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/25/18
 DATE COMPLETED: 1/26/18

NORTHING: 1,162,701.04
 EASTING: 2,559,456.38
 GS ELEVATION: 408.87
 TOC ELEVATION: 411.32 ft

DEPTH W.L.: 25.93
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
325		75.00 - 92.00 TRANSITIONALLY WEATHERED ROCK, shows in sample as Sand with trace gravel and trace silt, grayish brown with white mottling, micaceous, relic foliation where preserved, dry to wet, non-cohesive. (Continued)	TWR	[Blue Triangles]				<p style="font-size: small;">0.010" Slotted Schedule 40 PVC</p> <p style="font-size: small;">3/8" PEL-PLUG Bentonite Pellets</p>	<p>WELL CASING Interval: 0-81.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 81.6-91.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 91.6-92</p> <p>FILTER PACK Interval: 80-93 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 75-80 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-75 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5'</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
320					R9	ROTO SONIC	40.00		
315		92.00 - 97.00 BIOTITE GNEISS, sample recovered as rock flour, cobbles, and gravel. Slightly weathered to fresh, white and black, thinly bedded, phaneritic, strong, oxide staining in discontinuities.	BR	[Red Horizontal Lines]					
		Boring completed at 97.00 ft							

BOREHOLE RECORD 1666254-01.GPJ, PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE BRGWC-50/PZ-50

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 67.00 ft
 LOCATION: South boundary of site

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/31/18
 DATE COMPLETED: 1/31/18

NORTHING: 1,161,593.68
 EASTING: 2,562,372.00
 GS ELEVATION: 378.79
 TOC ELEVATION: 381.53 ft

DEPTH W.L.: 37.68
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0		0.00 - 7.00 Soil removed by Hydrovac from 0-7 ft bgs. Logged by sight. silty SAND, reddish brown, micaceous, moist, non-cohesive.	SM						Grout mix and stainless-steel casing	WELL CASING Interval: 0-54.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 54.6-64.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 64.6-65 FILTER PACK Interval: 53-66 Type: FilterSil FILTER PACK SEAL Interval: 48-53 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-48 Type: Portland Cement and Quick Gel Bentonite Mix WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5' DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
375										
5		7.00 - 47.00 RESIDUUM, silty SAND, reddish brown, micaceous, non-cohesive, moist.			371.79 7.00				Portland Cement and Quick Gel Bentonite Mix	
10					R1	ROTO SONIC	10.00 10.00			
15			SM							
20					R2	ROTO SONIC	10.00 10.00			
25										
30					R3	ROTO SONIC	10.00 10.00			
35										
35					R4	ROTO SONIC	10.00 10.00			
40										

Log continued on next page

BOREHOLE RECORD 1666254-01.GPJ, PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE BRGWC-50/PZ-50

SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 67.00 ft
 LOCATION: South boundary of site

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/31/18
 DATE COMPLETED: 1/31/18

NORTHING: 1,161,593.68
 EASTING: 2,562,372.00
 GS ELEVATION: 378.79
 TOC ELEVATION: 381.53 ft

DEPTH W.L.: 37.68
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE			REC
45	335	7.00 - 47.00 RESIDUUM, silty SAND, reddish brown, micaceous, non-cohesive, moist. <i>(Continued)</i>	SM		331.79	R4	ROTO SONIC	10.00		<p>WELL CASING Interval: 0-54.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 54.6-64.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 64.6-65</p> <p>FILTER PACK Interval: 53-66 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 48-53 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-48 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5'</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
50	330	47.00 - 55.00 RESIDUUM, SAND with trace gravel, some relic structure, light reddish brown, moist, non-cohesive.	SP		47.00	R5	ROTO SONIC	10.00		
55	325	55.00 - 60.00 TRANSITIONALLY WEATHERED ROCK (BIOTITE GNEISS), SAND with trace gravel, some relic structure, light reddish brown, moist, non-cohesive.	TWR		323.79					
60	320	60.00 - 67.00 BIOTITE GNEISS, slightly weathered to fresh, subhorizontal foliation, white/black, phaneritic, moderately strong to strong.	BR		318.79	R6	ROTO SONIC	10.00		
		Boring completed at 67.00 ft								
70	310									
75	305									
80	300									

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE BRGWC-521/PZ-521

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 75.00 ft

DRILL RIG: 8140LC
 DATE STARTED: 8/6/18
 DATE COMPLETED: 8/6/18

NORTHING: 1,161,275.44
 EASTING: 2,562,144.69
 GS ELEVATION: 380.93 ft
 TOC ELEVATION: 383.83 ft

DEPTH W.L.: 35.99 ft
 ELEVATION W.L.: 347.84 ft
 DATE W.L.: 8/9/18
 TIME W.L.: 11:45:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES				DIAGRAM and NOTES MONITORING WELL/ PIEZOMETER	WELL CONSTRUCTION DETAILS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE			REC / ATT
0	380	0.00 - 8.00 Soil was hydrovacuum to 8 feet								<p style="text-align: center;">PZ-521</p> <p>2.9 ft-ags Stick up</p> <p style="text-align: center;">Portland Cement and Quick Gel - Bentonite Mix</p>	<p>PZ-521 Borehole Diameter: 6</p> <p>WELL CASING Interval: 0-73.9' Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Screen</p> <p>WELL SCREEN Interval: 63.9-73.9' Material: 0.010" Slotted Schedule 40 PVC Pre-Pack Screen Diameter: 2" Slot Size: 0.010 End Cap: 73.9</p> <p>FILTER PACK Interval: 59.7-73.9' Type: FilterSil Quantity: 5 - 50lb bags</p> <p>FILTER PACK SEAL Interval: 50.4-59.7' Type: 3/8" PEL-PLUG Quantity: 10 gallons</p> <p>ANNULUS SEAL Interval: 0.50,4' Type: Portland Cement and Quick Gel Bentonite Mix Quantity: Cement: 6 - 94lb bags Water: 75 gallons</p>
5	375	8.00 - 10.00 Loss of material			372.93 8.00						
10	370	10.00 - 18.00 sandy SILT w/ trace gravel, fine to coarse, weathered, micaceous, fill, moist to dry, loose to compact, non-cohesive	MLS		370.93 10.00	No Data	S - 1	ROTO SONIC	4.00 10.00		
15	365	18.00 - 20.00 sandy SILT, fine to coarse, weathered, dry, loose, non-cohesive, trace gravel at bottom	MLS		362.93 18.00						
20	360	20.00 - 26.00 sandy SILT with trace gravel, dark brown, micaceous, sand/gravel fine to coarse, loose to compact	MLS		360.93 20.00						
25	355	26.00 - 30.00 sandy SILT with trace gravel, grey to brown, less micaceous, sand/gravel fine to coarse, moist, compact	MLS		354.93 26.00	No Data	S - 2	ROTO SONIC	7.00 10.00		
30	350	30.00 - 32.50 sandy SILT with trace gravel, red, sand/gravel fine to coarse, moist, compact, non-cohesive, high plasticity	MLS		350.93 30.00						
35	345	32.50 - 37.00 CLAY with some sand, RED, cohesive, w>PL, stiff to very stiff, sand fine to coarse, high plasticity	CH		348.43 32.50	No Data	S - 3	ROTO SONIC	10.00 10.00		
40		37.00 - 40.00 sandy SILT, red, w>PL, soft to firm, sand fine to coarse, cohesive, high plasticity	MLS		343.93 37.00						
		Log continued on next page			340.93						

AA BOREHOLE RECORD PLANT_BRANCH_20181002.GPJ GOLDR NJ-PA 05-24-06.GDT 10/2/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade Environmental, LLC
 DRILLER: M.Rodriguez

GA INSPECTOR: Ben Hodges
 CHECKED BY: Rachel Kirkman, PG
 DATE: 9/6/18



RECORD OF BOREHOLE BRGWC-521/PZ-521

SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 75.00 ft

DRILL RIG: 8140LC
 DATE STARTED: 8/6/18
 DATE COMPLETED: 8/6/18

NORTHING: 1,161,275.44
 EASTING: 2,562,144.69
 GS ELEVATION: 380.93 ft
 TOC ELEVATION: 383.83 ft

DEPTH W.L.: 35.99 ft
 ELEVATION W.L.: 347.84 ft
 DATE W.L.: 8/9/18
 TIME W.L.: 11:45:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES				DIAGRAM and NOTES MONITORING WELL/ PIEZOMETER	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE		
40	340	40.00 - 45.00 silty SAND with trace gravel and clay, light grey to brown, sand/gravel fine to coarse, non-cohesive, compact to dense, wet	GM		40.00	No Data	S - 4	ROTO SONIC		<p style="text-align: center;">PZ-521</p> <p style="text-align: center;">3/8' PEL-PLUG Bentonite Pellets</p> <p style="text-align: center;">FilterSil - 0.010" Slotted Schedule 40 PVC Pre-Pack Screen</p> <p style="text-align: center;">End Cap -</p>
45	335	45.00 - 47.50 Sandy Clay, red, cohesive, very stiff w> PL, sand, fine, high plasticity	SC		335.93 45.00	No Data	S - 4	ROTO SONIC	10.00 10.00	
		47.50 - 50.00 Sandy Clay with trace gravel, red, fine to coarse, cohesive, very firm to stiff, w > PL to w ~ PL, high plasticity	SC		333.43 47.50					
50	330	50.00 - 60.00 BIOTITE GNEISS, fresh to weathered, medium to coarse, banding, black/white, weak to strong	BR		330.93 50.00	No Data	S - 5	ROTO SONIC	3.00 3.00	
55	325		BR			No Data	S - 6	ROTO SONIC	2.30 7.00	
60	320	60.00 - 70.00 BIOTITE GNEISS, fresh, banded coarse and fine grain, black/white, very strong	BR		320.93 60.00					
65	315		BR			No Data	S - 7	ROTO SONIC	6.00 10.00	
70	310	70.00 - 75.00 BIOTITE GNEISS, fresh, banded coarse and fine grain, black/white, very strong	BR		310.93 70.00	No Data	S - 8	ROTO SONIC	0.00 5.00	
75	305	Boring completed at 75.00 ft			305.93					

AA BOREHOLE RECORD PLANT_BRANCH_20181002.GPJ GOLDR NJ-PA 05-24-06.GDT 10/2/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade Environmental, LLC
 DRILLER: M.Rodriguez

GA INSPECTOR: Ben Hodges
 CHECKED BY: Rachel Kirkman, PG
 DATE: 9/6/18





LOG OF TEST BORING

BORING PZ-11 S

PAGE 1 OF 1

ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study

LOCATION Milledgeville, GA

DATE STARTED 2/20/2014 COMPLETED 2/20/2014 SURF. ELEV. Not Surveyed COORDINATES: _____

CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger

DRILLED BY S. Denty LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 26 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 9.2 ft. after 250 hrs.

NOTES _____

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Lean Clay (CL) - residuum damp, stiff, silty CLAY, red with dark gray-brown mottles, sand micas			
5		- ML: saprolite damp, stiff, clayey SILT, yellow-red with black mottles, sand, micas			
10		- ML: saprolite very damp, medium stiff, clayey SILT, yellow-brown with black mottles, sand, micas			Annular Seal: bentonite pellets
15		- ML: saprolite wet, soft, SILT, pale yellow with white mottles, sand, micas			Filter: silica filter sand
20		- ML: saprolite wet, medium stiff, SILT, pale yellow, light gray-brown, white and black mottles, sand, micas			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
25		- ML: saprolite wet, medium stiff, SILT, pale yellow, light gray-brown, white and black mottles, sand, micas			Sump: 0.3999999999999999 ft. Cave-in to 24.5 ft.
Bottom of borehole at 26.0 feet.					
30					
35					
40					



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 4/1/2014 COMPLETED 4/14/2014 SURF. ELEV. Not Surveyed COORDINATES: _____

CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core

DRILLED BY T. Milam LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 143.2 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 56 ft. after 200 hrs.

NOTES _____

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\W\SHAUGS\DESKTOP\BRANCH\PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION		GROUNDWATER OBSERVATIONS	WELL DATA
			Weak	Moderate		
5		Lean Clay (CL) - dry, silty CLAY, red with pale yellow mottles				
10		- CL: damp, silty CLAY, red with red-yellow mottles, sand, trace micas				
15		- ML: dry, clayey SILT, red-yellow and red with white and pink mottles, some quartz gravel, micas - ML: dry, clayey SILT, pale red and red with yellow-red mottles, then gray-brown and olive-yellow with white mottles, occasional quartz sand, micas				
20		- ML: dry, clayey SILT, yellow-brown and pale red with white and black mottles, white felsic seam with quartz sand 23-24 ft., micas				
25		- ML: dry, sandy SILT, dry, gray-brown, red and yellow-red with black mottles, micas, white felsic sand seam 28-29 ft.				
30		- ML: dry, sandy SILT, pale gray-brown with white mottles, yellow-red with black mottles, micas				
35		- ML: dry, sandy SILT, pale gray-brown with white mottles, yellow-red with black mottles, micas				
40		- ML: dry, clayey SILT, dry to damp, dark gray to black, red and pale gray-brown with white mottles, sand, micas				

(Continued Next Page)



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
					(CONTINUED)	
45		(Cont) - ML: very damp, sandy SILT, gray-brown and gray with white mottles, sand seams, very wet 44-45 ft.				
50		Silty Sand (ML) - wet, silty SAND, gray-brown with white mottles, mica				
55		∇ - ----sampler refusal----				
60						
65		- Felsic biotite GNEISS: fine to medium grain, soft to medium hard, slightly weathered, flow banded, few fractures, gray and white banding, partially weathered - ----auger refusal----				← Annular Seal:
70		- medium to coarse grain, hard, flow banded, few fractures, dark gray and white banding, fresh				
75		- medium to coarse grain, hard, flow banded, few fractures, dark gray and white banding, fresh				← Filter:
80		- medium to coarse grain, hard, flow banded, few fractures, dark gray to black with white banding, fresh				
85		- medium to coarse grain, hard, flow banded, few fractures, dark gray to black with white banding, fresh				
90		- medium to coarse grain, hard, flow banded, few fractures, dark gray to black with white banding, fresh				

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PIANT BRANCH\PIEZOMETERS.GPJ

Standpipe:
4" OD PVC (SCH 40)
Screen:
60 ft;

(Continued Next Page)



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
		(Cont) - medium to coarse grain, hard, flow banded, few fractures, dark gray to black with white banding, fresh			(CONTINUED)
100		- medium to coarse grain, hard to medium hard, flow banded, few fractures, dark gray to black with white banding, fresh			
105		- medium to coarse grain, hard, flow banded, few fractures, dark gray to black with white banding, fresh			
110		- medium to coarse grain, hard, flow banded, few fractures, dark gray to black with white banding, fresh			
115		- medium to coarse grain, hard to medium hard, flow banded, few fractures, dark gray to black with white banding, micro-folds, fresh			
120		- medium to coarse grain, hard to medium hard, flow banded, few fractures, dark gray to black with white banding, fresh			
125		- medium to coarse grain, hard to medium hard, flow banded, few fractures, dark gray to black with white banding, feldspar phenocrysts, fresh			
130		- medium to coarse grain, hard to medium hard, flow banded, one fracture, dark gray to black with white banding, fresh			
135		- medium to coarse grain, hard to medium hard, flow banded, several fractures, dark gray to black with white banding, fresh			
140		- medium to coarse grain, hard to medium hard, flow banded, several fractures, dark gray to black with white banding, fresh			
145		Bottom of borehole at 143.2 feet.			Standpipe: 4" OD PVC (SCH 40) Screen: 60 ft; Sump: 0.399999999999977 ft. Cave-in to 141.7 ft.



LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study

LOCATION Milledgeville, GA

DATE STARTED 2/26/2014 **COMPLETED** 2/26/2014 **SURF. ELEV.** Not Surveyed **COORDINATES:** _____

CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger

DRILLED BY S. Denty **LOGGED BY** W. Shaughnessy **CHECKED BY** _____ **ANGLE** _____ **BEARING** _____

BORING DEPTH 25.1 ft. **GROUND WATER DEPTH: DURING** _____ **COMP.** _____ **DELAYED** 14.8 ft. after 260 hrs.

NOTES _____

SAMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective steel cover; 4-foot square concrete pad
5		- See PZ-18 I for material descriptions			
10					
15	▽				<p>Annular Seal: bentonite pellets</p> <p>Filter: silica filter sand</p>
20					<p>Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack</p>
25					<p>Sump:-0.5 ft. Cave-in to 24.2 ft.</p>
		Bottom of borehole at 25.1 feet.			
30					
35					
40					



LOG OF TEST BORING

BORING PZ-18 I
PAGE 1 OF 1
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 2/24/2014 COMPLETED 2/26/2014 SURF. ELEV. Not Surveyed COORDINATES: _____
 CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core
 DRILLED BY S. Denty LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____
 BORING DEPTH 38.8 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 14.7 ft. after 260 hrs.
 NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
					Completion: protective steel cover; 4-foot square concrete pad
5		Lean Clay (CL) - residuum dry, medium stiff, CLAY, red, micas, silt			
5		- ML: residuum dry, stiff, Clayey SILT, reds, mica			
10		- ML: residuum dry, stiff, Clayey SILT, yellow-red, micas			
15		- ML: saprolite very damp, stiff, Clayey SILT, yellow-red, light gray, pale yellow, micas			
20		- ML: saprolite wet, stiff, Clayey SILT, brown, white, micas, sand			
25		- ML: saprolite wet, hard, Clayey SILT, yellow-brown, dark gray, gray, micas, sand			
30		Felsic biotite GNEISS - medium to coarse grain, medium hard to hard, moderately to not weathered, flow banded, numerous fractures, dark gray, pale yellow, white banding, feldspar, quartz, biotite, pyrite - medium to coarse grain, medium hard to hard, slightly to not weathered, flow banded, few fractures, dark gray, white banding, feldspar, quartz, biotite, pyrite			
35		- medium to coarse grain, medium hard to hard, slightly to not weathered, flow banded, few fractures, dark gray, white banding, feldspar, quartz, biotite, pyrite			
40		Bottom of borehole at 38.8 feet.			

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

Annular Seal:
bentonite pellets

Filter:
silica filter sand

Standpipe:
2" OD PVC (SCH 40)
Screen:
10 ft; pre-pack

Sump: 0.100000000000001 ft.



LOG OF TEST BORING

BORING PZ-19 S
PAGE 1 OF 1
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 3/4/2014 COMPLETED 3/4/2014 SURF. ELEV. Not Surveyed COORDINATES: _____


CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger

DRILLED BY S. Denty LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 28 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 6 ft. after 42 hrs.

NOTES _____

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective steel cover; 4-foot square concrete pad
5		 - See PZ-19 I for material descriptions			
10					
15					
20					
25					Annular Seal: bentonite pellets Filter: silica filter sand Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
30		Bottom of borehole at 28.0 feet.			Sump: 0.399999999999999 ft. Cave-in to 28 ft.
35					
40					



LOG OF TEST BORING

BORING PZ-19 I
PAGE 1 OF 1
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 2/27/2014 COMPLETED 3/4/2014 SURF. ELEV. Not Surveyed COORDINATES: _____
 CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core
 DRILLED BY S. Denty LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____
 BORING DEPTH 43.7 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 7 ft. after 50 hrs.
 NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA	
					Completion: protective steel cover; 4-foot square concrete pad	
0 - 5		Lean Clay (CL) - residuum damp, soft, sandy CLAY, dark red-brown				
5 - 10		- SM: subsoil dry, very dense, silty SAND, pale gray-brown, gravel, weathered rock/boulder				
10 - 15		- ---no recovery/sampler plugged by gravel---				
15 - 20		- CL: saprolite damp, stiff, silty CLAY, dark red-brown, sand, micas				
20 - 25		- SM: saprolite very damp, dense, silty SAND, pale gray-brown with yellow mottles, clay, micas				
25 - 30		- SM: saprolite wet, very dense, silty SAND, dark yellow-brown, clay				
30 - 35		- SM: saprolite wet, very dense, silty SAND, red-yellow and pale gray-brown				
35 - 40		Felsic biotite GNEISS - medium to coarse grain, hard, slightly to not weathered, flow banded, few fractures, black and white banding, feldspar, quartz, biotite, feldsapr phenocrysts - medium to coarse grain, hard, slightly to not weathered, flow banded, few fractures, distinct black and white banding, feldspar, quartz, biotite, feldsapr phenocrysts				
40 - 43.7		- medium to coarse grain, hard, slightly to not weathered, flow banded, few fractures, distinct black and white banding, feldspar, quartz, biotite, feldsapr phenocrysts				

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

Annular Seal: bentonite pellets
 Filter: silica filter sand
 Standpipe: 2" OD PVC (SCH 40)
 Screen: 10 ft; pre-pack

Sump: 0.400000000000006 ft.

Bottom of borehole at 43.7 feet.



LOG OF TEST BORING

BORING PZ-20 S
PAGE 1 OF 1
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 3/5/2014 COMPLETED 3/5/2014 SURF. ELEV. Not Surveyed COORDINATES: _____

CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger

DRILLED BY S. Denty LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____

BORING DEPTH 15 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 9.4 ft. after 115 hrs.

NOTES _____

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION		GROUNDWATER OBSERVATIONS	WELL DATA
			Weak	Moderate Strong		
5		<p>- See PZ-20 I for material descriptions</p>				<p>Completion: protective steel cover; 4-foot square concrete pad</p>
10						
15						
20						
25						
30						
35						
40						
		Bottom of borehole at 15.0 feet.				



LOG OF TEST BORING

BORING PZ-20 I
PAGE 1 OF 1
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 3/5/2014 COMPLETED 3/5/2014 SURF. ELEV. Not Surveyed COORDINATES: _____
 CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core
 DRILLED BY S. Denty LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____
 BORING DEPTH 29.5 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 8.9 ft. after 115 hrs.
 NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
					Completion: protective steel cover; 4-foot square concrete pad
5		- CL: residuum damp, very stiff, silty CLAY, red, pale yellow mottles, sand, micas			
10		- SM: saprolite dry, medium dense, silty SAND, pale brown, fine to medium grained, gravel			
15		- SM: saprolite dry, very dense, silty SAND, brown, fine grained, gravel, some clay			
20		Felsic biotite GNEISS - fine to coarse grain, soft to hard, moderately to not weathered, flow banded, fractures, some weathered, gray with white banding, moderately weathered to 16 ft., then fresh, feldspar, quartz, biotite - medium to coarse grain, hard, not weathered, flow banded, very few fractures, dark gray to black with white banding, fresh			Annular Seal: bentonite pellets Filter: silica filter sand
25		- medium to coarse grain, hard to soft, not to highly weathered, flow banded, very few fractures, dark gray to black with white banding, fresh, highly weathered 24.5-25.3 ft.			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
30		Bottom of borehole at 29.5 feet.			Sump: 0.3999999999999999 ft.
35					
40					

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ



LOG OF TEST BORING

BORING PZ-21 S
PAGE 1 OF 1
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 3/11/2014 **COMPLETED** 3/11/2014 **SURF. ELEV.** Not Surveyed **COORDINATES:** _____

CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger

DRILLED BY S. Denty **LOGGED BY** W. Shaughnessy **CHECKED BY** _____ **ANGLE** _____ **BEARING** _____

BORING DEPTH 9.5 ft. **GROUND WATER DEPTH: DURING** _____ **COMP.** _____ **DELAYED** 4.3 ft. after 50 hrs.

NOTES _____

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\WSHAUGS\DESKTOP\BRANCH\PLANT BRANCH\PIEZOMETERS.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION		GROUNDWATER OBSERVATIONS	WELL DATA
			Weak	Moderate Strong		
5	▼	- See PZ-21 I for material descriptions				Completion: protective steel cover; 4-foot square concrete pad Annular Seal: bentonite pellets Filter: silica filter sand Standpipe: 2" OD PVC (SCH 40) Screen: 5 ft; pre-pack Sump: 0.4 ft. Cave-in to 9.8 ft.
10		Bottom of borehole at 9.5 feet.				
15						
20						
25						
30						
35						
40						



LOG OF TEST BORING

BORING PZ-21 I
PAGE 1 OF 1
ES

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Branch Hydrogeologic Study
LOCATION Milledgeville, GA

DATE STARTED 3/6/2014 COMPLETED 3/10/2014 SURF. ELEV. Not Surveyed COORDINATES: _____
 CONTRACTOR SCS Field Services EQUIPMENT CME 550 METHOD Hollow Stem Auger; Casing Advance; HQ Rock Core
 DRILLED BY S. Denty LOGGED BY W. Shaughnessy CHECKED BY _____ ANGLE _____ BEARING _____
 BORING DEPTH 24.4 ft. GROUND WATER DEPTH: DURING _____ COMP. _____ DELAYED 7.9 ft. after 50 hrs.
 NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
					Completion: protective steel cover; 4-foot square concrete pad
5		- CL: residuum damp, stiff, sandy CLAY, red-brown with red-yellow mottles, silt, micas			
10	 ▽	- MH: saprolite wet, stiff, sandy SILT, brown with pale yellow-brown mottles, clay, micas			
15		Felsic biotite GNEISS - medium to coarse grain, medium hard to hard, slightly to not weathered, flow banded, few fractures, dark gray to black with white bands, slightly weathered to 12 ft., then fresh, feldspar, quartz, biotite - medium to coarse grain, hard, not weathered, flow banded, very few fractures, fresh rock, feldspar, quartz, biotite, feldspar phenocrysts			Annular Seal: bentonite pellets Filter: silica filter sand
20		- medium to coarse grain, hard, not weathered, flow banded, very few fractures, fresh rock, feldspar, quartz, biotite, feldspar phenocrysts			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
25		Bottom of borehole at 24.4 feet.			Sump: 0.3999999999999999 ft.
30					
35					
40					

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 4/29/14 10:50 - \\ALTRCFP01\X2\W\SHAUGS\DESKTOP\BRANCH\PLANT BRANCH PIEZOMETERS.GPJ

RECORD OF BOREHOLE PZ-231

SHEET 1 of 2

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 67.00 ft
 LOCATION: Milledgeville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/27/16
 DATE COMPLETED: 7/29/16

NORTHING: 1,162,974.25
 EASTING: 2,557,877.88
 GS ELEVATION: 424.95
 TOC ELEVATION: 427.90 ft

DEPTH W.L.: 52.00
 ELEVATION W.L.:
 DATE W.L.: 07/29/2016
 TIME W.L.: na

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0		0.00 - 6.00 sandy SILT, fine sand, reddish brown, cohesive, w < PL	ML		418.95 6.00	1		6.00 6.00	<p>WELL CASING Interval: 0'-56.5' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 56.5'-66.5' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: PVC</p> <p>FILTER PACK Interval: 54.5'-67' Type: 54.5-55.0 - 30/45 Sand; 55.5-67 - #1 Sand</p> <p>FILTER PACK SEAL Interval: 48.5'-54.5' Type: 52.5'-54.5' - 3/8" Bentonite Pellets, 50.5'-52.5' - 3/8" Bentonite Chips</p> <p>ANNULUS SEAL Interval: 0' - 48.5' Type: Portland Cement (Type II)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminium</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: 4-inch Sonic</p>
5	420	6.00 - 16.00 silty SAND, fine to medium sand, light reddish brown, non-cohesive, moist, micaceous			408.95 16.00	2		8.00 10.00	
10	415	16.00 - 24.00 light grayish brown	SM		400.95 24.00	3		5.40 10.00	
15	410	24.00 - 36.00 silty SAND, fine to coarse, trace gravel, light grayish brown, moist, relict rock structure apparent, SAPROLITE			388.95	4		7.50 10.00	
20	405	36.00 - 37.00 No Recovery			36.00 387.95	5		0.00 1.00	
25	400	37.00 - 40.00 Biotite Gneiss, highly competent, little weathering	GNEISS		37.00	6		2.50 3.00	
30	395	40.00 - 42.00 Difficult drilling			384.95 40.00	7		0.00 6.00	
35	390	42.00 - 67.00 Biotite Gneiss			382.95 42.00			0.00 6.00	
45	380	Log continued on next page							

BOREHOLE RECORD: PLAT BRANCH LOGS.GPJ - PIEDMONT.GDT - 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade
 DRILLER: John Vasquez

GA INSPECTOR: Randy Pettyjohn
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE PZ-23I

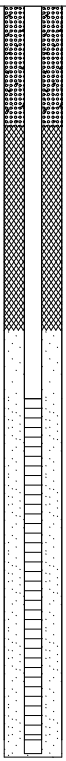
SHEET 2 of 2

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 67.00 ft
 LOCATION: Milledville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/27/16
 DATE COMPLETED: 7/29/16

NORTHING: 1,162,974.25
 EASTING: 2,557,877.88
 GS ELEVATION: 424.95
 TOC ELEVATION: 427.90 ft

DEPTH W.L.: 52.00
 ELEVATION W.L.:
 DATE W.L.: 07/29/2016
 TIME W.L.: na

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
45		42.00 - 67.00 Biotite Gneiss (Continued)				7				<p>WELL CASING Interval: 0'-56.5' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 56.5'-66.5' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: PVC</p> <p>FILTER PACK Interval: 54.5'-67' Type: 54.5-55.0 - 30/45 Sand; 55.5-67 - #1 Sand</p> <p>FILTER PACK SEAL Interval: 48.5'-54.5' Type: 52.5'-54.5' - 3/8" Bentonite Pellets, 50.5'-52.5' - 3/8" Bentonite Chips</p> <p>ANNULUS SEAL Interval: 0' - 48.5' Type: Portland Cement (Type II)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminium</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: 4-inch Sonic</p>
50	375				8		6.00 10.00			
55	370									
60	365				9		8.60 10.00			
65	360							#1 Sand - 0.010" Slot Size		
		Boring completed at 67.00 ft								
70	355									
75	350									
80	345									
85	340									
90	335									

BOREHOLE RECORD: PLAT BRANCH LOGS.GPJ - PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade
 DRILLER: John Vasquez

GA INSPECTOR: Randy Pettyjohn
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE PZ-261

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 30.50 ft
 LOCATION: Milledgeville, GA

DRILL RIG: TS-150 Track Mounted Rig
 DATE STARTED: 7/26/16
 DATE COMPLETED: 7/26/16

NORTHING: 1,160,669.95
 EASTING: 2,561,625.75
 GS ELEVATION: 368.10
 TOC ELEVATION: 370.93 ft

DEPTH W.L.: 18.71 (bgs)
 ELEVATION W.L.: 352.22 (amsl)
 DATE W.L.: 7/21/2016
 TIME W.L.: 13:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0		0.00 - 4.30 SILTY SAND, fine to coarse angular sand, non-plastic fines, trace fine to coarse sub-angular gravels; moderate reddish brown (10YR 4/6), some weathered micaceous grains, non-cohesive, compact, dry	SM	[Graphic Log]	363.8	1		6.90 7.00		<p>WELL CASING Interval: 0.0'-20.5' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 20.5'-30.5' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.006" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 17.0'-30.5' Type: 17.0'-18.0' 30/45 Sand - 18.0'-30.5' #1 Sand</p> <p>FILTER PACK SEAL Interval: 12.0'-17.0' Type: 12.0'-15.0' 3/8" Bentonite Chips - 15.0'-17.0' 3/8" Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 2'-12' Type: Portland Cement (Type II)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: 4-inch Sonic</p>
5		4.30 - 6.10 SAND, fine to medium sub-angular sand, trace fine angular gravel (weathered bedrock); dusky brown (5YR 2/2), completely weathered (W5), SAPROLITE; non-cohesive, dry, compact	SP	[Graphic Log]	6.10					
6		6.10 - 8.50 SILTY SAND, fine sand, non-plastic to low plasticity fines; light brown (5YR 6/6) to moderate reddish brown (10YR 4/6), highly weathered (W4), some relic foliations in core stones, weathered micaceous grains and quartz, SAPROLITE; cohesive, w-PL, firm	SM	[Graphic Log]	8.50	2				
7		8.50 - 9.40 Gravelly SAND, fine to medium angular sand, fine to coarse soft angular gravels (weathered core stones), trace non-plastic fines; very pale orange (10YR 8/6) with black (N1) and pale yellowish orange (10YR 6/6) core stones, highly weathered (W4), weathered micaceous grains, biotite, and quartz, SAPROLITE; non-cohesive, dry, dense	SP	[Graphic Log]	9.40					
10		9.40 - 12.80 SAND, medium to coarse sub-angular sand, some coarse soft angular gravels (weathered core stones); light brown (5YR 5/6), completely weathered (W5), SAPROLITE; non-cohesive, dry, dense to very dense	SM	[Graphic Log]	12.80	3				
12		12.80 - 14.30 SILTY SAND, fine to medium sub-angular sand, non-plastic to low plasticity fines, some fine to coarse soft angular gravels (weathered core stones); very pale orange (10YR 8/2) to dark yellowish orange (10YR 6/6), highly weathered (W4), weathered micaceous minerals, biotite and quartz, SAPROLITE; non-cohesive, moist, dense	TWR	[Graphic Log]	14.30					
15		14.30 - 15.50 TRANSITIONALLY WEATHERED ROCK, fine to medium sub-angular sand, non-plastic to low plasticity fines, trace soft angular gravels (weathered core stones); light gray (N7), medium weathered (W3), quartz and biotite, non-cohesive, moist, very dense	GNEISS	[Graphic Log]	15.50	4				
17		15.50 - 20.00 BEDROCK, Fresh (W1) to slightly weathered (W2), strongly foliated (1 to 2 cm thick), light gray (N7) to grayish black (N2) mottled brownish gray (5YR 4/1) and medium bluish gray (5B 5/10) with some light brown (5YR 5/6) staining, fine to medium grained, non-porous to faintly porous, very strong (R4), GNEISS with hornblende, biotite and quartz, moist.		[Graphic Log]	20.00					
20		20.00 - 30.50 fresh (W1), some weathered fracture surfaces (spaced ~2 feet apart), trace weathered micaceous grains		[Graphic Log]	30.50	5				
25		Boring completed at 30.50 ft		[Graphic Log]	30.50					

BOREHOLE RECORD PLAT BRANCH LOGS.GPJ - PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Trenton Herod

GA INSPECTOR: Jeffrey Ingram
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE PZ-281

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 25.00 ft
 LOCATION: Milledgeville, GA

DRILL RIG: Mini-Sonic Track Mounted Rig
 DATE STARTED: 7/23/16
 DATE COMPLETED: 7/24/16

NORTHING: 1,159,504.90
 EASTING: 2,560,150.20
 GS ELEVATION: 362.40
 TOC ELEVATION: 364.88 ft

DEPTH W.L.: 10.5 (bgs)
 ELEVATION W.L.: 354.38 (amsl)
 DATE W.L.: 7/23/16
 TIME W.L.: 7:30

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0		0.00 - 5.00 SILT, NP, some fine-medium sand, trace subrounded fine gravel; reddish brown mottled light grey, whigly weathered, massive, micaceous, SAPROLITE; NC, dry, compact	ML		357.4 5.00 356.3	1		4.00 5.00		<p>WELL CASING Interval: 0'-14.0' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 14.0'-24.0' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 11.0'-24.0' Type: 11.0'-12.0', 30/45 fine sand; 12.0'-24.0', #1 sand</p> <p>FILTER PACK SEAL Interval: 6.0'-11.0' Type: 6.0'-9.0', 3/8" Bentonite Chips; 9.0'-11.0', Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 11.0'-24.0' Type: Portland Cement (Type I)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: 4-inch Sonic</p>
5		5.00 - 6.10 sandy SILT, NP, finesand, trace subrounded fine quartz gravel; light reddish grey brown, moderately weathered, massive, micaceous, SAPROLITE; NC, dry, loose	MLS		6.10	2		5.00 5.00		
355		6.10 - 9.50 SAND, poorly graded, fine-medium grain, some silt, trace subangular coarse gravel; grey lightly weathered, massive, micaceous, SAPROLITE; NC, dry, very loose	SP		352.9 352.4 351.6 350.9					
10		9.50 - 10.00 TRANSITIONALLY WEATHERED ROCK, slightly weathered, foliated; brown to light yellowish brown, medium crystalline, weak rock, biotite GNEISS, biotite, quartz, feldspar, intensely fractured	TWR SPG		11.50	3		5.00 5.00		
350		10.00 - 10.80 gravelly SAND, well graded, medium-coarse grain, some subangular coarse grain gravel, trace silt, trace subrounded cobbles; olive brown, moderately weathered, massive, homogenous, micaceous, SAPROLITE; NC, moist, loose	ML SPG		347.4 15.00					
15		10.80 - 11.50 SILT, NP, some medium-coarse sand, trace quartz fine angular gfael; reddish brown, moderately weathered, massive, micaceous, SAPROLITE; cohesive, wet, firm	TWR		344.6 17.80	4		3.50 5.00		
345		11.50 - 15.00 gravelly SAND, well graded, medium-coarse grain, some subangular coarse grain gravel, trace silt, trace subrounded cobbles; olive brown, moderately weathered, massive, homogenous, micaceous, SAPROLITE; NC, moist, loose	TWR		342.4 20.00					
20		15.00 - 17.80 TRANSITIONALLY WEATHERED ROCK, slightly weathered, foliated; grey brown to light yellowish brown, medium crystalline, weak rock, biotite GNEISS, biotite, quartz, feldspar, moderately fractured, fine-medium sand present, wet	GNEISS		337.4	5		5.00 5.00		
340		17.80 - 20.00 sluff in hole	GNEISS							
25		20.00 - 25.00 BEDROCK, biotite GNEISS, fresh, foliated, dark grey and light grey, yellow brown discoloration, medium-very coarsely crystalline, little fracures, biotite, quartz, feldspar, wet	GNEISS							
340		Boring completed at 25.00 ft								

BOREHOLE RECORD PLAT BRANCH LOGS2.GPJ PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Scotty Vermillon

GA INSPECTOR: Will Ethier
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE PZ-31S

SHEET 1 of 1

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 39.50 ft
 LOCATION: Milledgville, GA

DRILL RIG: Prosonic Truck Mounted Rig
 DATE STARTED: 7/15/16
 DATE COMPLETED: 7/26/16

NORTHING: 1,160,937.05
 EASTING: 2,557,972.68
 GS ELEVATION: 374.21
 TOC ELEVATION: 376.94 ft

DEPTH W.L.: 19.6 (bgs)
 ELEVATION W.L.: 357.34 (amsl)
 DATE W.L.: 7/26/16
 TIME W.L.: 10:07

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0		0.00 - 5.50 sandy SILT, NP, medium grain, trace fine gravel; reddish brown, massive, micaceous, SAPROLITE; NC, dry loose	MLS	[Pattern]	368.71	1		7.00 7.00		<p>WELL CASING Interval: 0'-29.5' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 29.5'-39.5' Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 26.5'-39.5' Type: 26.5'-27.5', 30/45 fine sand; 27.5'-39.5', #1 sand</p> <p>FILTER PACK SEAL Interval: 21.5'-26.5' Type: 21.5'-24.5', 3/8" Bentonite Chips; 24.5'-26.5', Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 2.0'-21.5' Type: Portland Cement (Type I)</p> <p>WELL COMPLETION Pad: 4"x4"x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: 4-inch Sonic</p>
370		5.50 - 5.80 SAND, poorly graded, fine grain; light yellowish brown; NC, dry, loose	SP MLS	[Pattern]	5.80 367.21					
5		5.80 - 7.00 sandy SILT, NP, medium grain, trace fine gravel; reddish brown, massive, micaceous, SAPROLITE; NC, dry, loose			7.00					
365		7.00 - 9.50 fine sand, trace coarse subangular sand; brown, homogenous, micaceous, SAPROLITE; NC, dry, compact			364.71					
10		9.50 - 17.00 SAND, well graded, medium grain, trace subrounded coarse sand, trace silt; grey brown with white mottle, massive, micaceous, SAPROLITE; NC, dry (moist at 16 ft), compact	SW	[Pattern]	9.50	2		10.00 10.00		
360					357.21					
15					17.00					
355		17.00 - 19.50 clayey SAND, medium grain, poorly graded, highly plastic clay, trace subangular coarse sand; yellowish brown sand, grey clay, moderately weathered, heterogenous, micaceous; NC, moist, slightly loose	SC	[Pattern]	354.71					
20		19.50 - 23.00 poorly graded, medium grain sand, low plastic clay; grey with brown mottling, homogenous, micaceous, SAPROLITE; cohesive, wet, firm	SC	[Pattern]	19.50	3		10.00 10.00		
350		23.00 - 25.00 highly plastic clay, trace subangular coarse sand; yellowish brown sand, grey clay, moderately weathered, heterogenous, micaceous, SAPROLITE; NC, moist, slightly loose	SC	[Pattern]	349.21					
25		25.00 - 27.00 well graded, medium-coarse grained sand, few clay, trace subangular fine gravel, trace cobbles; dark grey clay, light brown sand with white mottling, heterogenous, micaceous, SAPROLITE; NC, moist, loose	SC	[Pattern]	347.21					
345		27.00 - 29.50 CLAYEY SAND, poorly graded, medium grained sand, low plastic clay; grey with brown mottling, homogenous, micaceous, SAPROLITE; cohesive, wet, firm	SC	[Pattern]	27.00					
30		29.50 - 31.50 gravelly SAND, medium-coarse sand, well graded, some angular cobbles; grey-white mottling, highly weathered bedrock, micaceous; NC, wet, very loose	SPG	[Pattern]	344.71					
340		31.50 - 33.00 TRANSITIONALLY WEATHERED ROCK, biotite GNEISS, highly weathered, yellow, white brown, medium-coarsely crystalline, soft rock, feldspar, quartz, biotite, pulverized rock, moist, highly fractured	TWR	[Pattern]	342.71	4		10.00 10.00		
35		33.00 - 37.00 No Recovery			31.50					
335		37.00 - 37.80 stuff in hole			341.21					
40		37.80 - 38.00 TRANSITIONALLY WEATHERED ROCK, biotite GNEISS, highly weathered, yellow, white brown, medium-coarsely crystalline, soft rock, feldspar, quartz, biotite, pulverized rock, wet, highly fractured			337.21					
330		38.00 - 39.50 No Recovery			336.41	5		1.00 2.50		
45		Boring completed at 39.50 ft								

BOREHOLE RECORD PLAT BRANCH LOGS2.GPJ PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: John Vasquez

GA INSPECTOR: Will Ethier
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE PZ-22S/PZ-39

SHEET 1 of 2

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 56.50 ft
 LOCATION: Milledville, GA

DRILL RIG: TS-150 Track Mounted Rig
 DATE STARTED: 7/30/16
 DATE COMPLETED: 7/30/16

LOCATION: 33.196253/-83.313844
 GS ELEVATION: 431.76
 TOC ELEVATION: 434.70

DEPTH W.L.: 46.02 (bgs)
 ELEVATION W.L.: 388.68 (amsl)
 DATE W.L.: 08/02/2016
 TIME W.L.: 14:15

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
0		0.00 - 10.00 SILT, NP; reddish brown, moderately weathered, massive, micaceous, SAPROLITE; cohesive, dry, firm	ML			1		10.00 10.00		<p>WELL CASING Interval: 0'-34.7' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 34.7'-44.7' Material: U-Pack Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 31.4'-44.7' Type: 31.4'-32.5', 30/45 fine sand; 32.5'-44.7', #1 sand</p> <p>FILTER PACK SEAL Interval: 26.2'-31.4' Type: 26.2'-29.4', 3/8" Bentonite Chips; 29.4'-31.4', Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 2'-26.2' Type: Portland Cement (Type II)</p> <p>WELL COMPLETION Pad: 4'x4'x4" Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: N/A</p>
5		10.00 - 15.00 No Recovery			10.00					
10		15.00 - 19.50 SILT, NP, trace fine sand; reddish brown, moderately weathered, massive, micaceous, SAPROLITE; cohesive, dry, firm	ML		15.00	2		5.00 10.00		
15		19.50 - 20.00 trace fine-coarse sand; white mottling, relict rock structure, micaceous, SAPROLITE; cohesive, dry, soft		19.50						
20		20.00 - 22.00 No Recovery		20.00						
25		22.00 - 30.00 SILT, NP, trace fine-coarse sand; reddish brown with white mottling, moderately weathered, relict rock structure, micaceous, SAPROLITE; cohesive, moist, soft	ML		22.00	3		8.00 10.00		
30		30.00 - 33.00 No Recovery			30.00					
35		33.00 - 34.00 SILT, NP, trace fine-coarse sand; reddish brown with white mottling, moderately weathered, relict rock structure, micaceous, SAPROLITE; cohesive, moist, soft	ML		33.00	4		7.00 10.00		
40		34.00 - 40.00 light grey brown		34.00						
45		40.00 - 45.20 sandy SILT, NP, fine-medium grain sand, trace coarse sand; reddish light grey brown mottled, moderately weathered, relict foliation structure, micaceous, SAPROLITE; cohesive, wet, very soft	MLS		40.00	5		6.50 6.50		

Log continued on next page

BOREHOLE RECORD PLAT BRANCH LOGS2.GPJ PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Trenton Herod

GA INSPECTOR: Will Ethier
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE PZ-22S/PZ-39

SHEET 2 of 2

PROJECT: SCS Plant Branch
 PROJECT NUMBER: 166-0939
 DRILLED DEPTH: 56.50 ft
 LOCATION: Milledgeville, GA

DRILL RIG: TS-150 Track Mounted Rig
 DATE STARTED: 7/30/16
 DATE COMPLETED: 7/30/16

LOCATION: 33.196253/-83.313844
 GS ELEVATION: 431.76
 TOC ELEVATION: 434.70

DEPTH W.L.: 46.02 (bgs)
 ELEVATION W.L.: 388.68 (amsl)
 DATE W.L.: 08/02/2016
 TIME W.L.: 14:15

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC		
45		45.20 - 46.20 silty SAND, well graded fine-coarse sand, angular, NP, trace subangular cobbles, weathered bedrock, quartz, mica; grey brown, lightly weathered, relict foliation structures, micaceous, SAPROLITE, cohesive, wet, very soft	SM	[Graphic Log: Sand]	45.20	5		6.50 6.50		<p>WELL CASING Interval: 0'-34.7' Material: Schedule 40 PVC Diameter: 2" Joint Type: Threaded</p> <p>WELL SCREEN Interval: 34.7'-44.7' Material: U-Pack Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: Schedule 40 PVC</p> <p>FILTER PACK Interval: 31.4'-44.7' Type: 31.4'-32.5', 30/45 fine sand; 32.5'-44.7', #1 sand</p> <p>FILTER PACK SEAL Interval: 26.2'-31.4' Type: 26.2'-29.4', 3/8" Bentonite Chips; 29.4'-31.4', Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 2'-26.2' Type: Portland Cement (Type II)</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: Anodized Aluminum</p> <p>DRILLING METHODS Soil Drill: 4-inch Sonic Rock Drill: N/A</p>
		46.20 - 56.50 Fresh, foliated, dark grey, white, red, finely-medium crystalline, highly competent rock, biotite GNEISS, little fractured	GNEISS	[Graphic Log: Gneiss]	46.20	6		3.50 3.50		
		Boring completed at 56.50 ft								

BOREHOLE RECORD PLAT BRANCH LOGS2.GPJ PIEDMONT.GDT 9/18/17

LOG SCALE: 1 in = 5.5 ft
 DRILLING COMPANY: Cascade Drilling
 DRILLER: Trenton Herod

GA INSPECTOR: Will Ethier
 CHECKED BY: Rachel P. Kirkman, P.G.
 DATE: 9/29/17



RECORD OF BOREHOLE PZ-43

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 41.50 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/6/18
 DATE COMPLETED: 2/7/18

NORTHING: 1,162,159.80
 EASTING: 2,562,031.35
 GS ELEVATION: NA
 TOC ELEVATION: 383.75 ft

DEPTH W.L.: 30.60
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0		0.00 - 8.50 Soil was removed by Hydorvac to 8.5 ft bgs							<p>WELL CASING Interval: 0-30 Material: Schedule 40 PVC Diameter: 1 inch Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 30.0-40.0 Material: .010 Slotted Screen Diameter: 1 inch Slot Size: .010" End Cap: 40-40.4</p> <p>FILTER PACK Interval: 28.0-41.5 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 23.0-28.0 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-23.0 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: Protective Casing:</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
5									
10		8.50 - 17.00 FILL, Silty SAND, sands fine to medium, reddish brown, micaceous, non-cohesive, moist, loose.	SM	8.50					
15								Portland Cement and Quick Gel Bentonite Mix	
20		17.00 - 39.50 RESIDUUM, Silty SAND, sands fine to coarse, grayish brown, micaceous, non-cohesive, moist to wet, loose. Final three inches is transitionally weathered rock.		17.00					
25								3/8" PEL-PLUG Bentonite Pellets	
30			SM					FilterSil	
35								One inch piezometer pipe	
40			BR	39.50					

Log continued on next page

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: Ben Hodges
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-43



SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 41.50 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/6/18
 DATE COMPLETED: 2/7/18

NORTHING: 1,162,159.80
 EASTING: 2,562,031.35
 GS ELEVATION: NA
 TOC ELEVATION: 383.75 ft

DEPTH W.L.: 30.60
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
45		39.50 - 41.50 BIOTITE GNEISS, slightly weathered to fresh, very thin layer of saprolite, thinly banded, white and black, phaneritic. <i>(Continued)</i> Boring completed at 41.50 ft	BR						<p>WELL CASING Interval: 0-30 Material: Schedule 40 PVC Diameter: 1 inch Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 30.0-40.0 Material: .010 Slotted Screen Diameter: 1 inch Slot Size: .010" End Cap: 40-40.4</p> <p>FILTER PACK Interval: 28.0-41.5 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 23.0-28.0 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-23.0 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: Protective Casing:</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
50									
55									
60									
65									
70									
75									
80									

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: Ben Hodges
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-44

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 57.00 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/1/18
 DATE COMPLETED: 2/2/18

NORTHING: 1,161,723.84
 EASTING: 2,561,586.79
 GS ELEVATION: 380.49
 TOC ELEVATION: 383.12 ft

DEPTH W.L.: 24.83
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0	380	0.00 - 8.00 Soil was removed by Hydrovac from 0-8 ft bgs						Grout Mix and Stainless Steel Casing	WELL CASING Interval: 0-47 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 46.6-56.6 Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" Slotted End Cap: 56.6-57
5	375								
10	370	8.00 - 29.00 FILL, SAND with trace silt and trace gravel, reddish brown, non-cohesive, moist.		SP-SM	372.49 8.00			Portland Cement and Quick Gel Bentonite Mix	FILTER PACK Interval: 45-57 Type: FilterSil FILTER PACK SEAL Interval: 40-45 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-40 Type: Portland Cement and Quick Gel Bentonite Mix
15	365				R1	ROTO SONIC	6.00 10.00		
20	360				R2	ROTO SONIC	9.00 10.00		
25	355				R3	ROTO SONIC	9.00 10.00		
30	350	29.00 - 48.00 RESIDUUM, SAND with trace silt and trace gravel, grayish brown, micaceous, non-cohesive, moist.		SP	351.49 29.00				WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5" DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
35	345				R4	ROTO SONIC	10.00 10.00		
40	340								

Log continued on next page

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-44

SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 57.00 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/1/18
 DATE COMPLETED: 2/2/18

NORTHING: 1,161,723.84
 EASTING: 2,561,586.79
 GS ELEVATION: 380.49
 TOC ELEVATION: 383.12 ft

DEPTH W.L.: 24.83
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE			REC
45	335	29.00 - 48.00 RESIDUUM, SAND with trace silt and trace gravel, grayish brown, micaceous, non-cohesive, moist. <i>(Continued)</i>	SP		332.49 48.00	R4	ROTO SONIC	10.00 10.00		<p>WELL CASING Interval: 0-47 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 46.6-56.6 Material: Schedule 40 PVC Diameter: 2" Slot Size: 0.010" Slotted End Cap: 56.6-57</p> <p>FILTER PACK Interval: 45-57 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 40-45 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-40 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5'</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
50	330	48.00 - 51.00 TRANSITIONALLY WEATHERED ROCK, recovered as rock flour, gravel, and cobbles.	TWR		329.49 51.00			FilterSil		
55	325	51.00 - 57.00 BIOTITE GNEISS, slightly weathered to fresh, white/black, phaneritic, strong, oxide staining on discontinuities.	BR		323.49			0.010 Schedule 40 Slotted Screen		
		Boring completed at 57.00 ft								

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-46

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 47.00 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/5/18
 DATE COMPLETED: 2/5/18

NORTHING: 1,162,755.59
 EASTING: 2,560,558.42
 GS ELEVATION: 382.11
 TOC ELEVATION: 384.70 ft

DEPTH W.L.: 8.85
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0	380	0.00 - 8.00 Soil was removed by Hydrovac from 0-8 ft bgs.						Grout mix and stainless steel casing	WELL CASING Interval: 0-35.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 35.6-45.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 45.6-47 FILTER PACK Interval: 34-46 Type: FilterSil FILTER PACK SEAL Interval: 29-34 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-29 Type: Portland Cement and Quick Gel Bentonite Mix WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5" DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
5	375				374.11				
10	370	8.00 - 37.00 RESIDUUM, silty Sand, sands fine to coarse, dark brown, micaceous, non-cohesive, moist, loose.	SM	8.00				Portland Cement and Quick Gel Bentonite Mix	
15	365								
20	360								
25	355								
30	350							3/8" PEL-PLUG Bentonite Pellets	
35	345							FilterSil	
37.00 - 39.00		TRANSITIONALLY WEATHERED ROCK (BIOTITE GNEISS), core presented as rock flour, and gravel/cobbles, black and white with light green coating around rock, highly mafic, thinly laminated, fine grained, soft.	TWR		345.11 37.00				
39.00 - 47.00		BIOTITE GNEISS, slightly weathered to fresh, thickly banded, white and black, phaneritic, very strong. <i>Log continued on next page</i>	BR		343.11 39.00			0.010" Slotted Schedule 40 PVC	

BOREHOLE RECORD 1666254-01.GPJ, PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: Ben Hodges
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-46

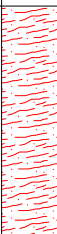
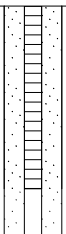
SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 47.00 ft
 LOCATION: Former Coal Pile

DRILL RIG: Pro Sonic 150
 DATE STARTED: 2/5/18
 DATE COMPLETED: 2/5/18

NORTHING: 1,162,755.59
 EASTING: 2,560,558.42
 GS ELEVATION: 382.11
 TOC ELEVATION: 384.70 ft

DEPTH W.L.: 8.85
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
340		39.00 - 47.00 BIOTITE GNEISS, slightly weathered to fresh, thickly banded, white and black, phaneritic, very strong. <i>(Continued)</i>	BR		335.11				<p>WELL CASING Interval: 0-35.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 35.6-45.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 45.6-47</p> <p>FILTER PACK Interval: 34-46 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 29-34 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-29 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5'</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
335		Boring completed at 47.00 ft							
45									
50									
55									
60									
65									
70									
75									
80									

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: Ben Hodges
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-48

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 67.00 ft
 LOCATION: South of Skills Center

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/24/18
 DATE COMPLETED: 1/25/18

NORTHING: 1,163,047.72
 EASTING: 2,558,444.99
 GS ELEVATION: 418.30
 TOC ELEVATION: 421.05 ft

DEPTH W.L.: 30.55
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0		0.00 - 8.00 Soil removed by Hydrovac from 0-8 ft bgs.						Grout mix with stainless steel casing	WELL CASING Interval: 0-56.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 56.6-66.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 66.6-67 FILTER PACK Interval: 55-67 Type: FilterSil FILTER PACK SEAL Interval: 50-55 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-50 Type: Portland Cement and Quick Gel Bentonite Mix WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5' DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
415									
410		8.00 - 17.00 FILL, silty SAND, reddish brown, micaceous, moist, non-cohesive.			410.3 8.00			Portland Cement and Quick Gel Bentonite Mix	
405			SM			R1	ROTO SONIC		10.00 10.00
400		17.00 - 64.50 RESIDUUM, SAND with some silt, grayish brown with white mottling, occasional relic structure, micaceous, dry, non-cohesive.			401.3 17.00				
395						R2	ROTO SONIC	10.00 10.00	
390			SM			R3	ROTO SONIC	10.00 10.00	
385						R4	ROTO SONIC	10.00 10.00	
380									
40									

Log continued on next page

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-48

SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 67.00 ft
 LOCATION: South of Skills Center

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/24/18
 DATE COMPLETED: 1/25/18

NORTHING: 1,163,047.72
 EASTING: 2,558,444.99
 GS ELEVATION: 418.30
 TOC ELEVATION: 421.05 ft

DEPTH W.L.: 30.55
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
375		17.00 - 64.50 RESIDUUM, SAND with some silt, grayish brown with white mottling, occasional relic structure, micaceous, dry, non-cohesive. <i>(Continued)</i>							<p>WELL CASING Interval: 0-56.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread</p> <p>SURFACE CASING Interval: Material: Diameter:</p> <p>WELL SCREEN Interval: 56.6-66.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 66.6-67</p> <p>FILTER PACK Interval: 55-67 Type: FilterSil</p> <p>FILTER PACK SEAL Interval: 50-55 Type: 3/8" PEL-PLUG Bentonite Pellets</p> <p>ANNULUS SEAL Interval: 0-50 Type: Portland Cement and Quick Gel Bentonite Mix</p> <p>WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5'</p> <p>DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core</p>
45					R4	ROTO SONIC	10.00 10.00		
370									
50								3/8" PEL-PLUG Bentonite Pellets	
365			SM		R5	ROTO SONIC	10.00 10.00		
55								FilterSil	
360								0.010" Slotted Schedule 40 PVC	
60									
355					R6	ROTO SONIC	10.00 10.00		
65		64.50 - 65.50 TRANSITIONALLY WEATHERED ROCK, sampled as sand and gravel with trace silt, grayish brown, subangular, non-cohesive.	TWR	▲▲▲▲			353.8 64.50 352.8		
		65.50 - 67.00 BIOTITE GNEISS, fresh, with biotite/muscovite/feldspar/quartz, white/black, weak foliation near horizontal, phaneritic, strong.	BR	▬▬▬▬			65.50 351.3		
350		Boring completed at 67.00 ft							
70									
345									
75									
340									
80									

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-49

SHEET 1 of 1

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 27.00 ft
 LOCATION: Near former pyrite pit

DRILL RIG: Pro Sonic 150
 DATE STARTED: 1/30/18
 DATE COMPLETED: 1/30/18

NORTHING: 1,163,321.94
 EASTING: 2,561,124.93
 GS ELEVATION: 382.10
 TOC ELEVATION: 385.06 ft

DEPTH W.L.: 8.10
 DATE W.L.: 2/14/18
 TIME W.L.:

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			MONITORING WELL/PIEZOMETER DIAGRAM and NOTES	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE		
0		0.00 - 2.00 FILL, silty SAND with trace gravel, reddish brown, micaceous, moist, non-cohesive.	SM		380.1			Grout mix and stainless steel casing Portland Cement and Quick Gel Bentonite Mix FilterSil 0.010" Slotted Schedule 40 PVC 3/8" PEL-PLUG Bentonite Pellets	WELL CASING Interval: 0-6.6 Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Thread SURFACE CASING Interval: Material: Diameter: WELL SCREEN Interval: 6.6-16.6 Material: 0.010" Slotted Schedule 40 PVC Diameter: 2" Slot Size: 0.010" End Cap: 16.6-17 FILTER PACK Interval: 5-18 Type: FilterSil FILTER PACK SEAL Interval: 2-5 Type: 3/8" PEL-PLUG Bentonite Pellets ANNULUS SEAL Interval: 0-2 Type: Portland Cement and Quick Gel Bentonite Mix WELL COMPLETION Pad: 4'x4' Protective Casing: 4"x4"x5' DRILLING METHODS Soil Drill: Rotosonic Rock Drill: Core
380		2.00 - 7.00 RESIDUUM SAND, reddish brown, micaceous, moist, non-cohesive.	SP		2.00				
5									
375		7.00 - 27.00 BIOTITE GNEISS, slightly weathered to fresh, thinly bedded, white/black, phaneritic, strong.	BR		375.1				
10									
370						R1	ROTO SONIC	6.00 10.00	
15									
365									
20									
360						R2	ROTO SONIC	8.00 10.00	
25									
355		Boring completed at 27.00 ft			355.1				
30									
350									
35									
345									
40									

BOREHOLE RECORD 1666254-01.GPJ PIEDMONT.GDT 5/30/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade
 DRILLER: Matt Pope

GA INSPECTOR: David Hannam
 CHECKED BY: TIR
 DATE: 2/15/18



RECORD OF BOREHOLE PZ-51S

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 50.00 ft

DRILL RIG: 8140LC
 DATE STARTED: 8/2/18
 DATE COMPLETED: 8/2/18

NORTHING: 1,161,613.91
 EASTING: 2,562,432.18
 GS ELEVATION: 377.63 ft
 TOC ELEVATION: 380.19 ft

DEPTH W.L.: 35.60 ft
 ELEVATION W.L.: 344.59 ft
 DATE W.L.: 8/1/18
 TIME W.L.: 14:56:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES				DIAGRAM and NOTES MONITORING WELL/ PIEZOMETER	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE		
0		0.00 - 10.00 Soil was hydrovacuumed to 10 feet.							PZ-51S 2.56 ft-ags Stick up Portland Cement and Quick Gel - Bentonite Mix 3/8' PEL-PLUG Bentonite Pellets	PZ-51S Borehole Diameter: 6 WELL CASING Interval: 0-50' Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Screen WELL SCREEN Interval: 40.0-45.0' Material: 0.010" Slotted Schedule 40 PVC Pre-Pack Screen Diameter: 2 Slot Size: 0.10 End Cap: 45.4 FILTER PACK Interval: 35.7-47 Type: FilterSil Quantity: 4 - 50lb bags FILTER PACK SEAL Interval: 45.4-47.0' Type: 3/8" PEL-PLUG Quantity: 5 gallons ANNULUS SEAL Interval: 0-33.2' Type: Portland Cement and Quick Gel Bentonite Mix Quantity: Cement: 4 - 94lb bags Water: 20 gallons
375										
5										
370										
10		10.00 - 20.00 Silty SAND, reddish brown, fine to medium grained, some relic structure, micaceous, cohesive, w>PL, dry, loose	SM	[Vertical Line]	367.63 10.00	No Data	S - 1	ROTO SONIC	3.70 10.00	
365										
15										
360										
20		20.00 - 30.00 Silty SAND, reddish brown with black sand intrusions, fine to medium grained, micaceous, non-cohesive, moist, loose	SM	[Vertical Line]	357.63 20.00	No Data	S - 2	ROTO SONIC	9.10 10.00	
355										
25										
350										
30		30.00 - 35.00 silty to clayey SAND, reddish brown w/ black sand intrusions, fine to medium grain, micaceous, non-cohesive, moist to wet	SC-SM	[Diagonal Hatching]	347.63 30.00	No Data	S - 3	ROTO SONIC	5.00 5.00	
345										
35		35.00 - 45.00 silty SAND, reddish brown, fine to medium grained, micaceous, non-cohesive, moist to wet	SM	[Vertical Line]	342.63 35.00	No Data	S - 4	ROTO SONIC	10.00 10.00	
340										
40		Log continued on next page								

AA BOREHOLE RECORD PLANT_BRANCH_20181002.GPJ GOLDBER NJ-PA 05-24-06.GDT 10/2/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade Environmental, LLC
 DRILLER: M.Rodriguez

GA INSPECTOR: Ben Hodges
 CHECKED BY: Rachel Kirkman, PG
 DATE: 9/6/18



RECORD OF BOREHOLE PZ-51S

SHEET 2 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 50.00 ft

DRILL RIG: 8140LC
 DATE STARTED: 8/2/18
 DATE COMPLETED: 8/2/18

NORTHING: 1,161,613.91
 EASTING: 2,562,432.18
 GS ELEVATION: 377.63 ft
 TOC ELEVATION: 380.19 ft

DEPTH W.L.: 35.60 ft
 ELEVATION W.L.: 344.59 ft
 DATE W.L.: 8/1/18
 TIME W.L.: 14:56:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES				DIAGRAM and NOTES MONITORING WELL/ PIEZOMETER	WELL CONSTRUCTION DETAILS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE			REC / ATT
40		35.00 - 45.00 silty SAND, reddish brown, fine to medium grained, micaeous, non-cohesive, moist to wet <i>(Continued)</i>	SM		332.63 45.00	No Data	S - 4	ROTO SONIC	10.00 10.00	<p style="text-align: center;">PZ-51S</p> <p>FilterSil - 0.010" Slotted Schedule 40 PVC Pre-Pack Screen</p> <p>End Cap -</p> <p>3/8" PEL-PLUG Bentonite Pellets</p>	<p>PZ-51S Borehole Diameter: 6</p> <p>WELL CASING Interval: 0-50' Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Screen</p> <p>WELL SCREEN Interval: 40.0-45.0' Material: 0.010" Slotted Schedule 40 PVC Pre-Pack Screen Diameter: 2" Slot Size: 0.10 End Cap: 45.4</p> <p>FILTER PACK Interval: 35.7-47 Type: FilterSil Quantity: 4 - 50lb bags</p> <p>FILTER PACK SEAL Interval: 45.4-47.0' Type: 3/8" PEL-PLUG Quantity: 5 gallons</p> <p>ANNULUS SEAL Interval: 0-33.2' Type: Portland Cement and Quick Gel Bentonite Mix Quantity: Cement: 4 - 94lb bags Water: 20 gallons</p>
45		45.00 - 50.00 high plastic CLAY with some sand, dark brown, fine to coarse sand, dark brown, cohesive, dry, firm to stiff	CH			No Data	S - 5	ROTO SONIC	5.00 5.00		
50		Boring completed at 50.00 ft									
55											
60											
65											
70											
75											
80											

AA BOREHOLE RECORD PLANT_BRANCH_20181002.GPJ GOLDBER NJ-PA 05-24-06.GDT 10/2/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade Environmental, LLC
 DRILLER: M.Rodriguez

GA INSPECTOR: Ben Hodges
 CHECKED BY: Rachel Kirkman, PG
 DATE: 9/6/18



RECORD OF BOREHOLE PZ-51I

SHEET 1 of 2

PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 65.00 ft

DRILL RIG: 8140LC
 DATE STARTED: 8/1/18
 DATE COMPLETED: 8/1/18

NORTHING: 1,161,631.46
 EASTING: 2,562,438.27
 GS ELEVATION: 377.79 ft
 TOC ELEVATION: 380.60 ft

DEPTH W.L.: 35.20 ft
 ELEVATION W.L.: 345.40 ft
 DATE W.L.: 8/3/18
 TIME W.L.: 08:33:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE				SAMPLES				DIAGRAM and NOTES MONITORING WELL/ PIEZOMETER	WELL CONSTRUCTION DETAILS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER	TYPE	REC / ATT			
0		0.00 - 10.00 Soil was hydrovacuumed to 10 feet.									<p style="text-align: center;">PZ-51I</p> <p style="text-align: center;">2.81 ft-aggs Stick up</p>	<p>PZ-51I Borehole Diameter: 6</p> <p>WELL CASING Interval: 0-65' Material: Schedule 40 PVC Diameter: 2" Joint Type: Flush/Screen</p> <p>WELL SCREEN Interval: 54.9-64.9' Material: 0.010" Slotted Schedule 40 PVC Pre-Pack Screen Diameter: 2 Slot Size: 0.010 End Cap: 65.3</p> <p>FILTER PACK Interval: 52.5-65.0 Type: FilterSilt Quantity: 5 - 50 lb bags</p> <p>FILTER PACK SEAL Interval: 49.2-52.5' Type: 3/8" PEL-PLUG Quantity: 5 gallons</p> <p>ANNULUS SEAL Interval: 0-49.2 Type: Portland Cement and Quick Gel Bentonite Mix Quantity: Cement: 6 - 94lb bags Water: 75 gallons</p>
10		10.00 - 20.00 silty SAND, reddish brown with white mottling, fine to coarse, some relic structure, non-cohesive, dy, loose	SM		367.79 10.00	No Data	S - 1	ROTO SONIC	2.70 10.00			
20		20.00 - 25.00 silty SAND with trace gravel, fine to coarse	SM		357.79 20.00	No Data	S - 2	ROTO SONIC	4.00 5.00			
25		25.00 - 35.00 silty SAND with some boulders > 3inches, dark brown fine to coarse, non-cohesive, dry, loose to compact	SM		352.79 25.00	No Data	S - 3	ROTO SONIC	8.40 10.00			
35		35.00 - 45.00 silty SAND, fine to coarse, relic granitic structure, micaceous, non-cohesive, moist, loose to compact	SM		342.79 35.00	No Data	S - 4	ROTO SONIC	5.50 10.00			
40		Log continued on next page										

AA BOREHOLE RECORD PLANT_BRANCH_20181002.GPJ GOLDBER NJ-PA 05-24-06.GDT 10/2/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade Environmental, LLC
 DRILLER: M. Rodriguez

GA INSPECTOR: Ben Hodges
 CHECKED BY: Rachel Kirkman, PG
 DATE: 9/6/18



RECORD OF BOREHOLE PZ-51I

SHEET 2 of 2

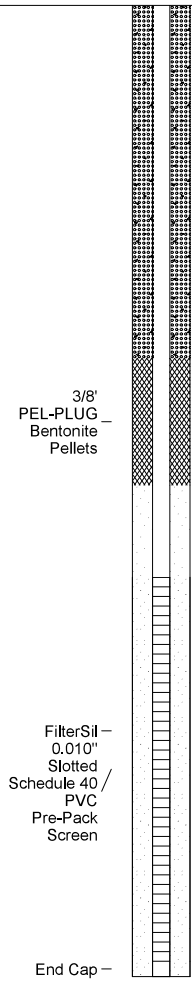
PROJECT: Plant Branch
 PROJECT NUMBER: 1666254-01
 DRILLED DEPTH: 65.00 ft

DRILL RIG: 8140LC
 DATE STARTED: 8/1/18
 DATE COMPLETED: 8/1/18

NORTHING: 1,161,631.46
 EASTING: 2,562,438.27
 GS ELEVATION: 377.79 ft
 TOC ELEVATION: 380.60 ft

DEPTH W.L.: 35.20 ft
 ELEVATION W.L.: 345.40 ft
 DATE W.L.: 8/3/18
 TIME W.L.: 08:33:00

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE			SAMPLES			DIAGRAM and NOTES MONITORING WELL/ PIEZOMETER	WELL CONSTRUCTION DETAILS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	PID (ppm)	NUMBER		
40		35.00 - 45.00 silty SAND, fine to coarse, relic granitic structure, micaceous, non-cohesive, moist, loose to compact <i>(Continued)</i>	SM		332.79 45.00	No Data	S - 4	ROTO SONIC	5.50 10.00
45		45.00 - 53.50 high plastic CLAY, clay with some sand, sand fine to medium, light reddish brown, cohesive, moist to wet, stiff	CH		324.29 53.50	No Data	S - 5	ROTO SONIC	8.50 8.50
50		53.50 - 55.00 silty Sand, reddish brown, relic foliation, micaceous, moist, loose to compact	SM		322.79 55.00	No Data	S - 6	ROTO SONIC	-
55		55.00 - 58.00 Saprolite, silty SAND with some gravel, sand and gravel fine to coarse	SM		319.79 58.00	No Data	S - 7	ROTO SONIC	3.10 5.00
60		58.00 - 60.00 BIOTITE GNEISS, gravel, highly weathered, very weak dry	BR		317.79 60.00	No Data	S - 7	ROTO SONIC	3.10 5.00
65		60.00 - 65.00 BIOTITE GNEISS, banded white with dark brown, large grained, highly weathered, strong	BR		312.79	No Data	S - 7	ROTO SONIC	3.10 5.00
65		Boring completed at 65.00 ft							



PZ-51I
 Borehole Diameter: 6

WELL CASING
 Interval: 0-65'
 Material: Schedule 40 PVC
 Diameter: 2"
 Joint Type: Flush/Screen

WELL SCREEN
 Interval: 54.9-64.9'
 Material: 0.010" Slotted Schedule 40 PVC Pre-Pack Screen
 Diameter: 2"
 Slot Size: 0.010
 End Cap: 65.3

FILTER PACK
 Interval: 52.5-65.0
 Type: FilterSil
 Quantity: 5 - 50 lb bags

FILTER PACK SEAL
 Interval: 49.2-52.5'
 Type: 3/8" PEL-PLUG
 Quantity: 5 gallons

ANNULUS SEAL
 Interval: 0-49.2
 Type: Portland Cement and Quick Gel Bentonite Mix
 Quantity: Cement: 6 - 94lb bags
 Water: 75 gallons

AA BOREHOLE RECORD PLANT_BRANCH_20181002.GPJ GOLDR NJ-PA 05-24-06.GDT 10/2/18

LOG SCALE: 1 in = 5 ft
 DRILLING COMPANY: Cascade Environmental, LLC
 DRILLER: M. Rodriguez

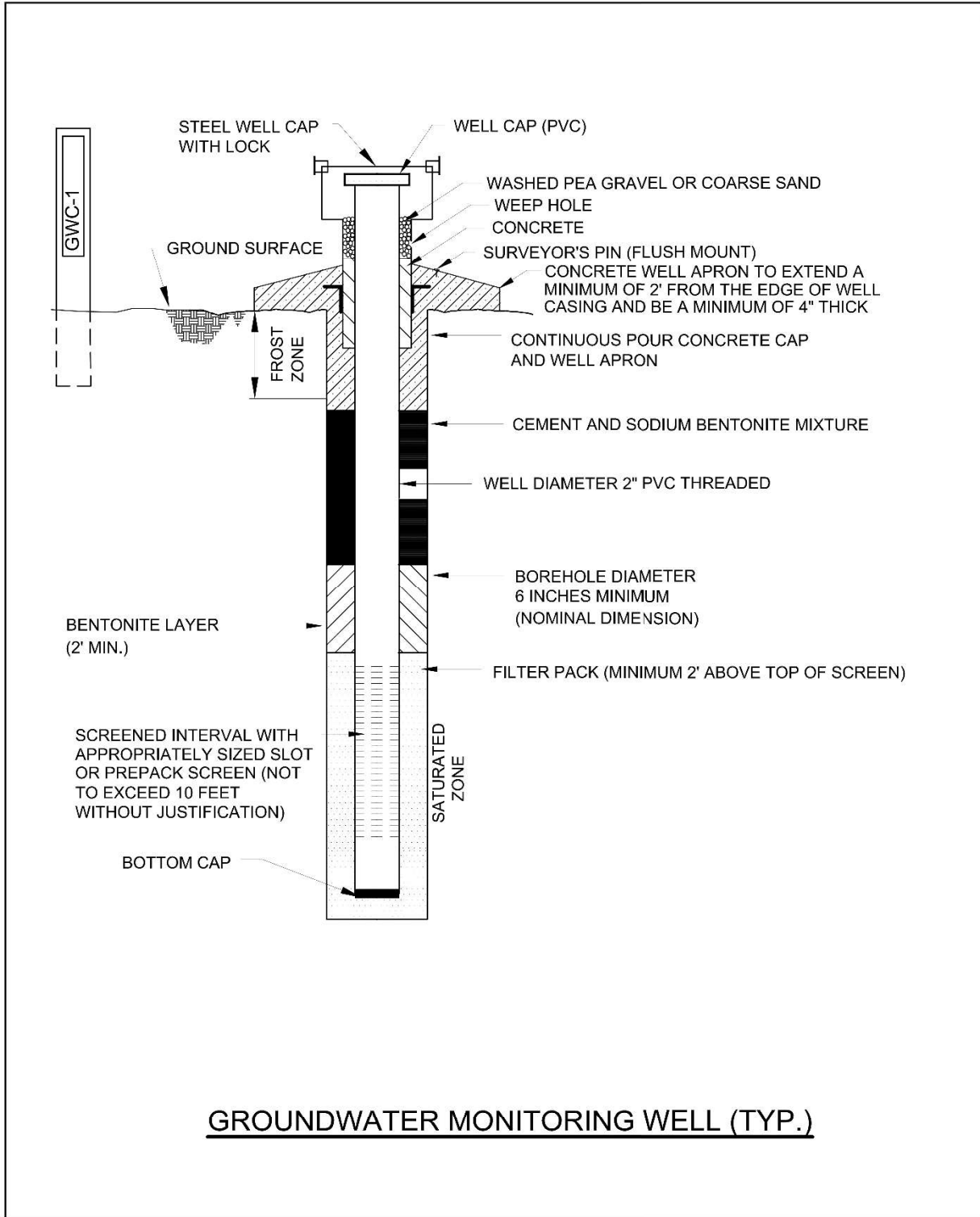
GA INSPECTOR: Ben Hodges
 CHECKED BY: Rachel Kirkman, PG
 DATE: 9/6/18



APPENDIX B

GROUNDWATER MONITORING WELL DETAIL

B. GROUNDWATER MONITORING WELL DETAIL



APPENDIX C

GROUNDWATER SAMPLING PROCEDURES

C. GROUNDWATER SAMPLING PROCEDURES

Groundwater sampling will be conducted using USEPA Region 4 Field Quality and Technical Procedures as a guide. The following procedures describe the general methods associated with groundwater sampling at the site. Prior to sampling, the well must be evacuated (purged) to ensure that representative groundwater is obtained. Any item coming in contact with the inside of the well casing or the well water will be kept in a clean container and handled only with gloved hands.

GPC will follow the procedures below at each well to ensure that a representative sample is collected:

- 1) Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations and notify GPC if it appears that the well has been compromised.
- 2) Measure and record the depth to water in all wells to be sampled prior to purging. Static water levels will be measured from each well, within a 24-hour period. The water level measuring device will be decontaminated prior to lowering in each well.
- 3) Install Pump: If a dedicated pump is not present, slowly lower the pump into the well to the midpoint of the well screen or a depth otherwise approved by the hydrogeologist or project scientist. The pump intake must be kept at least two (2) feet above the bottom of the well to prevent disturbance and suspension of any sediment present in the bottom of the well. Record the depth to which the pump is lowered. Non-dedicated pumps and wiring will be decontaminated before use and between well locations using procedures described in the latest version of the *Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division (SESD) Operating Procedure for Field Equipment Cleaning and Decontamination* as a guide.
- 4) Measure Water Level: Immediately prior to purging, measure the water level again with the pump in the well. Leave the water level measuring device in the well.
- 5) Purge Well: Begin pumping the well at approximately 100 to 500 milliliters per minute (ml/min). Monitor the water level continually. Maintain a steady flow rate that results in a stabilized water level with 0.3 ft. or less of variability. Avoid entraining air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.
- 6) Monitor Indicator Parameters: Monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, oxidation reduction potential (ORP), and dissolved oxygen (DO)) approximately every three to five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings at a minimum:
 - ± 0.1 S.U. for pH
 - ± 5 % for specific conductance (conductivity)
 - $\pm 10\%$ for DO where $DO > 0.5$ mg/L. If $DO < 0.5$ mg/L no stabilization criteria apply
 - ≤ 10 NTUs for turbidity
 - Temperature – Record only, not used for stabilization criteria
 - ORP – Record only, not used for stabilization criteria.
- 7) Collect samples at a flow rate between 50 and 250 mL/min and such that drawdown of the water level within the well is stable. Flow rate must be reduced if excessive drawdown is observed during sampling. Sample

containers should be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container.

- 8) Compliance samples will be unfiltered; however, to determine if turbidity is affecting sample results, duplicate samples may be filtered in the field prior to being placed in a sample container, clearly marked as filtered and preserved. Filtering will be accomplished by the use of 0.45-micron filters on the sampling line. At least two filter volumes of sample will pass through before filling sample containers. Filtered samples are not considered compliance samples and are only used to evaluate the effects of turbidity and the potential need for well redevelopment.
- 9) Sample bottles will be filled, capped, and placed in an ice containing cooler immediately after sampling where temperature control is required. Samples that do not require temperature control will be placed in a clean and secure container.
- 10) Sample containers and preservative will be appropriate for the analytical method being used.
- 11) Information contained on sample container labels will include:
 - a) Name of facility
 - b) Date and time of sampling
 - c) Sample description (well number)
 - d) Sampler's initials
 - e) Preservatives
 - f) Analytical method(s)
- 12) After samples are collected, samplers will remove non-dedicated equipment. Upon completion of field activity the well will be closed and locked.
- 13) Samples will be delivered to the laboratory following appropriate chain-of-custody (COC) and temperature control requirements. The goal for sample delivery will be within 48 hours of collection. If delivery is delayed, samples should not be analyzed after the method-prescribed hold time.

Throughout the sampling process new nitrile gloves will be worn by the sampling personnel. A clean pair of new, disposable gloves will be worn each time a different location is sampled and new gloves donned prior to filling sample bottles. Gloves will be discarded after sampling each well and before sampling the next well.

The goal when sampling is to attain a turbidity of less than 5 NTUs however, samples may be collected where turbidity is less than 10 NTUs and the stabilization criteria described above are met.

If sample turbidity is greater than 5 NTUs and other stabilization criteria have been met, samplers will continue purging for 3 additional hours in order to reduce the turbidity to 5 NTUs or less.

- If turbidity remains above 5 NTUs but is less than 10 NTUs, and other parameters are stabilized, the well can be sampled.
- Where turbidity remains above 10 NTUs, an unfiltered sample will be collected followed by a filtered sample that has passed through an in-line 0.45-micron filter attached to the discharge (sample collection) tube. Data from filtered samples will only be used to quantify the effects of turbidity on sample results.

Samplers will identify the sample bottle as containing a filtered sample on the sample bottle label and on COC form.



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