

GROUNDWATER MONITORING PLAN

PLANT MCINTOSH CCR LANDFILL NO. 4 EFFINGHAM COUNTY, GEORGIA

FOR



Georgia Power

September 2022



GEORGIA
DEPARTMENT OF NATURAL RESOURCES

ENVIRONMENTAL PROTECTION DIVISION

Approved
Solid Waste Management Program

Approved By: _____

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	GEOLOGIC AND HYDROGEOLOGIC CONDITIONS	2
3.	SELECTION OF WELL LOCATIONS	4
4.	MONITORING WELL DRILLING, CONSTRUCTION, ABANDONMENT, AND REPORTING	5
4.1	Drilling	5
4.2	Design and Construction	5
4.2.1	Well Casings and Screens	5
4.2.2	Well Intake Design	5
4.2.3	Filter Pack and Annular Seal	6
4.2.4	Protective Casing and Well Completion	6
4.2.5	Well Development	7
4.3	Abandonment	7
4.4	Documentation	7
5.	GROUNDWATER MONITORING PARAMETERS AND FREQUENCY	9
6.	SAMPLE COLLECTION	13
7.	CHAIN-OF-CUSTODY	14
8.	FIELD AND LABORATORY QUALITY ASSURANCE / QUALITY CONTROL	15
9.	REPORTING RESULTS	16
10.	STATISTICAL ANALYSIS	18
11.	REFERENCES	24

Tables

1. Groundwater Monitoring Parameters and Frequency
2. Analytical Methods

Figures

1. Statistical Analysis Plan Overview
2. Decision Logic for Determining Appropriate Statistical Method
3. Decision Logic for Computing Prediction Limits
4. Decision Logic with Interwell Prediction Limits

Appendices

- A. Monitoring System Details
 - Figure A-1 – Compliance Monitoring Network Map
 - Figure A-2 – Potentiometric Surface Contour Map
 - Table A-1 – Monitoring Network Well Details
 - Table A-2 – Water Level Monitoring Piezometer Details
 - Boring and Well Construction Logs
 - Signed and Sealed Well Re-Survey Letter
 - Well Drillers Bond
- B. Groundwater Monitoring Well Detail
- C. Groundwater Sampling Procedure

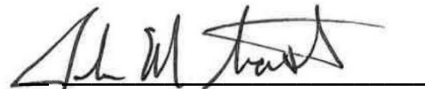
CERTIFICATION

I hereby certify that this Groundwater Monitoring Plan was prepared by, or under the direct supervision of, a Qualified Groundwater Scientist, in accordance with the Georgia Environmental Protection Division (EPD) Rules of Solid Waste Management. According to 391-3-4-.01, 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 EPD Rules of Solid Waste Management, Chapter 391-3-4.10(6).

Signature: 

Date: 9-30-2022



Signature: 

Date: 9-30-2022



1. 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 Coal Combustion Residuals (CCR) Landfill No. 4 (Landfill No. 4) (Site) at Georgia Power Company's (GPC's) Plant McIntosh. This plan meets the requirements of EPD rules and uses EPD's *Manual for Groundwater Monitoring* dated September 1991 as a guide (EPD, 1991). Groundwater sampling locations are presented in Appendix A, Figure A-1 Compliance Monitoring Network Map.

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 (EPA) Coal Combustion Rule (§257.90), which is incorporated in the Georgia State CCR Rule by reference, a detection monitoring well network for Landfill No. 4 has been installed and certified by a qualified professional engineer. This certification has been placed in the Site's operating record, per EPA Rule requirements. 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. Currently, routine detection monitoring is completed as required by 391-3-4-.10(6)(a) and §257.94.

2. GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

Plant McIntosh is in southeast Effingham County, Georgia, on the west bank of the Savannah River at Big Kiffer Point. The plant is located within the Coastal Plain Province of Georgia. Coastal Plain sediments are composed of stratified clay, silt, sand, and limestone, resting on much older igneous and metamorphic basement rocks (Cooke, 1943). These older, crystalline rocks dip to the south and east causing the overlying sediments to form a wedge-shaped deposit, which is thickest to the east and the south. The Coastal Plain deposits crop out at the land surface in bands, from the oldest to the most recent, from the Fall Line to the coast. Pleistocene-aged deposits are at the surface in this region. Recharge to the major aquifers in the area is to the northeast of Plant McIntosh, where these formations outcrop (Southern Company Services Earth Science & Environmental Engineering [SCS ES&EE], 2002).

The Site is situated on sediments that were deposited from the Cretaceous to Pleistocene period and consist of stratified marine deposits and materials eroded from crystalline rock of the Piedmont Region. Soils at Landfill No. 4 are described in boring logs as interbedded clays, silts, and sands typical of Coastal Plain sediments.

Based on the data contained in the cross sections included in Site boring logs and Drawings H-1C-1304 (Proposed Ash Monofill Geologic Cross-Sections A-A' and B-B' [Southern Company, 2002], included in Attachment A, Site Acceptability Report, dated 2002 (Southern Company Services, 2002), the lithologic units directly underlying Landfill No. 4 are considered an aquitard and include gray to orange-red clayey sands to sandy clays.

The overburden within the Site boundary of Landfill No. 4 was excavated to the design depth for Landfill No. 4. However, based on the Site boring logs and Drawings H-1C-1304 (Proposed Ash Monofill Geologic Cross-Sections A-A' and B-B' [Southern Company Services, 2002], the overburden that is located outside of the Landfill No. 4 boundary consists of tan-orange silty sand.

The overburden for Landfill No. 4 was excavated to Unit 2, which is considered a thick, low permeability aquitard consisting of clayey sand to sandy clays. Therefore, there are no anticipated potential pathways underlying Landfill No. 4.

The uppermost aquifer at Landfill No. 4 is the surficial aquifer, characterized by silty, sandy clays, clayey silts, silty sands, and fine to medium grained sands. Monitoring wells and piezometers are screened in the surficial aquifer between elevation 40 and 12 feet (ft) North American Vertical Datum 88 (NAVD88). Groundwater at Landfill No. 4 flows from the south-southwest to the north-northeast across the Site (Appendix A, Figure A-2, Potentiometric Surface Contour Map). Based on testing performed on an undisturbed sample, the permeability of Unit 2 (aquitard) is approximately 1.3×10^{-6} cm/sec. Based on slug testing in the uppermost aquifer performed in March 2002, and corresponding horizontal hydraulic conductivity (Kh) calculations, the average Kh in a subset of piezometers screened in the Unit 3 aquifer (M-1 [Avg. Kh = 0.000122 cm/sec], M-7 [Avg. Kh = 0.000607 cm/sec], M-8 [Avg. Kh = 0.000274 cm/sec], and M-10 [Avg. Kh = 0.000208 cm/sec]) was determined to be 3.03×10^{-4} cm/sec (or 0.859 ft/day, SCS ES&EE, 2002). This average Kh value is consistent with Kh literature values for sandy soils, which are the predominant soil type in the Plant McIntosh area.

Soils at the screened intervals of the wells are generally classified as silty sands (SM). The default value for effective porosity for this type of soil is 0.20 (USEPA 530/SW-89-031, 1989). To calculate an average

gradient across Landfill No. 4, the hydraulic gradient was calculated between three separate well pairs: GWA-3 and GWC-11; GWA-5 and GWC-23; and GWA-14 and GWC-18 (see table below). The calculated average groundwater flow velocity at Landfill No. 4 in August 2021 (the most recent monitoring event) is 0.053 ft/day or 19.35 feet per year (ft/year).

Monitoring Wells	h_1	h_2	K_h (ft/day)	n_e	dh (ft)	L (ft)	i (ft/ft)	Velocity (ft/day)	Velocity (ft/year)
GWA-3 and GWC-11	35.78	24.34	0.859	0.20	11.44	1,057	0.011	0.046	16.97
GWC-5(*GWB-5) and GWC-23	37.78	23.44			14.34	1,296	0.011	0.048	17.35
GWA-14 and GWC-18	35.56	24.01			11.55	764	0.015	0.065	23.70
								Avg. (ft/day)	Avg. (ft/year)
								0.053	19.35

Notes:

dh - difference between h_1 and h_2

L - distance between locations 1 and 2

ft - feet

h_1 and h_2 - groundwater elevation at location 1 and 2

i - hydraulic gradient (dh/L)

K_h - horizontal hydraulic conductivity

n_e - effective porosity

Velocity = linear velocity = K_i/n_e

All wells were gauged on August 16, 2021.

All elevations listed in North American Vertical Datum 88 (NAVD 88).

Recharge to the uppermost (or surficial) aquifer is from local precipitation in the area. Average rainfall in the area is approximately 48.1 inches/year.

3. SELECTION OF WELL LOCATIONS

Groundwater monitoring wells are installed to monitor the uppermost occurrence of groundwater beneath the Site. Locations are selected based on disposal cell layouts and Site geologic and hydrogeologic considerations. GPC follows the recommendation as stated in Chapter 2 of the *Manual for Groundwater Monitoring* (EPD, 1991) to determine well spacing based on Site-specific conditions. Locations are chosen to serve as upgradient (GWA), sidegradient (GWB), or downgradient (GWC) based on groundwater flow direction determined by potentiometric evaluation. The well naming nomenclature is based on EPD's *Industrial Waste Disposal Site Design and Operations Plan – Supplemental Data for Solid Waste Handling Permit* (EPD, undated). 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 is included in Appendix A, Figure A-1 Compliance Monitoring Network Map. Appendix A Table A-1 includes a tabulated list of individual monitoring wells with well construction details such as location coordinates, relative locations of monitoring wells (upgradient/downgradient), top-of-casing elevation, well depths, and screened intervals. The well network was resurveyed by Gunnin Land Surveying, LLC from May 18, 2020 to June 3, 2020. The top of the well casing and survey pin at each well pad were surveyed to within 0.5-foot horizontal accuracy using the North American Datum of 1983 (NAD83), State Plane Georgia East Zone for horizontal location and 0.01-foot vertical accuracy using the NAVD88 for vertical location. Table A-1 has been updated with the 2020 well resurvey data. Any change to the groundwater monitoring network will be made by a minor modification to the permit pursuant to Georgia Rules of Solid Waste Management, Chapter 391-3-4-.02(4)(b)7.

Landfill Cell 2B has not been constructed, Cell 1 has been constructed and closed, and Cell 2A is constructed and in operation. Currently Georgia Power is utilizing wells GWC-17 and GWC-18 for background data, but future placement of waste in cell 2B of McIntosh Landfill 4 will negate use of wells GWC-17 and GWC-18 as background wells. These wells will become downgradient wells for the landfill. The appropriate minor modification process will be followed for this change to the groundwater monitoring network and submitted at such time as is required based on future landfill construction.

4. MONITORING WELL DRILLING, CONSTRUCTION, ABANDONMENT, AND REPORTING

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 rotosonic techniques. The drilling method shall 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 EPA Science and Ecosystem Support Division (SESD) *Operating Procedure for Field Equipment Cleaning and Decontamination* (EPA, SESDGUID-205-R3) as a general guide for best practices.

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

Well installation will be directed by a qualified groundwater scientist. All 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 shall be installed using the latest version of the Region 4 EPA SESD *Operating Procedure for Design and Installation of Monitoring Wells* (EPA, SESDGUID-205-R1) 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

American Society for Testing and Materials International (ASTM), National Science Foundation (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 Site. 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 steps 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 dual-wall 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 dual-wall well screens will be installed following general industry standards and using the latest version of the Region 4 EPA SEDS *Operating Procedure for Design and Installation of Monitoring Wells* (EPA, SESDGUID-205-R1) as a general guide for best practices.

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 2 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 2 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 cementitious grout to ground surface, where it will become a concrete apron extending outward with a radius of at least 2 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 will 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 will 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 5 nephelometric turbidity units (NTUs); however, formation-specific conditions may not allow this target to be accomplished. Development can be discontinued once a turbidity of less than 10 NTU is achieved. Additionally, the stabilization criteria contained in Appendix C 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. All 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 Abandonment

Monitoring wells will be abandoned using industry-accepted practices, the latest version of the Region 4 EPA SEDS *Operating Procedure for Design and Installation of Monitoring Wells* (EPA, SEDSGUID-205-R1) and using the *Manual for Groundwater Monitoring* (EPD, 1991), and *Annotated (O.C.G.A.) § 12-5-120, 1985* (EPD, 1985) as guides. The wells will be abandoned under the direction of a qualified groundwater scientist. Neat Portland cement or bentonite will be used as appropriate to complete abandonment and seal the well borehole. If appropriate, piezometers or groundwater wells located within the footprint of a future expansion to Landfill No. 4 will be over-drilled prior to abandonment.

4.4 Documentation

Within 60 days of the construction, development, survey and/or abandonment of each new groundwater monitoring well completed under the direction of a qualified groundwater scientist or engineer, a well installation/abandonment report will be submitted to the EPD. The report will include the following information documenting the construction and development of each well.

- 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 Advisory Council
- Dates of drilling and initial well emplacement
- Drilling method and drilling fluid if used
- Well identification
- Well location (± 0.5 ft.)
- Borehole diameter and well casing diameter
- Type of protective well cap
- Well depth given to within an accuracy of 0.01 feet based upon survey from acceptable survey point
- Lithologic logs
- Well casing materials
- Screen materials and design
- Screen length
- Screen slot size
- Filter pack material/size and volume
- Surface seal and volumes/mix of annular seal material
- Documentation of ground surface elevation (± 0.01 feet)
- Documentation of top of casing elevation (± 0.01 feet)
- Schematic of the well with dimensions
- Documentation that water quality field parameters meet well development criteria (Section 4.2)

In accordance with the Georgia Water Well Standards Act (O.C.G.A. § 12-5-134(5)(d)(vii)), at least once every 5 years, the owner of the property on which a monitoring well is constructed shall have the monitoring well(s) inspected by a professional engineer or professional geologist, who shall direct appropriate remedial corrective work to be performed if the well does not conform to standards. Well inspection records and records of remedial corrective work are subject to review by EPD.

5. 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. To establish the existing background statistical dataset, eight independent samples from each groundwater well were collected and analyzed for EPD approved modified Appendix I and Appendix II test parameters as well as 40 CFR Part 257, Subpart D, Appendix III and Appendix IV test parameters. For future network monitoring wells, a minimum of eight independent samples from each groundwater well will be collected and analyzed for EPD approved modified Appendix I and Appendix II test parameters, as well as 40 CFR Part 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 EPD modified Appendix I, EPD modified Appendix II and Appendix III parameters will be at least semi-annual during the active life of the facility and the post-closure care period. If required, Georgia Power Company will perform assessment monitoring in accordance with the Georgia Rules for Solid Waste Management Chapter 391-3-4-.10 to also include 40 CFR 257, Subpart D, Appendix IV test parameters. 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 (EPD, 2015).

A state-modified Appendix I and II list of detection parameters for the approved Georgia EPD Solid Waste Permit [No. 051-010D(LI)] have been historically monitored for the approved monitoring wells in accordance with the requirements of Chapter 391-3-4-.14, Rules for Solid Waste Management. These parameters will continue to be monitored during Detection Monitoring and will be monitored for Appendix IV during Assessment Monitoring, if necessary.

As shown on Table 2, Analytical Methods, the groundwater samples will be analyzed using methods specified in EPA Manual SW-846, EPA 600/4-79-020, *Standard Methods for the Examination of Water and Wastewater* (SM18-20), EPA Methods for the Chemical Analysis of Water and Wastes (MCAWW), ASTM, or other suitable analytical methods approved by the Georgia EPD. The method used will be able to reach a practical quantification limit to detect natural background conditions at the Site. The groundwater samples will be analyzed by licensed and accredited laboratories through the National Environmental Laboratory Accreditation Program (NELAP). 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 FREQUENCY	
		Background	Semiannual Events
Field Parameters	Temperature	X	X
	pH	X	X
	ORP	X	X
	Turbidity	X	X
	Specific Conductance	X	X
	Dissolved Oxygen	X	X
Appendix I and II (EPD-approved modified Appendix I and II test parameters from 40 CFR 258, Subpart E)	Antimony	X	X
	Arsenic	X	X
	Barium	X	X
	Beryllium	X	X
	Cadmium	X	X
	Chromium	X	X
	Cobalt	X	X
	Copper	X	X
	Lead	X	X
	Nickel	X	X
	Selenium	X	X
	Silver	X	X
	Thallium	X	X
	Vanadium	X	X
Zinc	X	X	
Appendix III (Detection test parameters from 40 CFR 257, Subpart D)	Boron	X	X
	Calcium	X	X
	Chloride	X	X
	Fluoride	X	X
	pH (field)	X	X
	Sulfate	X	X
	TDS	X	X

Table 1 – continued
GROUNDWATER MONITORING PARAMETERS & FREQUENCY

MONITORING PARAMETERS		GROUNDWATER MONITORING FREQUENCY	
		Background	Semiannual Events
Appendix IV Metals (Assessment test parameters from 40 CFR 257, Subpart D)	Antimony	X	
	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
Boron	6010D/6020B
Calcium	6010D/6020B
Chloride	300.0/300.1/9250/9251/9253/9056A
Fluoride	300.0/300.1/9214/9056A
pH	150.1field/90405C
Sulfate	9035/9036/9038300.0/300.1/9056A
Total Dissolved Solids (TDS)	160.1/Standard Method/2540C
Antimony	EPA 7040/7041/6010D/6020B
Arsenic	EPA 7060A/7061A/6010D/6020B
Barium	EPA 7080A/7081/6010D/6020B
Beryllium	EPA 7090/7091/6010D/6020B
Cadmium	EPA 7130/7131A/6020B
Chromium	EPA 7190/7191/6010D/6020B
Cobalt	EPA 7200/7201/6010D/6020B
Copper	EPA 7840/7841/6010D/6020B
Fluoride	300.0/300.1/9214/9056A
Lead	EPA 7420/7421/6010D/6020B
Lithium	6010D/6020B
Mercury	7470
Molybdenum	6010D/6020B
Nickel	EPA 7840/7841/6010D/6020B
Selenium	EPA 7740/7741A/6010D/6020B
Silver	EPA 7840/7841/6010D/6020B
Thallium	EPA 7840/7841/6010D/6020B
Vanadium	EPA 7840/7841/6010D/6020B
Zinc	EPA 7840/7841/6010D/6020B
Radium 226 and 228 combined	EPA 903/9320/9315

If any parameters contained in Appendix I or II of 40 CFR 258, Subpart E, as amended, 56 Fed. Reg. 51032 - 51039 (EPA, 1991) have been detected previously at statistically significant levels above background concentrations, these parameters will continue to be monitored.

6. 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 EPA Region 4 Field Branches Quality System and Technical Procedures. 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. Per Georgia Rule 391-3-4-.10(6)(g) monitoring wells require replacement after two consecutive dry sampling events. Well installation will be directed by a qualified groundwater scientist. A minor modification will be submitted to the EPD in accordance with Rule 391-3-4-.02(3)(b)(6) prior to the installation or decommissioning of monitoring wells.

7. CHAIN-OF-CUSTODY

All 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
- Notated date(s) and time(s) of sample transfer between individuals

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. FIELD AND LABORATORY QUALITY ASSURANCE / QUALITY CONTROL

All field quality control samples will be prepared the same as compliance samples regarding 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 10 samples using non-dedicated equipment.

Field Duplicates - Field duplicates will be 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 will be collected in the field using the same water source that is used for decontamination. The water will be 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 NELAP.

Calibration of field instruments will occur daily and follow the recommended (specific) instrument calibration procedures provided by the manufacturer and/or equipment manual specific to each instrument. Daily calibration will be documented on field forms and these field forms will be included in all groundwater monitoring reports. Instruments will be recalibrated as necessary (e.g., when calibration checks indicate significant variability), and all checks and recalibration steps will be documented on field calibration forms. Calibration of the instruments will also be checked if any readings during sampling activities are suspect. Replacement probes and meters will be obtained as a corrective action in the event that recalibration does not improve instrument function. Calibration field forms will be provided with the semiannual groundwater monitoring reports.

9. REPORTING RESULTS

A semiannual groundwater report that documents the results of sampling and analysis will be submitted to EPD. At a minimum, semiannual reports will include:

1. A summary of the Site's history and monitoring system status.
2. A brief discussion of the geology/hydrogeology of the Site.
3. Groundwater monitoring compliance status.
4. 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.
5. A narrative of purging/sampling methodologies, which will include the type of sampling equipment used.
6. Discussion of results.
7. Recommendations for the future monitoring consistent with the Rules.
8. Potentiometric surface contour map for the aquifer(s) being monitored, signed and sealed by a Georgia-registered P.G. or P.E.
9. 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.
10. Groundwater flow rate and direction calculations.
11. 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.
12. 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.
13. If applicable, semiannual assessment monitoring results.
14. Any alternate source demonstration completed during the previous monitoring period, if applicable.
15. Laboratory reports.
16. Chain-of custody (COC) documentation.

17. Field logs and forms will be kept for each sampling event, and will include the following, but not be limited to, well signage, well access, sampling and purging equipment condition, and any Site conditions that may affect sampling.
18. Documentation of non-functioning wells.
19. Table of current analytical results for each well, highlighting statistically significant increases, and concentrations above maximum contaminant level (MCL).
20. Statistical analyses.
21. Certification by a qualified groundwater scientist.

10. STATISTICAL ANALYSIS

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. Statistical analysis techniques will be consistent with the EPA document *Statistical Analysis of Groundwater Data at RCRA Facilities Unified Guidance* (Unified Guidance)(EPA, 2009).

According to EPD rules (391-3-4-.10(6)(a)), the Site must specify in the operating record the statistical methods to be used in evaluating groundwater monitoring data for each hazardous constituent. The statistical test chosen shall be conducted separately for each hazardous constituent in each well. As authorized by the rule, statistical tests that will 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) (§257.93(f)(5)). 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).

Intrawell methods use background data for individual wells and may be overly sensitive to natural variation; therefore, statistically significant increases (SSIs) may occur as a result of natural variation rather than facility impacts. A second step can be used to further evaluate the results and mitigate SSIs that result from natural variation. In instances where intrawell statistical methods identify an apparent SSI, a second step of interwell statistical evaluation may be used to determine whether the measurement exceeds the sitewide background limit. This is similar in concept to the procedure used in compliance monitoring programs where an interwell statistical limit is used to determine background per EPA Unified Guidance (2009). Both interwell and intrawell methods may use a 1-of-2 resample plan, allowing for a collection of an independent resample to confirm or disconfirm the initial finding. If the result does not exceed sitewide (interwell) background, an SSI is not declared, and no further action is needed to stay in detection monitoring. Trend tests will continue to be included in Semiannual Groundwater Monitoring and Corrective Action Reports for constituents exhibiting an SSI using an intrawell statistical method that does not exceed sitewide (interwell) background.

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 Intrawell Prediction Limits, presents the logic that will be used to calculate site-specific statistical limits and test compliance results against those limits. Figure 4: Decision Logic for

Computing Interwell Prediction Limits, presents the logic that will be used to calculate site-specific interwell statistical limits and test compliance results against those limits.

FIGURE 1. STATISTICAL ANALYSIS PLAN OVERVIEW

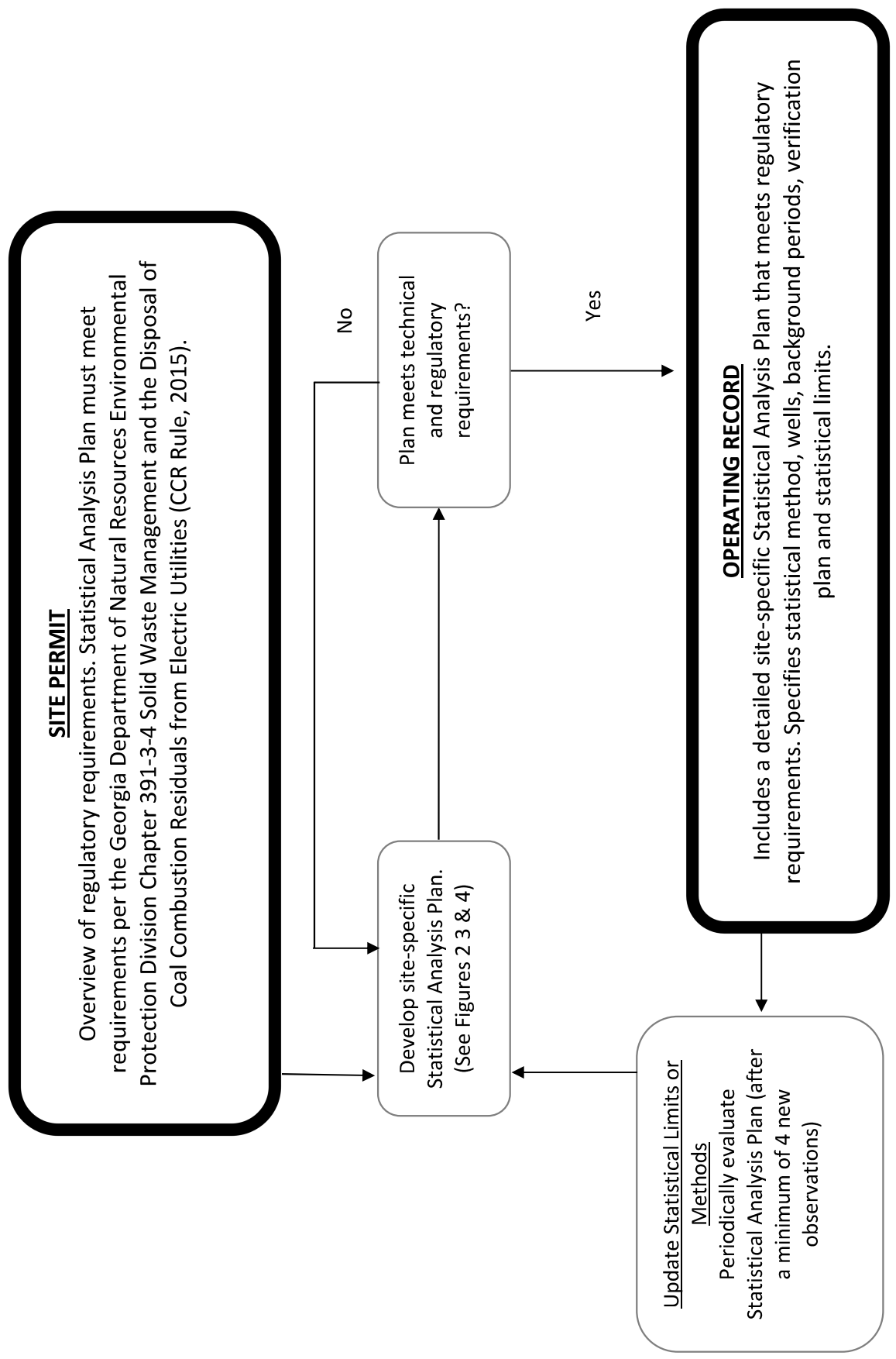
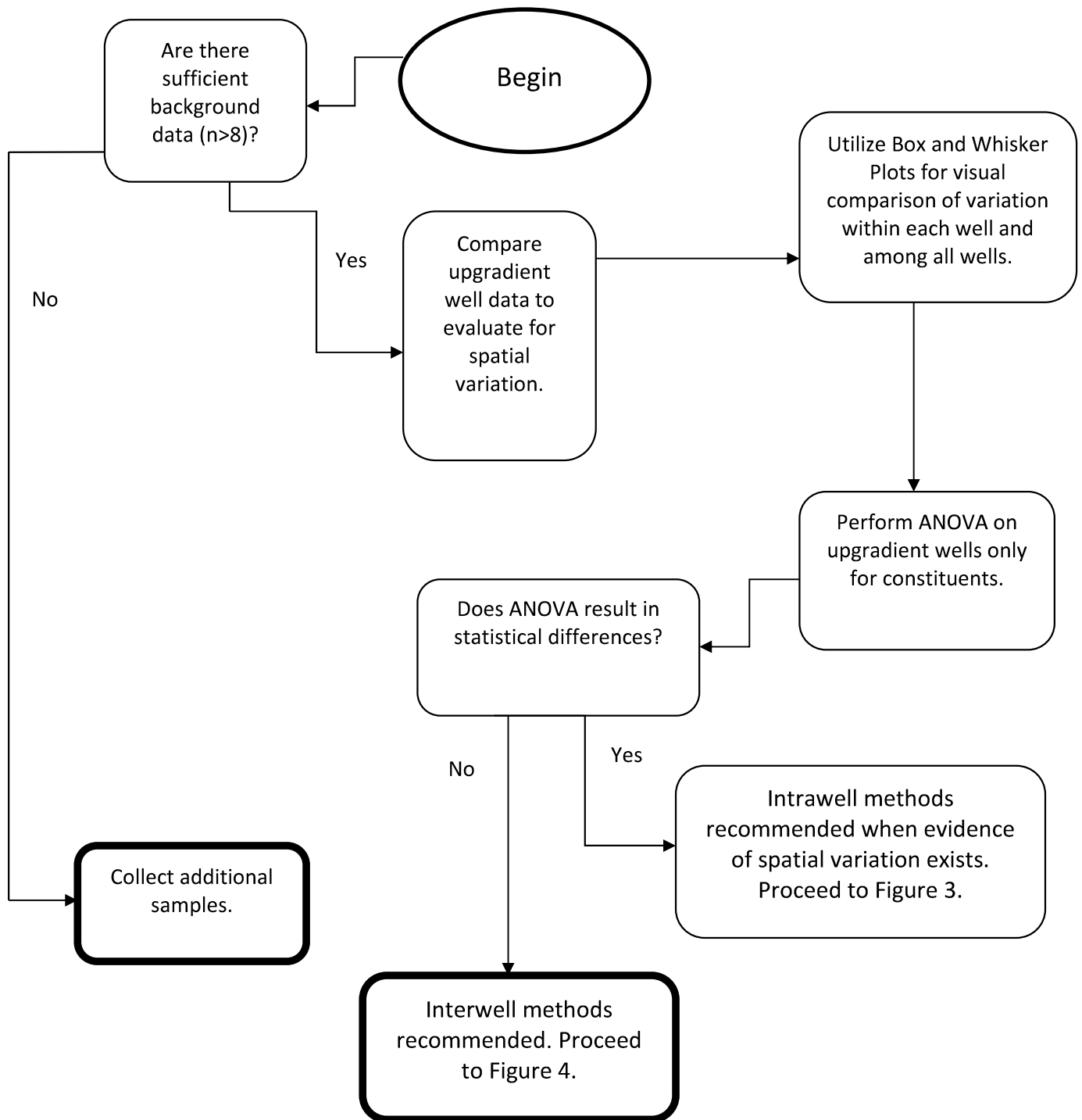


FIGURE 2. DECISION LOGIC FOR DETERMINING APPROPRIATE STATISTICAL METHOD



n = Number of sampling events
ANOVA = Analysis of Variance Test

FIGURE 3. DECISION LOGIC FOR COMPUTING INTRAWELL PREDICTION LIMITS

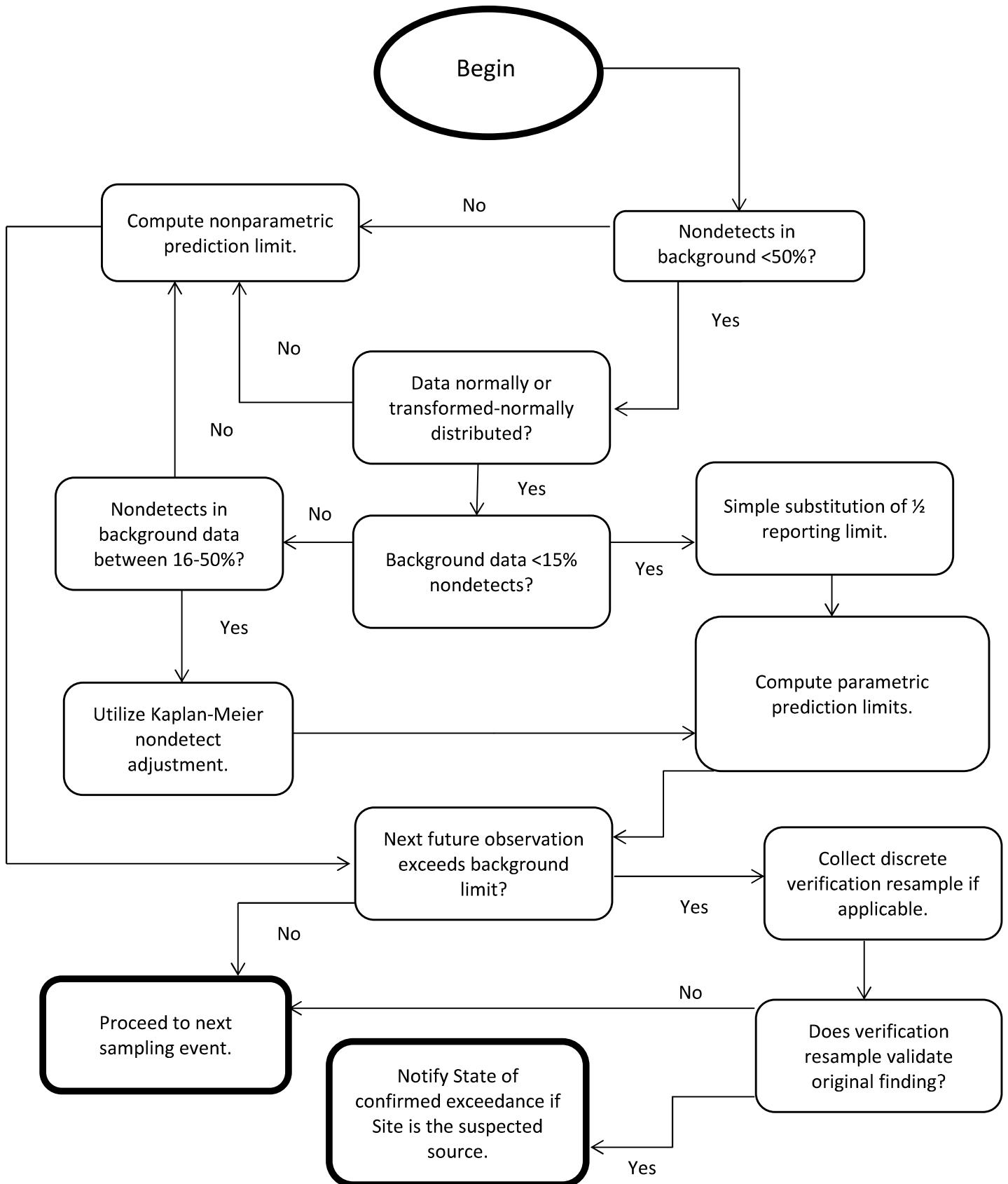
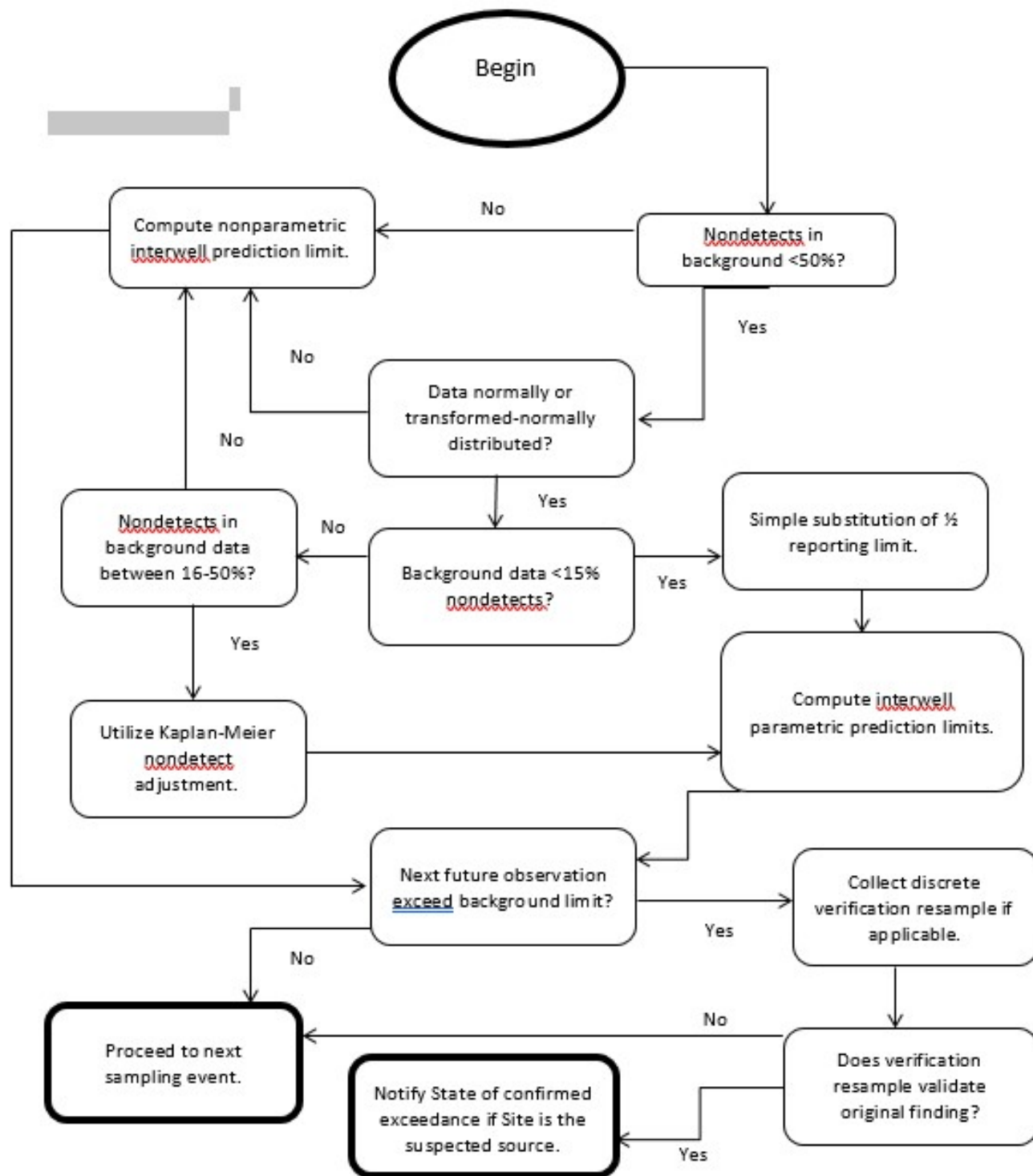


Figure 4: DECISION LOGIC WITH INTERWELL PREDICTION LIMITS



11. REFERENCES

Cooke, 1943. Cooke, Charles W., 1943, Geology of the Coastal Plain of Georgia, United States Geologic Survey Bulletin 941.

EPA, 1989. *Guidance on Site Characterization at Corrective Action Sites*. United States Environmental Protection Agency. USEPA 530/SW-89-031, 1989.

EPA, 2009. *Statistical Analysis of Groundwater Data at RCRA Facilities Unified Guidance*. United States Environmental Protection Agency

EPA, 2015. 40 CFR Parts 257 and 261. *Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule*.

EPA, SESDGUID-205-R1, 2013. EPA, Region 4 SESD *Operating Procedure for Design and Installation of Monitoring Wells*. SESDGUID-205-R1. Published January 29, 2013.

EPA, SESDGUID-205-R3. EPA, 2015, Region 4 SESD *Operating Procedure for Field Equipment Cleaning and Decontamination*. SESDGUID-205-R3. Published February 5, 2007, revised December 18, 2015.

EPD, 1985. Official Code of Georgia Annotated, 1985. O.C.G.A. § 1-1-8, 12-5-120. Water Well Standards Act of 1985.

EPD, 1991. Georgia EPD, 1991. *Manual for Groundwater Monitoring*. (PP. 38).

GA EPD, undated. *Industrial Waste Disposal Site Design and Operations Plan – Supplemental Data for Solid Waste Handling Permit*. Georgia Department of Natural Resources.

EPD, 2018. Georgia EPD Rules and Regulations, 2018. Rule Subject 391-3-4, Solid Waste Management. Revised March 28, 2018.

SCS ES&EE, 2002. *Savannah Electric Plant McIntosh Proposed Ash Monofill Site Acceptability Report*. Prepared for Savannah Electric, prepared by SCS ES&EE, July 2002.

APPENDIX

- A. MONITORING SYSTEM DETAILS
 - FIGURE A-1 - COMPLIANCE MONITORING NETWORK MAP
 - FIGURE A-2 - POTENTIOMETRIC SURFACE CONTOUR MAP
 - TABLE A-1 - MONITORING NETWORK WELL DETAILS
 - TABLE A-2 - WATER LEVEL MONITORING PIEZOMETER DETAILS
 - BORING AND WELL CONSTRUCTION LOGS
 - SIGNED AND SEALED WELL RE-SURVEY LETTER
 - WELL DRILLERS BOND
- B. GROUNDWATER MONITORING WELL DETAIL
- C. GROUNDWATER SAMPLING PROCEDURE

Appendix A – Monitoring System Details

FIGURE A-1 COMPLIANCE MONITORING NETWORK MAP

FIGURE A-2 POTENTIOMETRIC SURFACE CONTOUR MAP

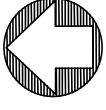
TABLE A-1 MONITORING NETWORK WELL DETAILS

TABLE A-2 WATER LEVEL MONITORING NETWORK PIEZOMETER DETAILS

BORING AND WELL CONSTRUCTION LOGS

SIGNED AND SEALED WELL RE-SURVEY LETTER

WELL DRILLERS BOND



ACC
ATLANTIC COAST
CONSULTING, INC.



LEGEND:

EXISTING	DESCRIPTION
	APPROXIMATE LANDFILL BOUNDARY
	APPROXIMATE CELL BOUNDARY
	PROPOSED CELL/POND BOUNDARY
	MONITORING WELL
	PIEZOMETER
	PROPOSED MONITORING WELL

NOTES:

- MONITORING WELLS GWC-17 AND GWC-18 ARE INCLUDED IN THE BACKGROUND MONITORING STATISTICAL POOL AS DESCRIBED IN THE APRIL 2018 ALTERNATIVE SOURCE DEMONSTRATION.
- AERIAL DATED 7/28/2021 FROM SAM, LLC.
- PROPOSED CELL/POND BOUNDARIES ARE DERIVED FROM DRAWING HIC2700 BY SOUTHERN COMPANY ENVIRONMENTAL SERVICES, DATED NOVEMBER 10, 2017.
- PROPOSED MONITORING WELLS ARE DERIVED FROM DRAWING HIC2715 BY SOUTHERN COMPANY GENERATION AND CONSTRUCTION SERVICES, DATED MARCH 15, 2017.

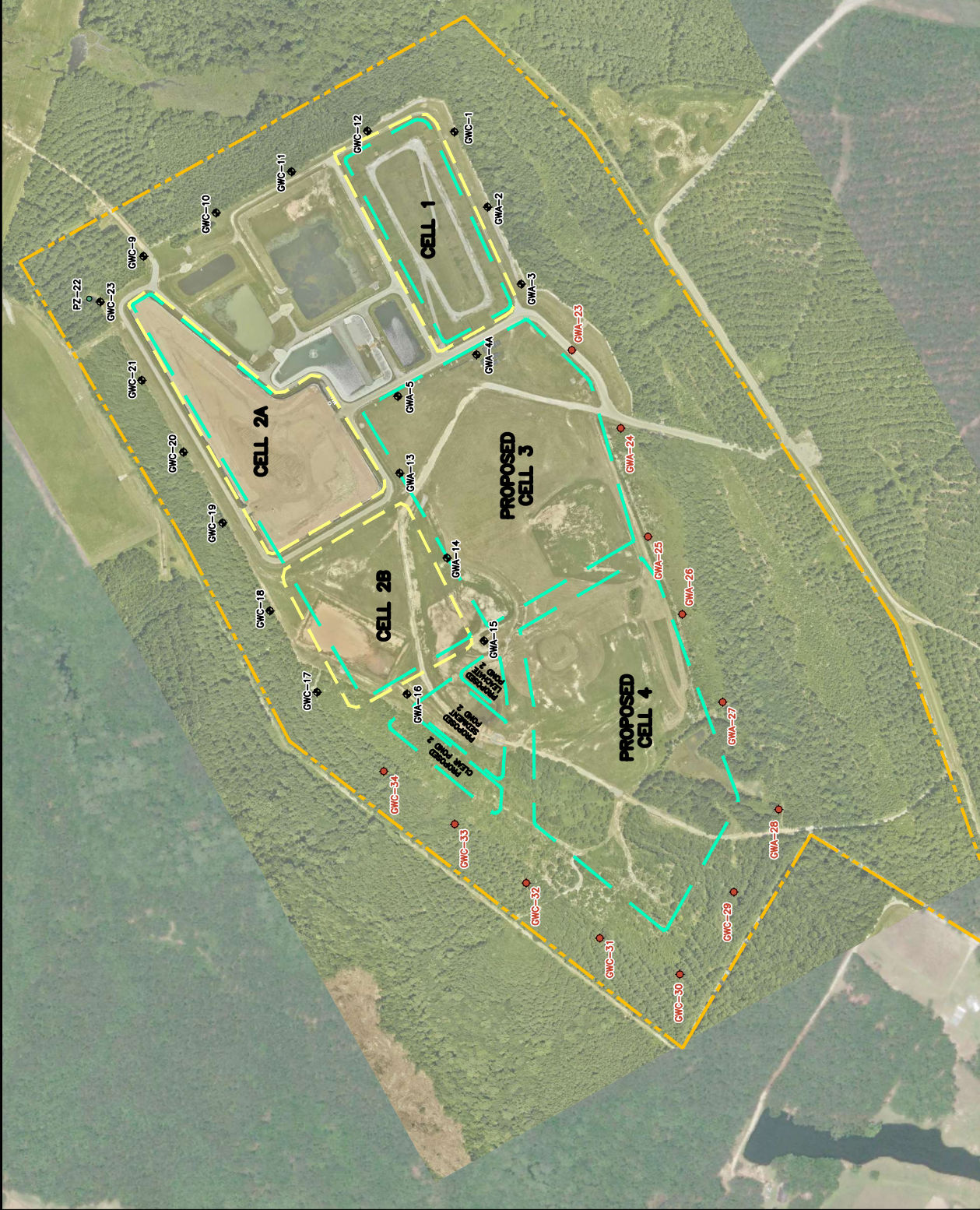
PROJECT

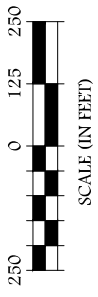
Georgia Power
GEORGIA POWER COMPANY
PLANT MCINTOSH LANDFILL NO. 4
GROUNDWATER MONITORING PLAN

COMPLIANCE MONITORING NETWORK MAP

PROJECT NO. 1054-110 May, 2022

DRAWN BY:	MM	FIGURE:	
CHECKED BY:	CA		A-1





LEGEND:

EXISTING	DESCRIPTION
	APPROXIMATE LANDFILL BOUNDARY
	APPROXIMATE CELL BOUNDARY
	MONITORING WELL GROUNDWATER ELEVATION
	PIEZOMETER GROUNDWATER ELEVATION
	GROUNDWATER ELEVATION CONTOUR
	GROUNDWATER FLOW DIRECTION

NOTES:
 1. MONITORING WELLS GWC-17 AND GWC-18 ARE INCLUDED IN THE BACKGROUND MONITORING STATISTICAL POOL AS DESCRIBED IN THE APRIL 2018 ALTERNATIVE SOURCE DEMONSTRATION.
 2. AERIAL DATED 7/28/2021 FROM SAM, LLC.

PROJECT
 Georgia Power
 GEORGIA POWER COMPANY
 PLANT MCINTOSH LANDFILL NO. 4
 GROUNDWATER MONITORING PLAN

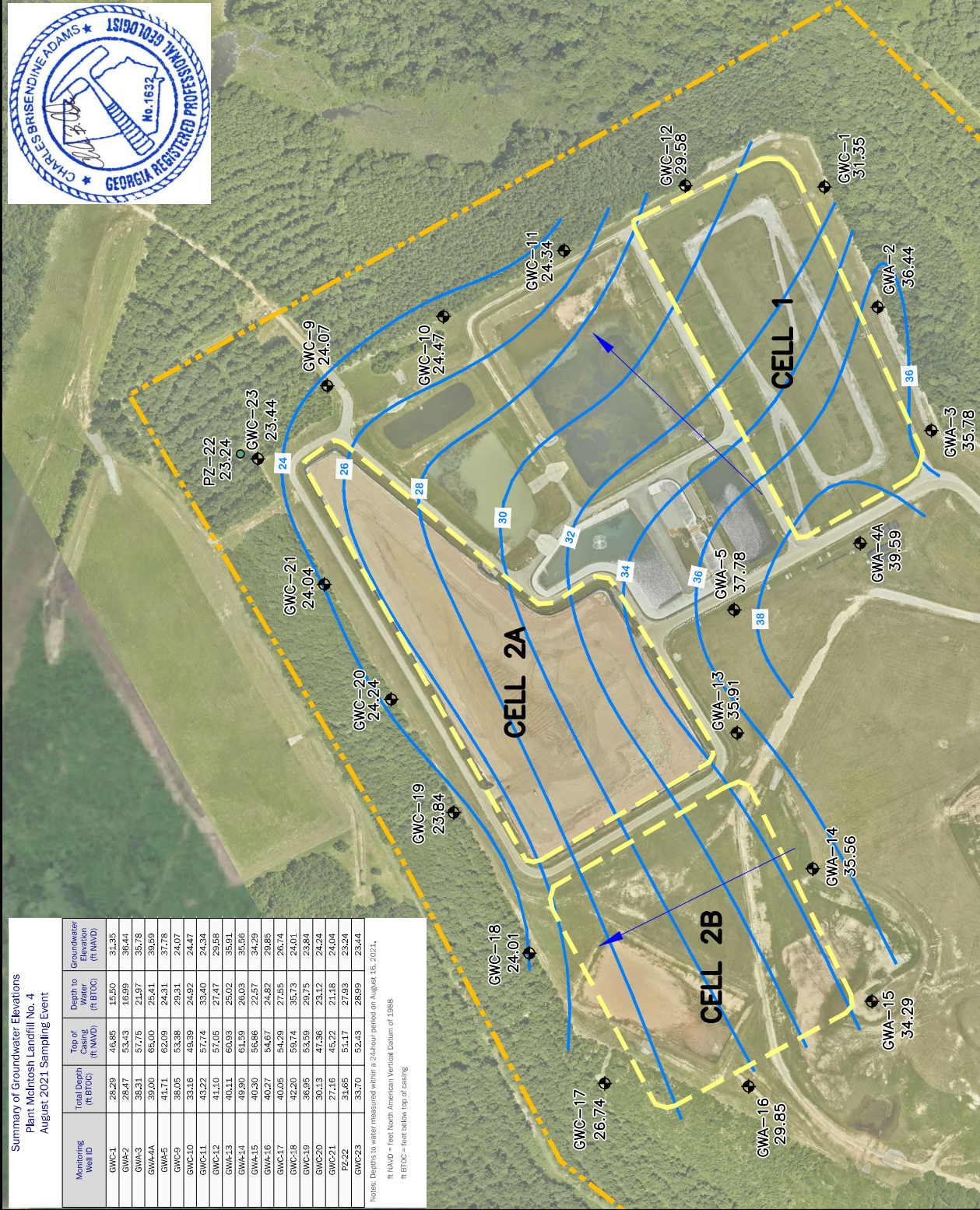
**POTENTIOMETRIC SURFACE
 CONTOUR MAP AUGUST 2021**

PROJECT NO. 1054-110 January 2022
 DRAWN BY: RW FIGURE:
 CHECKED BY: CA A-2

Summary of Groundwater Elevations
 Plant McIntosh Landfill No. 4
 August 2021 Sampling Event

Monitoring Well ID	Total Depth (ft BTDC)	Top of Casing (ft NAVD)	Depth to Water (ft BTDC)	Groundwater Elevation (ft NAVD)
GWC-1	28.29	46.85	18.56	31.35
GWC-2	28.47	53.43	16.99	36.44
GWA-3	38.31	57.75	21.97	35.78
GWA-4	39.00	65.00	25.41	39.59
GWA-5	41.71	62.09	24.31	37.78
GWC-9	38.05	53.38	15.31	24.07
GWC-10	33.16	49.39	24.92	24.47
GWC-11	43.22	57.74	14.40	24.34
GWC-12	41.10	57.05	15.95	25.68
GWA-13	40.11	61.99	21.02	35.91
GWA-14	40.30	56.86	22.57	34.29
GWC-15	40.27	54.67	24.82	29.85
GWC-17	40.05	54.29	27.55	26.74
GWC-18	42.20	59.74	35.73	24.01
GWC-19	36.95	53.99	29.75	23.84
GWC-20	30.13	47.36	23.12	24.24
GWC-21	27.16	45.22	21.16	24.04
PZ-22	31.65	51.17	27.93	23.24
GWC-23	33.70	52.43	28.99	23.44

Notes: Depths to water measured within a 24-hour period on August 16, 2021.
 ft NAVD = feet North American Vertical Datum of 1988
 ft BTDC = feet below top of casing



**Table A-1
Monitoring Network Well Details**

Well	Installation Date (mm/dd/yyyy)	Northing	Easting	Ground Surface Elevation (NAVD)	Top of Casing Elevation (NAVD)	Top of Screen Elevation (NAVD)	Bottom of Screen Elevation (NAVD)	Bottom Depth (ft BTOC)	Purpose
GWC-1	8/17/2004	855444.67	958416.09	44.06	46.85	29.06	19.06	28.29	Downgradient
GWA-2	8/17/2004	855307.00	958105.74	50.46	53.43	35.46	25.46	28.47	Upgradient
GWA-3	8/17/2004	855168.65	957788.07	54.94	57.75	29.94	19.94	38.31	Upgradient
GWA-4A	8/4/2016	855352.40	957496.55	61.90	65.00	40.00	30.00	39.00	Upgradient
GWA-5	8/18/2004	855677.36	957324.69	58.88	62.09	30.88	20.88	41.71	Upgradient
GWC-9	8/16/2004	856726.86	957902.73	50.83	53.38	25.83	15.83	38.05	Downgradient
GWC-10	8/19/2004	856427.33	958081.67	46.73	49.39	26.73	16.73	33.16	Downgradient
GWC-11	8/18/2004	856116.10	958251.47	55.02	57.74	25.02	15.02	43.22	Downgradient
GWC-12	8/18/2004	855803.06	958419.42	54.45	57.05	26.45	16.45	41.10	Downgradient
GWA-13	10/23/2015	855669.78	957006.93	57.92	60.93	31.12	21.12	40.11	Upgradient
GWA-14	10/27/2015	855474.34	956656.93	58.76	61.59	21.99	11.99	49.90	Upgradient
GWA-15	10/27/2015	855322.04	956314.43	53.76	56.86	26.86	16.86	40.30	Upgradient
GWA-16	10/27/2015	855639.94	956094.72	51.49	54.67	24.70	14.70	40.27	Upgradient
GWC-17	10/28/2015	856011.11	956102.53	51.50	54.29	24.54	14.54	40.05	Upgradient
GWC-18	10/29/2015	856205.60	956438.23	56.62	59.74	27.84	17.84	42.20	Upgradient
GWC-19	10/29/2015	856400.67	956801.55	51.00	53.59	26.94	16.94	36.95	Downgradient
GWC-20	10/30/2015	856561.94	957093.84	44.35	47.36	27.53	17.53	30.13	Downgradient
GWC-21	11/4/2015	856734.02	957390.27	42.31	45.22	28.36	18.36	27.16	Downgradient
GWC-23	5/26/2016	856905.61	957714.35	49.45	52.43	29.70	19.70	33.70	Downgradient

Notes:

1. ft BTOC indicates feet below top of casing.
2. Northings and Eastings are feet relative to North American Datum 1983 (NAD83), State Plane Georgia East Zone
3. NAVD elevations are feet relative to North American Vertical Datum of 1988.
4. Wells resurveyed June 2020.
5. Average horizontal hydraulic conductivity was measured at 3.0310-4cm/sec.

**Table A-2
Water Level Monitoring Network Well Piezometer Details**

Well	Installation Date (mm/dd/yyyy)	Northing	Easting	Ground Surface Elevation (NAVD)	Top of Casing Elevation (NAVD)	Top of Screen Elevation (NAVD)	Bottom of Screen Elevation (NAVD)	Bottom Depth (ft BTOC)	Purpose
PZ-22	11/4/2015	856950.76	957722.56	47.84	51.17	29.82	19.82	31.65	Downgradient Piezometer

Notes:

1. ft BTOC indicates feet below top of casing.
2. Northings and Eastings are feet relative to North American Datum 1983 (NAD83), State Plane Georgia East Zone
3. NAVD elevations are feet relative to North American Vertical Datum of 1988.
4. Wells resurveyed June 2020.
5. Average horizontal hydraulic conductivity was measured at 3.0310-4cm/sec.



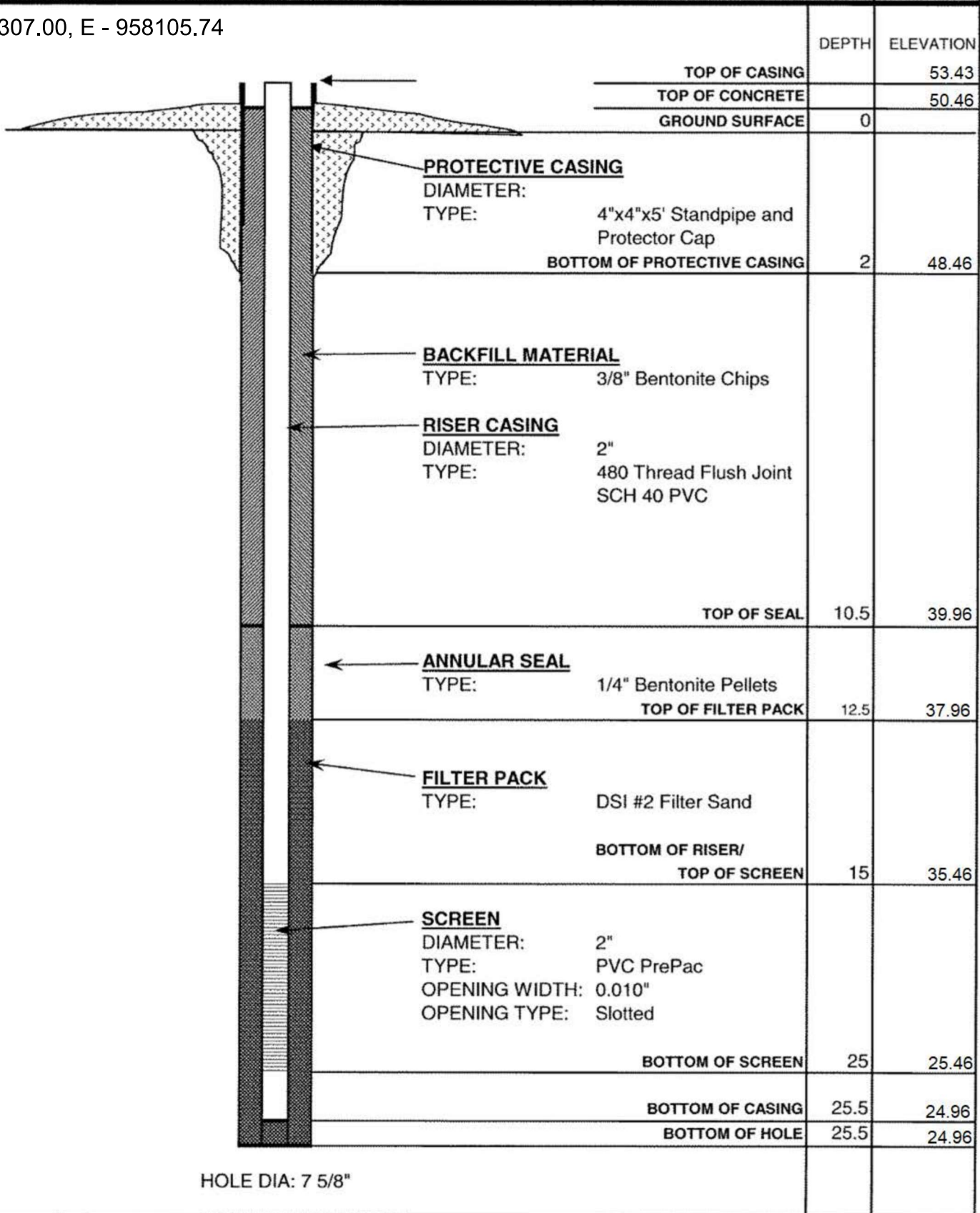
SOUTHERN COMPANY SERVICES			
WELL CONSTRUCTION LOG		PROJECT	McIntosh Monofill
SITE	Cell #1	LOCATION	Rincon, GA
DATE STARTED	8/17/2004	ENDED	8/17/2004
		PREPARED	JDP
N - 855444.67, E - 958416.09		WELL NO. GWC-1	

	DEPTH	ELEVATION
TOP OF CASING		46.85
TOP OF CONCRETE		44.06
GROUND SURFACE	0	
PROTECTIVE CASING DIAMETER: TYPE: 4"x4"x5' Standpipe and Protector Cap		
BOTTOM OF PROTECTIVE CASING	2	42.06
BACKFILL MATERIAL TYPE: 3/8" Bentonite Chips		
RISER CASING DIAMETER: 2" TYPE: 480 Thread Flush Joint SCH 40 PVC		
TOP OF SEAL	10.9	33.16
ANNULAR SEAL TYPE: 1/4" Bentonite Pellets		
TOP OF FILTER PACK	12.9	31.16
FILTER PACK TYPE: DSI #2 Filter Sand		
BOTTOM OF RISER/ TOP OF SCREEN	15	29.06
SCREEN DIAMETER: 2" TYPE: PVC PrePac OPENING WIDTH: 0.010" OPENING TYPE: Slotted		
BOTTOM OF SCREEN	25	19.06
BOTTOM OF CASING	25.5	18.56
BOTTOM OF HOLE	25.5	18.56

HOLE DIA: 7 5/8"

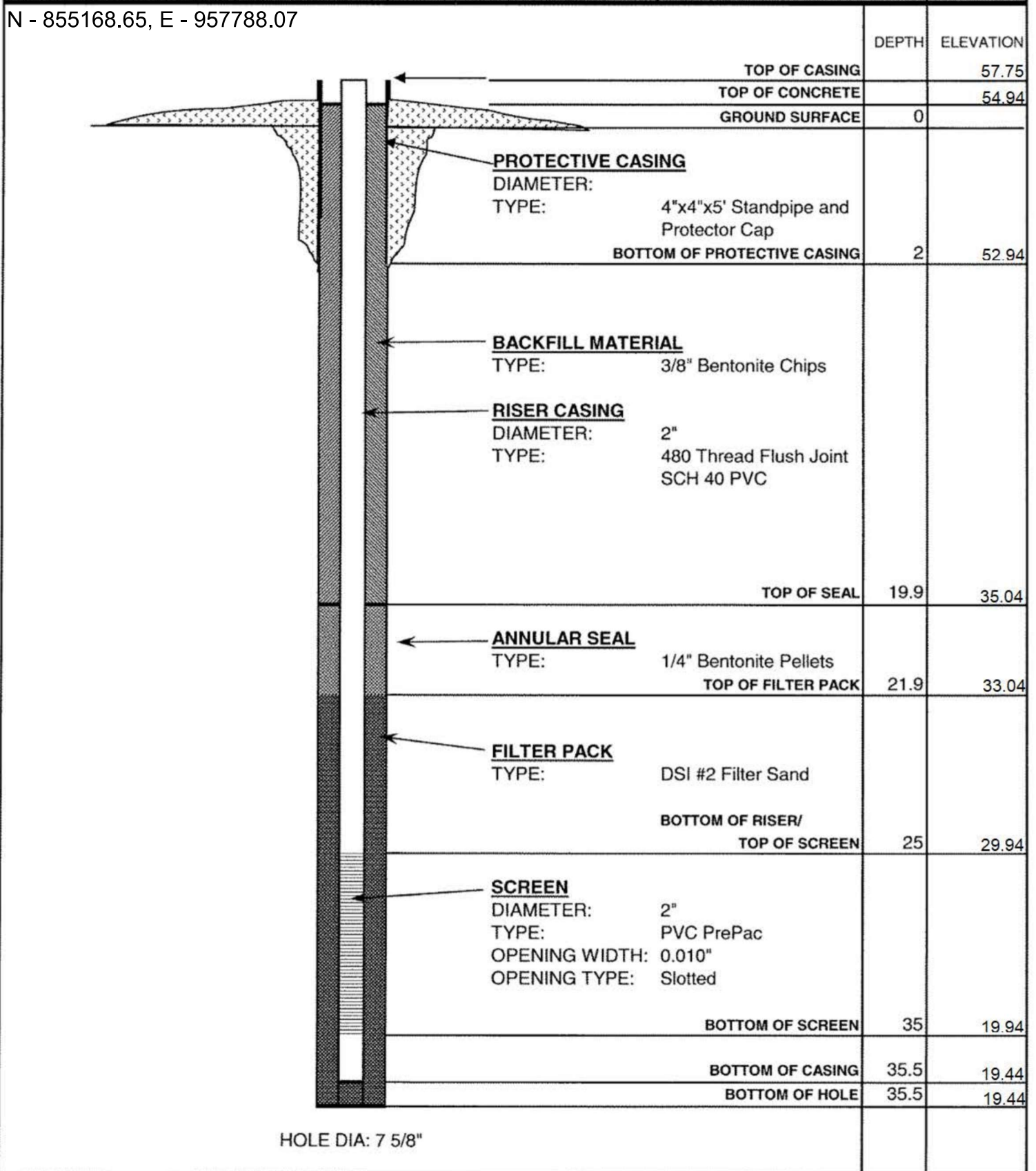
NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020

SOUTHERN COMPANY SERVICES			
WELL CONSTRUCTION LOG		PROJECT	McIntosh Monofill
SITE	Cell #1	LOCATION	Rincon, GA
DATE STARTED	8/17/2004	ENDED	8/17/2004
		PREPARED	JDP
N - 855307.00, E - 958105.74		WELL NO.	GWA-2



NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020

SOUTHERN COMPANY SERVICES			
WELL CONSTRUCTION LOG		PROJECT	McIntosh Monofill
SITE	Cell #1	LOCATION	Rincon, GA
DATE STARTED	8/17/2004	ENDED	8/17/2004
		PREPARED	JDP
N - 855168.65, E - 957788.07		WELL NO. GWA-3	



NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWA-4A (formerly GWC-4A)

PAGE 1 OF 1

GPC294369

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT PLANT MCINTOSH WELL REPLACEMENT

LOCATION RINCON, GEORGIA

DATE STARTED 8/3/2016 COMPLETED 8/4/2016 SURF. ELEV. 61.90 COORDINATES: N - 855352.40, E - 957496.55

CONTRACTOR Cascade Drilling LLC EQUIPMENT BL Mini METHOD Rotosonic

DRILLED BY Ray Whitt LOGGED BY S. Baxter CHECKED BY B. Coates ANGLE BEARING

BORING DEPTH 40 ft. GROUND WATER DEPTH: DURING 10 ft. COMP. 17.5 ft. DELAYED 21.22 ft. after 24 hrs.

NOTES TOC Elevation: 65.00

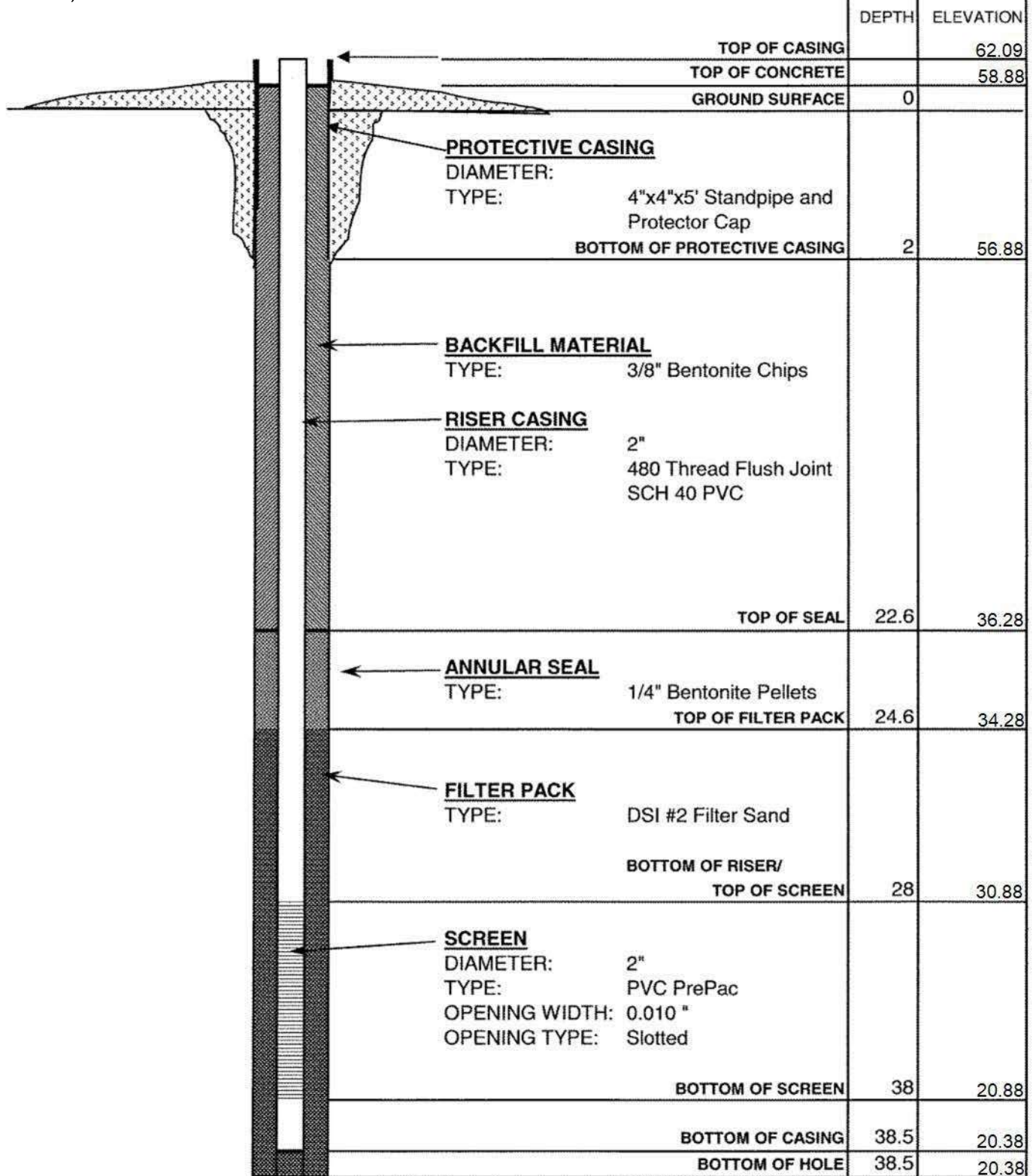
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
					Completion: Protective aluminum cover with bollards; 4-foot square concrete pad
0		Well-graded Sand (SW) - brown (10YR 4/3) fill moist, fine to coarse grained, subrounded			Surface Seal: concrete
5		Silty Clay (CL-ML) - mottled brown (10YR 4/3) and red / moderate reddish brown (10R 4/6) fill moist, with sand			Annular Fill: 1 - Batch Cement - Bentonite Grout (Batch = 6 bags Holcim Type I/II Portland Cement, 4 cups WyoBen High Yield Bentonite Powder, 35 Gal Potable Water, 18 PPG)
10		Well-graded Sand (SW) - brown (10YR 4/3) fill wet, fine to coarse grained, subangular			
15		Silt (ML) - mottled dark reddish gray (10R 4/1) and light gray (10R 7/1) alluvium wet, with sand			Annular Seal: 1 Bucket PelPlug 3/8" Non-Coated Bentonite Pellets, 50 lbs each
20		Silt (ML) - dark red (2.5YR 3/6) alluvium wet, with yellow streaking, trace sand			Filter: 6 Bags Filter Media GP#1 (20/40) Silica Sand, 50 lbs each, 1 Bag Quikcrete Fine Play Sand (Upper Filter), 50 lbs each
25		Silt (ML) - pink (10R 8/3) alluvium wet, trace coarse grained sand			
30		Well-graded Sand (SW) - brown (10YR 4/3) alluvium wet, fine to coarse grained, rounded, trace silt - coarsens downward			Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; pre-pack
35		Fat Clay (CH) - very dark bluish gray (10B 3/1) and brownish yellow / dark yellowish orange (10YR 6/6) alluvium wet, trace sand			Sump: 0.3999999999999999 ft.
40		Bottom of borehole at 40.0 feet.			Backfill: 1 Bag WyoBen Hole Plug 3/8" Chip Bentonite, 50 lbs each

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE: GDT - 5/8/16 09:04 - \\ALTRCF502\X2\JBAXT\DESKTOP\PLANTS\PLANT MCINTOSH\GINT DATA\PLANT MCINTOSH WELL REPLACEMENT.GPJ

Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020

SOUTHERN COMPANY SERVICES		WELL NO. GWA-5 (formerly GWC-5)	
WELL CONSTRUCTION LOG		PROJECT	McIntosh Monofill
SITE	Cell #1	LOCATION	Rincon, GA
DATE STARTED	8/18/2004	ENDED	8/18/2004
		PREPARED	JDP

N - 855677.36, E - 957324.69



HOLE DIA: 7 5/8"

NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020



DRILLING LOG GEOLOGICAL SERVICES

Hole No. **GWA-5 (formerly GWC-5)**
Sheet 1 of 2

SITE	McIntosh Monofill		HOLE DEPTH	38.5 ft.	SURF. ELEV.	58.88	
LOCATION	Rincon, GA	COORDINATES N	855677.36	E	957324.69		
ANGLE	BEARING	CONTRACTOR	SCS	DRILL NO.			
DRILLING METHOD	Hollow Stem Auger	NO. SAMPLES	1	NO. U.D. SAMPLES	N/A		
CASING SIZE	LENGTH	CORE SIZE		TOTAL % REC.	N/A		
WATER TABLE DEPTH	ELEV.	TIME AFTER COMP.		DATE TAKEN	8/18/2004		
TYPE GROUT	QUANTITY	MIX		DRILLING START DATE	8/18/2004		
DRILLER	Brad Filipovich	RECORDER	John Pugh	APPROVED		DRILLING COMP. DATE	8/18/2004

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From	To	Blows			
0	58.88								
1	57.88	brown silty fine-grained SAND							
2	56.88								
3	55.88								
4	54.88		greenish-brown silty fine-grained SAND						
5	53.88								
6	52.88	reddish-brown sandy CLAY							
7	51.88								
8	50.88								
9	49.88								
10	48.88								
11	47.88								
12	46.88								
13	45.88								
14	44.88								
15	43.88		reddish-yellow sandy silty CLAY						
16	42.88								
17	41.88								
18	40.88								
19	39.88								
20	38.88								
21	37.88								
22	36.88								
23	35.88								
24	34.88								

Water Depth at
24 hours: 23.6 ft



DRILLING LOG
GEOLOGICAL SERVICES

Hole No. **GWA-5 (formerly GWC-5)**

Sheet 2 of 2

SITE **McIntosh Monofill** TOTAL DEPTH **38.5 ft.** SURF.ELEV. **58.88**

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
25	33.88	purplish-brown sandy clayey SILT, moist							
26	32.88								
27	31.88								
28	30.88								
29	29.88								
30	28.88								
31	27.88								
32	26.88								
33	25.88								
34	24.88								
35	23.88	clayey silty fine-grained SAND, wet				Water Depth at time of boring: 34 ft			
36	22.88								
37	21.88								
38	20.88								
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									

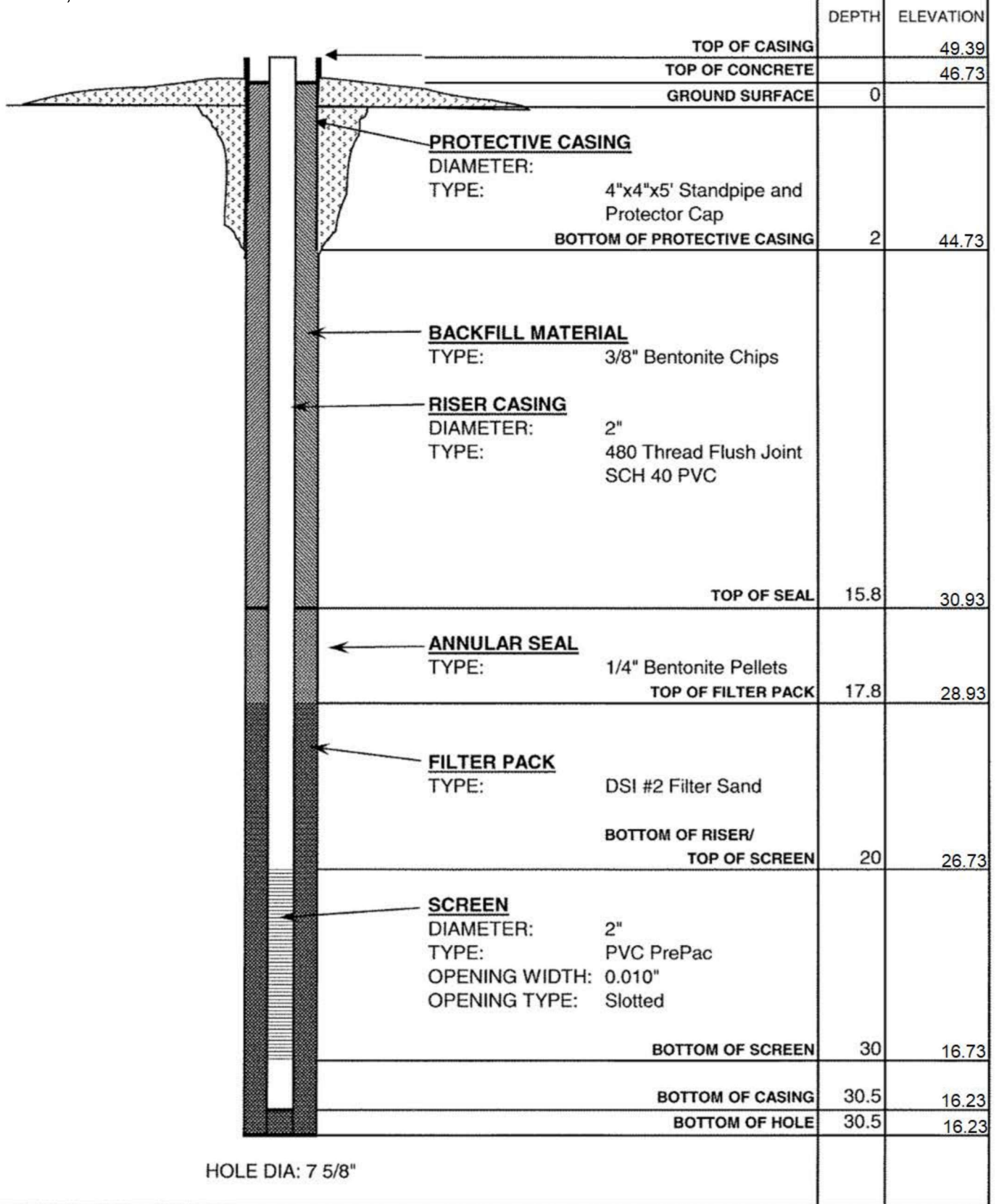
SOUTHERN COMPANY SERVICES			PROJECT		McIntosh Monofill		WELL NO.			
WELL CONSTRUCTION LOG			LOCATION		Rincon, GA		GWC-9			
SITE		Cell #1	DATE STARTED		8/16/2004	ENDED		8/16/2004	PREPARED	JDP
N - 856726.86, E - 957902.73										
							DEPTH	ELEVATION		
TOP OF CASING								53.38		
TOP OF CONCRETE								50.83		
GROUND SURFACE							0			
PROTECTIVE CASING										
DIAMETER:										
TYPE:							4"x4"x5' Standpipe and Protector Cap			
BOTTOM OF PROTECTIVE CASING							2	48.83		
BACKFILL MATERIAL										
TYPE:							3/8" Bentonite Chips			
RISER CASING										
DIAMETER:							2"			
TYPE:							480 Thread Flush Joint SCH 40 PVC			
TOP OF SEAL							20	30.83		
ANNULAR SEAL										
TYPE:							1/4" Bentonite Pellets			
TOP OF FILTER PACK							22	28.83		
FILTER PACK										
TYPE:							DSI #2 Filter Sand			
BOTTOM OF RISER/ TOP OF SCREEN							25	25.83		
SCREEN										
DIAMETER:							2"			
TYPE:							PVC PrePac			
OPENING WIDTH:							0.010"			
OPENING TYPE:							Slotted			
BOTTOM OF SCREEN							35	15.83		
BOTTOM OF CASING							35.5	15.33		
BOTTOM OF HOLE							35.5	15.33		
HOLE DIA: 7 5/8"										

NOTE:

Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020

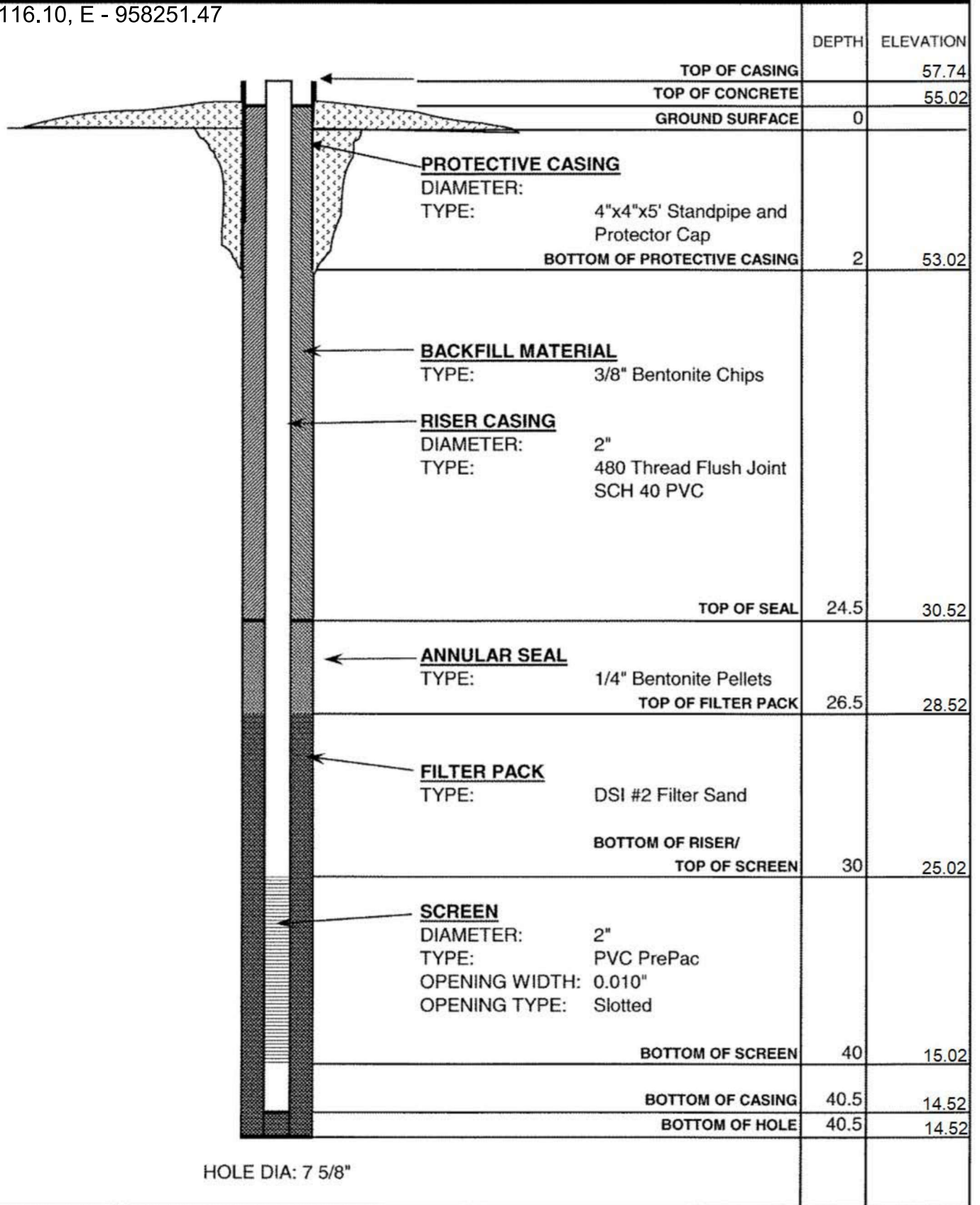
SOUTHERN COMPANY SERVICES			
WELL CONSTRUCTION LOG		PROJECT	McIntosh Monofill
SITE	Cell #1	LOCATION	Rincon, GA
DATE STARTED	8/19/2004	ENDED	8/19/2004
		PREPARED	JDP
WELL NO. GWC-10			

N - 856427.33, E - 958081.67



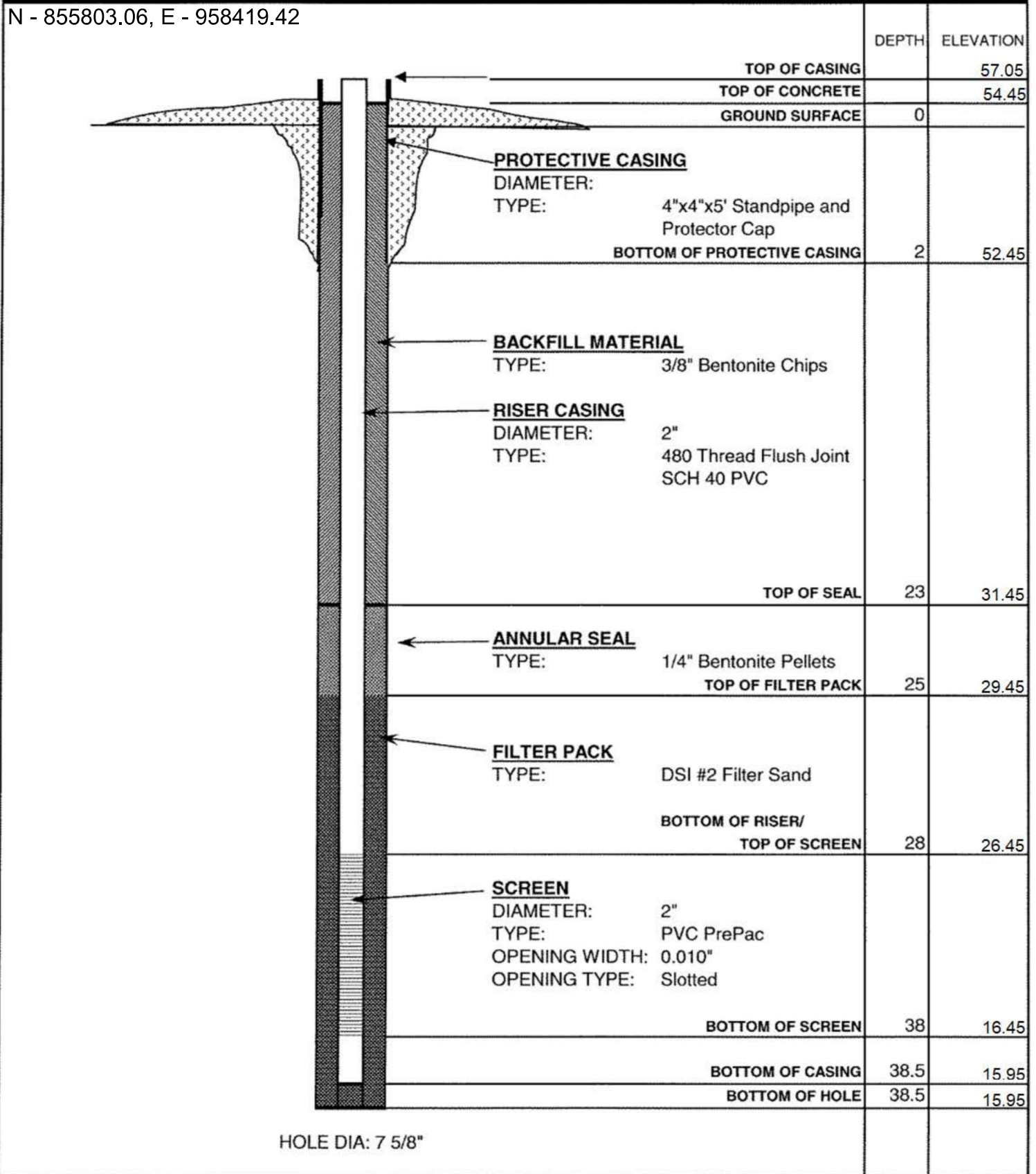
NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020

SOUTHERN COMPANY SERVICES			
WELL CONSTRUCTION LOG		PROJECT	McIntosh Monofill
SITE	Cell #1	LOCATION	Rincon, GA
DATE STARTED	8/18/2004	ENDED	8/18/2004
		PREPARED	JDP
N - 856116.10, E - 958251.47		WELL NO. GWC-11	



NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020

SOUTHERN COMPANY SERVICES			
WELL CONSTRUCTION LOG		PROJECT	McIntosh Monofill
SITE	Cell #1	LOCATION	Rincon, GA
DATE STARTED	8/18/2004	ENDED	8/18/2004
		PREPARED	JDP
N - 855803.06, E - 958419.42		WELL NO.	GWC-12



NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWA-13
PAGE 1 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 10/22/2015 COMPLETED 10/23/2015 SURF. ELEV. 57.92 COORDINATES: N - 855669.78, E - 957006.93

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 37 ft. GROUND WATER DEPTH DURING 25 ft. COMP. DELAYED 22.1 ft. after 100 hrs.

NOTES TOC Elevation: 60.93

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
0		Low Plastic Organic Silt or Clay (OL) - black (2.5Y 2.5/1) topsoil topsoil				Surface Seal: concrete
0 - 5		Poorly-graded Sand with Silt (SP-SM) - mottled light yellowish brown (2.5Y 6/3) and yellow (2.5Y 7/6) damp, loose, fine-grained				
5 - 10		Poorly-graded Sand with Clay (SP-SC) - mottled light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/8) and yellowish red / light brown (5YR 5/6) damp, cohesive, fine-grained - increase sand content with depth				
10 - 15		Silty Clay (CL-ML) - mottled light gray (2.5Y 7/2), dark reddish brown (2.5YR 3/3) and yellowish brown / moderate yellowish brown (10YR 5/4) dry, very stiff, low to medium - increased plasticity with depth				
15 - 20		Sandy Fat Clay (CH) - mottled light gray (2.5Y 7/2), dark reddish brown (2.5YR 3/3) and yellowish brown (10YR 5/8) damp, medium stiff, medium to high - mottled light gray (2.5Y 7/2) and yellowish brown (10YR 5/8) high - brownish yellow / dark yellowish orange (10YR 6/6) soft, high				Annular Fill: Cement-Bentonite Grout (30 gal.)
20 - 25		Fat Clay (CH) - light olive gray (5Y 6/2) damp, medium stiff, medium to high, some fine sand lenses				
25 - 28		Sandy Lean Clay (CL) - mottled pale olive (5Y 6/3) and brownish yellow / dark yellowish orange (10YR 6/6) damp, high				Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
28 - 30		Poorly-graded Sand with Clay (SP-SC) - yellow (2.5Y 7/6) wet, medium grained, interbedded with clay seams				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
30 - 37		Poorly-graded Sand (SP) - mottled brownish yellow (10YR 6/8), yellow (2.5Y 7/6) and strong brown (7.5YR 5/8) wet, medium grained, interbedded with few thin clay seams				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack

(Continued Next Page)

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ



LOG OF TEST BORING

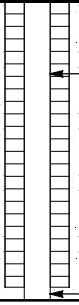



BORING GWA-13
 PAGE 2 OF 2
 GPC568939

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Poorly-graded Sand (SP)(Con't)				(CONTINUED)  Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack Sump:0.299999999999997 ft. Cave-in to 37 ft.
		Well-graded Sand with Clay (SW-SC) - mottled brownish yellow (10YR 6/8) and light gray (10YR 7/1) cohesive				
35		Fat Clay (CH) - mottled light gray (2.5Y 7/1) and yellow (2.5Y 7/6) high				
		Well-graded Gravelly Sand (SW-SC) - mottled yellow (2.5Y 8/6) and light gray (5Y 7/1) wet, fine to coarse-grained, trace of fine gravel				
		Bottom of borehole at 37.0 feet.				
40						
45						
50						
55						
60						
65						

NOTE:
 Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWA-14
PAGE 1 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 10/23/2015 COMPLETED 10/27/2015 SURF. ELEV. 58.76 COORDINATES: N - 855474.34, E - 956656.93

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 47 ft. GROUND WATER DEPTH DURING 19.2 ft. COMP. DELAYED 23 ft. after 24 hrs.

NOTES TOC Elevation: 61.59

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
5		Low Plastic Organic Silt or Clay (OL) - dark olive brown (2.5Y 3/3) damp, topsoil, fine-grained sand Poorly-graded Sand (SP) - light olive brown (2.5Y 5/3) damp, fine-grained Clayey Sand (SC) - mottled gray (10YR 6/1), gray / light brownish gray (5YR 6/1) and red (2.5YR 4/8) dry, cohesive, fine-grained, mica				Surface Seal: concrete
10		Sandy Lean Clay (CL) - mottled white / yellowish gray (5Y 8/1) and red (2.5YR 5/8) dry, very stiff, thin fine-sand lenses Lean Clay (CL) - mottled light greenish gray (5GY 8/1) and light reddish brown (2.5YR 6/3) dry, very stiff, low to medium, mica Silty Clay (CL-ML) - mottled light gray (5Y 7/1), red (2.5YR 4/8) and brownish yellow (10YR 6/8) dry, very stiff, low to medium, thin fine-sand lenses				
15		Silt (ML) - mottled light gray (5Y 7/1), red (2.5YR 4/8) and brownish yellow (10YR 6/8) damp, stiff, medium, with clay - strong brown (7.5YR 5/8) damp, soft, medium, with clay - red (2.5YR 5/8) with clay and fine-sand				Annular Fill: Cement-Bentonite Grout (45 gal.)
20		Lean Clay (CL) - light gray (5Y 7/1), light reddish brown (2.5YR 6/3) and red (2.5YR 4/8) damp, stiff, medium Silt (ML) - brownish yellow (10YR 6/8) dry, some fine-sand - yellowish red (5YR 5/8) - brownish yellow / dark yellowish orange (10YR 6/6) and light reddish brown (2.5YR 6/3)				
25		Poorly-graded Sand with Silt (SP-SM) - brownish yellow / dark yellowish orange (10YR 6/6) and strong brown (7.5YR 5/8) wet				
30						

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-14
PAGE 2 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Lean Clay (CL) - pale yellow (2.5Y 7/3) and strong brown (7.5YR 4/6) damp, medium stiff, medium				(CONTINUED) Annular Fill: Cement-Bentonite Grout (45 gal.) Annular Seal: ← Pel Plug 3/8 coated pellets (1 - 5gal. bucket) Filter: ← Filter Media 1A Silica Sand (4 - 50 lbs bags) Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack Sump: 0.299999999999997 ft. Cave-in to 47 ft.
35		Poorly-graded Sand with Silt (SP-SM) - pale yellow (2.5Y 7/3) and strong brown (7.5YR 4/6) wet, fine-grained - brownish yellow (10YR 6/8) wet, fine-grained				
40		- brownish yellow (10YR 6/8) cohesive, fine-grained - fine to medium-grained, with fine well rounded gravel				
45		Well-graded Sand with Silt (SW-SM) - light gray (2.5Y 7/1) wet - sparse fine well-rounded gravel, mica - brownish yellow (10YR 6/8) fine to coarse-grained - fine well-rounded gravel				
		Bottom of borehole at 47.0 feet.				
50						
55						
60						
65						

NOTE:
Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020



BORING GWA-15 (formerly GWC-15)

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 10/27/2015 COMPLETED 10/27/2015 SURF. ELEV. 53.76 COORDINATES: N - 855322.04, E - 956314.43

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE _____ BEARING _____

BORING DEPTH 37 ft. GROUND WATER DEPTH DURING 19 ft. COMP. _____ DELAYED 18.6 ft. after 24 hrs.

NOTES TOC Elevation: 56.86

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
5	[Diagonal Hatching]	Silty Sand (SM) - grayish brown (2.5Y 5/2) topsoil Poorly-graded Sand (SP) - light yellowish brown (2.5Y 6/3) damp, fine-grained Sandy Lean Clay (CL) - mottled gray / light olive gray (5Y 6/1) and red (2.5YR 4/8) damp, very stiff, medium - mottled gray (2.5Y 5/1) and reddish yellow (7.5YR 6/6)				Surface Seal: concrete
10	[Diagonal Hatching]	Lean Clay (CL) - mottled light gray / yellowish gray (5Y 7/2) and red (2.5YR 4/6) damp, stiff, medium Clayey Sand (SC) - reddish gray (2.5YR 5/1) damp, cohesive				Annular Fill: Cement-Bentonite Grout (30 gal.)
15	[Diagonal Hatching]	Lean Clay (CL) - mottled gray / light olive gray (5Y 6/1) and red (10R 5/8) dry Poorly-graded Sand with Silt (SP-SM) - yellow (10YR 7/8) dry, fine-grained Clayey Sand (SC) - yellowish red / light brown (5YR 5/6) fine-grained				
20	[Diagonal Hatching]	Poorly-graded Sand (SP) - mottled brownish yellow (10YR 6/8), pinkish gray (7.5YR 6/2) and red (10R 4/8) wet, fine-grained - brownish yellow (10YR 6/8) and pale yellow (2.5Y 7/4) - strong brown (7.5YR 5/6) and light gray (5Y 7/1)				Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
25	[Diagonal Hatching]	Sandy Lean Clay (CL) - light gray / yellowish gray (5Y 7/2) damp, low Sandy Fat Clay (CH) - mottled light gray / yellowish gray (5Y 7/2) and strong brown (7.5YR 5/6) dry, medium stiff, medium to high Poorly-graded Sand with Silt (SP-SM) - mottled yellow (5Y 7/8) and strong brown (7.5YR 5/6) wet, fine-grained				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
30	[Diagonal Hatching]					Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack

(Continued Next Page)



BORING GWA-15 (formerly GWC-15)

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
35	[Dotted pattern]	Poorly-graded Sand with Silt (SP-SM) <i>(Cont)</i> - with fine well-rounded gravel				Completion: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack Sump: 0.299999999999997 ft. Cave-in to 37 ft.
	[Diagonal hatching]	Well-graded Sand with Clay (SW-SC) - yellowish red (5YR 5/8) fine to coarse-grained Bottom of borehole at 37.0 feet.				
40						
45						
50						
55						
60						
65						

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

NOTE:
 Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWA-16
 PAGE 1 OF 2
 GPC568939

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
 LOCATION Rincon, GA

DATE STARTED 10/27/2015 COMPLETED 10/27/2015 SURF. ELEV. 51.49 COORDINATES: N - 855639.94, E - 956094.72

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 37 ft. GROUND WATER DEPTH DURING 18 ft. COMP. DELAYED 20.5 ft. after 48 hrs.

NOTES TOC Elevation: 54.67

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
5		Poorly-graded Sand (SP) - light olive brown (2.5Y 5/6) fine-grained Sandy Lean Clay (CL) - strong brown (7.5YR 5/8) and red (2.5YR 5/8) Fat Clay (CH) - mottled brownish yellow / dark yellowish orange (10YR 6/6) and red / moderate reddish brown (10R 4/6) damp, soft, medium to high - very pale brown (10YR 7/3) and yellowish brown (10YR 5/6)				Surface Seal: concrete
10		- mottled red (2.5YR 5/8), yellowish brown (10YR 5/6) and light gray (2.5Y 7/2) - mottled red (2.5YR 5/6) and light gray (2.5Y 7/2) wet				
15		- mottled light gray (2.5Y 7/2) and dark red (2.5YR 3/6) some sand - light gray / yellowish gray (5Y 7/2) sticky				Annular Fill: Cement-Bentonite Grout (30 gal.)
20		Poorly-graded Sand with Clay (SP-SC) - pale brown (10YR 6/3) and brownish yellow / dark yellowish orange (10YR 6/6) wet, cohesive, fine to coarse grained				
25		Fat Clay (CH) - mottled pale olive (5Y 6/3) and reddish yellow (7.5YR 6/6) wet, high Poorly-graded Sand with Clay (SP-SC) - mottled pale olive (5Y 6/3) and reddish yellow (7.5YR 6/6) wet				Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
30		Poorly-graded Sand (SP) - mottled brownish yellow (10YR 6/8) and light gray (2.5Y 7/2) wet, fine-grained				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
						Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

(Continued Next Page)



LOG OF TEST BORING

BORING GWA-16

PAGE 2 OF 2

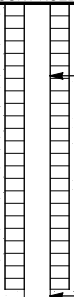
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
		Poorly-graded Sand (SP)(Con't)				Completion: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)  Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack Sump:0.299999999999997 ft. Cave-in to 37 ft.
35		Well-graded Sand with Silt (SW-SM) - pale yellow (2.5Y 7/3) with fine to coarse well-rounded gravel - yellow (2.5Y 7/6) some clay				
Bottom of borehole at 37.0 feet.						
40						
45						
50						
55						
60						
65						

NOTE:

Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWC-17
PAGE 1 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 10/28/2015 COMPLETED 10/28/2015 SURF. ELEV. 51.50 COORDINATES: N - 856011.11, E - 956102.53

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 37 ft. GROUND WATER DEPTH DURING 18 ft. COMP. DELAYED 23.9 ft. after 48 hrs.

NOTES TOC Elevation: 54.29

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
5		Poorly-graded Sand with Clay (SP-SC) - light yellowish brown (2.5Y 6/3) damp, topsoil - olive yellow (2.5Y 6/6) increase clay content with depth				Surface Seal: concrete
		Sandy Lean Clay (CL) - light gray (2.5Y 7/1) and red (2.5YR 4/8) dry, medium stiff, low - reddish yellow (7.5YR 6/6) interbedded clayey sand lenses (2" thick)				
10		Fat Clay (CH) - mottled light gray (2.5Y 7/1), red (2.5YR 5/6) and dark yellowish brown (10YR 4/6) damp, soft to medium stiff, low to medium, with sand				
		Sandy Lean Clay (CL) - mottled light gray (2.5Y 7/1) and red (2.5YR 5/6) dry, medium stiff, low				
		Well-graded Sand with Clay (SW-SC) - red (10R 4/8) dry, cohesive, fine to coarse-grained - mottled weak red (10R 4/3) and strong brown (7.5YR 5/8)				Annular Fill: Cement-Bentonite Grout (30 gal.)
15		Lean Clay (CL) - light gray (2.5Y 7/1) stiff, low				
		Poorly-graded Sand (SP) - yellow (2.5Y 7/6) very moist, fine to medium-grained, with mica				
		Well-graded Sand (SW) - pale yellow (2.5Y 7/3) and brownish yellow / dark yellowish orange (10YR 6/6) wet, fine to coarse-grained				
20		Fat Clay (CH) - mottled light gray (2.5Y 7/2) and yellowish brown (10YR 5/6) damp, high, sandy mottles - increasing sand content with depth				Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
		Poorly-graded Sand with Clay (SP-SC) - mottled light brownish gray (2.5Y 6/2) and brownish yellow / dark yellowish orange (10YR 6/6) wet, fine-grained - decreasing clay content with depth - olive yellow (2.5Y 6/6) trace of fine well-rounded gravel				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
25		Well-graded Sand with Silt (SW-SM) - light gray (2.5Y 7/2) fine to coarse-grained, with fine to coarse well-				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack
30						

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-17
 PAGE 2 OF 2
 GPC568939

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA	
35		rounded gravel Well-graded Sand with Silt (SW-SM)(Con't) - mottled olive yellow (2.5Y 6/6), very dark gray (2.5Y 3/1) and light yellowish brown (2.5Y 6/3)				Completion: protective aluminum cover with bollards; 4-foot square concrete pad Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack	
		Poorly-graded Sand with Clay (SP-SC) - dark greenish gray (5GY 4/1) damp, cohesive, fine grained, trace coarse sand, with mica			(CONTINUED)	Sump:0.299999999999997 ft. Cave-in to 37 ft.	
		Bottom of borehole at 37.0 feet.					
40							
45							
50							
55							
60							
65							

NOTE:

Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWC-18
PAGE 1 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 10/28/2015 COMPLETED 10/29/2015 SURF. ELEV. 56.62 COORDINATES: N - 856205.60, E - 956438.23

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE _____ BEARING _____

BORING DEPTH 47 ft. GROUND WATER DEPTH DURING 28 ft. COMP. _____ DELAYED 32.2 ft. after 24 hrs.

NOTES TOC Elevation: 59.74

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
5		Poorly-graded Sand with Clay (SP-SC) - dark grayish brown (2.5Y 4/2) and light yellowish brown (2.5Y 6/3) dry, topsoil, fine-grained - mottled brownish yellow (10YR 6/8) and red (2.5YR 5/8) increasing clay content with depth				Completion: protective aluminum cover with bollards; 4-foot square concrete pad Surface Seal: concrete Annular Fill: Cement-Bentonite Grout (30 gal.) Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket) Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
		Sandy Lean Clay (CL) - mottled light gray (2.5Y 7/2), brownish yellow (10YR 6/8) and red (2.5YR 4/6) damp, medium stiff, low, increasing sand content with depth, with mica				
10		Fat Clay (CH) - mottled light gray (5Y 7/1), brownish yellow (10YR 6/8) and red (2.5YR 4/6) very damp, medium stiff, high				
		Well-graded Sand with Clay (SW-SC) - mottled red / moderate reddish brown (10R 4/6) and yellowish brown (10YR 5/6) damp, cohesive, fine to coarse-grained				
		Fat Clay (CH) - mottled pale yellow (2.5Y 8/2) and light reddish brown (2.5YR 6/3) damp, medium stiff, high, with sand				
15		Poorly-graded Sand (SP) - mottled pale yellow (2.5Y 8/4) and light reddish brown (2.5YR 6/3) damp, fine-grained				
		Fat Clay (CH) - mottled light gray (2.5Y 7/2) and yellow (2.5Y 8/6) very damp, medium stiff, high, with silt - mottled light gray / yellowish gray (5Y 7/2) and very pale brown / grayish orange (10YR 7/4)				
20		- with sand				
25						
30		Poorly-graded Sand with Clay (SP-SC) - light yellowish brown (2.5Y 6/4) and pink (5YR 7/3) moist, fine-grained				

(Continued Next Page)



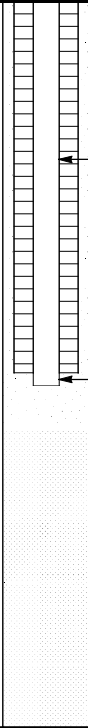
LOG OF TEST BORING

BORING GWC-18
PAGE 2 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
		Poorly-graded Sand with Clay (SP-SC) Con't - brownish yellow / dark yellowish orange (10YR 6/6) and pale yellow (2.5Y 7/3) fine to medium-grained - yellowish brown (10YR 5/8)				Completion: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)  Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack Sump: 0.299999999999997 ft. Backfill: Haliburton Baroid 3/8 chips Cave-in to 47 ft.
		Well-graded Sand (SW) - grayish brown (2.5Y 5/2) wet, fine to coarse-grained				
35		Poorly-graded Sand with Silt (SP-SM) - light brownish gray (2.5Y 6/2) wet, fine-grained, with mica				
40		Sandy Silt (ML) - dark greenish gray (10GY 4/1) very damp, with mica				
45						
Bottom of borehole at 47.0 feet.						
50						
55						
60						
65						

NOTE:

Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWC-19
PAGE 1 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 10/29/2015 COMPLETED 10/29/2015 SURF. ELEV. 51.00 COORDINATES: N - 856400.67, E - 956801.55

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE _____ BEARING _____

BORING DEPTH 37 ft. GROUND WATER DEPTH DURING 28 ft. COMP. _____ DELAYED 26.6 ft. after 72 hrs.

NOTES TOC Elevation: 53.59

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Poorly-graded Sand with Silt (SP-SM) - grayish brown (10YR 5/2) moist, topsoil, fine-grained				Surface Seal: concrete
5		Sandy Lean Clay (CL) - mottled light gray (10YR 7/1), brownish yellow (10YR 6/8) and red (2.5YR 4/6) dry, very stiff, low to medium				
		Well-graded Sand with Clay (SW-SC) - mottled gray (2.5Y 6/1) and light olive brown (2.5Y 5/6) dry, fine to coarse-grained				
		Silty Clay (CL-ML) - mottled light gray (2.5Y 7/1) and red (2.5YR 5/8) moist, very stiff				
10		- light gray (2.5Y 7/2) and red (2.5YR 4/8) dry, hard, low				Annular Fill: Cement-Bentonite Grout (30 gal.)
		Fat Clay (CH) - light gray / yellowish gray (5Y 7/2) damp, medium stiff, medium to high - interbedded with thin lenses of fine sand (white 5Y 8/1)				
15						
20						Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
		- increasing sand content				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
25		Well-graded Sand with Clay (SW-SC) - mottled yellowish brown (10YR 5/6) and very dark gray (10YR 3/1) damp, fine to coarse-grained				
		Well-graded Sand (SW) - pale brown (10YR 6/3) and light gray (2.5Y 7/2) dry, fine to coarse-grained - olive yellow (2.5Y 6/6) interbedded with clayey sand lenses - light yellowish brown (2.5Y 6/3) wet				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack
30						

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-19
 PAGE 2 OF 2
 GPC568939

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
35		<p>Well-graded Sand (SW)(Con't) - yellowish brown / moderate yellowish brown (10YR 5/4) - brown (10YR 4/3)</p> <p>Poorly-graded Sand with Silt (SP-SM) - light olive brown (2.5Y 5/6) wet, fine to medium-grained, with mica</p> <p>Silt (ML) - dark greenish gray (5GY 4/1) damp, with mica</p>			CONTINUED 	<p>Completion: protective aluminum cover with bollards; 4-foot square concrete pad</p> <p>Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack Sump: 0.299999999999997 ft.</p> <p>Backfill: Haliburton Baroid 3/8 chips Cave-in to 37 ft.</p>
Bottom of borehole at 37.0 feet.						
40						
45						
50						
55						
60						
65						

NOTE:
 Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWC-20
PAGE 1 OF 1
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 10/30/2015 COMPLETED 10/30/2015 SURF. ELEV. 44.35 COORDINATES: N - 856561.94, E - 957093.84

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 27 ft. GROUND WATER DEPTH DURING 17 ft. COMP. DELAYED 19.2 ft. after 100 hrs.

NOTES TOC Elevation: 47.36

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
5		Poorly-graded Sand with Clay (SP-SC) - grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/3) and yellow (2.5Y 7/6) wet, topsoil, fine-grained - mottled brownish yellow (10YR 6/8) and red (2.5YR 5/8) damp, increase clay content - mottled red (2.5YR 4/8) and brownish yellow (10YR 6/8) damp, interbedded with light gray (5Y 7/1) fine sand lenses				Completion: protective aluminum cover with bollards; 4-foot square concrete pad
10		Lean Clay (CL) - red (2.5YR 4/8) and brownish yellow (10YR 6/8) medium stiff, low to medium, interbedded with light gray (5Y 7/1) fine sand lenses				Annular Fill: Cement-Bentonite Grout (20 gal.)
15		Fat Clay (CH) - light gray (5Y 7/1) damp, medium stiff, medium to high				Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
20		Well-graded Sand (SW) - mottled yellow (5Y 8/6) and pale yellow (5Y 8/2) dry, fine to coarse-grained, interbedded with few olive-yellow (5Y 6/6) silt lenses - brownish yellow (10YR 6/8) wet - pale yellow (2.5Y 7/3) - interbedded with light gray (5Y 7/1) clay lenses				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
25		Elastic Silt (MH) - mottled reddish yellow (5YR 7/6) and brownish yellow / dark yellowish orange (10YR 6/6) wet, with mica - dark greenish gray (5GY 4/1) with sand and mica				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack
27.0		Bottom of borehole at 27.0 feet.				Sump: 0.300000000000001 ft. Cave-in to 27 ft.
30						

Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020



LOG OF TEST BORING

BORING GWC-21
PAGE 1 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells
LOCATION Rincon, GA

DATE STARTED 11/4/2015 COMPLETED 11/4/2015 SURF. ELEV. 42.31 COORDINATES: N - 856734.02, E - 957390.27

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 32 ft. GROUND WATER DEPTH DURING 17 ft. COMP. DELAYED 17.5 ft. after 24 hrs.

NOTES TOC Elevation: 45.22

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
5		Poorly-graded Sand with Silt (SP-SM) - yellowish brown / moderate yellowish brown (10YR 5/4) fine-grained				Surface Seal: concrete
		Clayey Sand (SC) - mottled yellowish brown (10YR 5/6) and red (2.5YR 4/8) wet, cohesive - yellowish red (5YR 5/8)				Annular Fill: Cement-Bentonite Grout (20 gal.)
10		Lean Clay (CL) - mottled light gray (5Y 7/1) and red (2.5YR 5/8) damp, medium stiff, low to medium - dry, stiff - mottled light gray (5Y 7/1) and yellow (10YR 7/8) interbedded with thin fine sand lenses				Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
15		Well-graded Sand (SW) - strong brown (7.5YR 5/8) dry, fine to coarse-grained - yellow (10YR 7/8) - brownish yellow (10YR 6/8) wet				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
20		Well-graded Sand with Clay (SW-SC) - pale yellow (2.5Y 7/3) wet, fine to coarse-grained, with mica - brownish yellow (10YR 6/8)				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack
25		Poorly-graded Sand with Silt (SP-SM) - mottled yellowish brown (10YR 5/6), black (10YR 2/1) and light gray (10YR 7/1) wet				Sump: 0.3000000000000001 ft.
		Elastic Silt (MH) - brownish yellow (10YR 6/8) wet, with mica				
		Silt (ML) - mottled light brownish gray (2.5Y 6/2) and brownish yellow (10YR 6/8) damp - dark greenish gray (10BG 4/1) damp, with mica				Backfill: Haliburton Baroid 3/8 chips
30						

(Continued Next Page)



LOG OF TEST BORING

BORING GWC-21
 PAGE 2 OF 2
 GPC568939

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Silt (ML) (Cont)				(CONTINUED)
						Backfill: Haliburton Baroid 3/8 chips Cave-in to 32 ft.
		Bottom of borehole at 32.0 feet.				
35						
40						
45						
50						
55						
60						
65						

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

NOTE:

Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020

WELL CONSTRUCTION LOG - ESEE DATABASE.GDT - 7/6/16 12:34 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-MCINTOSH\MCINTOSH REPLACEMENT AND ABANDONMENT (2016)\BORING LOGS\MCINTOSH



LOG OF WELL CONSTRUCTION

WELL: GWC-23
 PAGE 1 OF 1
 ECS38075

SOUTHERN COMPANY SERVICES, INC.
 EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT McIntosh CCR PZ Install (2016)
 LOCATION Plant McIntosh

DATE STARTED 5/25/2016 COMPLETED 5/26/2016 SURF. ELEV. 49.45 COORDINATES: N - 856905.61, E - 957714.35

CONTRACTOR Cascade Drilling EQUIPMENT Sonic METHOD Rotosonic

DRILLED BY T. Ardito LOGGED BY A. Henry CHECKED BY B. Smelser ANGLE _____ BEARING _____

BORING DEPTH 37 ft. GROUND WATER DEPTH DURING _____ COMP. 18.05 ft. DELAYED _____

NOTES TOC Elevation: 52.43

DEPTH (ft)	GROUNDWATER OBSERVATIONS	ELEVATION	WELL DATA		NOTES
			Completion: protective aluminum cover with bollards; 4-foot square concrete pad		
5		49.5	Surface Seal: concrete		
		47.5	Annular Fill: Portland Cement-Bentonite Grout (2 - 94lbs bags PC, 0.25 - 50lbs bags Gel, 20 gal. Water)		
10					
		37.0	Annular Seal: Pel-Plug 3/8 Bentonite Non-Coated Pellets (0.5 - 5gal buckets)		
15					
		31.6	Filter: Filter Media 20/40 Silica Sand (4 - 50 lbs bags)		
20		29.7	Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 0.010" Slot Prepack		
25					
		19.7	Sump: 0.20 ft.		
30		19.5			
		15.5	Backfill: Baroid 3/8 Hole Plug Chips (1 - 50lbs bags (37.0'-34.0')) and Filter Media 20/40 Silica Sand (1 - 50lbs bags (30.0'-34.0'))		
35					
		12.5	Cave-in to 37 ft.		

Elevation in feet North American Vertical Datum of 1988 (NAVD).
 Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
 Well resurveyed in June 2020



LOG OF TEST BORING

BORING PZ-22 (formerly GWC-22)

PAGE 1 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

DATE STARTED 11/3/2015 COMPLETED 11/4/2015 SURF. ELEV. 47.84 COORDINATES: N - 856950.76, E - 957722.56

CONTRACTOR Cascade EQUIPMENT Prosonic METHOD Rotosonic

DRILLED BY F. Kraus LOGGED BY W. Shaughnessy CHECKED BY B. Smelser ANGLE BEARING

BORING DEPTH 37 ft. GROUND WATER DEPTH DURING 23 ft. COMP. DELAYED 24.3 ft. after 24 hrs.

NOTES TOC Elevation: 51.17

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE:GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad
5		Silty Sand (SM) - dark olive gray / olive gray (5Y 3/2) and light olive gray (5Y 6/2) wet, topsoil				Surface Seal: concrete
		Clayey Sand (SC) - mottled light olive brown (2.5Y 5/3), red (2.5YR 5/8) and brownish yellow (10YR 6/8) very damp, cohesive - decrease sand content with depth				
		Poorly-graded Sand (SP) - mottled pale yellow (2.5Y 7/3) and brownish yellow (10YR 6/8) damp				
		Lean Clay (CL) - mottled light yellowish brown (2.5Y 6/3) and yellowish red / light brown (5YR 5/6) damp				Annular Fill: Cement-Bentonite Grout (20 gal.)
10		Fat Clay (CH) - light olive gray (5Y 6/2) and reddish yellow (7.5YR 6/6) damp, medium to high, with silt - white (2.5Y 8/1) interbedded with thin white (2.5Y 8/1) fine sand lenses				
15		- increase silt content				Annular Seal: Pel Plug 3/8 coated pellets (1 - 5gal. bucket)
		Well-graded Sand (SW) - pale yellow (2.5Y 7/4) and brownish yellow / dark yellowish orange (10YR 6/6) dry, fine to coarse-grained				Filter: Filter Media 1A Silica Sand (4 - 50 lbs bags)
20		Poorly-graded Sand (SP) - mottled pale brown (10YR 6/3) and brownish yellow (10YR 6/8) dry, fine to medium-grained				
25		- olive yellow (2.5Y 6/6) wet				Standpipe: 2" OD PVC (SCH 40) Screen: 10 ft; 10' - 0.010" Slot Prepack
		Poorly-graded Sand with Silt (SM) - pale yellow (5Y 7/4) wet, cohesive				
30		Sandy Silt (ML)				Sump:0.300000000000001 ft. Backfill:Haliburton Baroid 3/8 chips

(Continued Next Page)



LOG OF TEST BORING

BORING PZ-22 (formerly GWC-22)

PAGE 2 OF 2
GPC568939

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant McIntosh Landfill 4 Expansion Wells

LOCATION Rincon, GA

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 3/29/16 12:47 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLANT MCINTOSH LANDFILL 4 EXPANSION.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION <small>Weak Moderate Strong</small>	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)
35		Sandy Silt (ML) (Con't) - light yellowish brown (2.5Y 6/3) damp, with mica - strong brown (7.5YR 5/8) and light yellowish brown (10YR 6/4) - dark greenish gray (5G 4/1) damp				← Backfill: Haliburton Baroid 3/8 chips Cave-in to 37 ft.
40		Bottom of borehole at 37.0 feet.				
45						
50						
55						
60						
65						

NOTE:

Elevation in feet North American Vertical Datum of 1988 (NAVD).
Coordinates are in North American Datum of 1983 (NAD83) Georgia State Plane East Zone.
Well resurveyed in June 2020

107 Mountain Brook Dr., Ste. 104
Canton, GA 30115



www.gunninsurvey.com
678.880.7502

DATE: July 2, 2020

TO: Atlantic Coastal Consulting, Inc
1150 Northmeadow Parkway
Suite 100
Roswell, GA 30076

ATTN: Evan Perry of Atlantic Coastal Consulting

SUBJECT: Plant McIntosh Landfill #4: 20 wells

The following data has been established on the existing wells using Georgia State Plane East Zone (NAD 83 horizontal and NAVD 88 vertical). Wells were surveyed to the following tolerances: 0.01' vertical and 0.5' horizontal via conventional survey methods, GPS, OPUS processing, and level loops. Each well was cross-checked for horizontal and vertical accuracy.

WELL ID	NORTHING NAIL	EASTING Nail	ELEVATION NAIL	ELEVATION TOP OF CASE	ELEVATION TOP OF PVC
GWA-13	855669.78	957006.93	57.92	61.09	60.93
GWA-14	855474.34	956656.93	58.76	61.73	61.59
GWA-16	855639.94	956094.72	51.49	54.95	54.67
GWC-1	855444.67	958416.09	44.06	47.37	46.85
GWC-4A	855352.40	957496.55	61.90	65.20	65.00
GWC-15	855322.04	956314.43	53.76	57.06	56.86
GWC-17	856011.11	956102.53	51.50	54.46	54.29
GWC-18	856205.60	956438.23	56.62	59.88	59.74
GWC-19	856400.67	956801.55	51.00	53.77	53.59
GWC-20	856561.94	957093.84	44.35	47.62	47.36
GWC-21	856734.02	957390.27	42.31	45.42	45.22
GWC-22	856950.76	957722.56	47.84	51.32	51.17
GWC-23	856905.61	957714.35	49.45	52.64	52.43

WELL ID	NORTHING	EASTING	ELEVATION	ELEVATION	ELEVATION
	TOP OF CASE	TOP OF CASE	PAD	TOP OF CASE	TOP OF PVC
GWA-2	855307.00	958105.74	50.46	53.98	53.43
GWA-3	855168.65	957788.07	54.94	58.27	57.75
GWC-5	855677.36	957324.69	58.88	62.60	62.09
GWC-9	856726.86	957902.73	50.83	53.93	53.38
GWC-10	856427.33	958081.67	46.73	49.92	49.39
GWC-11	856116.10	958251.47	55.02	58.23	57.74
GWC-12	855803.06	958419.42	54.45	57.55	57.05

Sincerely yours,

Gunnin Land Surveying, LLC.



Jesse R. Gunnin, L.S. Principal Surveyor

PERFORMANCE BOND FOR WATER WELL CONTRACTORS

AND DRILLERS

Bond No. 4993104

WATER WELL CONTRACTOR OR DRILLER _____

KNOW ALL MEN BY THESE PRESENTS.

That we SOUTHERN COMPANY SERVICES, INC., as Principal, and SAFECO INSURANCE COMPANY OF AMERICA, as Surety, are held and firmly bound unto the Director of the Environmental Protection Division ("Director"), Department of Natural Resources, State of Georgia and his successor or successors in office, as Obligees, in the full sum of TEN THOUSAND & No/100 Dollars (\$10,000.00), for the payment of which well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1985 (Ga. Laws 1985, p. 1192) (the "Act") requires that water well contractors and drillers file performance bonds with the Director to ensure compliance with the Act; and

WHEREAS, the above bound principal is subject to the terms and provisions of said Act.

NOW, THEREFORE, the conditions of this obligation are such that if the above bound Principal shall fully and faithfully perform the duties and in all things comply with the procedures and standards set forth in the Act as now or hereafter amended, and the rules and regulations promulgated pursuant thereto, including but not limited to the correction of any violation of such procedures and standards upon discovery, irrespective of whether such discovery is made before completion of any well subject to this bond, then this obligation shall be void; otherwise of full force and effect.

And Surety, for value received, agrees that no amendment to existing laws, rules or regulations, or adoption of new laws, rules or regulations shall in any way discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption, or modification.

This bond shall be effective from date of issuance or, in the case of a water well contractor, date of licensure and shall continue in effect until terminated by expiration, mutual agreement or cancellation upon 60 days written notice to Principal and Obligees; provided that the rights of the Obligees and beneficiaries under this bond which arose prior to such termination shall continue.

Unless sooner terminated, this bond shall terminate June 30, 2006

IN WITNESS WHEREOF the Principal and Surety have caused these presents to be duly signed and sealed, this 15th day of April, 2003.

SOUTHERN COMPANY SERVICES, INC.
Principal, By: [Signature]
Title: SAM H. DABBS, JR.

ASSISTANT SECRETARY

Approved as to sufficiency and accepted:



POWER OF ATTORNEY

SAFECO INSURANCE COMPANY OF AMERICA
GENERAL INSURANCE COMPANY OF AMERICA
HOME OFFICE: SAFECO PLAZA
SEATTLE, WASHINGTON 98185

No. 6724

KNOW ALL BY THESE PRESENTS:

That SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA, each a Washington corporation, does each hereby appoint

SANDRA S. CARTER; JUDY GAY CERA; GARY D. EKLUND; JUDY S. FLEMING; VIRGINIA B. MCMANUS; BARBARA S. MACARTHUR; EDWARD L. MITCHELL; NANCY NIX; BARBARA THOMPSON; CYNTHIA I. RUDOLPH; LAUREL D. HUSS; Atlanta, Georgia***

its true and lawful attorney(s)-in-fact, with full authority to execute on its behalf fidelity and surety bonds or undertakings and other documents of a similar character issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, SAFECO INSURANCE COMPANY OF AMERICA and GENERAL INSURANCE COMPANY OF AMERICA have each executed and attested these presents

this 14th day of November 2001

R.A. Pierson

R.A. PIERSON, SECRETARY

Mike McGavick

MIKE MCGAVICK, PRESIDENT

CERTIFICATE

Extract from the By-Laws of SAFECO INSURANCE COMPANY OF AMERICA
and of GENERAL INSURANCE COMPANY OF AMERICA:

"Article V, Section 13. - FIDELITY AND SURETY BONDS ... the President, any Vice President, the Secretary, and any Assistant Vice President appointed for that purpose by the officer in charge of surety operations, shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the company in the course of its business... On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

Extract from a Resolution of the Board of Directors of SAFECO INSURANCE COMPANY OF AMERICA
and of GENERAL INSURANCE COMPANY OF AMERICA adopted July 28, 1970.

"On any certificate executed by the Secretary or an assistant secretary of the Company setting out,

- (i) The provisions of Article V, Section 13 of the By-Laws, and
- (ii) A copy of the power-of-attorney appointment, executed pursuant thereto, and
- (iii) Certifying that said power-of-attorney appointment is in full force and effect,

the signature of the certifying officer may be by facsimile, and the seal of the Company may be a facsimile thereof."

I, R.A. Pierson, Secretary of SAFECO INSURANCE COMPANY OF AMERICA and of GENERAL INSURANCE COMPANY OF AMERICA, do hereby certify that the foregoing extracts of the By-Laws and of a Resolution of the Board of Directors of these corporations, and of a Power of Attorney issued pursuant thereto, are true and correct, and that both the By-Laws, the Resolution and the Power of Attorney are still in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of said corporation

this 15th day of April 2003



R.A. Pierson

R.A. PIERSON, SECRETARY

IMPORTANT NOTICE TO SURETY BOND CUSTOMERS REGARDING THE TERRORISM RISK INSURANCE ACT OF 2002

As a surety bond customer of one of the SAFECO insurance companies (SAFECO Insurance Company of America, General Insurance Company of Americas, First National Insurance Company, American States Insurance Company or American Economy Insurance Company), it is our duty to notify you that the Terrorism Risk Insurance Act of 2002 extends to "surety insurance". This means that under certain circumstances, we may be eligible for reimbursement of certain surety bond losses by the United States government under a formula established by this Act.

Under this formula, the United States government pays 90% of losses caused by certified acts of terrorism that exceed a statutorily established deductible to be paid by the insurance company providing the bond. The Act also establishes a \$100 billion cap for the total of all losses to be paid by all insurers for certified acts of terrorism. Losses on some or all of your bonds may be subject to this cap.

This notice does not modify any of the existing terms and conditions of this bond, the underlying agreement guaranteed by this bond, any statutes governing the terms of this bond, or any generally applicable rules of law.

At this time, there is no premium charge resulting from this Act.

CONTINUATION
CERTIFICATE

SAFECO Insurance Company of America

, Surety upon

a certain Bond No. **4993104**

dated effective **June 30, 1987**
(MONTH-DAY-YEAR)

on behalf of **Southern Company Services, Inc.**
(PRINCIPAL)

and in favor of **Georgia - Dept. of Natural Resources**
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on **June 30, 2014**
(MONTH-DAY-YEAR)

and ending on **June 30, 2015**
(MONTH-DAY-YEAR)

Amount of bond **\$10,000.00**

Description of bond **Water Well Contractors & Drillers**

Premium: **\$100.00**

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on **April 09, 2014**
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By 
D-Ann Kleidosty, Attorney-In-Fact

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 8125754

First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America are corporations duly organized under the laws of the State of New Hampshire (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Chaun M. Wilson; D-Ann Kleidosty; Gary D. Eklund; Sharon J. Potts; Sylvia M. Ogle; Tracey D. Watson; William G. Moody

all of the city of Atlanta, state of GA each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 15th day of May, 2013.



First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

By: Gregory W. Davenport
Gregory W. Davenport, Assistant Secretary

NOT VALID UNLESS PRINTED ON RED BACKGROUND, NOTE, LETTER OR CREDIT, CURRENCY RATE, INTEREST RATE OR RESIDUAL VALUE GUARANTEES.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

STATE OF WASHINGTON ss
COUNTY OF KING

On this 15th day of May, 2013, before me personally appeared Gregory W. Davenport, who acknowledged himself to be the Assistant Secretary of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Seattle, Washington, on the day and year first above written.



By: KD Riley
KD Riley, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-law and Authorizations of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, which are now in full force and effect reading as follows:

ARTICLE IV - OFFICERS - Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

Certificate of Designation - The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Gregory W. Davenport, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization - By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, David M. Carey, the undersigned, Assistant Secretary, of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 9th day of April, 2014.



By: David M. Carey
David M. Carey, Assistant Secretary

CONTINUATION
CERTIFICATE

SAFECO Insurance Company of America

, Surety upon

a certain Bond No. 4993104

dated effective June 30, 1987
(MONTH-DAY-YEAR)

on behalf of Southern Company Services, Inc.
(PRINCIPAL)

and in favor of Georgia - Dept. of Natural Resources
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on June 30, 2016
(MONTH-DAY-YEAR)

and ending on June 30, 2017
(MONTH-DAY-YEAR)

Amount of bond \$10,000.00

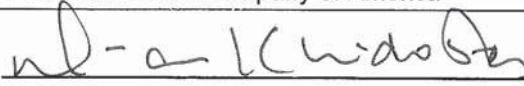
Description of bond Water Well Contractors & Drillers

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on April 07, 2016
(MONTH-DAY-YEAR)

SAFECO Insurance Company of America

By


D-Ann Kleidosty, Attorney-in-Fact

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 7310252

First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America are corporations duly organized under the laws of the State of New Hampshire (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Brooke A. Sharp; Christine Doczy; D-Ann Kleidosty; Gary D. Eklund; Sharon J. Potts; Sylvia M. Ogle; William G. Moody

all of the city of Atlanta, state of GA each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 1st day of April, 2016.



First National Insurance Company of America
General Insurance Company of America
Safeco Insurance Company of America

By: David M. Carey
David M. Carey, Assistant Secretary

STATE OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 1st day of April, 2016, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Teresa Pastella, Notary Public
Plymouth Twp., Montgomery County
My Commission Expires March 28, 2017
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-law and Authorizations of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America, which are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS – Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Gregory W. Davenport, the undersigned, Assistant Secretary, of First National Insurance Company of America, General Insurance Company of America, and Safeco Insurance Company of America do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 2th day of April, 2016.



By: Gregory W. Davenport
Gregory W. Davenport, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.



CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YYYY)
11/02/2015

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Aon Risk Services Southwest, Inc. Houston TX Office 5555 San Felipe Suite 1500 Houston TX 77056 USA	CONTACT NAME: PHONE (A/C. No. Ext): (866) 283-7122 FAX (A/C. No.): (800) 363-0105		
	E-MAIL ADDRESS:		
INSURED Cascade Drilling, L.P. PO Box 1184 17270 Woodinville-Redmond Road Building "A", #777 Woodinville WA 98072 USA	INSURER(S) AFFORDING COVERAGE		NAIC #
	INSURER A: Zurich American Ins Co		16535
	INSURER B: Aspen Specialty Insurance Company		10717
	INSURER C:		
	INSURER D:		
	INSURER E:		
INSURER F:			

COVERAGES**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. **Limits shown are as requested**

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
B	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GENL AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			ERAFXLW15	11/01/2015	11/01/2016	EACH OCCURRENCE	\$1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	\$300,000
							MED EXP (Any one person)	\$25,000
							PERSONAL & ADV INJURY	\$1,000,000
							GENERAL AGGREGATE	\$2,000,000
							PRODUCTS - COMP/OP AGG	\$2,000,000
							Professional Liability	\$1,000,000
A	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS			BAP 0137342-01	11/01/2015	11/01/2016	COMBINED SINGLE LIMIT (Ea accident)	\$2,000,000
							BODILY INJURY (Per person)	
							BODILY INJURY (Per accident)	
							PROPERTY DAMAGE (Per accident)	
B	<input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input type="checkbox"/> RETENTION			EXAFXLY15	11/01/2015	11/01/2016	EACH OCCURRENCE	\$10,000,000
							AGGREGATE	\$10,000,000
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below			WC013734402 Workers Comp AOS WC013734502 Workers Comp AR,MA,NE, NY	11/01/2015 11/01/2015	11/01/2016 12/01/2015	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER E.L. EACH ACCIDENT	\$1,000,000
							E.L. DISEASE-EA EMPLOYEE	\$1,000,000
							E.L. DISEASE-POLICY LIMIT	\$1,000,000
B	Contractor Pol1			ERAFXLW15	11/01/2015	11/01/2016	Aggregate	\$1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Certificate Holder is included as Additional Insured in accordance with the policy provisions of the Auto, General and Excess Liability policy. A waiver of Subrogation is granted in favor of Certificate Holder in accordance with the policy provisions of the AL GL WC policy. Insurance evidenced herein is Primary to other insurance available to an Additional Insured, but only in accordance with the policy's provisions.

CERTIFICATE HOLDER**CANCELLATION**

Southern Company Services Attn: Keith Morgan 42 Inverness Center Parkway BIN B426 Birmingham AL 35242 USA	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE

POLICY NUMBER: ERAFXLW15

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED –
PRIMARY AND NON-CONTRIBUTORY**

It is hereby agreed that the Policy is amended as follows solely as respects Coverage Section 1. , Coverage 1A (Bodily Injury and Property Damage) and Coverage 1B (Personal and Advertising Injury):

SCHEDULE

Name of Person or Organization:

Where required by written contract.

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

The persons or organizations shown in the Schedule above are insureds under § III. WHO IS AN INSURED, paragraph F. of this Policy subject to all the terms and conditions of that paragraph.

With respect to the persons or organizations shown in the Schedule above, this Policy shall be primary and non-contributory with any other valid and collectible insurance available to such persons or organizations.

All other terms and conditions of this Policy remain unchanged.

POLICY NUMBER: ERAFXLW15

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY

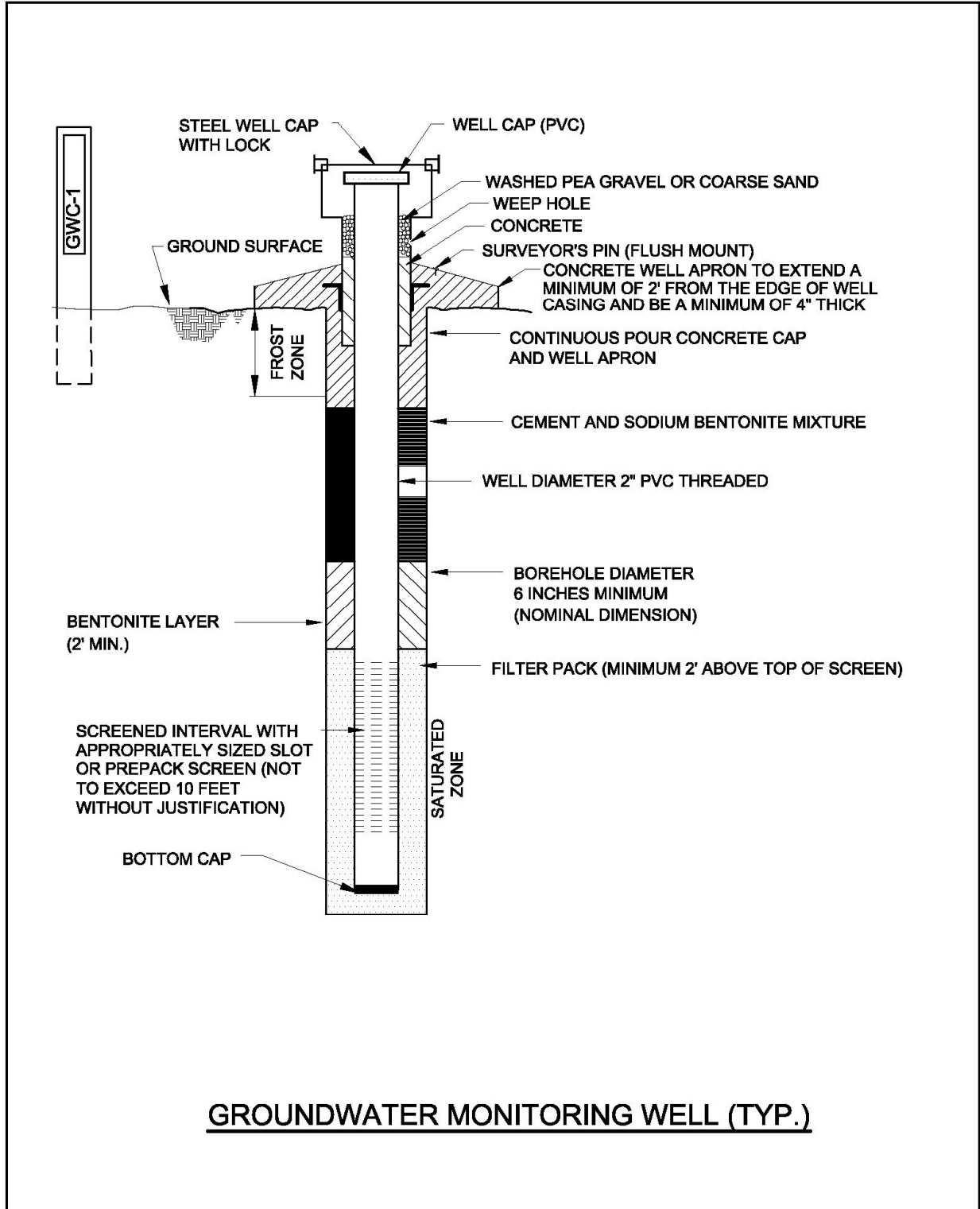
SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)
Blanket as required by written contract.

It is hereby agreed that "any person or organization" referred to in the waiver of rights of recovery contained in the last sentence of Section VI. **CONDITIONS**, paragraph O., **Subrogation**, includes the person or organization listed in the above Schedule.

All other terms and conditions of this Policy remain unchanged.

Appendix B - Groundwater Monitoring Well Detail



Appendix C - Groundwater Sampling Procedure

Groundwater sampling will be conducted using the latest United States Environmental Protection Agency (EPA) 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.

Georgia Power Company (GPC) will follow the procedures below at each well to ensure that a representative sample is collected:

4. 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.
5. 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.
6. 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 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. All 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 EPA Science and Ecosystem Support Division (SESD) *Operating Procedure for Field Equipment Cleaning and Decontamination* as a guide (LSASDPROC-205-R#).
7. 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.
8. 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 feet 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.
9. 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 3 to 5 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 for pH
 - $\pm 5\%$ for specific conductance (conductivity)
 - $\pm 10\%$ or ± 0.2 milligrams per liter (mg/L) (whichever is greater) for DO where $DO > 0.5 \text{ mg/L}$. If $DO < 0.5 \text{ mg/L}$ no stabilization criteria apply

- Temperature – Record only, not used for stabilization criteria
- ORP – Record only, not used for stabilization criteria.
- ≤10 for turbidity (see additional details below)

The goal when sampling is to attain a turbidity of less than 5 nephelometric turbidity units (NTU); however, samples may be collected where turbidity is less than 10 NTU and the stabilization criteria described above are met. If sample turbidity is greater than 5 NTU and all other stabilization criteria have been met, samplers will continue purging for 1 additional hour in order to reduce the turbidity to 5 NTU or less.

- If turbidity remains above 5 NTU but is less than 10 NTU after the additional hour of purging, and all other parameters are stabilized, the well can be sampled.
 - Where turbidity remains above 10 NTU, 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.
10. Collect samples at a lowflow rate according to the most current version of EPA Region 4 SESD guidance document, *Operating Procedure – Groundwater Sampling* (EPA, SESDPROC-301-R#), 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. All sample containers should be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container.
 11. Compliance samples will be unfiltered; however, to determine if turbidity is affecting sample results (i.e., >10 NTU), 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. A new filter must be used for each well and each sampling event. Filtered samples are not considered compliance samples and are only used to evaluate the effects of turbidity. Additional details related to managing for elevated turbidity is discussed below.
 12. All sample bottles will be filled, capped, and placed in a cooler containing ice immediately after sampling where temperature control is required. Samples that do not require temperature control will be placed in a clean and secure container.
 13. Sample containers and preservative will be appropriate for the analytical method being used.
 14. Information contained on sample container labels will include:
 - a. Name of Site
 - b. Date and time of sampling
 - c. Sample description (well number)

- d. Sampler's initials
 - e. Preservatives
 - f. Analytical method(s)
15. After samples are collected, samplers will remove all non-dedicated equipment. Upon completion of all activity the well will be closed and locked.
16. 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; however, at no time will samples be analyzed after the method-prescribed hold time.

Throughout the sampling process new latex or 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.