



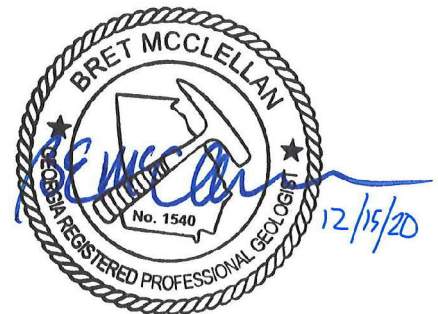
Southern Company Services / Georgia Power Company

Former Plant Arkwright New CCR Landfill Site Acceptability Report

Final Report

December 15, 2020

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Former Plant Arkwright New CCR Landfill Site Acceptability Report

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Executive Summary

Coal Combustion Residuals (CCR) units at former Plant Arkwright will be closed by removal, necessitating disposal of CCR materials at an approved location. The purpose of this report is to provide the necessary information to permit a new CCR landfill (CCRLF) at the former Plant Arkwright facility for consolidation of those materials.

This Site Acceptability Report has been prepared in accordance with Appendix A of Circular 14: Criteria for Performing Site Acceptability Studies for Solid Waste Landfills in Georgia (McLemore and Perriello, 1997). Appendix A of Circular 14 establishes siting criteria for landfills proposed to accept “moderate potential” industrial wastes, such as bottom ash and fly ash. The format of this report matches those listed criteria. The following key points and siting criteria are discussed in the report:

- The Georgia Environmental Protection Division (EPD) previously approved the proposed new CCRLF area for construction of a landfill accepting moderate potential industrial wastes in 1994.
- The proposed new CCRLF (site) is not located within 5,708 yards of a national historic site.
- The site is not located within the 100-year or 500-year floodplain.
- The site is not located within a Most Significant Groundwater Recharge Area.
- One wetland area was delineated south and downstream of the site. One man-made jurisdictional stream is located along the western boundary of the new CCRLF. The proposed landfill will be designed such that wetlands and surface water streams will not be impacted.
- No threatened or endangered animal or plant species or their habitats were observed at the site.
- No public water supply wells were identified within 2 miles of the site. The site is not within the water management area of a public water supply well. Ten privately-owned wells are potentially located within ½ mile of the site, all of which are hydraulically upgradient and all properties are connected to municipal water supply.
- A new CCRLF at this site complies with local zoning and land use ordinances.
- Native soils beneath the site generally consist of silty and sandy clay, underlain by sandy silt and silty sand with minor gravel at increasing depth. A silty sand saprolite typical of highly weathered piedmont crystalline rock underlies the silt, sand, and gravel layers above. Borings from recent and historical site investigations indicate parent materials consisting of extremely weathered quartzofeldspathic gneiss, hornblende gneiss and schist. Groundwater is generally encountered within the silty and sandy residual soils and saprolite layers above bedrock.
- The new CCRLF will be constructed adjacent to and will incorporate the existing Monofill.
- No confined aquifers were identified during drilling at the site.
- There were no faults or fault zones, unstable areas, or shear zones identified during work performed for this report.
- Groundwater pollution potential was determined using the LeGrand Method as described in Circular 14, using measured site input parameters. The LeGrand analysis produced a score of 12.7, which means groundwater pollution potential is possible but not likely.

Background

Former Plant Arkwright is located in northwestern Bibb County, Georgia, approximately six miles northwest of the city of Macon, Georgia and occupies approximately 230 acres along the Ocmulgee River. The plant has been decommissioned. Multiple CCR units currently exist at the former Plant Arkwright facility. CCR unit solid waste handling applications were submitted to EPD in 2018 in accordance with Rule 391-3-4-.10 of Georgia's Solid Waste Management Rules (Rules). The AP1 Landfill and AP2-DAS Landfill will be closed by removal, necessitating disposal of CCR materials at an approved location. The purpose of this report is to provide the necessary information for permitting a CCRLF at the former Plant Arkwright facility for disposal of such CCR materials in accordance with Rule 391-3-4-.10(9)(c)1(ii).

Former Plant Arkwright is located within the Piedmont Physiographic Province of the Appalachian Highland Physiographic District. The topography is rolling to hilly and the highest parts rise to about 800 feet above sea level. The main streams, having adjusted their courses to the structure of the underlying crystalline rocks, flow eastward to join the Ocmulgee River, which receives the entire drainage of Bibb County. Owing to the variety of rocks underlying the Piedmont, the soils differ from place to place, but in general they are deep red and reasonably fertile. Regionally, igneous and metamorphic rocks are exposed in the extreme northern part of Bibb County where the CCRLF is located. Many of them are granitic, being true granite, biotite-granite gneiss, or a granite component in a diorite injection complex. All these rocks are highly weathered and, where exposed, are generally soft and friable (LeGrand, 1962).

The stratigraphy in the new CCRLF area generally consists of darker colored silty clays at the higher elevations, grading to silts, sandy silts, and silty sands with depth, progressing to a micaceous sandy saprolite which transitions to bedrock. Recent borings indicate extremely weathered quartzofeldspathic gneiss, hornblende gneiss, and schist as parent materials.

The existing AP3 Landfill and Monofill units are permitted under solid waste handling permit 011-025D(LI). They are located adjacent to the site and are described as follows:

- Monofill:

Monofill includes a 9.18-acre closed unit and was permitted in January 1994 as a private industrial landfill to accept CCR waste from former Plant Arkwright. The Monofill area was originally permitted as a five-phase, 20.4-acre monofill; however, only the first phase was constructed and used. The remaining 4 phases were modified at closure to be utilized as a soil borrow area instead of a disposal area.

- AP3 Landfill:

AP3 Landfill is located immediately west and adjacent to the Monofill and is located along the western property boundary of the former Plant Arkwright property. The closed footprint encompasses 36.76 acres. It was constructed prior to 1958 and an earthen dam defines the landfill's southern limits. Beginning in the 1970s, the unit received CCR from former Plant Arkwright via a sluice line that crossed both the Norfolk Southern Railroad and Arkwright Road.

A Closure and Post-Closure Care Plan and Groundwater Monitoring Plan were approved by EPD on September 2, 2008 through a minor modification, which permitted Monofill and AP3 Landfill together and included a revised permit boundary, updated closure details, and groundwater monitoring network modifications.

Closure construction for Monofill and AP3 Landfill was completed in 2009 using a geosynthetic clay liner (GCL) overlain by 18-inches of cover soil. The two CCR units were issued a closure certificate by EPD on August 19, 2010 under Solid Waste Handling Permit 011-025D(LI). Groundwater monitoring is currently being conducted for these CCR units via 13 groundwater monitoring wells.

In order to consolidate CCR from former Plant Arkwright's Landfills into one area, a CCRLF is proposed in the location shown as CCR Waste Disposal Boundary on Figure 1 of this report. Waste from the CCR units will be excavated and disposed of in this lined landfill. The new CCRLF will be constructed in the area permitted by EPD in 1994 for the Monofill site. The CCRLF will be located on acreage immediately north of and will incorporate the Monofill.

Per Georgia Geologic Survey's (GGS's) Circular 14, Appendix A (McLemore and Perriello, 1997), CCR materials are specifically referenced as "Moderate Potential" wastes. Also, according to Appendix A, site acceptability criteria are dependent upon if the proposed facility is located within a Most Significant Ground-Water Recharge Area per GGS's Hydrologic Atlas 18. The new CCRLF is not located within a Most Significant Ground-Water Recharge Area according to Hydrologic Atlas 18, as shown on Figure 2. Therefore, this Site Acceptability Report addresses the siting criteria for landfills with "Moderate Potential" wastes, as specifically outlined in Circular 14, Appendix A (McLemore and Perriello, 1997).

1. Zoning

A letter from the local governing authority, stating that the new CCRLF complies with local zoning and land use ordinances, is provided in Appendix A of this report.

2. Floodplains

No portion of the new CCRLF is within a 100-year or 500-year flood plain (FEMA Flood Map No. 13021C0040G, 2017) as shown on Figure 3 and Figure 4.

3. Wetlands

The new CCRLF is located near surface water bodies and wetlands as shown on Figure 5. These surface waters and wetlands are described below.

A small, man-made pond is located just northwest of the new CCRLF (Figure 5). Based on a historical USGS topographic map and aerial photograph review, this pond formed after 1973 and prior to 1993. The pond is apparently fed by an intermittent stream created by the outfall from a residential retention pond located further upstream (north) of the site. In 2005, the configuration of the man-made pond was adjusted to promote drainage into a relocated stream constructed adjacent to the AP3 Landfill. This was accomplished by constructing an earthen dam along AP3 Landfill's northern edge.

The relocated stream runs roughly from north to south, west and adjacent to the proposed new CCRLF, separating the original Monofill site from AP3 Landfill. The stream discharges surface water through a weir structure located at the southeastern corner of AP3 Landfill into the wetlands area located further south, alongside Beaverdam Creek. This feature is not identified as a trout stream.

Beaverdam Creek is a tributary of the Ocmulgee River and is located approximately 1,700 feet south of the proposed new CCRLF. Beaverdam Creek runs roughly from northwest to southeast, eventually discharging to the Ocmulgee River at a location over $\frac{3}{4}$ -mile from the proposed new CCRLF area. Beaverdam Creek is not classified as a trout stream.

The new CCRLF is located approximately 1,400 feet west of the Ocmulgee River at its closest point. The Ocmulgee River at this site is part of the Lower Ocmulgee River Basin, flowing from north to south in the vicinity of former Plant Arkwright. All surface water and groundwater in the former Plant Arkwright area eventually flows toward the Ocmulgee River. The Ocmulgee River is not classified as a trout stream.

An Ecological Resource Survey was performed by Jacobs as part of this project and is included in Appendix B of this report. The study area encompassed all CCR units and surrounding areas on the former Plant Arkwright facility and included field surveys for identification of Waters of the United States, waters of the state, and protected species habitats. According to the survey, approximately 12.6 acres of jurisdictional wetlands and 6,000 linear feet of jurisdictional stream channels were mapped as shown in Appendix B of this report. The wetland is located south

and adjacent to AP3 Landfill, which is south of the new CCRLF. The CCR disposal activities and land disturbing activities will be designed without impacting the adjacent wetland area.

4. Fault Areas

There were no faults, fault zones, or shear zones encountered during work performed as part of this site acceptability report nor were they encountered in prior site investigations. Per the United States Geologic Survey (USGS) Interactive U.S. Faults Map there are no known faults with Quaternary (Holocene) movement in this region of Georgia (U.S. Geologic Survey, 2019).

5. Seismic Impact Zones

Earthquake acceleration maps were reviewed to determine the seismic impact zone for the new CCRLF (U.S. Geological Survey, 1990). Map C of the series indicates that the horizontal acceleration (expressed as a percentage of gravity) for the site area is 0.09g with a 90% probability of not being exceeded in 250 years. Therefore, the new CCRLF is not considered to be within a seismic impact zone.

6. Unstable Areas

6.1 Soil Conditions

The site is located in the Piedmont Physiographic Province and is underlain by residuum and saprolite of the metamorphic gneiss bedrock. The residuum typically consists of silts and silty sands and contains no relict structures of the parent rock. The saprolite typically consists of silty sands and exhibits relict structures of the parent gneiss bedrock. These types of materials are not prone to differential settling.

6.2 Geologic/Geomorphic Features

There were no geologic or geomorphologic features, such as poor foundation conditions, areas susceptible to mass movements, or karst terrain, observed during work performed for this SAR that indicate that the proposed new CCRLF site contains any unstable areas.

6.3 Other Features/Events

No human-made features or events were observed during work performed for this SAR indicating that the proposed new CCRLF site contains unstable areas. The design, construction, CCR disposal, and closure of the new CCRLF is not anticipated to create unstable conditions.

7. Hydrogeological Assessment

In April 2018, five (5) borings were completed to characterize subsurface conditions in the new CCRLF area – an approximate 20-acre area. Eight additional borings were completed in March

2019 for a total of thirteen (13) recent on-site borings. Boring locations are shown in Figure 6. The general procedures by which these borings were installed are described below.

In April 2018, five (5) borings (CCRLF-1 through CCRLF-5) were drilled in the new CCRLF area by the Civil Field Services group of Southern Company Services (SCS), who has a current bond on file with the Georgia Water Well Standards Advisory Council (GWWSAC), provided in Appendix C. Samples were obtained from the borings for analysis of moisture content, sieve size, Atterberg limits, standard modified proctor, specific gravity, and flexible wall permeability. Analyses were performed by Excel Geotechnical Testing, Inc. located in Roswell, Georgia. Results are discussed below, and a summary is presented in Table 1 of this report. Laboratory data sheets are provided in Appendix D.

Drilling was conducted utilizing 4.25-inch inner diameter (ID) hollow stem augers (HSA) to depths at least 20 feet below the apparent groundwater level in each boring. To characterize subsurface soils, split spoon samples were taken every 5 feet until completion of HSA drilling. Undisturbed (Shelby tube) samples were also collected for characterization of the subsurface soil. Where rock was encountered within 20 feet of groundwater, coring was completed utilizing 2.5-inch ID HQ core barrels to depths of at least 10 feet below top-of-rock elevations. Rock coring was performed for borings CCRLF-3, CCRLF-4, and CCRLF-5.

Temporary piezometers were installed in borings CCRLF-1 through CCRLF-5 utilizing 2-inch ID flush-threaded polyvinyl chloride (PVC) pipe. The bottom 10-foot section of each piezometer consisted of 0.010-inch slotted PVC screen with 3-inch outer diameter pre-packed filter materials. The screened section was set relative to groundwater level measurements. Remaining annular space was filled with filter sand to elevations above the top of the screened section.

In March 2019, eight (8) additional borings (DP-01, DP-02, P-01, P-02, D-02, CV-15, CV-16, and CV-17) were completed near the western edge of the proposed CCRLF. These borings were installed to obtain subsurface data relating to closure constructability of other CCR units; however, since they were located within the proposed footprint of the new CCRLF, Jacobs elected to provide field data from these borings to supplement existing information from borings CCRLF-1 through CCRLF-5. The borings were initially drilled by TTL, Inc. (a contractor with a current bond on file with GWWSAC, provided in Appendix C) utilizing 2.25-inch ID HSA to auger refusal. To characterize subsurface soils, split spoon samples were taken every 5 feet until completion of HSA drilling.

Temporary 4-inch PVC piezometers were installed via sonic rig in borings DP-01, DP-02, P-01, and P-02 for the purposes of hydraulic testing. Cascade Drilling, Inc. (a contractor with a current bond on file with the GWWSAC, provided in Appendix C) was utilized to overdrill the borings for the piezometer installation. A sonic rig was selected for this work to minimize disturbance of the water-bearing formation. Once overdrilled, the piezometers were installed utilizing 20 feet of 0.010-inch slotted PVC screen and approximately 30 to 35 feet of solid PVC riser pipe to ground surface. No piezometer was installed in borings D-02, CV-15, CV-16, and CV-17.

The borings and piezometer/well installations were observed and logged by qualified Jacobs personnel under the supervision of a Professional Geologist registered to practice in the State of Georgia. Refer to Table 2 of this report for a summary of boring and piezometer details.

Boring logs and piezometer construction diagrams are located in Appendix E of this report. Each piezometer will be abandoned in accordance with the Water Well Standards Act prior to new CCRLF construction activities.

Additionally, historical information was reviewed, including subsurface data from prior site acceptability studies and from installation of the existing AP3 Landfill and Monofill groundwater monitoring well network. In total, information from 26 borings has been reviewed as part of this investigation. The reports reviewed are listed in the References section of this report.

The water table aquifer was generally encountered within the silty sands and saprolite layers in each boring. This is characteristic of soil/saprolite/rock systems in the Piedmont. The water table aquifer is hydraulically connected to the underlying bedrock. While the site is not within a Significant Groundwater Recharge Area per GGS's Hydrologic Atlas 18, the major source of recharge in this system is rainwater percolation through the overlying soils. Average annual precipitation in the site area is approximately 46 inches (NOAA 2019).

As shown on Figure 6, the direction of groundwater flow is generally to the south-southeast towards Beaverdam Creek. Groundwater elevations shown on this map were taken in February 2019 and represent seasonal high groundwater measurements. Table 3 of this report shows the current and historical water level data reviewed for generation of the potentiometric maps. Since temporary piezometers P-01, P-02, DP-01, and DP-02 were installed in 2019 for purposes other than site acceptability, only one round of water level readings was obtained from them. Therefore, water levels from these temporary piezometers were not considered in the evaluation of the site's seasonal high groundwater elevations.

7.1 Distance to Nearest Public/Private Drinking Water Supply

A water well survey was conducted in December 2003 by Kemron Environmental Services as part of the 2005 SAR for former Plant Arkwright. In July 2018, an updated water well survey was conducted by Jacobs Engineering, Inc. as part of this SAR. The 2018 survey was performed in general accordance with the specifications for a Private Industry Disposal Facility as outlined in Chapter 391-3-4-.05 of the Rules for Solid Waste Management, and Circular 14, Appendix A, Criteria for Industrial Waste Landfills. For the 2018 survey, an inventory of all privately owned (domestic) water supply wells within a 0.5-mile radius and all public water supply wells and surface water intakes within a 2-mile radius was completed. Similar to the 2003 survey, the updated 2018 survey consisted of visiting the site and surrounding areas, contacting local city and county agencies, and searching USGS and EPD databases to identify water supply wells and surface water intakes near the site.

The 2018 survey provided the following information:

- The USGS database listed five wells located within a 0.5-mile radius of the site area. These wells are located northwest and hydraulically upgradient of the site on the property of Southern Natural Gas Company (one well at 5675 Arkwright Road and four wells at 5645 Arkwright Road). The accuracy of the coordinate locations provided for these wells was unknown. A field investigation was conducted in the area surrounding the coordinate locations provided by USGS, and no signs of water supply wells were found. The 2003 USGS database survey also listed the well at 5675 Arkwright Road and field reconnaissance at that time also found no evidence of a water supply well in the area. Several attempts were made to contact site personnel (now Kinder Morgan), however, no

response was received. Jacobs therefore conservatively assumes that the 5 wells shown in locations 1 and 2 on Figure 7 are currently present and functioning.

- The State of Georgia EPD database was utilized to confirm surface water intake sources around the site; however, EPD does not maintain a database of private/domestic drinking water sources. The search of the EPD database confirmed the results of the 2003 survey, which showed no surface water withdrawal points within a 2-mile radius of the site except for one withdrawal point at former Plant Arkwright on the Ocmulgee River. The surface water intake structure at former Plant Arkwright was used for process water and was decommissioned along with the plant in 2003.
- The water departments for Monroe and Jones Counties were contacted to determine if any surrounding properties were connected to the public drinking water system. Bibb County does not have a water department since the Macon Water Authority (MWA) maintains jurisdiction for such matters within the county. Neither of the county water departments contacted were able to provide information regarding properties connected to the public drinking water system. Jones County was able to list nine potential groundwater wells on file, none of which lie within a 0.5-mile radius of the site.
- The health departments of Bibb, Monroe, and Jones Counties were contacted to obtain information on wells sited within a 0.5-mile radius of the site area. In accordance with the Water Well Standards Act, water well drillers must submit an application to the respective county health department for the intent to drill a water supply well. However, there is no requirement to provide any information relating to the use, proposed construction, exact location on the property, or to provide documentation of actual well installation. Therefore, the County health departments cannot verify if an actual well was installed or identify the intended use of any well. The Bibb County health department provided a list of six groundwater wells within a 0.5-mile radius from the site location. The Jones County Health Department provided a list of groundwater wells within a 3-mile radius but none of them were present within a 0.5-mile radius of the site. The Monroe County Health Department was not able to provide any well information. The 2003 survey only listed one private operational well from the Bibb County Health Department, which is included in the list from the 2018 survey.
- The MWA provided information on properties connected to the public drinking water system within a 0.5-mile radius of the site location in Bibb County. From this information, it was determined that all potential groundwater wells within a 0.5-mile radius of the site location were on properties serviced by the public drinking water supply system, except the previously-mentioned well located at 5675 Arkwright Road – Southern Natural Gas Company. No signs of this well were found during the field investigation. Additionally, the 2003 survey presented that the MWA surface water intake is located approximately 3.7 miles south of former Plant Arkwright on the Ocmulgee River. The surface water is transferred from the river to the Town Creek Reservoir, which is approximately 3.4 miles east of the site. Both Bibb County and western Jones County receive supplied water from the Town Creek Reservoir.
- Field reconnaissance within a 0.5-mile radius of the site did not verify the existence of any of the potential wells mentioned above and no additional water supply wells or surface water intakes were discovered. During the field investigation, Jacobs' personnel walked the road rights-of-way of all properties in the area of interest to identify the presence of water meters, wells, or structures that could represent a potential well location (e.g., well riser/surface completion, well house, fake rock well cover, etc.).

Based on the investigations noted above from both the 2003 and updated 2018 surveys, there are ten potential private water supply wells located within a 0.5-mile radius of the site and no surface water intakes used for public drinking water within 2 miles. All ten of the potential private water supply wells are located hydraulically upgradient of the site, and six of the seven well locations are on properties connected to the public drinking water supply system. The one potential well on the Southern Gas Company property that is not connected to the public water system was not verified during the field investigation and likely no longer exists or is not in use. The locations of the potential water supply wells identified from the 2018 survey within a 0.5-mile radius of the site are plotted on Figure 7. Information regarding the water supply wells is summarized in Table 4. Well IDs shown in Table 4 are referenced on Figure 7.

7.2 Depth to Uppermost Aquifer

The groundwater table typically resides in the silty sands above the bedrock system. The top of the uppermost (unconfined) aquifer is defined by the groundwater table itself. Groundwater beneath the new CCRLF is typically encountered between elevation (El.) 355 and El. 345 (feet above mean sea level), and flows generally in a south-southeasterly direction, discharging into Beaverdam Creek or the Ocmulgee River depending on the flow path.

7.2.1 Thickness/Nature of Unsaturated Zone

The vadose or unsaturated zone at the new CCRLF consists of silty clays, silts, and sandy silts. The unsaturated zone generally ranges from approximately 10 feet below grade at CCRLF-1 to approximately 42 feet below grade at CCRLF-5. Flexible wall permeability testing was performed on undisturbed samples obtained from borings CCRLF-2 and CCRLF-5 in the unsaturated zone, within 5 to 15 feet from the water table elevations. Results indicate permeability ranging from 6.6×10^{-5} cm/s to 2.0×10^{-4} cm/s near the proposed elevations of the liner system.

7.2.2 Ability for Natural Contamination Control

A composite liner system, constructed in accordance with current regulatory requirements and industry standards, is proposed for the new CCRLF. Considering the liner system and given the sorption data of the site's soils (see Section 7.7 of this report), groundwater contamination is not likely to occur as a result of CCR disposal into a lined new CCRLF.

7.3 Uppermost Aquifer Gradient

The top of the uppermost (unconfined) aquifer is defined by the groundwater table itself. Groundwater may also exist below the soil/rock interface in bedrock joints, foliations, shears, and fractures. These structures in rock, if present, would be hydraulically connected to the groundwater in above soils and would be considered part of the same unconfined aquifer system.

Groundwater elevations from the facility's February 2019 groundwater sampling event were used to calculate the hydraulic gradient for the new CCRLF. The steepest gradient was determined to be from existing well locations GWA-3 to GWC-16. The water table aquifer gradient (i) was calculated as a function of $i = (h_1 - h_2)/L$, where h_1 is the groundwater elevation at GWA-3 [353.69 feet above mean sea level (ft MSL)]; h_2 is the groundwater elevation at

GWC-16 (345.75 ft MSL); and L is the distance between the two wells (approximately 1,200 feet). From these data, a hydraulic gradient of 0.007 was calculated.

7.4 Topographic Setting

The natural topography surrounding the new CCRLF is one of relatively low relief, with very broad, gently rolling terrain that gradually slopes from the northern topographic high down to the lower-lying bottomland areas associated with the wetland area and Beaverdam Creek south of AP3 Landfill. The areas of higher topographic relief (i.e. the dam at the southern edge of AP3 Landfill and the borrow areas located within the original Monofill footprint) are the result of historical construction activities. The maximum elevation difference within the new CCRLF permit boundary is from about El. 395 at the northeastern edge to El. 320 at the southwestern corner of AP3 Landfill dam. The maximum percent slope within the proposed footprint of the new CCRLF is 5.9% from the topographic high to the topographic low within the CCR waste disposal boundary. Refer to Figure 5 for a representation of the topographic features discussed. No bedrock outcrops were observed within the new CCRLF permit boundary.

7.4.1 Areas Affecting or Affected by Site

Upstream drainage areas are not expected to be affected by construction of the proposed new CCRLF. Downstream drainage areas that could be affected by construction of the new CCRLF include the adjacent man-made intermittent stream channel and wetland area to which the channel discharges. These features could experience slightly more run-on due to the additional surface area of the new CCRLF's final grades. As required, the surface water control system for the proposed new CCRLF will be designed to handle the hydraulic loading for the 25-year, 24-hour storm.

The proposed new CCRLF is not located within the 100-year or 500-year floodplain (see Figures 3 and 4) and is therefore not expected to affect floodplains or be affected by floods.

The proposed new CCRLF does not exhibit any karst features, and no unstable soils were encountered as part of work activities associated with this report. Small erosion features (gullies) currently exist on-site, within the proposed footprint of the new CCRLF. These gullies will be eliminated with construction of the new CCRLF.

7.5 Geologic Setting

Native soils beneath the new CCRLF generally consist of silty and sandy clay, underlain by sandy silt and silty sand with minor gravel at increasing depth. A silty sand saprolite typical of highly weathered piedmont crystalline rock underlies the silt, sand and gravel layers above. Borings from recent and historical site investigations indicate parent materials consisting of extremely weathered quartzofeldspathic gneiss, hornblende gneiss and schist. See Figure 8 for a geologic map of the general site area.

Since borings CCRLF-1, CCRLF-2, and CCRLF-3 were installed in locations previously utilized for soil borrow, the silty clay layers were not encountered. Bedrock was encountered within 20 feet of apparent groundwater in three borings (CCRLF-3 through CCRLF-5). Core samples were obtained from depths at least 15-feet below HSA refusal and consisted of micaceous

gneiss with quartz veins, which is consistent with historical information. See Figures 9A and 9B for representative cross sections of the proposed new CCRLF footprint. Refer to Table 2 of this report for boring and piezometer details.

7.5.1 Rock Characteristics

Auger refusal (generally considered top of rock) was encountered at depths ranging from approximately 32 to 55 feet below grade. In borings CCRLF-3, CCRLF-4, and CCRLF-5, drilling advanced with a 3.38-inch outer diameter HQ core barrel approximately 15 feet into rock, where recovery was greater than 95% for more than 5 feet. As mentioned above, core samples consisted of micaceous gneiss with quartz veins.

The amount of fracturing and jointing in bedrock appears to be minimal since the only rock core that exhibited less than 95% recovery was obtained from CCRLF-4 (88% RQD) within the first 5 feet of coring. No significant fracturing or jointing was apparent while observing rock cores obtained in the field.

7.6 Hydraulic Conductivity

The horizontal hydraulic conductivity of the aquifer was computed from slug tests performed in six of the eight recently installed piezometers (CCRLF-1, CCRLF-4, CCRLF-5, P-01, P-02, and DP-01). The slug test procedure consisted of raising and lowering the potentiometric head in the well using a solid slug of known volume. Time-series head data were collected for each rising/falling head test using digital data logging equipment. Analyses of the slug test data yielded an average hydraulic conductivity of 8.67×10^{-4} centimeters per second (cm/s). Summarized hydraulic conductivity data is included in Table 2 of this report. The hydraulic conductivity data shown in Table 2 represents the average between each well's "Slug In" and "Slug Out" tests. The data sheets from slug testing are included in Appendix F of this report.

According to slug test data from the 2005 SAR for AP3 Landfill, hydraulic conductivity ranged from 1.2×10^{-3} cm/s to 8.6×10^{-4} cm/s in the AP3 Landfill area. Therefore, the slug test data from recently installed piezometers is consistent with the lower end of the historically noted range.

Horizontal groundwater flow velocity was calculated using the Darcy's Law equation and the average hydraulic conductivity of 8.67×10^{-4} cm/s [2.46 feet per day (ft/day)], the calculated hydraulic gradient of 0.007 from Section 7.3 of this report, and a literature value for effective porosity (0.20). The results of this calculation indicate that groundwater flows to the southeast at a rate of approximately 0.09 ft/day [31.42 feet per year (ft/yr)].

7.7 Sorption and Attenuation Capacity

An SAR addressing, amongst other criteria, sorption and attenuation capacity was generated in November 2005 for the current proposed disposal area of the new CCRLF. Subsurface conditions of the proposed new CCRLF area have not changed significantly since submittal of the 2005 SAR. Therefore, the information provided in the 2005 SAR regarding sorption and attenuation capacity are still applicable for the site. A summary of the findings from the 2005 SAR are provided below.

7.7.1 Sorption (Distribution) Coefficients

The partition or distribution coefficient (K_d) is a measure of sorption of contaminants to soils and is defined as the ratio of the contaminant concentration adhered to the solid to the contaminant concentration in the surrounding aqueous solution when the system is at equilibrium (page 11 of the 2005 SAR). Three composite samples were collected for the 2005 SAR at varying depths (fill material, upper saprolite, and lower saprolite) for the testing of arsenic K_d (page 12). Results from the testing indicate K_d values ranging from 2,212 milliliters per gram (mL/g) to 16,610 mL/g in site soils, increasing with depth. The report concluded that the distribution coefficients of the soil fill and saprolite at the site are at a range to significantly retard any possible leaching of metals from the soil (page 12).

7.7.2 Cation Exchange Capacity (CEC)

The 2005 SAR (page 12) indicates that three composite samples were taken at varying depths and analyzed for CEC. Results ranged from 21.0 milliequivalents per 100 grams (meq/100g) soil to 23.6 meq/100g soil.

7.8 Distance to Surface Water

Former Plant Arkwright is located adjacent to the Ocmulgee River and Beaverdam Creek. Per the water supply study completed as part of this report (Section 7.1), the only surface water intake located within 2 miles of the site was at the former plant itself, and it has not been operable since it was decommissioned along with Plant Arkwright in 2003. Per Appendix A of Circular 14, industrial waste landfills located within two miles upstream of a surface water intake must be designed with liners, leachate collection systems, and groundwater monitoring networks. A groundwater monitoring network currently exists at the site for AP3 Landfill and Monofill, and the new CCRLF design will incorporate a composite liner and leachate collection system.

8. Proximity to National Historic Sites

There are no National Historic Sites within 5,708 yards of the new CCRLF according to the National Register of Historic Places (National Park Service, 2019).

9. Proximity to County Boundaries

The proposed new CCRLF is approximately 1,500 feet to the east from the boundary between Bibb and Jones Counties and more than one mile to the northwest from the boundary between Bibb and Monroe Counties.

10. Wellhead Protection

Circular 14 specifies a wellhead protection area around wells and springs used as sources of water supply for public water systems serving municipalities, counties, and authorities. There are no public water supply wells or springs within a two-mile radius of the site.

11. LeGrand Method

An analysis of the pollution potential of the new CCRLF site was performed using the LeGrand method as described in Circular 14 (McLemore and Perriello, 1997). Since the site lies within the Piedmont Physiographic Province, a two-media analysis was used for unconsolidated granular materials underlain by dense rocks with potential fractures, as recommended by Circular 14. Table 5 of this report shows the measured input parameters and the LeGrand score for the proposed facility.

The LeGrand Analysis produced a score of 12.7, indicating that groundwater pollution potential is “possible, but not likely.”

12. Recommendations for Design

12.1 Unfavorable Areas

There are no unfavorable areas for disposal, as referenced in Circular 14, within the proposed footprint of the new CCRLF (Figure 5). Unfavorable areas within the property boundary would include the small pond in the northwestern corner of the site and the relocated stream, as currently configured.

12.2 Liner/Leachate Collection Systems

The proposed new CCRLF will have a composite liner system consisting of a 2-foot-thick low-permeability (1×10^{-7} cm/s or less) soil layer overlain by a 60-mil high density polyethylene (HDPE) liner, or an equivalent alternative liner system.

A leachate collection system consisting of a 2-foot-thick drainage and/or protective layer, collection piping, sumps, pumping systems, and storage tank(s) will also be designed and constructed in accordance with current solid waste regulations and guidance.

12.3 Cell Depths

A vertical buffer of five feet or more will be maintained between the bottom of the liner system and the seasonal high groundwater elevations shown on Figure 6 of this report.

12.4 Site Drainage and Erosion Control

The site will be designed and constructed to minimize soil erosion and transport of sediment. An erosion and sedimentation control plan that meets or exceeds current regulations and guidance will be provided as part of the design and operations plan for the facility.

12.5 Buffers

Proposed: A minimum 200-foot undisturbed buffer will be provided between the CCR waste disposal boundary and the boundary of the permitted facility for any proposed new CCRLF disposal areas identified in this SAR. A 500-foot buffer will be maintained between the waste disposal boundary and any occupied dwelling and, if applicable, the dwelling's operational private, domestic water supply well in existence on the date of the permit application. This 500-foot buffer may be reduced if the owner of the dwelling provides a written waiver consenting to the waste disposal boundary being less than 500 feet away.

Existing: As shown on Figure 6, the southeastern side of the existing Monofill has a buffer (less than 200 feet) which was previously approved by EPD (Couch, 2007) and is considered an existing condition. This existing buffer will remain undisturbed; no waste will be placed between Monofill's existing CCR limits and the permit boundary to the southeast.

12.6 Monitoring Network

An EPD-approved groundwater monitoring network currently exists at the site as shown on Figure 6. The network has been sampled semi-annually since EPD approval. Some modifications to the network will be recommended within the groundwater monitoring plan that will be included within the facility's design and operations plan. Such modifications will likely include abandonment of compliance wells currently located within the proposed CCRLF waste footprint and relocation and/or addition of wells along the perimeter of the new CCRLF.

12.7 Disposition of Borings

All piezometers and wells installed within the waste footprint will be abandoned in accordance with the Water Well Standards Act and current guidance, following approval of this SAR and receipt of a letter of site suitability.

13. References

Blaylock, Tanya. Georgia Power Company. EPD Site Inspection for Monitoring Well Certification, April 22, 2009 – Industrial Solid Waste Landfill – Ash Monofill and Ash Pond #3, May 8, 2009.

Bouwer, H. The Bouwer and Rice Slug Test – An Update; Ground Water, vol. 27, no. 3, pp 304-309; 1989.

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McLemore, William H. and Paul D. Perriello. Criteria for Performing Site Acceptability Studies for Solid Waste Landfills in Georgia, Circular 14, Appendix A; Georgia Geologic Survey, 1991 (amended 1997), pp. A-1 – A-6.

National Oceanic and Atmospheric Administration (NOAA). National Weather Service Rainfall Scorecard. Retrieved September 2019.

National Park Service. National Register of Historic Places. Retrieved September 2019. <https://www.nps.gov/subjects/nationalregister/database-research.htm>

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Southern Company Generation. Earth Science and Environmental Engineering; Plant Arkwright, Ash Ponds 2 and 3 and Ash Monofill, Site Acceptability Report, Revision 1, November 2005.

U.S. Geological Survey. Interactive U.S. Faults Map. Retrieved September 2019. <https://earthquake.usgs.gov/hazards/>

U.S. Geological Survey. Probabilistic Earthquake Acceleration and Velocity Maps for the United States and Puerto Rico, 1990.

Figures

Figure 1 – General Location Map

Figure 2 – Hydrologic Atlas 18

Figure 3 – FEMA Map

Figure 4 – Topographical and Flood Plain Map

Figure 5 – Existing Conditions

Figure 6 – Seasonal High Potentiometric Map

Figure 7 – Water Wells Map

Figure 8 – Geologic Map of General Area

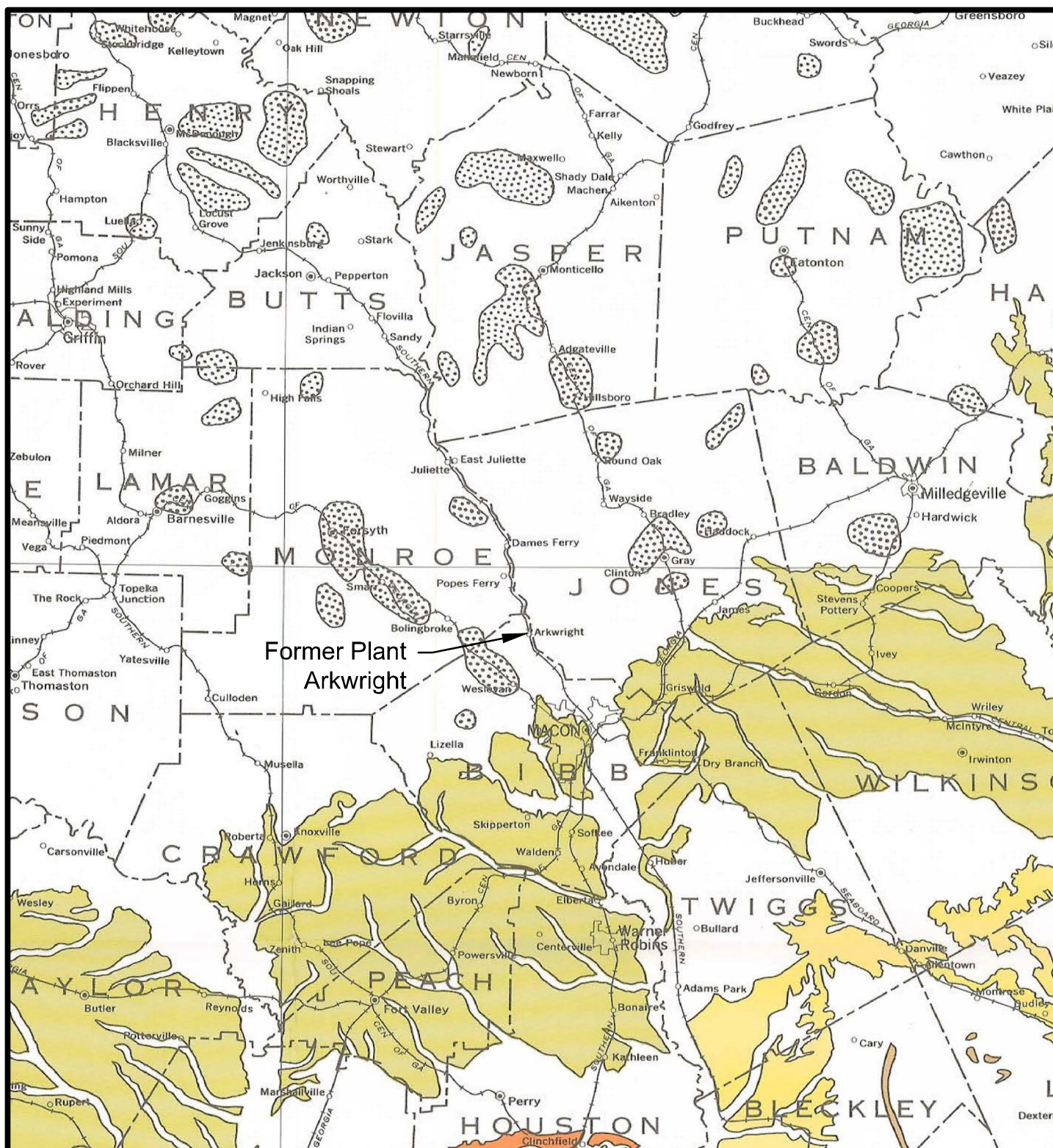
Figure 9A – Geologic Cross Sections Location Map

Figure 9B – Geologic Cross Sections



General Location Map

SHEET NO.: **Figure 1**



COASTAL PLAIN PROVINCE
(HYDROLOGIC ATLAS 18)

Cretaceous-Tertiary
Aquifer System

Probable Areas of Thick Soil
(may be significant recharge areas)

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Former Plant Arkwright New CCR Landfill
Site Acceptability Report

Hydrologic Atlas 18

PROJECT NO.: D3280400
DATE: February 2020
SCALE: NTS

Figure 2

Figure 3

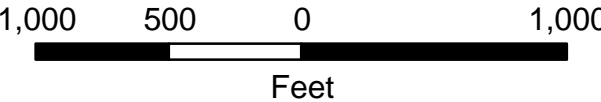
FEMA Map
Former Plant Arkwright
New CCR Landfill
Site Acceptability Report

Legend

- CCR Waste Disposal Boundary
- Monofill
- New CCR Landfill Permit Boundary

Flood Hazard Areas

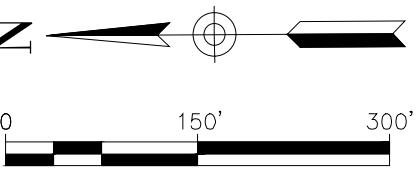
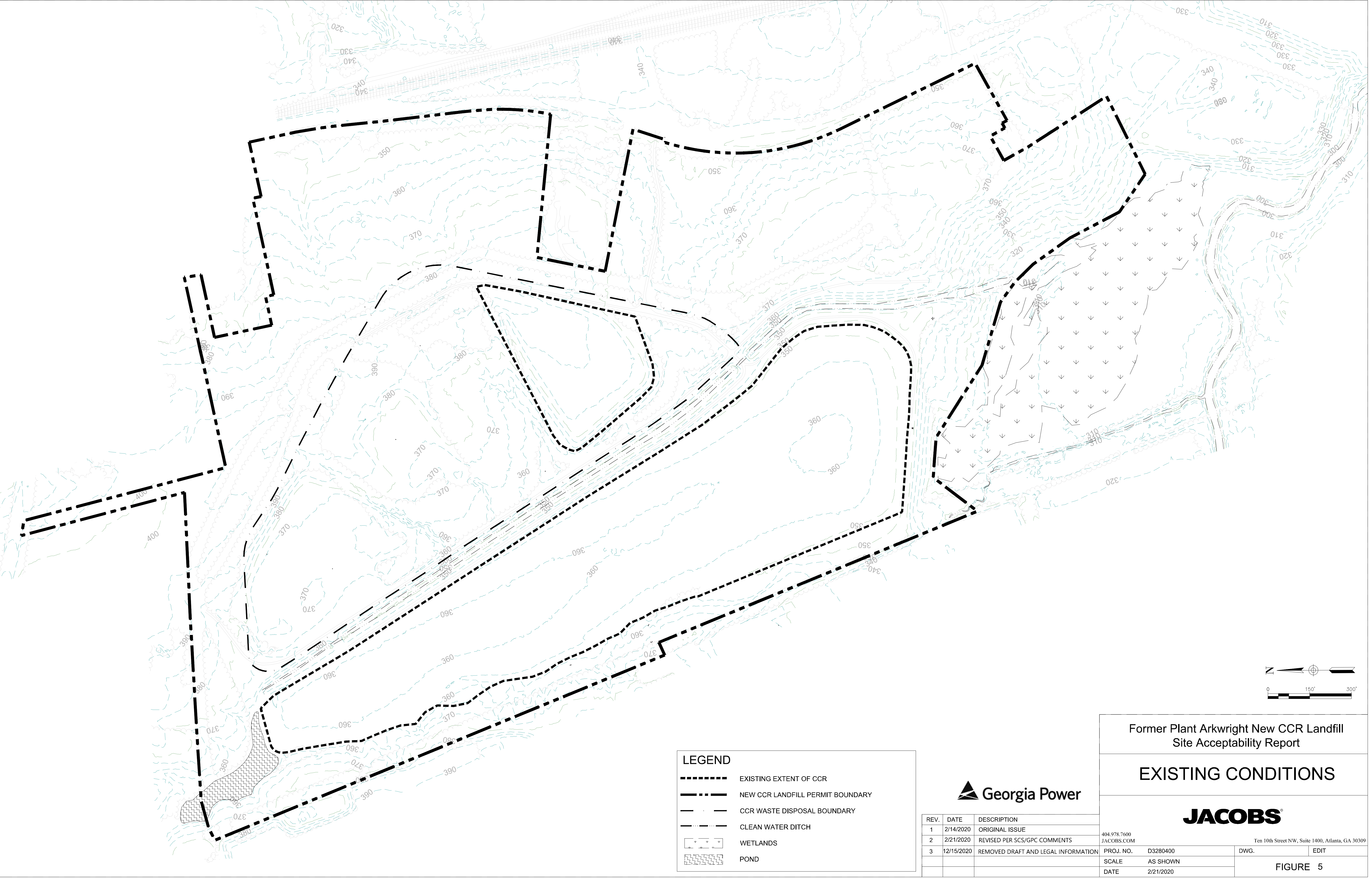
- Regulatory Floodway - Zone AE, AO, AH, VE, AR
- 100 year Floodplain With Base Flood Elevation (BFE) (Zone AE) and Without BFE (Zone A)
- 500 Year Floodplains , 100 Year Floodplains with average depth less than one foot or with drainage areas of less than one square mile - Zone X





Topographical and Flood Plain Map

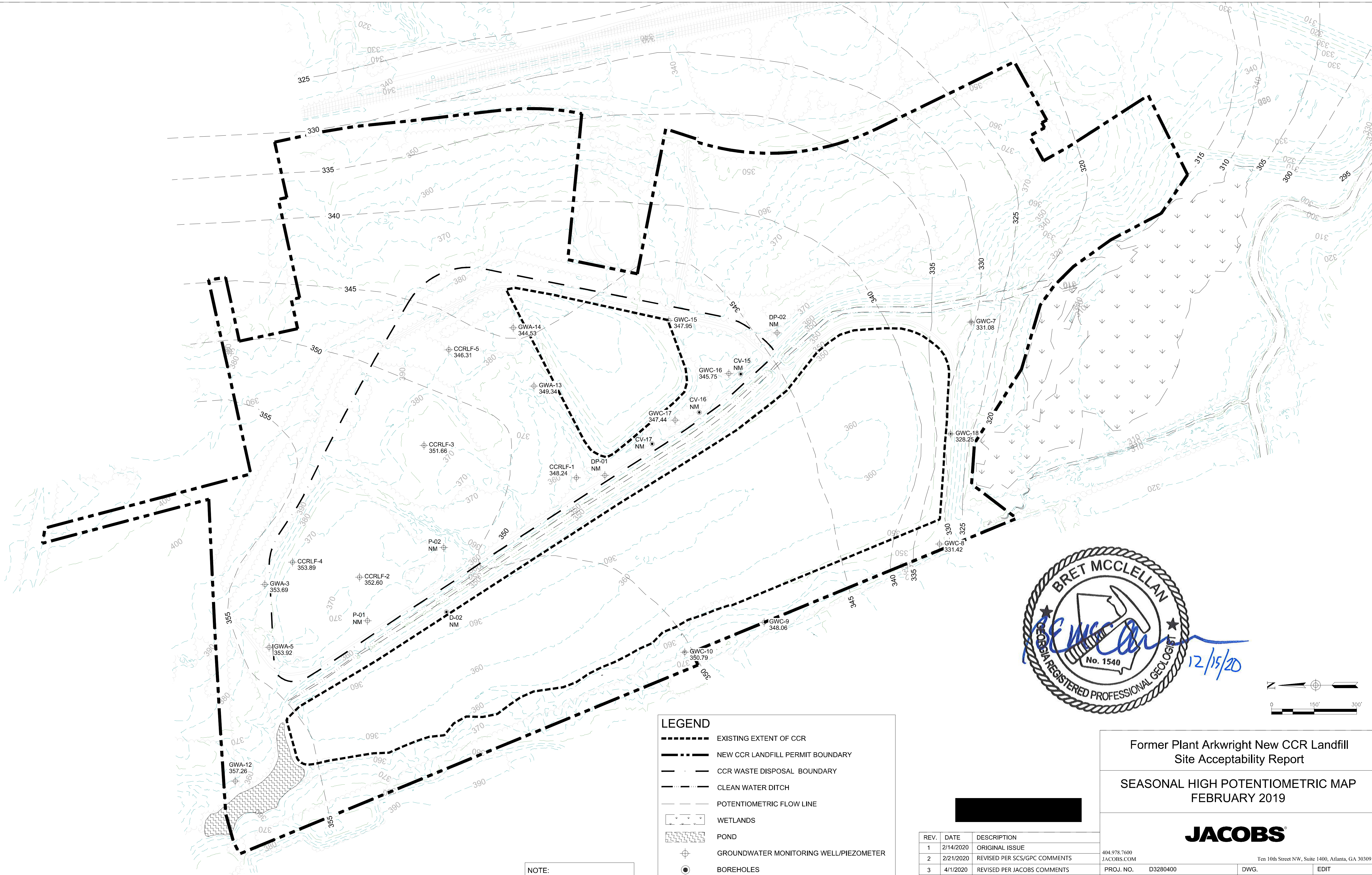
Figure 4



LEGEND		
	EXISTING EXTENT OF CCR	
	NEW CCR LANDFILL PERMIT BOUNDARY	
	CCR WASTE DISPOSAL BOUNDARY	
	CLEAN WATER DITCH	
	WETLANDS	
	POND	

REV.	DATE	DESCRIPTION
1	2/14/2020	ORIGINAL ISSUE
2	2/21/2020	REVISED PER SCS/GPC COMMENTS
3	12/15/2020	REMOVED DRAFT AND LEGAL INFORMATION

Former Plant Arkwright New CCR Landfill Site Acceptability Report			
EXISTING CONDITIONS			
<div>JACOBS®</div> <div>404.978.7600 JACOBS.COM</div> <div>Ten 10th Street NW, Suite 1400, Atlanta, GA 30309</div>			
PROJ. NO.	D3280400	DWG.	EDIT
SCALE	AS SHOWN	FIGURE 5	
DATE	2/21/2020		



LEGEND	
	EXISTING EXTENT OF CCR
	NEW CCR LANDFILL PERMIT BOUNDARY
	CCR WASTE DISPOSAL BOUNDARY
	CLEAN WATER DITCH
	POTENTIOMETRIC FLOW LINE
	WETLANDS
	POND
	GROUNDWATER MONITORING WELL/PIEZOMETER
	BOREHOLES

NOTE:
NM = Water Level Not Measured

REV.	DATE	DESCRIPTION
1	2/14/2020	ORIGINAL ISSUE
2	2/21/2020	REVISED PER SCS/GPC COMMENTS
3	4/1/2020	REVISED PER JACOBS COMMENTS
4	12/15/2020	REMOVED DRAFT AND LEGAL INFORMATION

Former Plant Arkwright New CCR Landfill Site Acceptability Report			
SEASONAL HIGH POTENTIOMETRIC MAP FEBRUARY 2019			
JACOBS			
404.978.7600 JACOBS.COM		Ten 10th Street NW, Suite 1400, Atlanta, GA 30309	
PROJ. NO.	D3280400	DWG.	EDIT
SCALE	AS SHOWN	FIGURE 6	
DATE	2/21/2020		

Figure 7

Water Wells Map
Former Plant Arkwright
New CCR Landfill
Site Acceptability Report

Legend

CCR Waste Disposal Boundary

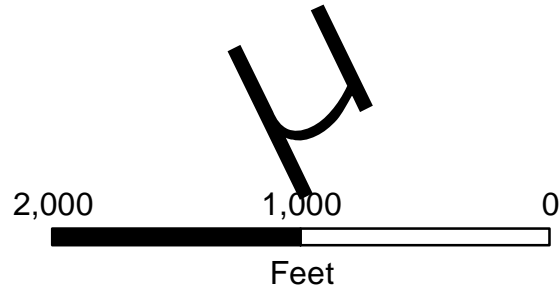
Monofill

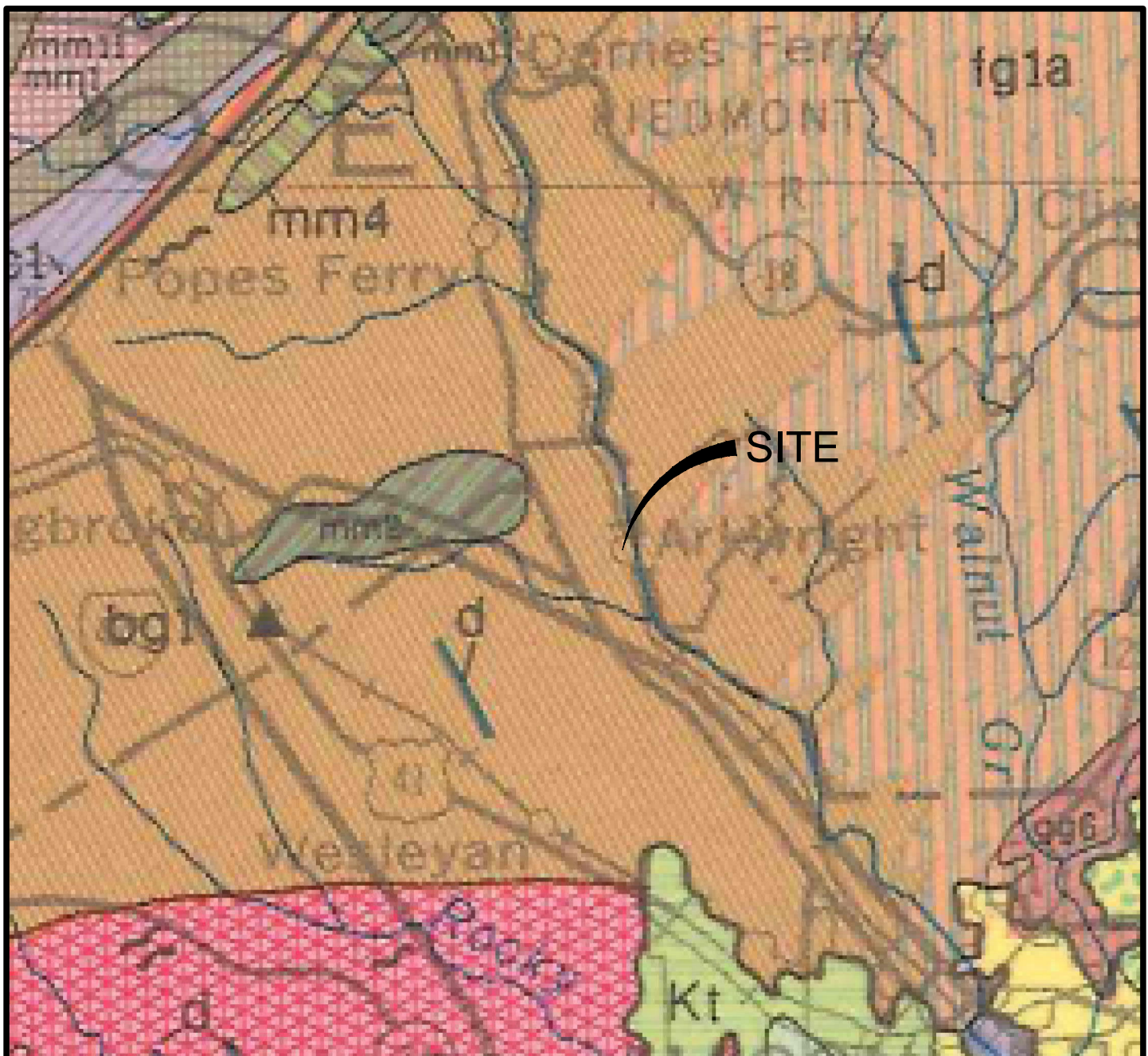
New CCR Landfill Permit Boundary

0.5 Mile Radius

Potential Private Water Wells

Notes:
1) Information on each potential well location (Well ID) is provided in Table 4.
2) Well ID #2 is associated with four potential locations according to the 2018 USGS database survey. Therefore, all four locations are



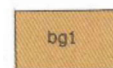


Geological Map of Georgia
Atlanta
1976
Reprinted 1997
Georgia Department of Natural Resources

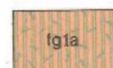
APPROXIMATE SCALE: 1" = 2 MILES



Georgia Power



BIOTITE GNEISS



BIOTITE GRANITE GNEISS/
FELDSPATHIC BIOTITE
GNEISS/AMPHIBOLITE-
HORNBLLENDE GNEISS



HORNBLLENDE GNEISS

FINAL

JACOBS

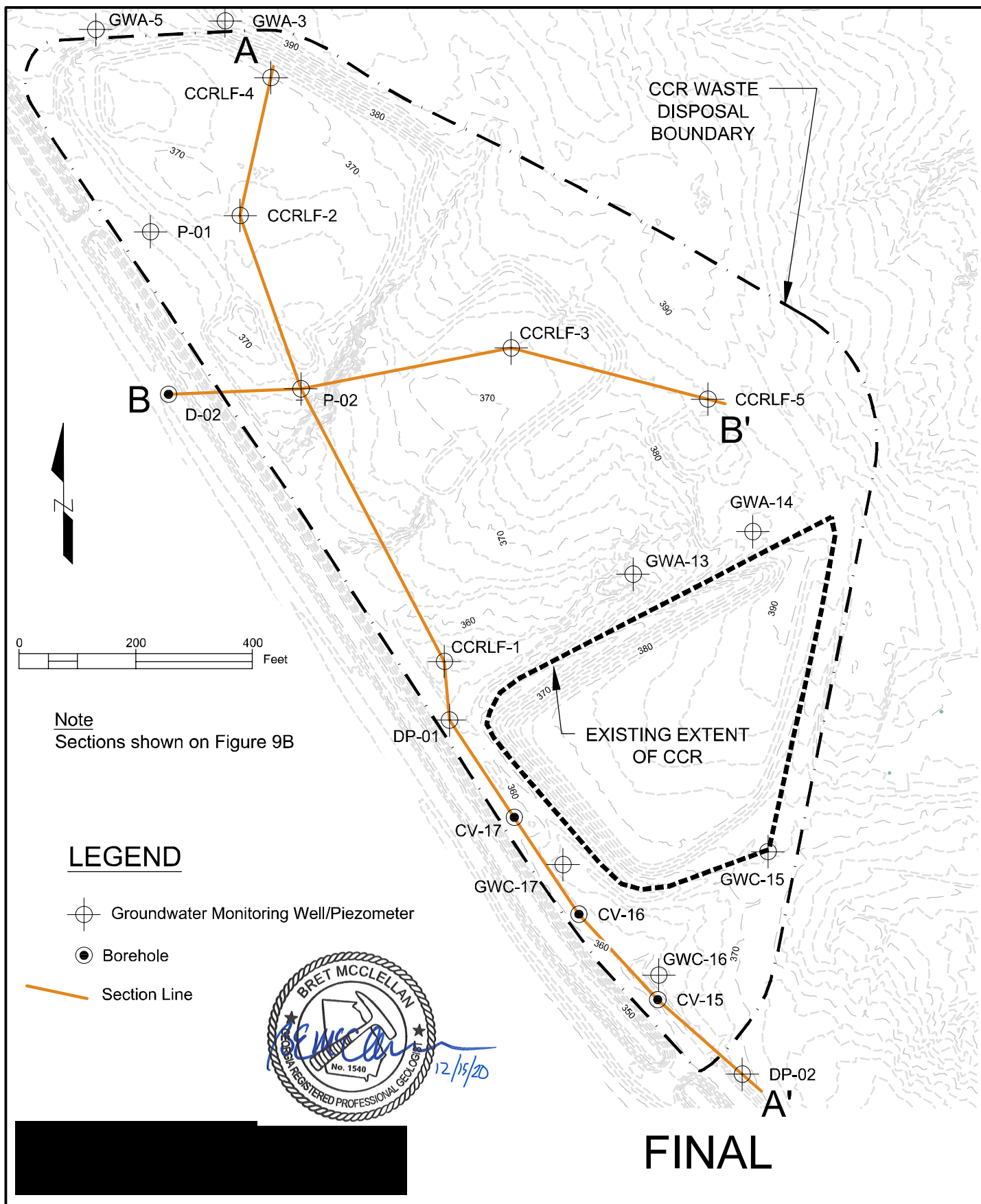
Former Plant Arkwright New CCR Landfill
Site Acceptability Report

Geologic Map
of General Area

PROJECT NO.: D3280400
DATE: February 2020
SCALE: AS SHOWN

SHEET NO.:

Figure 8



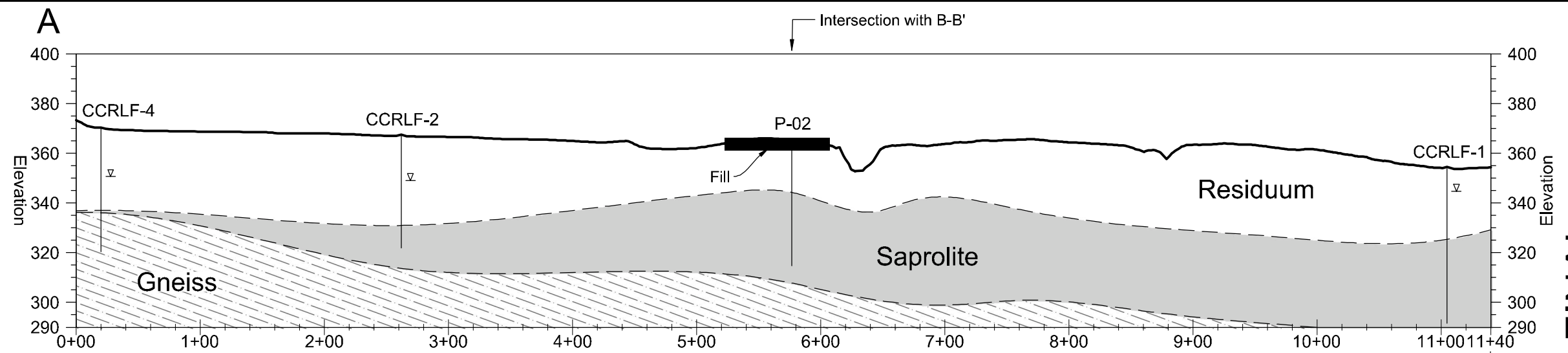
JACOBS

Former Plant Arkwright New CCR Landfill
Site Acceptability Report

Geologic Cross Sections Location Map

PROJECT NO.: D3280400
DATE: February 2020
SCALE: As Shown
SHEET NO.:

Figure 9A



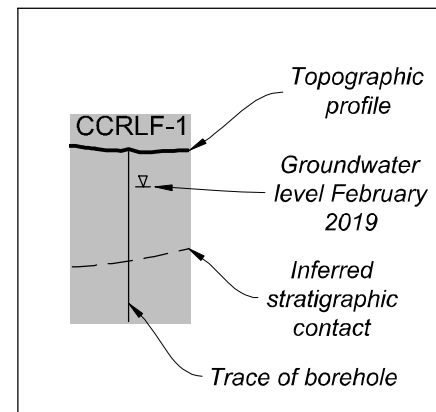
FINAL

Notes
See Figure 9A for location of section lines

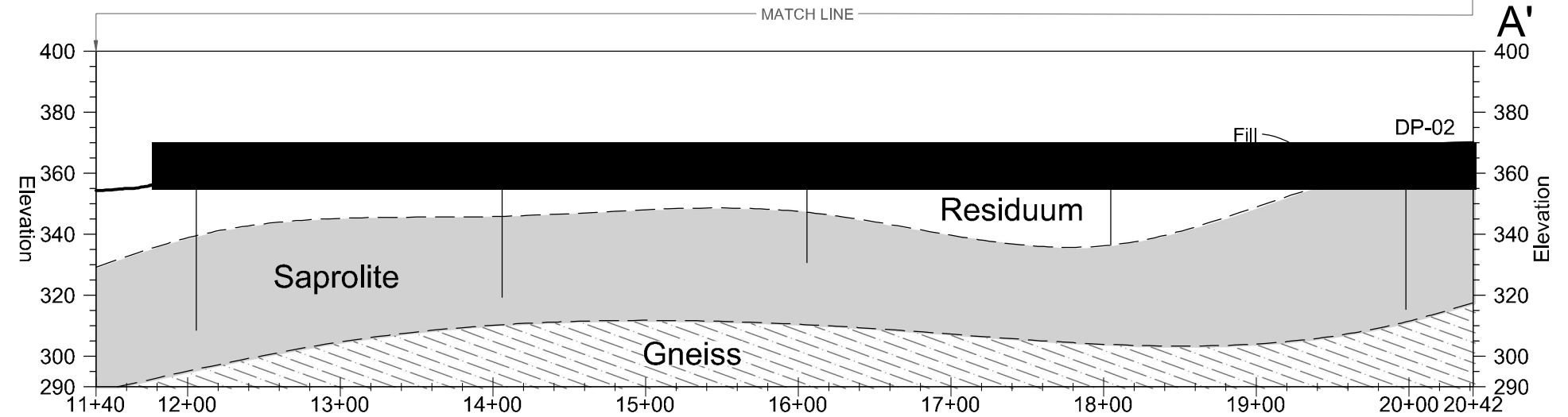
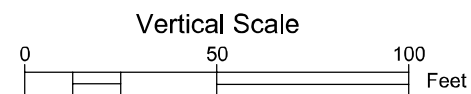
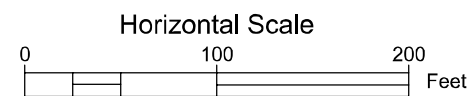
Topographic Data provided by Donaldson, Garrett & Associates, Inc. Dated 06-26-2018

Boreholes logged by Jacobs in April 2018 and March 2019

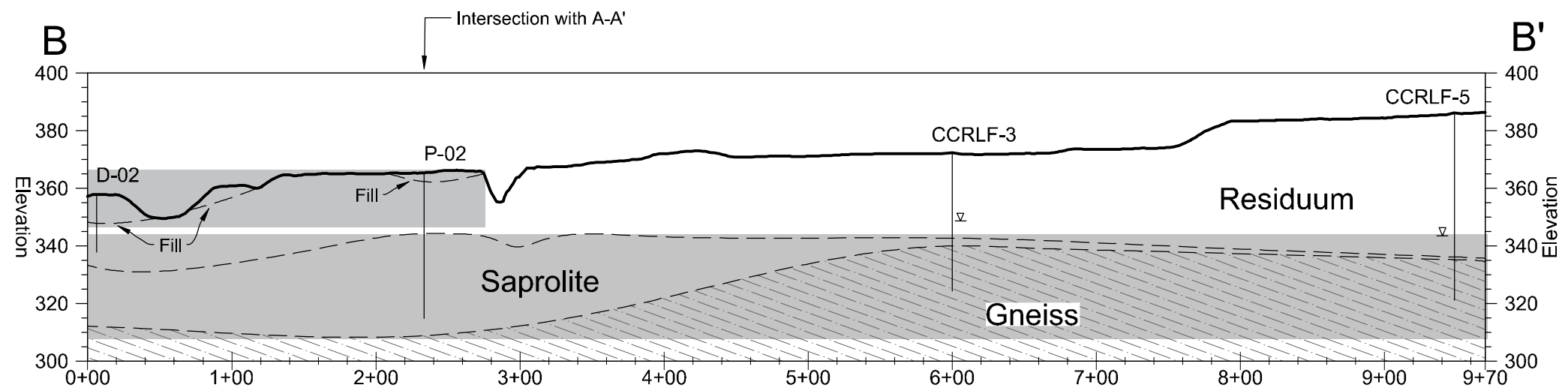
Water levels only shown in borings with data from February 2019



LEGEND



SECTION
Looking East
2x Vertical Exaggeration



SECTION
Looking North
2x Vertical Exaggeration



Former Plant Arkwright New CCR Landfill
Site Acceptability Report

JACOBS

Geologic Cross Sections

PROJECT NO.: D3280400
DATE: February 2020
SCALE: As Shown
SHEET NO.:

Figure 9B

Tables

Table 1 – Summary of Laboratory Results

Table 2 – Boring and Piezometer Details

Table 3 – Historical Well and Piezometer Groundwater Elevations

Table 4 – Water Supply Well Information

Table 5 – LeGrand Method Results

Table 1
Summary of Laboratory Results
Former Plant Arkwright

Sample ID	Bulk (B), Split Spoon (SPT), or Shelby Tube (ST)	Lab No.	Sample Depth (ft MSL)	Moisture Content ASTM D2216 (%)	Sieve Analysis					Atterberg Limits			Vertical Hydraulic Conductivity (cm/s)	USCS Description
					Gravel Content (%)	Sand Content (%)	Fines Content (%)	Silt Content (%)	Clay Content (%)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)		
CCRLF-01-SS-01	SPT	18E034	353.92-352.42	26.2	0.4	33.7	65.9	--	--	--	--	--	--	ML
CCRLF-01-SS-02	SPT	18E035	349.42-347.92	30.3	2.2	35.2	62.6	17.7	44.9	73	52	20	--	ML
CCRLF-01-SS-03		18E036	347.92-346.42											ML
CCRLF-01-SS-06		18E039	330.42-328.92											SM
CCRLF-01-SS-09	SPT	18E042	315.42-313.92	14.6	0.1	70.5	29.4	--	--	NP	NP	NP	--	SP
CCRLF-01-SS-10		18E043	310.42-308.92											SP
CCRLF-02-Bulk	B	18E030	366.98-321.98	25.4	0.0	69.9	30.1	19.6	10.5	36	28	8	--	N/A
CCRLF-02-ST-01	ST	18E032	356.98-354.98	16.1	0.0	72.1	27.9	22.4	5.5	NP	NP	NP	2.0×10^{-4}	SP
CCRLF-02-SS-02	SPT	18E048	363.48-361.98	17.1	0.0	73.5	26.5	--	--	NP	NP	NP	--	SM
CCRLF-02-SS-03		18E049	358.48-356.98											SP
CCRLF-02-SS-04	SPT	18E050	353.48-351.98	16.9	0.3	71.1	28.6	--	--	NP	NP	NP	--	SP
CCRLF-02-SS-05		18E051	348.48-346.98											SP
CCRLF-02-SS-06	SPT	18E052	343.98-341.98	22.9	0.0	62.1	37.9	--	--	NP	NP	NP	--	SP
CCRLF-02-SS-08	SPT	18E054	333.48-331.98	13.4	1.6	72.3	26.1	--	--	NP	NP	NP	--	SM
CCRLF-02-SS-09		18E055	328.48-326.98											SP
CCRLF-03-Bulk	B	18E011	371.92-324.32	21.4	0.0	57.9	42.1	24.3	17.8	NP	NP	NP	--	N/A
CCRLF-03-SS-02	SPT	18E190	368.42-366.92	32.2	0.0	39.6	60.4	--	--	NP	NP	NP	--	SM
CCRLF-03-SS-03		18E191	363.42-361.92											SM
CCRLF-03-SS-06	SPT	18E194	348.42-346.92	10.1	1.3	77.6	21.1	--	--	NP	NP	NP	--	SP
CCRLF-03-SS-07		18E195	343.42-341.92					--	--					SP
CCRLF-04-SS-02	SPT	18E058	366.49-364.99	21.9	2.9	67.2	29.9	--	--	NP	NP	NP	--	SM
CCRLF-04-SS-03		18E059	361.49-359.99					--	--					SM
CCRLF-04-SS-06	SPT	18E062	346.49-344.99	13.2	0.9	77.4	21.7	--	--	43	34	9	--	SP
CCRLF-04-SS-07		18E063	341.49-339.99					--	--					SP
CCRLF-05-ST-01	ST	18E014	359.99-357.99	18.9	15.1	61.3	23.6	14.2	9.4	40	35	5	6.6×10^{-5}	SM
CCRLF-05-SS-02	SPT	18E197	382.18-380.68	26.3	0.0	30.2	69.8	--	--	63	38	25	--	SC
CCRLF-05-SS-03		18E198	377.18-375.68					--	--					SM
CCRLF-05-SS-04	SPT	18E199	372.18-370.68	18.2	3.9	50.4	45.7	--	--	NP	NP	NP	--	SM
CCRLF-05-SS-05		18E200	367.18-365.68					--	--					SM
CCRLF-05-SS-07	SPT	18E202	357.18-355.68	23.7	0.4	60.4	39.2	--	--	NP	NP	NP	--	SP
CCRLF-05-SS-08		18E203	352.18-350.68					--	--					SP

Notes:

1. Elevations measured in feet from mean sea level (ft MSL).
2. Dashes indicate that the analysis was not conducted for the soil sample.
3. Vertical hydraulic conductivity is measured in centimeters per second (cm/s).
4. NP = nonplastic soil for which the Atterberg limit tests could not be performed.
5. ML = inorganic silts; SC = clayey sands, sand-clay mixtures; SM = silty sands, sand-silt mixtures; SP = poorly graded sands, gravelly sands.
6. N/A = USCS description not applicable for bulk soil samples.

Table 2
Boring and Piezometer Details
Former Plant Arkwright

Piezometer ID	Northing	Easting	Ground Surface Elevation (ft MSL)	Boring Depth (ft MSL)	TOC Elevation (ft MSL)	Well Depth (ft BTOC)	Top of Screen Elevation (ft MSL)	Bottom of Screen Elevation (ft MSL)	Screened Stratum	Slug Test Avg (cm/s)
CCRLF-1	1065801.43	2437806.75	353.92	291.52	357.40	23.48	344.22	334.22	Saprolite	2.25×10^{-3}
CCRLF-2	1066565.73	2437456.55	366.98	321.98	370.54	34.06	346.78	336.78	Saprolite	NT
CCRLF-3	1066338.52	2437920.97	371.92	324.32	375.03	35.11	350.22	340.22	Saprolite	NT
CCRLF-4	1066801.97	2437509.21	369.99	320.39	373.21	36.22	347.29	337.29	Saprolite	2.46×10^{-3}
CCRLF-5	1066250.77	2438258.03	385.68	321.08	388.56	62.88	335.98	325.98	Bedrock	1.15×10^{-4}
DP-01	1065700.92	2437815.24	359.62	308.62	360.84	52.22	328.62	308.62	Saprolite	1.76×10^{-4}
DP-02	1065093.96	2438317.29	368.35	315.35	368.45	53.10	336.85	316.85	Saprolite	NT
P-01	1066537.71	2437302.92	362.46	307.46	364.83	57.37	357.46	307.46	Saprolite	5.27×10^{-5}
P-02	1066268.73	2437560.83	365.26	314.76	365.45	50.69	334.76	314.76	Saprolite	1.45×10^{-4}
D-02	1066259.32	2437333.65	357.83	337.83	N/A	N/A	N/A	N/A	N/A	NT
CV-15	1065221.91	2438172.08	359.45	336.45	N/A	N/A	N/A	N/A	N/A	NT
CV-16	1065368.18	2438037.15	360.75	330.75	N/A	N/A	N/A	N/A	N/A	NT
CV-17	1065534.24	2437926.27	359.40	319.40	N/A	N/A	N/A	N/A	N/A	NT
Average =										8.67×10^{-4}

Notes:

1. TOC = top of casing (i.e., riser pipe).
2. All depths measured in feet below top of casing (ft BTOC).
3. Elevations measured in feet from mean sea level (ft MSL).
4. Coordinates are in Georgia West State Plane, US Survey Feet, NAD83.
5. cm/s = centimeters per second.
6. Slug Test Avg = hydraulic conductivity data represents the average between each well's "Slug In" and "Slug Out" tests.
7. NT = No slug test performed.
8. N/A = Not applicable. No piezometer was installed in borings D-02, CV-15, CV-16, and CV-17.

Table 3
Historical Well and Piezometer Groundwater Elevations
Former Plant Arkwright

Monitoring Well/ Piezometer ID	TOC Elevation (ft MSL)	Ground Elevation (ft MSL)	Well Depth (ft BTOC)	Groundwater Elevations (ft MSL)							
				May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
CCRLF-1	357.40	353.92	23.48	347.15	347.51	347.37	347.56	346.98	346.80	347.90	348.40
CCRLF-2	370.54	366.98	34.06	351.54	351.88	351.91	351.96	351.50	351.08	350.89	351.41
CCRLF-3	375.03	371.92	35.11	349.88	350.06	350.33	350.71	n/a	353.85	353.30	350.08
CCRLF-4	373.21	369.99	36.22	352.28	352.47	352.78	352.93	348.48	347.99	347.84	351.99
CCRLF-5	388.56	385.68	62.88	n/a	344.26	344.47	344.93	345.09	344.97	344.81	344.92
GWA-3	388.55	387.10	41.95	352.65	352.82	352.89	353.09	352.72	352.31	352.25	352.63
GWA-5	376.45	373.71	32.74	352.92	353.17	353.11	353.25	352.79	352.45	352.78	353.15
GWA-12	372.56	369.39	32.51	355.84	356.06	355.94	356.03	355.77	355.53	355.73	356.16
GWA-13	371.81	368.94	43.61	347.11	347.25	347.29	347.81	347.36	347.93	347.37	348.00
GWA-14	388.16	385.37	58.75	344.57	344.83	344.83	344.85	344.96	345.01	344.52	345.12
GWC-7	352.73	349.00	48.50	329.10	329.77	329.59	330.35	329.39	328.82	329.43	330.33
GWC-8	355.67	352.17	43.10	330.49	330.99	330.79	330.96	330.21	329.81	330.54	331.23
GWC-9	367.34	363.94	38.20	345.99	346.41	346.36	346.66	345.91	345.36	345.84	346.77
GWC-10	370.87	367.66	38.20	349.06	349.47	350.34	349.61	348.92	348.39	349.01	349.80
GWC-15	375.90	372.88	43.00	345.93	346.25	346.50	347.03	346.97	346.83	346.43	346.96
GWC-16	365.21	362.31	34.48	344.06	344.60	344.58	345.05	344.53	344.15	344.68	345.28
GWC-17	368.52	365.57	33.85	346.11	346.55	346.50	346.87	346.43	346.14	346.68	347.22
GWC-18	354.99	352.25	50.85	327.06	327.44	327.39	327.71	327.16	326.92	327.25	327.81

Notes:

1. TOC = top of casing (i.e., riser pipe).
2. Well depths measured in feet below top of casing (ft BTOC).
3. Elevations measured in feet from mean sea level (ft MSL).
4. n/a = Water level not measured or determined inaccurate.
5. February 2019 levels are representative of the seasonal high.

Table 3 (continued)
Historical Well and Piezometer Groundwater Elevations
Former Plant Arkwright

Monitoring Well/ Piezometer ID	TOC Elevation (ft MSL)	Ground Elevation (ft MSL)	Well Depth (ft BTOC)	Groundwater Elevations (ft MSL)							
				Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19
CCRLF-1	357.40	353.92	23.48	348.51	348.24	348.27	348.47	347.86	347.46	346.99	346.57
CCRLF-2	370.54	366.98	34.06	352.38	352.60	352.47	352.21	351.98	351.57	351.26	350.89
CCRLF-3	375.03	371.92	35.11	351.00	351.66	351.74	351.65	351.40	350.82	350.34	349.67
CCRLF-4	373.21	369.99	36.22	351.99	353.89	353.73	353.56	353.28	352.89	352.48	351.94
CCRLF-5	388.56	385.68	62.88	345.32	346.31	346.74	346.96	347.08	346.85	346.52	345.81
GWA-3	388.55	387.10	41.95	353.30	353.69	353.67	353.60	353.46	353.11	352.86	352.53
GWA-5	376.45	373.71	32.74	353.75	353.92	353.88	353.83	353.53	353.08	352.80	352.56
GWA-12	372.56	369.39	32.51	356.99	357.26	357.34	357.33	357.08	356.58	356.28	355.92
GWA-13	371.81	368.94	43.61	349.20	349.34	349.39	349.33	348.86	348.15	347.59	346.87
GWA-14	388.16	385.37	58.75	344.54	344.53	344.69	345.06	344.91	344.94	345.03	345.04
GWC-7	352.73	349.00	48.50	331.70	331.08	331.23	330.95	330.26	329.52	328.79	327.83
GWC-8	355.67	352.17	43.10	327.84	331.42	331.50	331.25	330.99	330.22	329.54	329.70
GWC-9	367.34	363.94	38.20	347.88	348.06	348.22	347.82	347.28	346.49	345.85	344.95
GWC-10	370.87	367.66	38.20	350.68	350.79	351.02	350.91	350.34	349.48	348.87	348.10
GWC-15	375.90	372.88	43.00	347.69	347.95	347.89	347.79	347.56	347.28	347.08	346.59
GWC-16	365.21	362.31	34.48	346.03	345.75	n/a	345.68	345.19	344.66	344.26	343.87
GWC-17	368.52	365.57	33.85	347.82	347.44	347.49	347.37	346.98	346.59	346.24	345.89
GWC-18	354.99	352.25	50.85	328.51	328.25	328.36	328.15	327.76	327.08	326.45	326.58

Notes:

1. TOC = top of casing (i.e., riser pipe).
2. Well depths measured in feet below top of casing (ft BTOC).
3. Elevations measured in feet from mean sea level (ft MSL).
4. n/a = Water level not measured or determined inaccurate.
5. February 2019 levels are representative of the seasonal high.

Table 4
Water Supply Well Information
Former Plant Arkwright

Well ID	Location	Owner	Private or Public Property?	*Parcel on Public Drinking Water System?
1	(32.936803, -83.712124) 5675 Arkwright Road	Southern Natural Gas Company	Private	No
2	5645 Arkwright Road	Southern Natural Gas Company (4 Wells)	Private	Yes
3	5600 Arkwright Road	No Information	Private	Yes
4	5570 Arkwright Road	Lucious Wilson	Private	Yes
5	5281 Arkwright Road	Paul Wellborn	Private	Yes
6	5219 Riverside Drive	No Information	Private	Yes
7	5650 Arkwright Road	Wanda Stewart	Private	Yes

Notes:

1. * - Source: Macon Water Authority
2. Locations of each potential well location (Well ID) are shown on Figure 7.

Table 5
LeGrand Method Results
Former Plant Arkwright

Criteria	Description	Input	LeGrand Two-Media Score	Comment
Water Table	Distance below base of disposal unit	7 feet	0.7	5 feet separation plus 2-foot thick clay, per Circular 14 guidance
Sorption	Materials beneath disposal unit	Clay	4	Score per Circular 14 guidance
Permeability	Materials beneath disposal unit	Composite Liner	3	Score per Circular 14 guidance
Gradient	Groundwater gradient across site	0.007	3	Calculated utilizing observed seasonal high groundwater elevations with a favorable direction of flow, per Circular 14 guidance
Distance	Distance to closest receptor	25 feet	0	Site will be constructed in close proximity to an intermittent stream. Score per Circular 14 guidance.
Thickness	Thickness of overburden	36.5 feet	2	Per boring logs, survey data, and Circular 14 guidance
		Total	12.7	"Possible, but not likely"

Total Points	Pollution Potential of a Site
0 - 4	Imminent
4 - 8	Probable
8 - 12	Possible
12 - 25	Possible, but not likely
25+	Approaching impossible

Appendix A. Zoning Letter



MACON-BIBB COUNTY
Planning & Zoning

Macon-Bibb Planning & Zoning Commission
Terminal Station | 200 Cherry Street, Suite 301
Macon, Georgia 31201 MBPZ.org

November 10, 2020

Mr. Chuck Mueller
Land Protection Branch Chief
Georgia Environmental Protection Division
2 Martin Luther King Jr. Drive, SE
East Floyd Tower, Suite 1456
Atlanta, GA 30334-9000

**Re: GA Power – Former Plant Arkwright
Permit Application – CCR Landfill**

Dear Mr. Mueller:

The Georgia Power Former Plant Arkwright – CCR Landfill located near 5001 Arkwright Road, Arkwright, Georgia complies with local zoning and land use ordinances.

Sincerely,



James P Thomas
Executive Director
Macon-Bibb County Planning & Zoning Commission

Appendix B. Ecological Survey

Memorandum



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Subject	Ecological Resource Survey	Project Name	Plant Arkwright
Attention	Bret McClellan	Project Location	Bibb County, GA
From	Stacy Stewart		
Date	October 17, 2018		
Copies	File		

Overview

Jacobs Engineering, Inc. was contracted to evaluate environmental features located on the Plant Arkwright property in Bibb County, approximately six miles northwest of Macon, Georgia. Field studies to identify ecological resources, including Waters of the United States (US), state waters, and protected species habitat was conducted by Jacobs on March 7, 2018, March 22, 2018, April 10, 2018, May 1-3, 2018, and May 8, 2018.

Methodology

An assessment of jurisdictional Waters of the US within the proposed project area was conducted using the following as aids: US Geological Survey topographic quadrangles, US Fish and Wildlife Service (USFWS) National Wetland Inventory maps, US Department of Agriculture Natural Resources Conservation Service Soil Survey Maps for Bibb County, and aerial photography. Wetland locations were determined using methodologies outlined in the 1987 US Army Corps of Engineers (USACE) Wetlands Delineation Manual and the Regional Supplement to the USACE Wetland Delineation Manual: Eastern Mountains and Piedmont (Version 2.0). This multi-parameter approach requires positive evidence of the following three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology.

Areas were considered jurisdictional wetlands if they exhibited evidence of all three of the above wetland criteria. A low-medium-high rating system was used to evaluate wetland sites in terms of their ability to perform their associated functions. Factors considered included type of habitat (i.e. forested, emergent, etc.), vegetation diversity, hydrology, size, surrounding landscape, wildlife habitat, wildlife corridors, and size/type of stream course.

In addition, the Georgia Environmental Protection Division's (EPD) Guide to Determining State Waters Requiring Buffers and the North Carolina Division of Water Quality (NCDWQ) Methodology for Identification of Intermittent and Perennial Streams and Their Origins (Version 4.11) were used as aids to determine state and federal jurisdiction of drainage features. Areas were considered jurisdictional streams if they exhibited an ordinary high water mark, well-defined channel, and showed evidence of base flow at times other than major storm events.

To prepare field personnel for evaluating protected species habitat, desktop reviews of federal, state, and private published reference material were conducted prior to the project survey. Referenced resources



included the USFWS Information for Planning and Consultation (IPaC) database for Bibb County; Georgia Department of Natural Resources (GDNR) Element Occurrence by County database; and the GDNR Rare Species Profiles website database.

Habitats and Land Use Areas

Field studies identified three habitat types within the project survey area: ruderal, mixed pine hardwood, and Waters of the US. Land use within the vicinity of the survey area primarily consisted of residential, light commercial development, and roadway/railroad right-of-way (ROW). The following discussion briefly summarizes each habitat type identified within the project survey area.

Ruderal – This community is characterized by habitats that are currently manipulated by human activities, including, but not limited to, roadway/railroad ROW, utility ROW, and residential /light commercial properties. Vegetation within this habitat is frequently mowed and includes fescue species (*Festuca* spp.), crabgrass (*Digitaria ciliaris*), annual ragweed (*Ambrosia artemisiifolia*), Japanese honeysuckle (*Lonicera japonica*), dog fennel (*Eupatorium capillifolium*), and goldenrod (*Solidago* spp.).

Mixed Pine Hardwood – This habitat type is dominated by early to mid-successional forested areas. Dominant vegetation within this habitat consists of loblolly pine (*Pinus taeda*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), yellow poplar (*Liriodendron tulipifera*), water oak (*Quercus nigra*), and Chinese privet (*Ligustrum sinense*).

Waters of the US – Jurisdictional features present along the project corridor include one open water, one wetland, five intermittent streams, and four perennial streams. A detailed description of each feature is included below in the section titled State and Federal Water Identification and Description.

State and Federal Protected Species

Based on the IPaC database, two federal protected species are known to occur in Bibb County [fringed campion (*Silene polypetala*) and relict trillium (*Trillium reliquum*)]. According to GDNR element occurrence records, two additional state listed species are known to occur within the same quarter quad (Macon NW, Georgia) of the survey area [Altamaha shiner (*Cyprinella xaenura*) and robust redhorse (*Moxostoma robustum*)]. Please see below for a brief description of each protected species.

Fringed campion (*Silene polypetala*, federal and state endangered) – The fringed campion is a perennial herb with stems growing up to 16 inches tall and occurs in mature hardwood forests. Within this habitat, it can be found in low-acid sandy loam soils on moist, mid to lower slopes, river-bluffs, well shaded ridge crests, and small terraces. The fringed campion often occurs in association with oak-leaf hydrangea (*Hydrangea arborescens*), blue palmetto (*Sabal palmetto*), and rhododendron (*Rhododendron minus*). The range of the fringed campion is restricted to only Georgia and Florida. Within Georgia, there are about 30 known populations along the Chattahoochee, Flint, and Ocmulgee River drainages and it has been recorded in Bibb, Crawford, Decatur, Houston, Talbot, Taylor, Twiggs, and Upson counties. Threats to this species include logging of hardwood slopes, overbrowsing, and invasion by exotic plants.

Field investigations determined no suitable habitat exists within the survey area for the fringed campion. Forested areas within the Plant Arkwright site were secondary successional and considered to be too disturbed to support this species. Furthermore, no associate species such as oak-leaf hydrangea, blue

palmetto, or rhododendron were identified. Site surveys were conducted during the recommended flowering period, and no individuals or populations of fringed campion were identified.

Relict trillium (*Trillium reliquum*, federal and state endangered) – Relict trillium is a perennial herb that produces a hairless, curved stem that measures from two to seven inches long. This species can be found on moist slopes, bottomlands, and floodplains of mesic hardwood forests. It prefers soils ranging from rocky clays to alluvial sands with high organic matter over calcium-rich bedrock such as amphibolite or limestone. This plant can typically be found in the vicinity of creeks or rivers, often in rich ravines and on stream terraces. This species grows with a variety of species in areas that lack fire as a disturbance. Relict trillium may inhabit disturbed areas such as power and sewer ROWs and after activities such as quarrying, agriculture, and road building; however, the moisture regime must remain mesic. The range of this species includes Alabama, Georgia, and South Carolina. In Georgia, there are approximately 40 known populations, eight of which are on protected lands. Threats to this species include clearing of hardwood slope forest, over-browsing by deer, and competition from exotic plants.

Suitable habitat for the relict trillium was observed within the survey area. Field surveys were conducted during the recommended flowering period, and although other trillium species were identified, no individuals or populations of relict trillium were observed.

Altamaha shiner (*Cyprinella xanura*, state threatened) – The Altamaha shiner is a larger minnow species, reaching lengths of up to 4.3 inches. This species inhabits small streams and tributaries and are often found in small pools with rocky to sandy substrate. This species particularly prefers cool pools that are behind obstacles along and under banks. Altamaha shiners are common to the Piedmont portion of the upper Altamaha River drainage of north central Georgia, from both the Ocmulgee and Oconee River systems. Primary threats to this species are degradation and impoundment of tributary streams in the upper Altamaha drainage.

Suitable habitat for the Altamaha shiner exists within Perennial Stream 2 (Beaver Dam Creek). An aquatic survey would be needed to determine the absolute presence/absence of this species. However, because the species is not federally protected, an aquatic survey is not required for permitting or construction activity on or near Beaver Dam Creek.

Robust redhorse (*Moxostoma robustum*, state endangered) – The robust redhorse is a large, freshwater sucker measuring up to 28 inches long that is typically known from habitats in main-stem rivers. This species can be found in riffles, runs, and pools with swift, moderately deep waters over silty to rocky substrate. Populations in the Oconee and Savannah Rivers are frequently found in association with tree snags and woody debris. Historically, the robust redhorse ranged from the Altamaha River in Georgia to the Pee Dee of North and South Carolina in southeastern Atlantic slope river drainages. In Georgia, this species is known to occur in the Oconee River downstream of Milledgeville and the Savannah River downstream of Augusta. Furthermore, spawning has been infrequently observed in the Broad and Ocmulgee rivers. Threats to this species include hazardous industrial spills, habitat degradation from poor land-use practices, excess sedimentation and water withdrawals. Other hazards include predation from introduced species including the blue catfish (*Ictalurus furcatus*) and flathead catfish (*Pylodictis olivaris*).

Suitable habitat for the robust redhorse exists within Perennial Stream 1 (Ocmulgee River), and there are known historical occurrences of this species within the river. The robust redhorse is not federal protected, so an aquatic survey is not required for permitting or construction activities.



Bald and Golden Eagles

The Bald Eagle Protection Act of 1940 provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds.

Bald eagle (*Haliaeetus leucocephalus*, state threatened) – The bald eagle is a raptor with a dark brown body with a white head and tail. The legs, eyes, feet, and bill are yellow. The USFWS removed the bald eagle as threatened under the Endangered Species Act (ESA) on August 8, 2007, and in May 2007 published in the National Bald Eagle Management Guidelines to assist the public in understanding protections afforded to and prohibitions related to the bald eagle under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) (Eagle Act), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Lacey Act (16 U.S.C. 3371-3378). The Eagle Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Eagle Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

In Georgia, the bald eagle finds habitat along inland waterways and estuarine areas, selecting areas with low human disturbance, suitable forest structure, and abundant prey. It typically nests in the largest tree in its chosen territory. Nest sites are usually near water, with large individual trees, and little overall human disturbance. This species prefers nest sites within 0.5 miles of water. The bald eagle usually forages within approximately one mile of its nest site during breeding season.

Field studies did not identify any bald eagle specimens or nests within the project survey area. According to GDNr occurrence records, no bald eagle nests are known to occur within the project quarter quad. Additional early coordination for known nests locations within a 3-mile radius should be conducted prior to any construction activities to further ensure no take of the bald eagle.

Critical Habitat

Critical habitat, as defined under the ESA, identifies specific geographic areas that include physical and biological features essential to the conservation of a federally listed protected species. No designated critical habitat occurs within the vicinity of the proposed project or within Bibb County.

Essential Fish Habitat

In compliance with the Magnuson-Stevens Fishery Conservation and Management Act, unavoidable adverse impacts to Essential Fish Habitat (EFH) must be identified. The proposed project does not occur in any of the coastal counties of Georgia which contain EFH; therefore, there would be no impacts to EFH.

State and Federal Water Identification and Description

Field surveys identified a total of 11 jurisdictional Waters of the US: one open water, one wetland, five intermittent streams, and four perennial streams. A brief description of the features identified during field studies is included below.

Open Water 1 (OW 1) – Open Water 1 is located upstream of Perennial Stream 4 at the northern end of the site. Open Water 1 is a man-made pond but has both an inlet and outlet stream, making it a buffered state water and a jurisdictional resource. The functional riparian buffer of the pond is greater than 50 feet wide along all banks and is dominated by maintained grass and loblolly pine. This system is considered



somewhat impaired due to buffer maintenance and sedimentation from disturbance upstream. At the time of survey, the water was cloudy but no foul odors were detected. Open Water 1 does not provide suitable habitat for any federal or state protected species.

Wetland 1 (WL 1) – One palustrine forested wetland (PFO1B) was located in the central portion of the project survey area downstream of Perennial Stream 4 and upstream of Intermittent Stream 5 and Perennial Stream 2 (Beaver Dam Creek). This forested wetland is dominated by canopy and understory trees consisting of sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and Chinese privet (*Ligustrum sinense*). In wetter areas, the herbaceous layer is dominated by lizard tail (*Saururus cernuus*) and netted chain fern (*Woowardia areolata*). Hydric soils were identified throughout the area (depleted matrix).

Intermittent Stream 1 (IS 1) – Intermittent Stream 1 is a warm water, intermittent stream with a streambed composed of sand (R4SB4). This system is located on the west side of OW 1. The intermittent characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as an intermittent stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks and is dominated by maintained grass. This system is considered fully impaired due to buffer maintenance, bank erosion, sedimentation, and a rock ford which has been constructed in the upper part of the channel to allow maintenance vehicles to pass. At bankfull, the channel is approximately 3-4 feet wide and two feet deep with a wetted width of approximately 1-2 feet. At the time of the survey, the depth of the stream was approximately 0.5-1 foot, the water was cloudy, and no foul odors were detected. Intermittent Stream 1 is not listed on the most current 303(d) list. This stream is considered a buffered state water and would require a 25-foot protective buffer. Intermittent Stream 1 does not provide suitable habitat for any federal or state protected species and consideration of fish passage would not be required for this system.

Intermittent Stream 2 (IS 2) - IS 2 is a warm water, intermittent stream with a streambed composed of sand (R4SB4). This system is located on the west side of the site near the existing Arkwright-Forest Road 115kV transmission line and flows south to Beaver Dam Creek (Perennial Stream 2). The intermittent characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as an intermittent stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks and is composed of maintained utility right-of-way and mixed pine-hardwood species. This system is considered fully impaired due to buffer clearing and maintenance, severe erosion, and sedimentation from disturbance upstream. At bankfull, the channel is approximately 3-5 feet wide and 2-4 feet deep with a wetted width of approximately 2-3 feet. At the time of the survey, the depth of the stream was approximately 0.5-1 foot, the water was cloudy, and no foul odors were detected. Intermittent Stream 2 is not listed on the most current 303(d) list. This stream is considered a buffered state water and would require a 25-foot protective buffer. This stream does not provide suitable habitat for any federal or state protected species and consideration of fish passage would not be required for this system.

Intermittent Stream 3 (IS 3) – Intermittent Stream 3 is a warm water, intermittent stream with a streambed composed of sand (R4SB4). This system flows south, parallel to IS 2 within the ROW of an existing transmission line. The intermittent characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as an intermittent stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks and is composed of maintained utility right-of-way. This system is considered somewhat impaired due to buffer clearing, severe bank erosion, and sedimentation from disturbance upstream. At bankfull, the channel is approximately two feet wide and one foot deep with a wetted width of



approximately one foot. At the time of the survey, the depth of the stream was approximately 0.5 foot, the water was cloudy, and no foul odors were detected. Intermittent Stream 3 is not listed on the most current 303(d) list. This stream is considered a buffered state water and would require a 25-foot protective buffer. Intermittent Stream 3 does not provide suitable habitat for any federal or state protected species and consideration of fish passage would not be required for this system.

Intermittent Stream 4 (IS 4) – Intermittent Stream 4 is a warm water, intermittent stream with a streambed composed of sand and mud (R4SB45). This system is located adjacent to Wetland 1 and flows to IS 2. The intermittent characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as an intermittent stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks and is composed of mixed pine hardwood species and some areas of maintained utility ROW. This system is considered somewhat impaired due to bank erosion and sedimentation. At bankfull, the channel is approximately 3-5 feet wide and 1-2 feet deep with a wetted width of approximately one foot. At the time of the survey, the depth of the stream was approximately 0.5 foot, the water was cloudy, and no foul odors were detected. Intermittent Stream 4 is not listed on the most current 303(d) list. This stream is considered a buffered state water and would require a 25-foot protective buffer. This stream does not provide suitable habitat for any federal or state protected species and consideration of fish passage would not be required for this system.

Intermittent Stream 5 (IS 5) – Intermittent Stream 5 is a warm water, intermittent stream with a streambed composed of sand and mud (R4SB45). This system is located to the south of Wetland 1 and flows to Beaver Dam Creek (Perennial Stream 2). The intermittent characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as an intermittent stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks and is composed of mixed pine hardwood species. This system is considered somewhat impaired due to bank erosion and sedimentation. At bankfull, the channel is approximately 4-5 feet wide and 2-3 feet deep with a wetted width of approximately 1-2 feet. At the time of the survey, the depth of the stream was approximately 0.5 foot, the water was cloudy, and no foul odors were detected. Intermittent Stream 5 is not listed on the most current 303(d) list. This stream is considered a buffered state water and would require a 25-foot protective buffer. This stream does not provide suitable habitat for any federal or state protected species and consideration of fish passage would not be required for this system.

Perennial Stream 1 (PS 1) - Perennial Stream 1 is the Ocmulgee River, a warm water stream with a substrate composed of sand, silt, and cobble-gravel (R2UB12). The perennial characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as a perennial stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks, and is composed of mixed pine hardwood species. This system is considered somewhat impaired due to bank erosion, sedimentation, and pollution. At bankfull, the channel is approximately 150-200 feet wide and 15 feet deep with a wetted width of approximately 140-185 feet. Within the survey area, Perennial Stream 1 is not listed on the most current 303(d) list, but it does become listed approximately 10 miles downstream. This stream is a state water and would require a 25-foot protective buffer. Perennial Stream 1 provides suitable habitat for one state protected species, the robust redbreast. Consideration of fish passage would be required for any proposed impacts to this system.



Perennial Stream 2 (PS 2) - Perennial Stream 2 is Beaver Dam Creek, a tributary to PS 1 (Ocmulgee River). Perennial Stream 2 is a warm water stream with a substrate composed of sand and silt (R2UB2). The perennial characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed which ranked this system as a perennial stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks, and is composed of mixed pine hardwood species. This system is considered somewhat impaired due to bank erosion, sedimentation, and roadway pollutants. At bankfull, the channel is approximately 45-50 feet wide and 4-8 feet deep with a wetted width of approximately 30-40 feet. At the time of the survey, the depth of the stream was approximately 1-3 feet, the water was cloudy, and no foul odors were detected. Perennial Stream 2 is not listed on the most current 303(d) list. This stream is a state water and would require a 25-foot protective buffer. This stream does not provide suitable habitat for any federal protected species but does provide habitat for the state protected Altamaha shiner. Consideration of fish passage would be required for any proposed impacts to this system.

Perennial Stream 3 (PS 3) - Perennial Stream 3 occurs on the northeast side of the site and is a tributary to PS 1 (Ocmulgee River). Perennial Stream 3 is a warm water stream composed of sand and silt (R2UB2). The perennial characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as a perennial stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks, and is composed of grass and mixed pine hardwood species. This system is considered somewhat impaired due to heavy amounts of debris, bank erosion, and sedimentation. At bankfull, the channel is approximately 10-15 feet wide and 3-4 feet deep with a wetted width of approximately 8-10 feet. At the time of the survey, the depth of the stream was approximately one foot, the water was cloudy, and no foul odors were detected. Perennial Stream 3 is not listed on the most current 303(d) list. This stream is a state water and would require a 25-foot protective buffer. This stream does not provide suitable habitat for any federal or state protected species but consideration of fish passage would be required for any proposed impacts to this system.

Perennial Stream 4 (PS 4) - Perennial Stream 4 originates at the base of OW 6, at the north end of the site. Perennial Stream 4 is a warm water stream with a substrate composed of sand and mud (R2UB23). The perennial characteristics observed within this system include the presence of baseflow and wretched vegetation. During the field survey, a NCDWQ data form was completed, which ranked this system as a perennial stream. The functional riparian buffer of this system is greater than 50 feet wide along both banks, and is primarily composed of maintained grasses. This system is considered fully impaired due to impoundment, channelization, and culverting. At bankfull, the channel is approximately 5-6 feet wide and 1-2 feet deep with a wetted width of approximately 3 feet. At the time of the survey, the depth of the stream was approximately four to six inches, the water was clear, and no foul odors were detected. Perennial Stream 4 is not listed on the most current 303(d) list. This stream is a state water and would require a 25-foot protective buffer. This stream does not provide suitable habitat for any federal or state protected species but consideration of fish passage would be required for any proposed impacts to this system.

Non-jurisdictional Drainage Features

A total of 11 non-jurisdictional drainage features were identified within the project survey area. These features did not exhibit an ordinary high water mark, base flow, hydric soils, well-defined channel bed/bank, or wretched vegetation. These features were also discontinuous and not directly connected to other aquatic features within the survey area. The location of each feature was collected for documentation purposes.



only and no additional information regarding these features would be required for permitting or construction activities.

Permitting Overview

The discharge of dredge or fill material within waters of the U.S. is regulated by the USACE under the Clean Water Act (33 U.S.C. 1344). Impacts to jurisdictional systems require authorization under Section 404 of the Clean Water Act. Typically, minor impacts or fill activities may be eligible for permitting under the Nationwide Permit (NWP) program. Typically, NWPs can be utilized for up to 0.5 acre of jurisdictional waters/wetland impacts and 300 linear feet of perennial, intermittent, and ephemeral stream impacts for single and complete projects. Depending on the extent of the activity, some minor impacts (typically less than 0.10 acre or 100 linear feet) may be conducted without formal notification to the USACE (with some exceptions due to proximity to protected lands). However, use of any NWP in USACE Savannah District requires notification to EPD. Use of an NWP permit requiring pre-construction notification (PCN) to the USACE, requires mitigation of impacts (typically in the purchase of credits), inter-agency review, and up to a 90-day review period by the USACE and other commenting regulatory agencies. Impacts exceeding the limits of a NWP would require an individual permit from the USACE. Impacts exceeding 0.1 acre of wetlands or 100 feet of stream would require the purchase of compensatory mitigation credits.

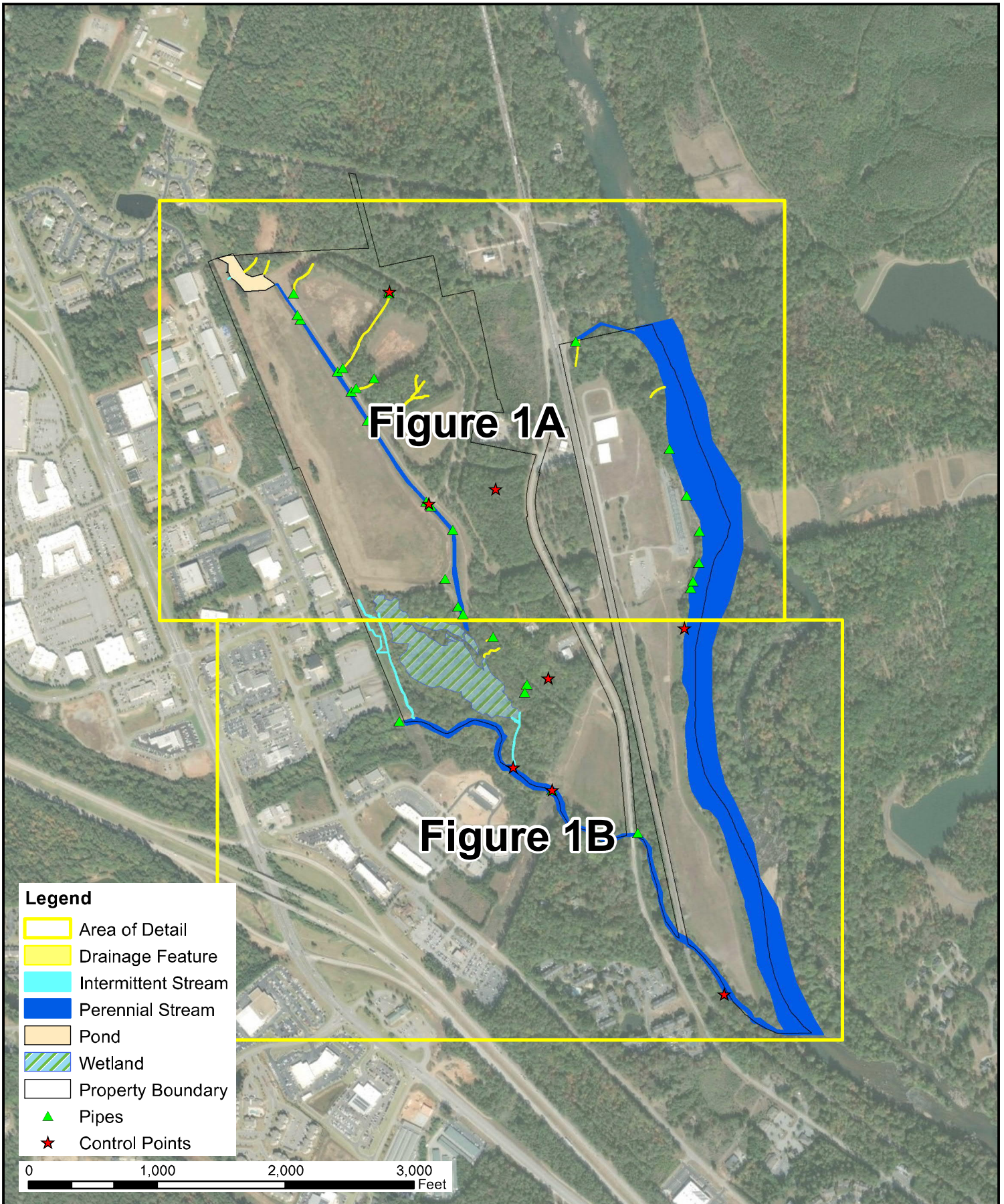
Disturbance to the twenty-five foot State stream buffer would require a stream buffer variance to the Georgia EPD. Buffer variance requests require a mandatory 30-day public notice period and typically take 4-6 months for agency approval. Depending on the nature of the project and the application criteria, additional mitigation credits may be required by EPD.



Memorandum

Ecological Resource Survey

Figures



Plant Arkwright
Bibb County, Georgia

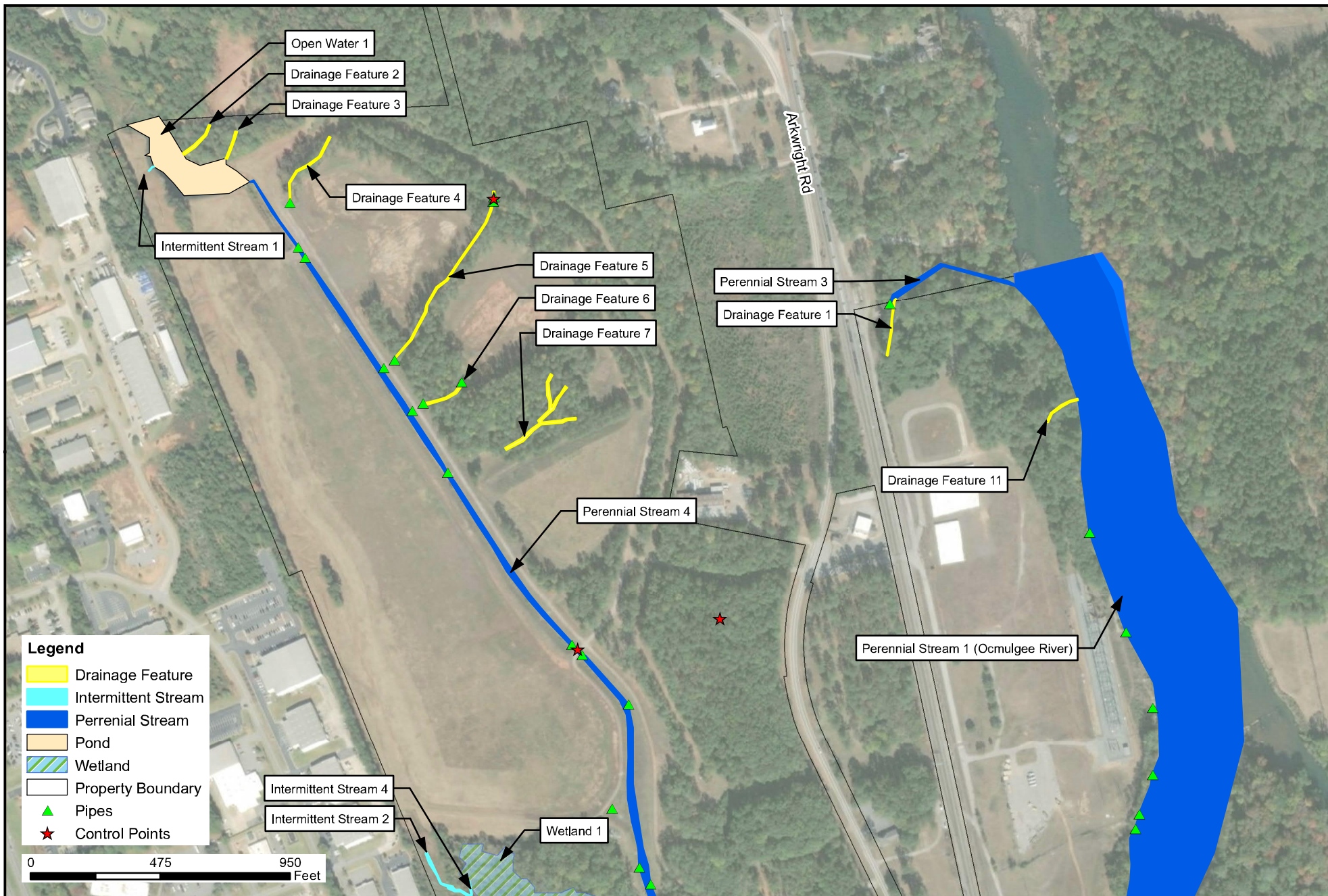
Federal and State Waters Map

N

Date: Oct. 2018

Scale: 1" = 1,000'

Figure 1 - Index



Plant Arkwright
Bibb County, Georgia

Federal and State Waters Map

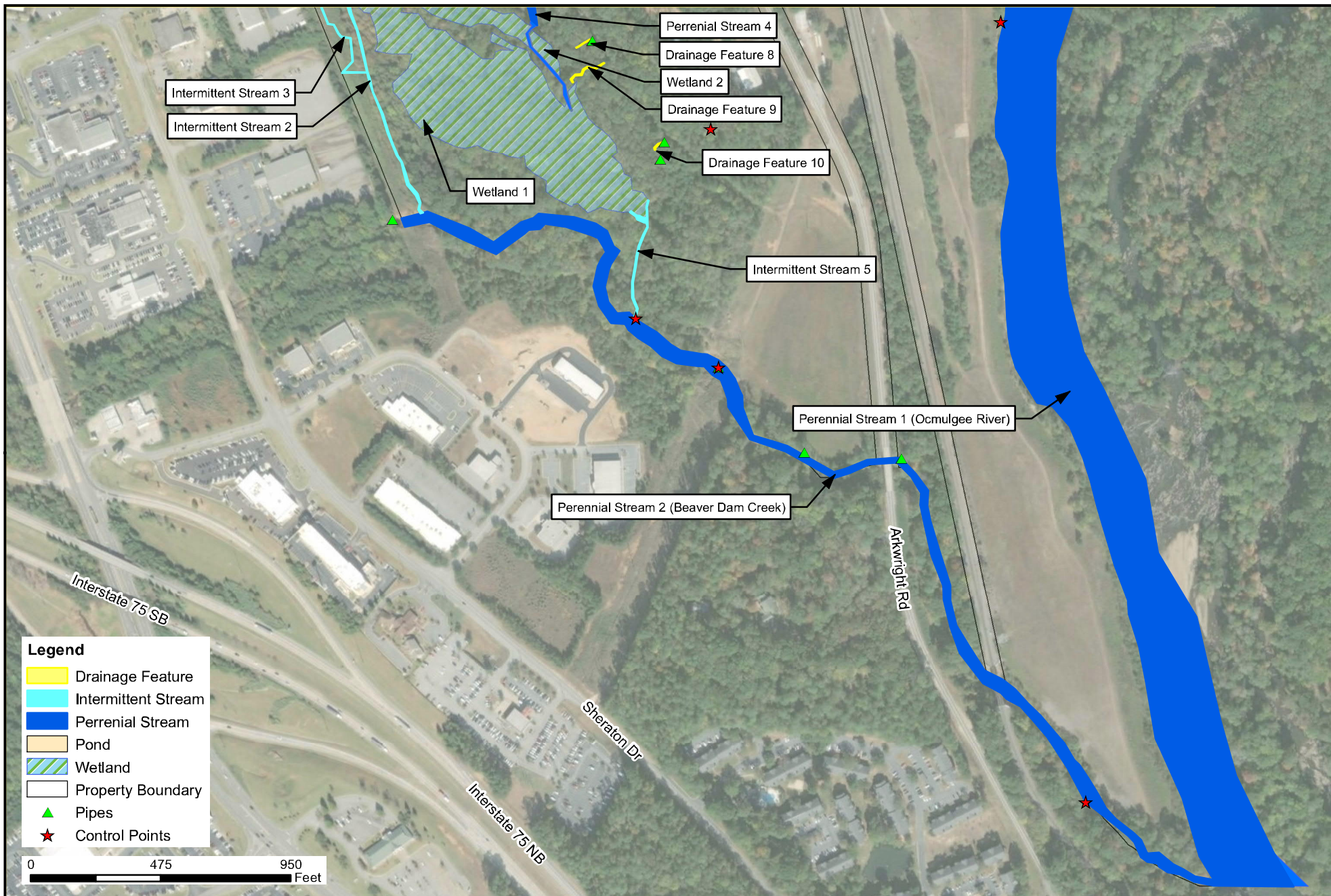


Date: Oct. 2018

Scale: 1" = 475'

Figure 1A

Source: ESRI World Imagery



Plant Arkwright
Bibb County, Georgia

Federal and State Waters Map

	Date: Oct. 2018
	Scale: 1" = 475'
	Figure 1B



Memorandum

Ecological Resource Survey

Representative Photographs



Photograph 1. Open Water 1



Photograph 2. Wetland 1



Photograph 3. Intermittent Stream 1



Photograph 4. Intermittent Stream 2



Photograph 5. Intermittent Stream 3



Photograph 6. Intermittent Stream 4



Photograph 7. Intermittent Stream 5



Photograph 8. Perennial Stream 1 (Ocmulgee River)



Photograph 9. Perennial Stream 2 (Beaver Dam Creek)



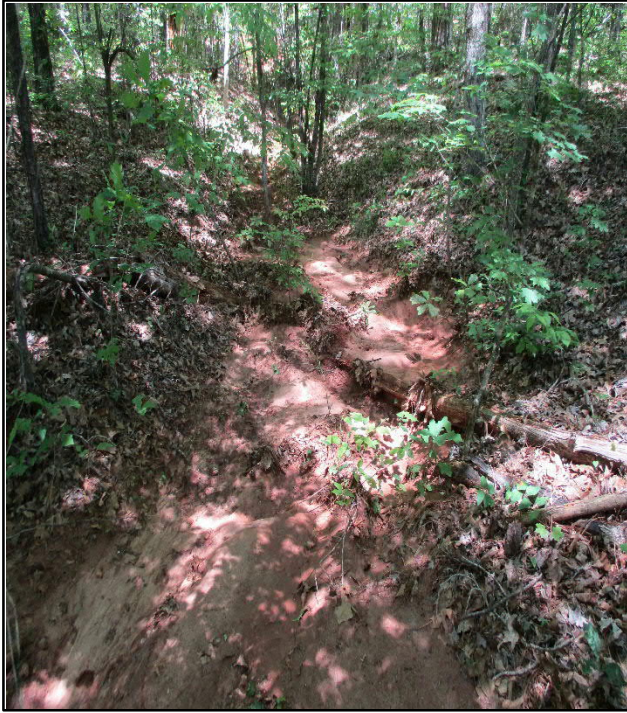
Photograph 10. Perennial Stream 3



Photograph 11. Perennial Stream 4



Photograph 12. Drainage Feature 1



Photograph 13. Drainage Feature 2



Photograph 14. Drainage Feature 3



Photograph 15. Drainage Feature 4



Photograph 16. Drainage Feature 5



Photograph 17. Drainage Feature 6



Photograph 18. Drainage Feature 7



Photograph 19. Drainage Feature 8



Photograph 20. Drainage Feature 9



Photograph 21. Drainage Feature 10



Photograph 22. Drainage Feature 11

Appendix C. Water Well Driller Bonds

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 Department of Natural Resources, Environmental Protection Division
(OBLIGEE)

does hereby continue said bond in force for the further period

beginning on June 30, 2017
(MONTH-DAY-YEAR)

and ending on June 30, 2018
(MONTH-DAY-YEAR)

Amount of bond \$10,000.00

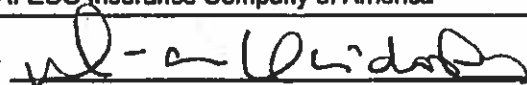
Description of bond Water Well Contractors & Drillers

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 May 04, 2017
(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 7710213

American States Insurance Company
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 American States Insurance Company is a corporation duly organized under the laws of the State of Indiana, 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

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 4th day of April, 2017.



American States Insurance Company
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 4th day of April, 2017, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of American States Insurance Company, 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 King of Prussia, Pennsylvania, on the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Teresa Pastella, Notary Public
Upper Merion Twp., Montgomery County
My Commission Expires March 28, 2021
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-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions 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, Renee C. Llewellyn, the undersigned, Assistant Secretary, of American States Insurance Company, 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 4th day of May, 2017.



By: Renee C. Llewellyn
Renee C. Llewellyn, 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.

POWER OF ATTORNEY

LX- 295872

Lexon Insurance Company

KNOW ALL MEN BY THESE PRESENTS, that **LEXON INSURANCE COMPANY**, a Texas Corporation, with its principal office in Louisville, Kentucky, does hereby constitute and appoint: Elizabeth Brooks, Scottie Satcher, Leslie A. Worley, Betsye Thomas, Jessica Spears its true and lawful Attorney(s)-In-Fact to make, execute, seal and deliver for, and on its behalf as surety, any and all bonds, undertakings or other writings obligatory in nature of a bond.

This authority is made under and by the authority of a resolution which was passed by the Board of Directors of **LEXON INSURANCE COMPANY** on the 1st day of July, 2003 as follows:

Resolved, that the President of the Company is hereby authorized to appoint and empower any representative of the Company or other person or persons as Attorney-In-Fact to execute on behalf of the Company any bonds, undertakings, policies, contracts of indemnity or other writings obligatory in nature of a bond not to exceed \$2,500,000.00, Two Million Five Hundred Thousand dollars, which the Company might execute through its duly elected officers, and affix the seal of the Company thereto. Any said execution of such documents by an Attorney-In-Fact shall be as binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company. Any Attorney-In-Fact, so appointed, may be removed for good cause and the authority so granted may be revoked as specified in the Power of Attorney.

Resolved, that the signature of the President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Assistant Secretary, and the seal of the Company may be affixed by facsimile to any certificate of any such power and any such power or certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certificate so executed and sealed shall, with respect to any bond of undertaking to which it is attached, continue to be valid and binding on the Company.

IN WITNESS THEREOF, **LEXON INSURANCE COMPANY** has caused this instrument to be signed by its President, and its Corporate Seal to be affixed this 5th day of August, 2015.



LEXON INSURANCE COMPANY

BY David E. Campbell
David E. Campbell
President

ACKNOWLEDGEMENT

On this 5th day of August, 2015, before me, personally came David E. Campbell to me known, who be duly sworn, did depose and say that he is the President of **LEXON INSURANCE COMPANY**, the corporation described in and which executed the above instrument; that he executed said instrument on behalf of the corporation by authority of his office under the By-laws of said corporation.



AMY TAYLOR
Notary Public- State of Tennessee
Davidson County
Mv Commission Expires 07-08-19

BY Amy Taylor
Amy Taylor
Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of **LEXON INSURANCE COMPANY**, A Texas Insurance Company, DO HEREBY CERTIFY that the original Power of Attorney of which the forgoing is a true and correct copy, is in full force and effect and has not been revoked and the resolutions as set forth are now in force.

Signed and Seal at Mount Juliet, Tennessee this 11th Day of April, 2017.



BY Andrew Smith
Andrew Smith
Assistant Secretary

"WARNING: Any person who knowingly and with intent to defraud any insurance company or other person, files and application for insurance of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact material thereto, commits a fraudulent insurance act, which is a crime and subjects such person to criminal and civil penalties."

GA Water Well Contractor License # _____

Bond Number 1075185

Performance Bond For Water Well Contractors

Name of Water Well Contractor Forest Wilson dba TTL Inc

Know All Men By These Presents

That we Forest Wilson dba TTL Inc and Forest Wilson dba TTL Inc

hereinafter, **Principal**), and we Lexon Insurance Company, any and all employees, officers and partners (collectively the State of Texas (hereinafter, **Surety**), are held and firmly bound unto the Director of the Environmental Protection Division, Department of Natural Resources, State of Georgia (**Director**) and his or her successor or successors in office, as **Obligee**, in the full sum of **THIRTY THOUSAND DOLLARS (\$30,000.00)** for the payment of which will and truly to be made, the Principal and Surety bind ourselves, our heirs, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1985 (O.C.G.A. §§ 12-5-120 *et seq.*) (the Act) requires that a Water Well Contractor, as that term is defined by the Act, have a performance bond 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 and 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 it shall remain in 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 anyway discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption or modification.

This bond shall be effective from the 1st day of July, 2017 and shall continue in effect until June 30, 2019, unless sooner terminated by mutual agreement of Principal and Surety, provided that no such termination may be made unless sixty (60) days' prior written notice is made to the Director. In the event of such termination, the rights of the Director as Obligee and beneficiaries under this bond which arose prior to such termination shall continue.

IN WITNESS THEREOF the Principal and Surety have caused these present to be duly signed and sealed, this the 11th day of April, 2017.

Principal

Print name: FOREST WILSON
Title: Exec. Vice President

Surety

Print name: Jessica Spears
Title: Attorney-In-Fact

Seal:

Seal:

Revised March 2017

GA Water Well Contractor License # _____

Bond Number 1075185

Performance Bond For Water Well Contractors

Name of Water Well Contractor Forest Wilson dba TTL Inc

Know All Men By These Presents

That we Forest Wilson dba TTL Inc and Forest Wilson

dba TTL Inc any and all employees, officers and partners (collectively hereinafter, **Principal**), and we Lexon Insurance Company, duly organized under the laws of the State of Texas (hereinafter, **Surety**), are held and firmly bound unto the Director of the Environmental Protection Division, Department of Natural Resources, State of Georgia (**Director**) and his or her successor or successors in office, as **Obligee**, in the full sum of **THIRTY THOUSAND DOLLARS (\$30,000.00)** for the payment of which will and truly to be made, the Principal and Surety bind ourselves, our heirs, administrators, successors and assigns, jointly and severally, by these presents.

WHEREAS, the Water Well Standards Act of 1985 (O.C.G.A. §§ 12-5-120 *et seq.*) (the Act) requires that a Water Well Contractor, as that term is defined by the Act, have a performance bond 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 and 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 it shall remain in 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 anyway discharge its obligation on this bond, and does hereby waive notice of any such amendment, adoption or modification.

This bond shall be effective from the 1st day of July, 20 19 and shall continue in effect until June 30, 2021, unless sooner terminated by mutual agreement of Principal and Surety, provided that no such termination may be made unless sixty (60) days' prior written notice is made to the Director. In the event of such termination, the rights of the Director as Obligee and beneficiaries under this bond which arose prior to such termination shall continue.

In WITNESS THEREOF the Principal and Surety have caused these present to be duly signed and sealed, this the 8th day of April, 20 19.

Principal


Print name: Forest Wilson
Title: Executive Vice President

Surety


Print name: Jessica Spears
Title: Attorney-In-Fact

POWER OF ATTORNEY

LX - 10165

Lexon Insurance Company

KNOW ALL MEN BY THESE PRESENTS, that **LEXON INSURANCE COMPANY**, a Texas Corporation, with its statutory home office in Austin, Texas, does hereby constitute and appoint: Jessica Spears its true and lawful Attorney(s)-In-Fact to make, execute, seal and deliver for, and on its behalf as surety, any and all bonds, undertakings or other writings obligatory in nature of a bond.

This authority is made under and by the authority of a resolution which was passed by the Board of Directors of **LEXON INSURANCE COMPANY** on the 1st day of July, 2003 as follows:

Resolved, that the President of the Company is hereby authorized to appoint and empower any representative of the Company or other person or persons as Attorney-In-Fact to execute on behalf of the Company any bonds, undertakings, policies, contracts of indemnity or other writings obligatory in nature of a bond not to exceed \$5,000,000.00, Five Million Dollars, which the Company might execute through its duly elected officers, and affix the seal of the Company thereto. Any said execution of such documents by an Attorney-In-Fact shall be as binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company. Any Attorney-In-Fact, so appointed, may be removed for good cause and the authority so granted may be revoked as specified in the Power of Attorney.

Resolved, that the signature of the President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Assistant Secretary, and the seal of the Company may be affixed by facsimile to any certificate of any such power and any such power or certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certificate so executed and sealed shall, with respect to any bond of undertaking to which it is attached, continue to be valid and binding on the Company.

IN WITNESS THEREOF, **LEXON INSURANCE COMPANY** has caused this instrument to be signed by its President, and its Corporate Seal to be affixed this 22nd day of June, 2018.

LEXON INSURANCE COMPANY



BY

Brian Beggs
President

ACKNOWLEDGEMENT

On this 22nd day of June, 2018, before me, personally came Brian Beggs to me known, who be duly sworn, did depose and say that he is the President of **LEXON INSURANCE COMPANY**, the corporation described in and which executed the above instrument; that he executed said instrument on behalf of the corporation by authority of his office under the By-laws of said corporation.



AMY TAYLOR
Notary Public- State of Tennessee
Davidson County
My Commission Expires 07-08-19

BY

Amy Taylor
Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of **LEXON INSURANCE COMPANY**, A Texas Insurance Company, DO HEREBY CERTIFY that the original Power of Attorney of which the forgoing is a true and correct copy, is in full force and effect and has not been revoked and the resolutions as set forth are now in force.

Signed and Seal at Mount Juliet, Tennessee this 8th Day of April, 2019.



BY

Andrew Smith
Assistant Secretary

"WARNING: Any person who knowingly and with intent to defraud any insurance company or other person, files and application for insurance of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact material thereto, commits a fraudulent insurance act, which is a crime and subjects such person to criminal and civil penalties."

SURETY RIDER

To be attached to and form a part of

Bond No. 800031223

Type of

Bond: Performance Bond for Water Well Contractors

dated

effective June 30, 2017
(MONTH-DAY-YEAR)

executed by Michael C. Rice/Cascade Drilling, L.P.
(PRINCIPAL)

. as Principal,

and by Atlantic Specialty Insurance Company

. as Surety,

in favor of State of Georgia
(OBLIGEE)

in consideration of the mutual agreements herein contained the Principal and the Surety hereby consent to changing

Coverage under the bond to include:
Michael Coleman

Nothing herein contained shall vary, alter or extend any provision or condition of this bond except as herein expressly stated.

This rider

is effective December 21, 2017
(MONTH-DAY-YEAR)

Signed and Sealed December 21, 2017
(MONTH-DAY-YEAR)

Michael C. Rice/Cascade Drilling, L.P.
(PRINCIPAL)

By: _____
(PRINCIPAL)

Atlantic Specialty Insurance Company

By: Elizabeth R. Hahn
Elizabeth R. Hahn, Attorney-in-Fact





Power of Attorney

KNOW ALL MEN BY THESE PRESENTS, that ATLANTIC SPECIALTY INSURANCE COMPANY, a New York corporation with its principal office in Plymouth, Minnesota, does hereby constitute and appoint: **Deanna M. French, Jill A. Wallace, Susan B. Larson, Elizabeth R. Hahn, Jana M. Roy, Scott McGilvray, Mindee L. Rankin, Ronald J. Lange, John R. Claeys, Roger Kaltenbach, Guy Armfield, Scott Fisher**, each individually if there be more than one named, its true and lawful Attorney-in-Fact, to make, execute, seal and deliver, for and on its behalf as surety, any and all bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof; provided that no bond or undertaking executed under this authority shall exceed in amount the sum of: **sixty million dollars (\$60,000,000)** and the execution of such bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof in pursuance of these presents, shall be as binding upon said Company as if they had been fully signed by an authorized officer of the Company and sealed with the Company seal. This Power of Attorney is made and executed by authority of the following resolutions adopted by the Board of Directors of ATLANTIC SPECIALTY INSURANCE COMPANY on the twenty-fifth day of September, 2012:

Resolved: That the President, any Senior Vice President or Vice-President (each an "Authorized Officer") may execute for and in behalf of the Company any and all bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof, and affix the seal of the Company thereto; and that the Authorized Officer may appoint and authorize an Attorney-in-Fact to execute on behalf of the Company any and all such instruments and to affix the Company seal thereto; and that the Authorized Officer may at any time remove any such Attorney-in-Fact and revoke all power and authority given to any such Attorney-in-Fact.

Resolved: That the Attorney-in-Fact may be given full power and authority to execute for and in the name and on behalf of the Company any and all bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof, and any such instrument executed by any such Attorney-in-Fact shall be as binding upon the Company as if signed and sealed by an Authorized Officer and, further, the Attorney-in-Fact is hereby authorized to verify any affidavit required to be attached to bonds, recognizances, contracts of indemnity, and all other writings obligatory in the nature thereof.

This power of attorney is signed and sealed by facsimile under the authority of the following Resolution adopted by the Board of Directors of ATLANTIC SPECIALTY INSURANCE COMPANY on the twenty-fifth day of September, 2012:

Resolved: That the signature of an Authorized Officer, the signature of the Secretary or the Assistant Secretary, and the Company seal may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing an Attorney-in-Fact for purposes only of executing and sealing any bond, undertaking, recognizance or other written obligation in the nature thereof, and any such signature and seal where so used, being hereby adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS WHEREOF, ATLANTIC SPECIALTY INSURANCE COMPANY has caused these presents to be signed by an Authorized Officer and the seal of the Company to be affixed this eighth day of December, 2014.

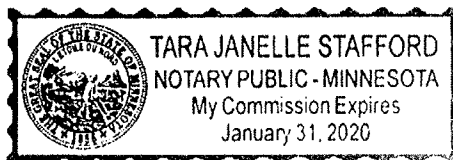


STATE OF MINNESOTA
HENNEPIN COUNTY

By

Paul J. Brehm, Senior Vice President

On this eighth day of December, 2014, before me personally came Paul J. Brehm, Senior Vice President of ATLANTIC SPECIALTY INSURANCE COMPANY, to me personally known to be the individual and officer described in and who executed the preceding instrument, and he acknowledged the execution of the same, and being by me duly sworn, that he is the said officer of the Company aforesaid, and that the seal affixed to the preceding instrument is the seal of said Company and that the said seal and the signature as such officer was duly affixed and subscribed to the said instrument by the authority and at the direction of the Company.

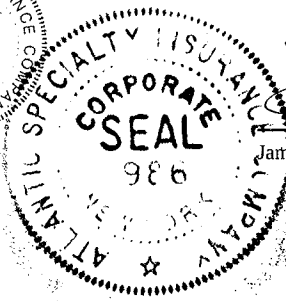


Notary Public

I, the undersigned, Assistant Secretary of ATLANTIC SPECIALTY INSURANCE COMPANY, a New York Corporation, do hereby certify that the foregoing power of attorney is in full force and has not been revoked, and the resolutions set forth above are now in force.

Signed and sealed. Dated 21 day of December, 2017

This Power of Attorney expires
October 1, 2019



James G. Jordan, Assistant Secretary

Appendix D. Laboratory Data Sheets

7-12-2018
DBI/NSA



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

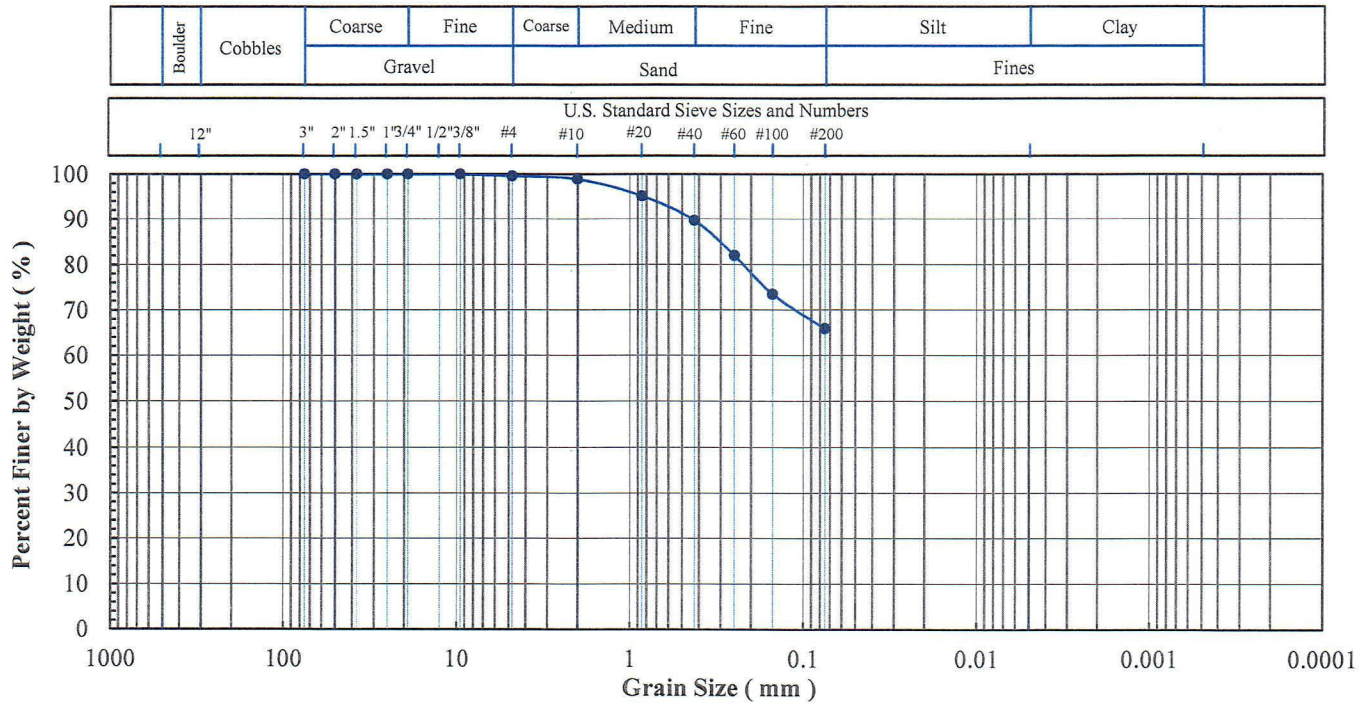
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-01-SS01
Lab Sample No: 18E034

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



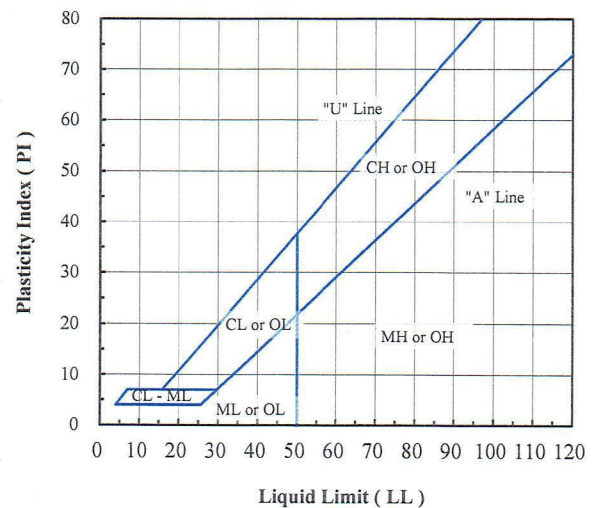
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	98.9
#20	0.850	95.1
#40	0.425	89.7
#60	0.250	82.0
#100	0.150	73.5
#200	0.075	65.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	33.7
Fines (%):	65.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
-----------------------	--



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-01-SS01	18E034	26.2	65.9				

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

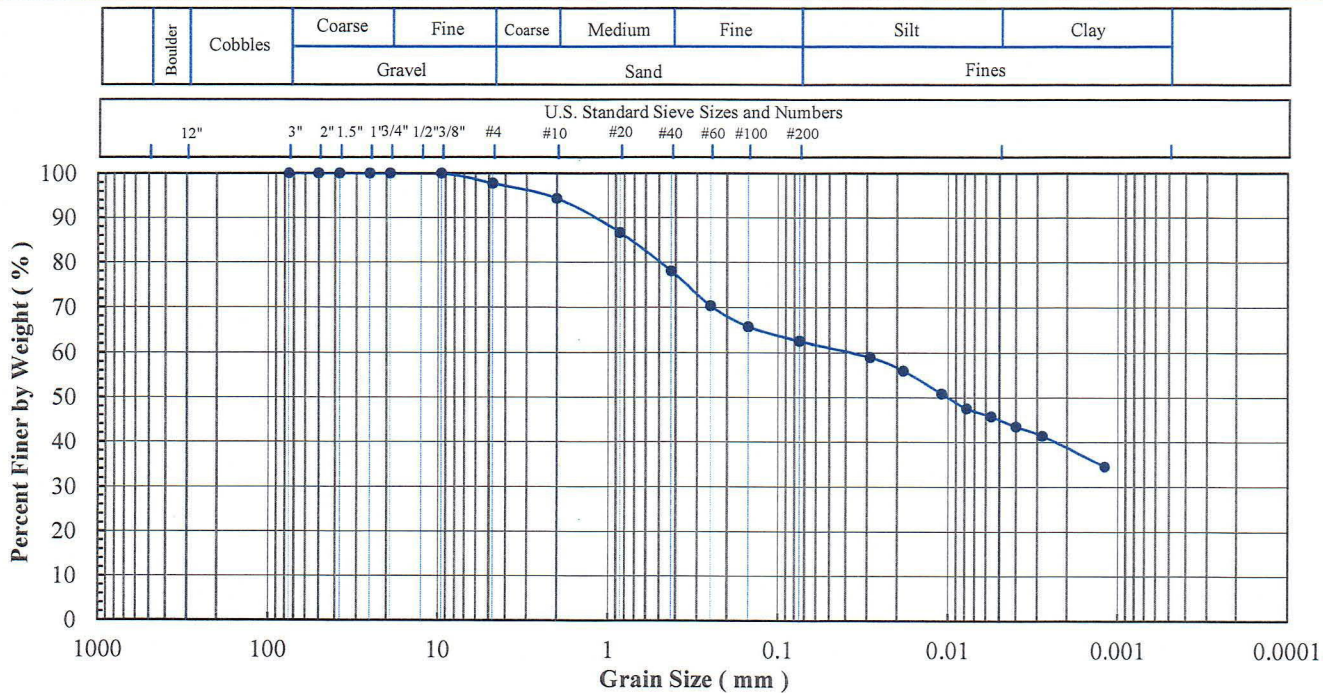
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-01-SS02 & CCRLF-01-SS03
Lab Sample No: 18E035 & 18E036

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



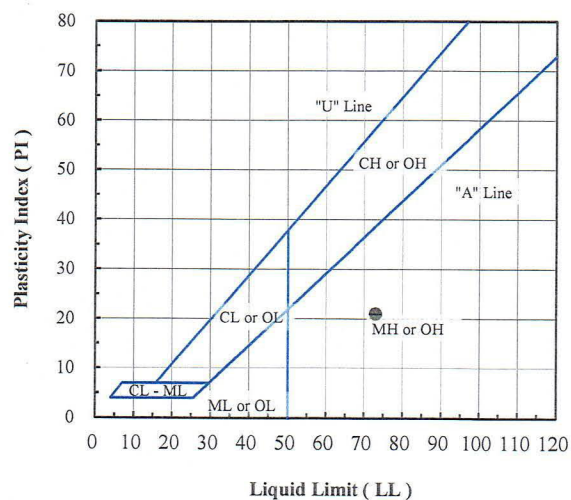
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.8
#10	2.00	94.4
#20	0.850	86.7
#40	0.425	78.1
#60	0.250	70.4
#100	0.150	65.8
#200	0.075	62.6

Hydrometer Particle Diameter (mm)	% Finer
0.0288	59.0
0.0109	50.9
0.0056	45.8
0.0028	41.4
0.0012	34.5

Gravel (%):	2.2
Sand (%):	35.2
Fines (%):	62.6
Silt (%):	17.7
Clay (%):	44.9

Specific Gravity (-):	2.7
-----------------------	-----

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-01-SS02 & CCRLF-01-SS03	18E035 & 18E036	30.3	62.6	73	52	21	

Note(s): An assumed specific gravity of 2.7 was used when analyzing the hydrometer test results.

7-12-2018
DB/JSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

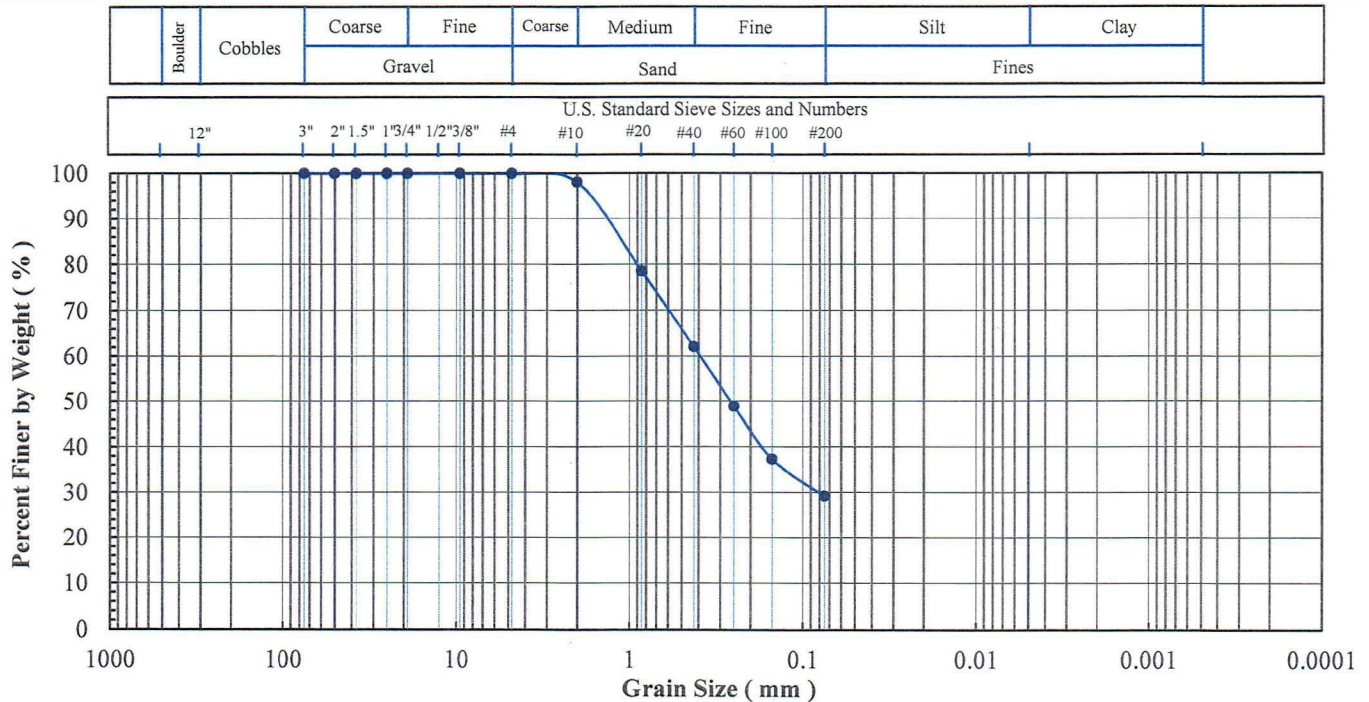
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-01-SS06
Lab Sample No: 18E039

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



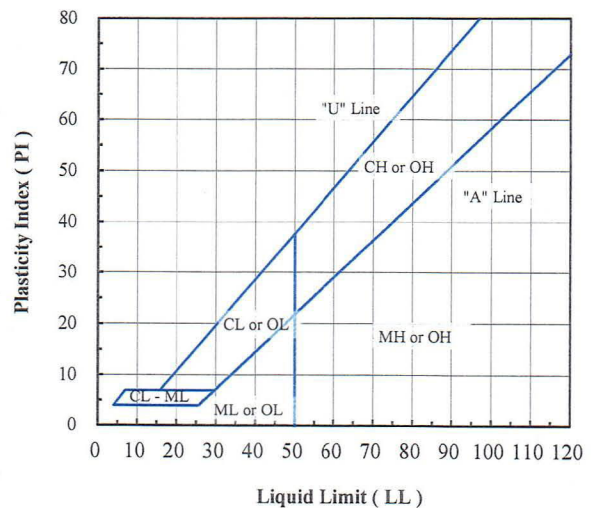
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.1
#20	0.850	78.6
#40	0.425	62.1
#60	0.250	48.9
#100	0.150	37.3
#200	0.075	29.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	70.8
Fines (%):	29.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-01-SS06	18E039	35.0	29.2	NP	NP	NP	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

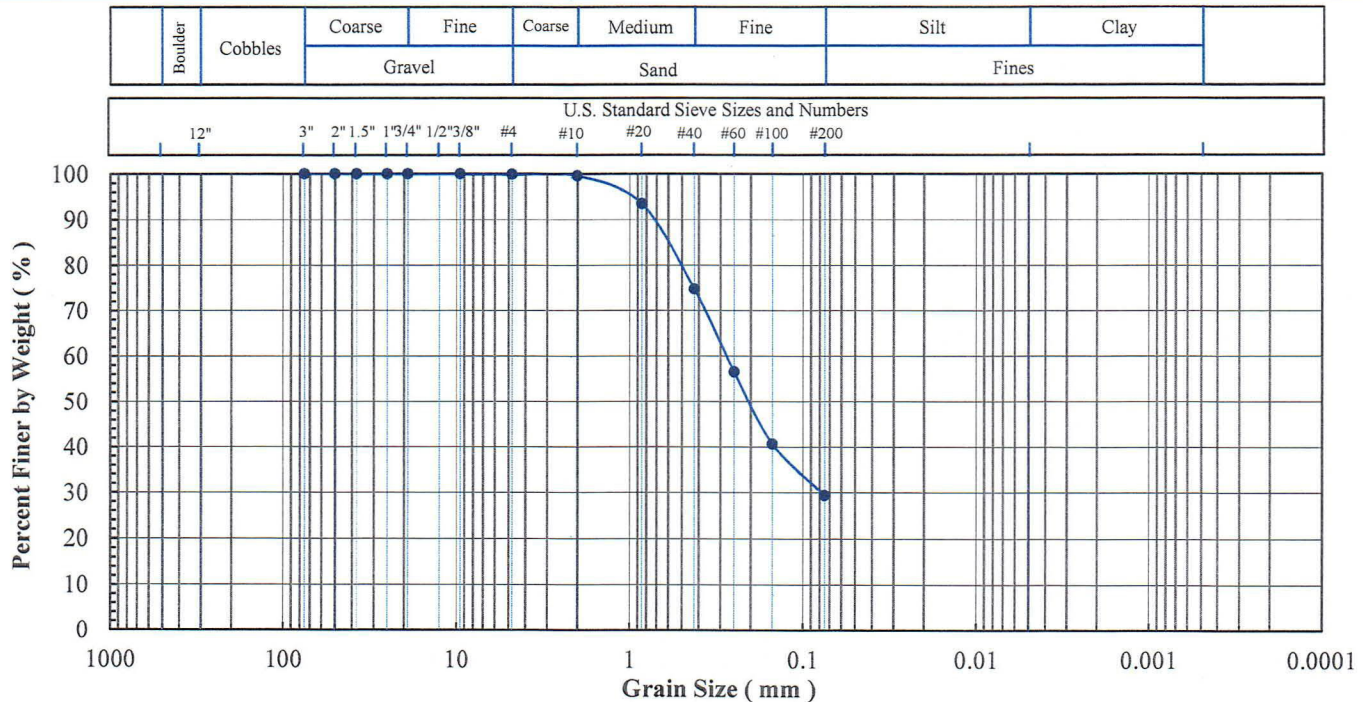
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-01-SS09 & CCRLF-01-SS10
Lab Sample No: 18E042 & 18E043

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits

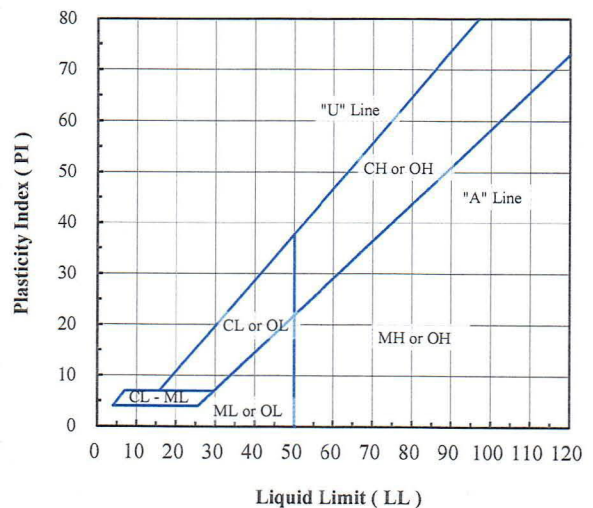


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	99.6
#20	0.850	93.4
#40	0.425	74.8
#60	0.250	56.5
#100	0.150	40.7
#200	0.075	29.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	70.5
Fines (%):	29.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
-----------------------	--

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-01-SS09 & CCRLF-01-SS10	18E042 & 18E043	14.6	29.4	NP	NP	NP	

Note(s):

7-12-2018
DB/NSA



Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotechnical Analyses

Project No: 896

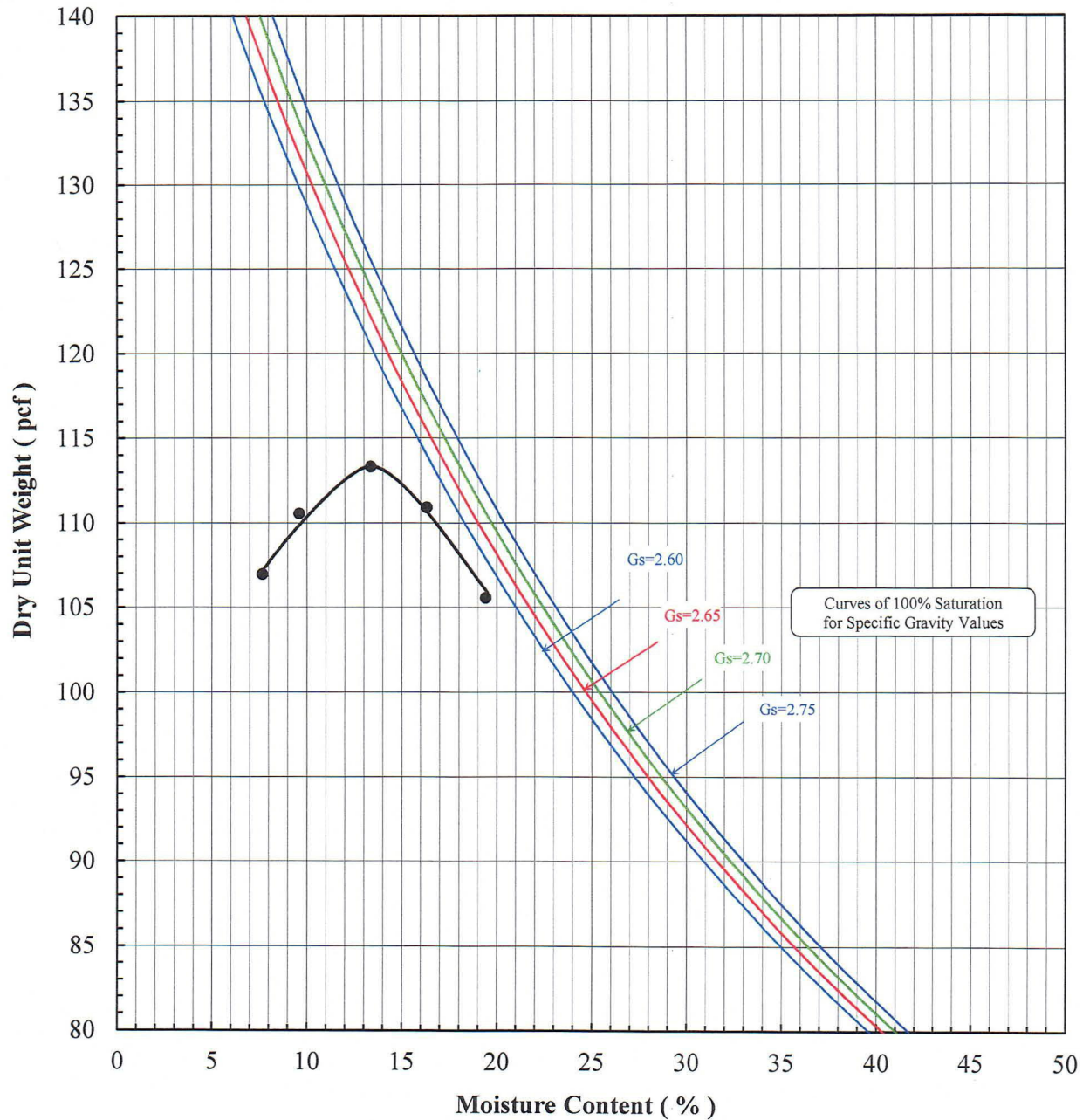
Client Sample ID: CCRLF-02-Bulk

Lab Sample No: 18E030

ASTM D 698 - Method B

STANDARD PROCTOR COMPACTION

Moist Preparation



Client/Site Sample ID.	Lab Sample No.	Maximum Dry Unit Weight (pcf)	Optimum Moist. Content (%)	Laboratory Visual Soil Description (-)
CCRLF-02-Bulk	18E030	113.1	13.4	Brown sandy clay

Note(s): Unless coarse correction is required, all particles passed through 1.0 in. Sieve were used.
From the bucket received, all particles were smaller than 1.0 inch.

7-12-2018
AA, NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses

Project No: 896

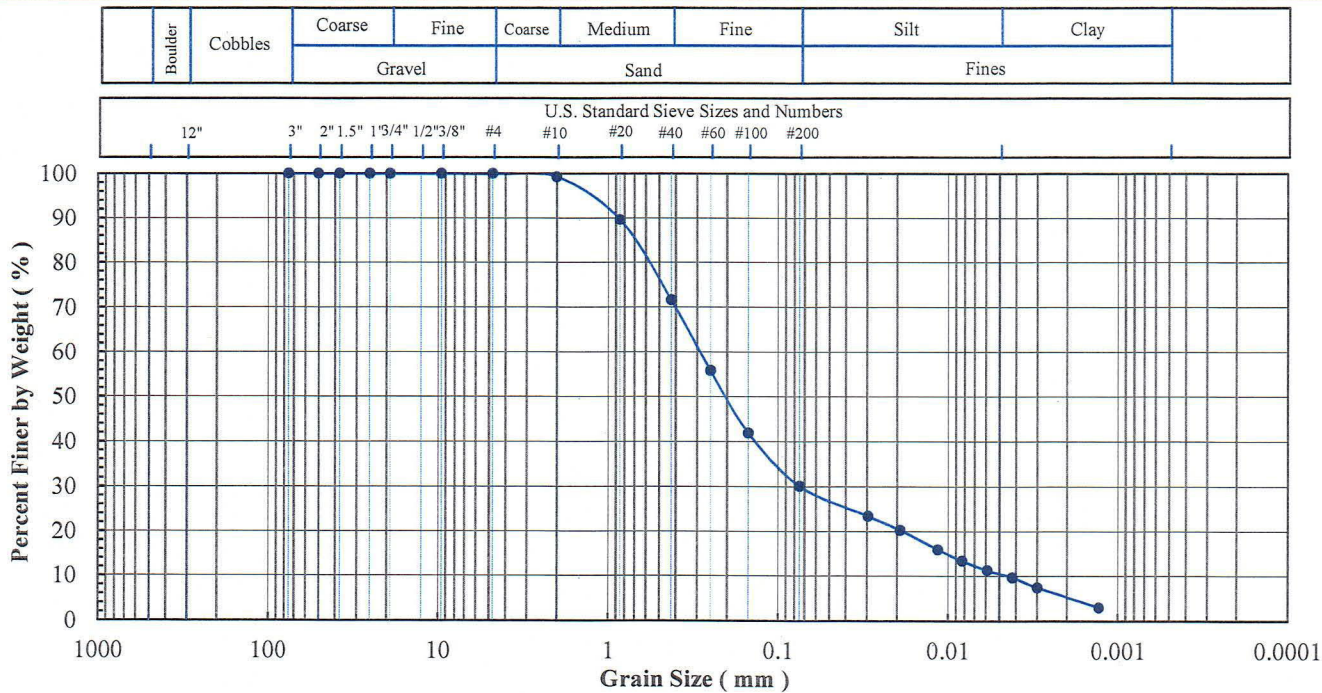
Client Sample ID: CCRLF-02-Bulk

Lab Sample No: 18E030

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

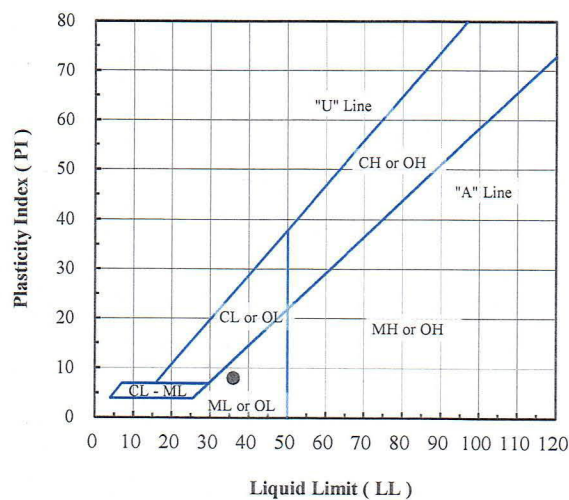
Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.3
#20	0.850	89.7
#40	0.425	71.6
#60	0.250	55.9
#100	0.150	41.9
#200	0.075	30.1

Hydrometer Particle Diameter (mm)	% Finer
0.0297	23.4
0.0115	16.0
0.0059	11.3
0.0030	7.5
0.0013	3.0

Gravel (%):	
Sand (%):	69.9
Fines (%):	30.1
Silt (%):	19.6
Clay (%):	10.5



Specific Gravity (-):	2.752
-----------------------	-------

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-02-Bulk	18E030	25.4	30.1	36	28	8	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075

Tel: (770) 910 7537 Fax: (770) 910 7538

FLEXIBLE WALL PERMEABILITY TEST ⁽¹⁾

ASTM D 5084 *

Project Name:	Former Plant Arkwright Geotechnical Analyses
Project Number:	896
Client Name:	Georgia Power
Site Sample ID:	CCRLF-02-ST01
Lab Sample Number:	18E032
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	5/22/18

Specimen Type (See Note2) (-)	Specimen Initial Conditions				Test Conditions					Hydraulic Conductivity ⁽⁴⁾ (cm/s)
	Specimen Final Conditions									
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid ⁽³⁾ (-)	Average Gradient (-)	
ST	5.76	7.29	83.6	18.1	88.0	70.0	18.0	DTW	11	2.0E-4
	5.40	7.19	90.9	31.3						

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen Type: ST = Shelby Tube, BS = Block Sample, Ot = Others
3. Type of permeant liquid: DTW = Deaired Tap Water, DDI = Deaired Deionized Water
4. Measured hydraulic conductivity value approaching the hydraulic conductivity of the permeability measurement system.

* Deviations:

Laboratory temperature at 22±3 °C.

7-12-2018
AA1250R



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

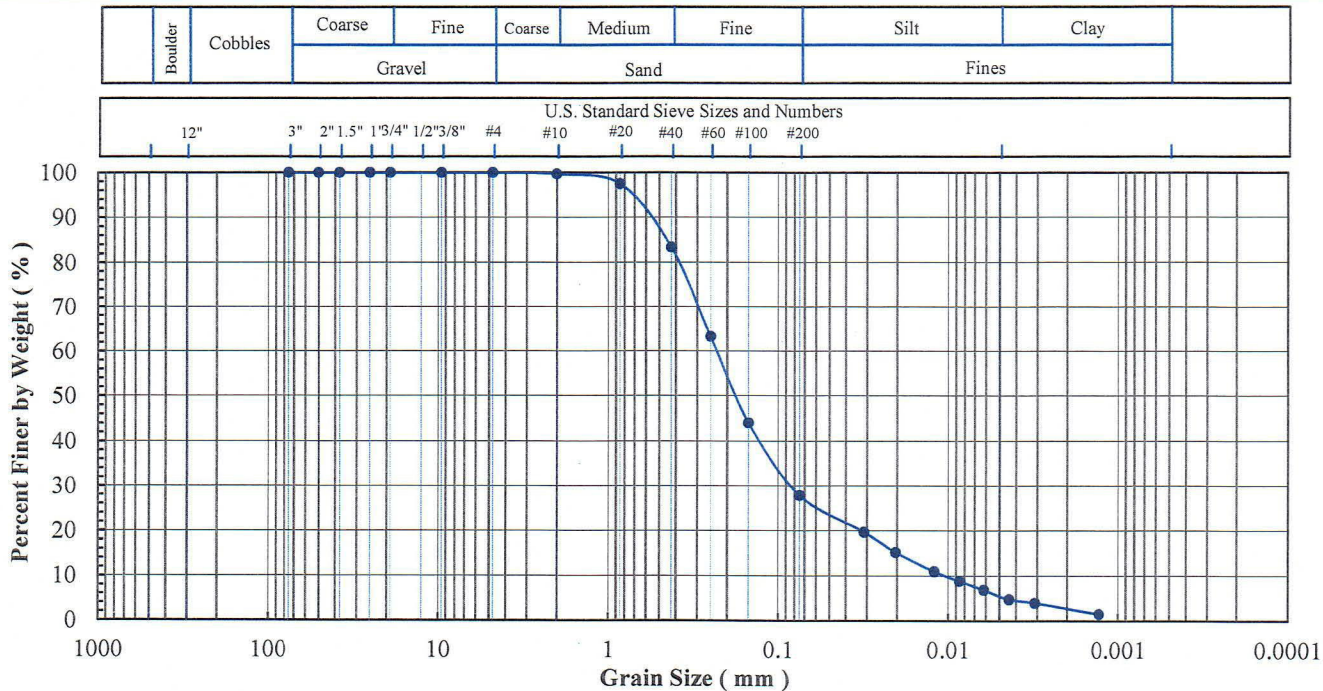
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-02-ST01
Lab Sample No: 18E032

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



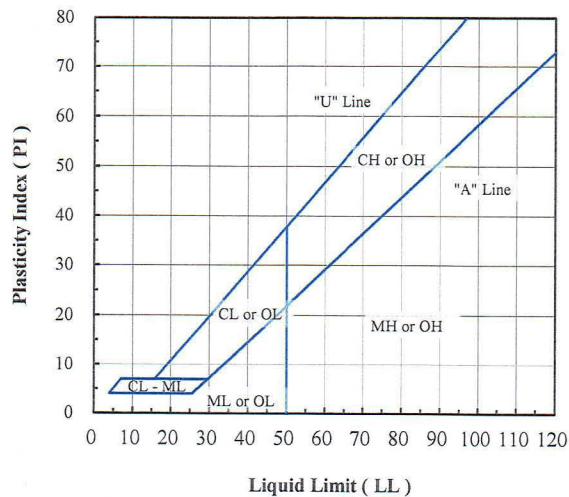
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.7
#20	0.850	97.5
#40	0.425	83.4
#60	0.250	63.3
#100	0.150	44.1
#200	0.075	27.9

Hydrometer Particle Diameter (mm)	% Finer
0.0313	19.7
0.0121	11.0
0.0062	6.9
0.0031	4.0
0.0013	1.5

Gravel (%):	
Sand (%):	72.1
Fines (%):	27.9
Silt (%):	22.4
Clay (%):	5.5

Specific Gravity (-):	2.706
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Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-02-ST01	18E032	16.1	27.9	NP	NP	NP	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

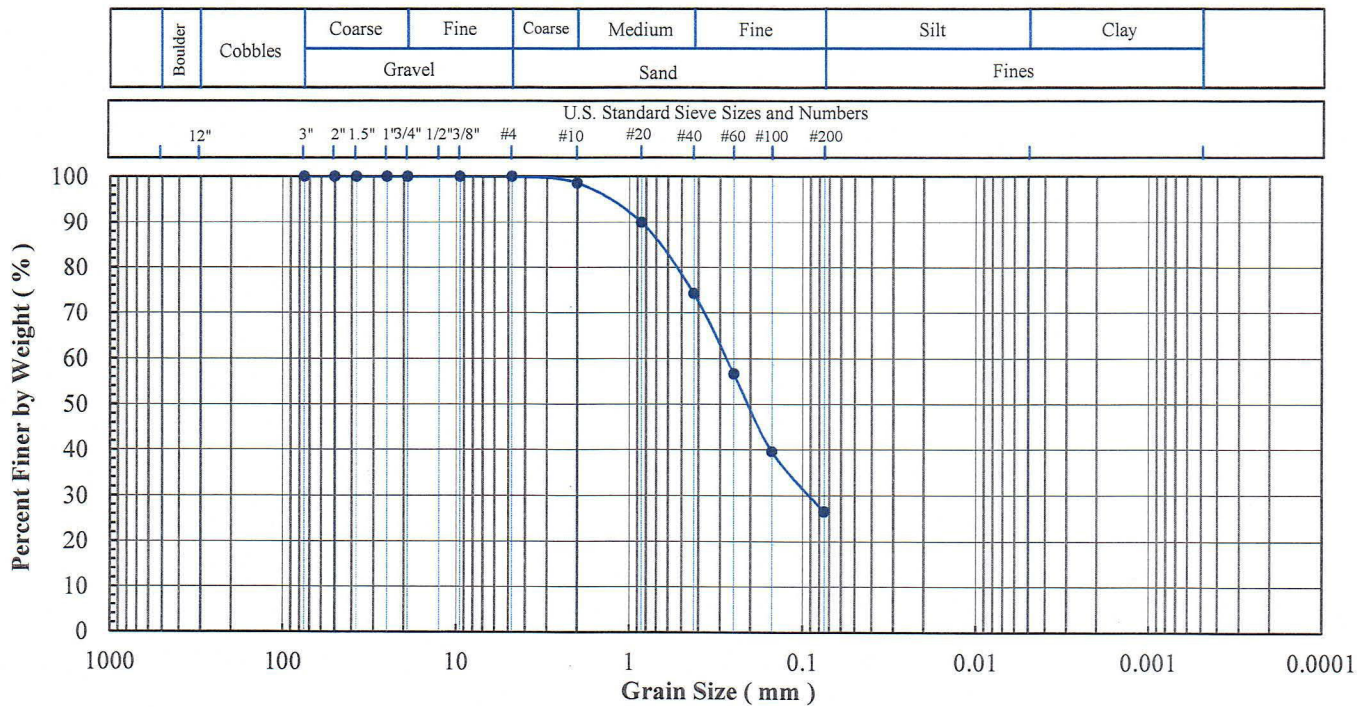
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-02-SS02 & CCRLF-02-SS03
Lab Sample No: 18E048 & 18E049

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



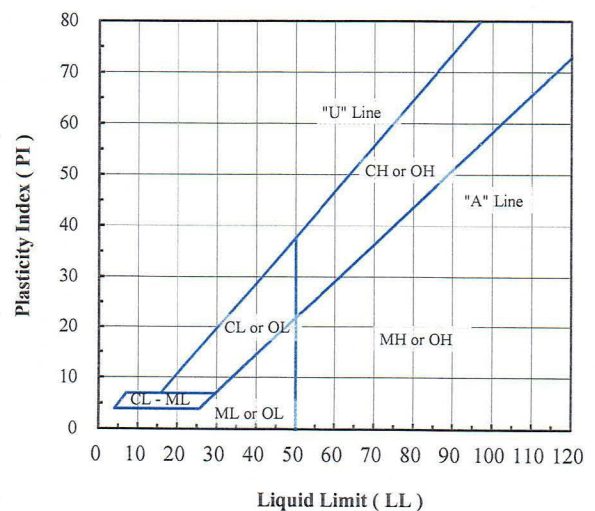
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.6
#20	0.850	89.9
#40	0.425	74.2
#60	0.250	56.7
#100	0.150	39.6
#200	0.075	26.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	73.5
Fines (%):	26.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-02-SS02 & CCRLF-02-SS03	18E048 & 18E049	17.1	26.5	NP	NP	NP	

Note(s):

7-12-2018
DB, NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

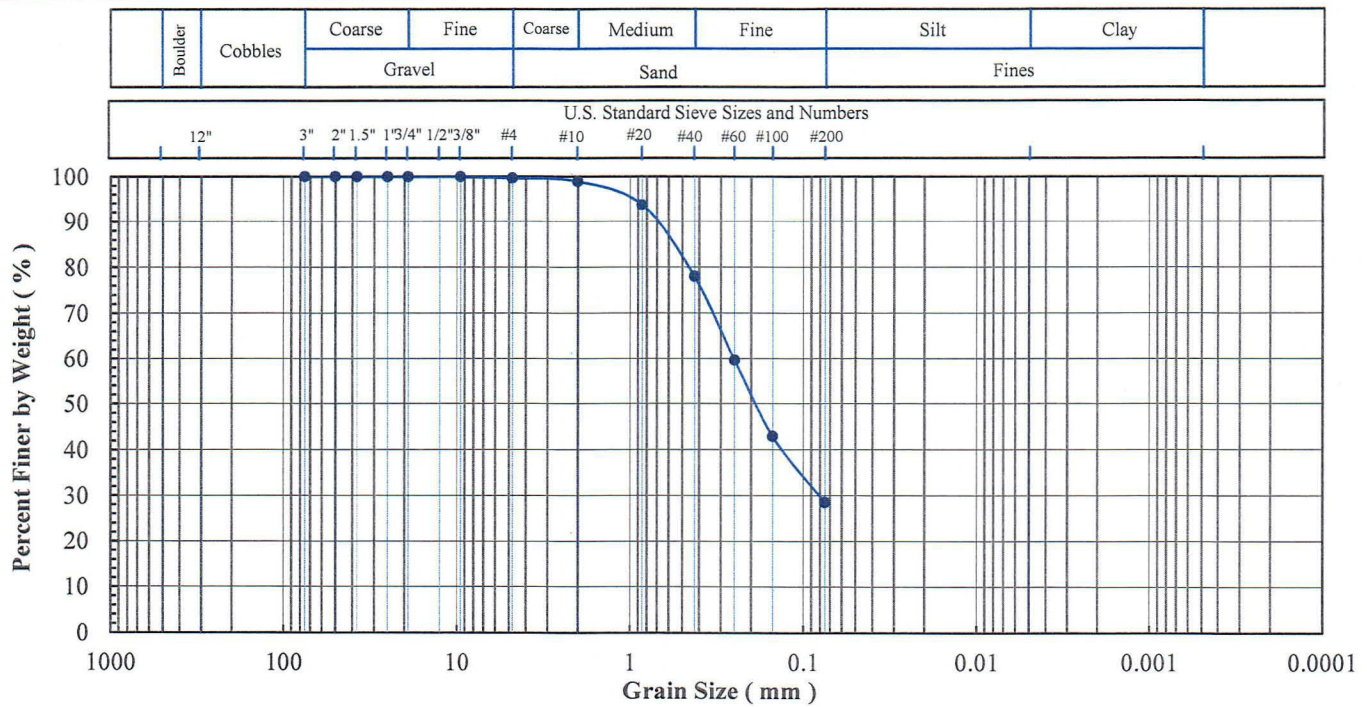
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-02-SS04 & CCRLF-02-SS05
Lab Sample No: 18E050 & 18E051

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



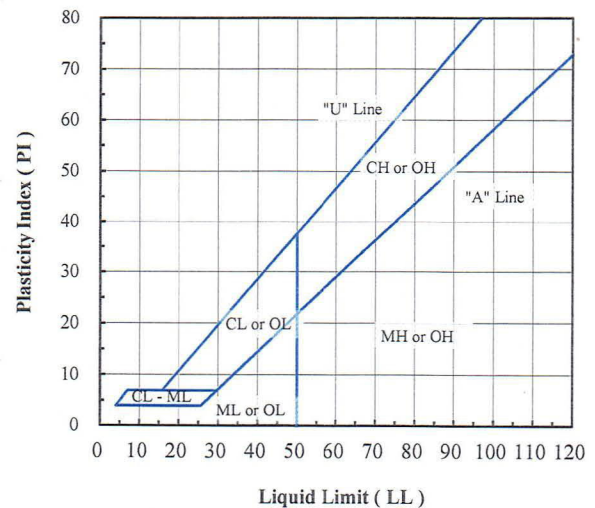
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.0
#20	0.850	93.7
#40	0.425	78.0
#60	0.250	59.7
#100	0.150	42.9
#200	0.075	28.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	71.1
Fines (%):	28.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
-----------------------	--



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-02-SS04 & CCRLF-02-SS05	18E050 & 18E051	16.9	28.6	NP	NP	NP	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

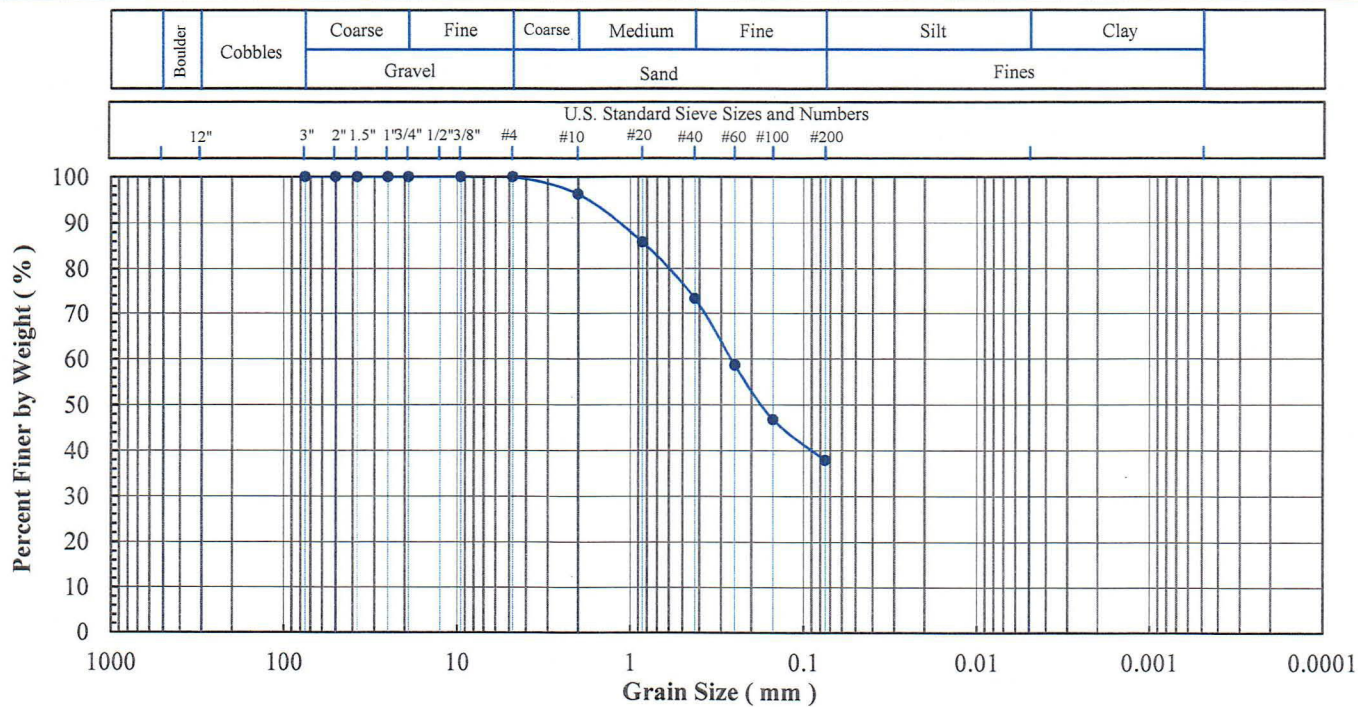
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-02-SS06
Lab Sample No: 18E052

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



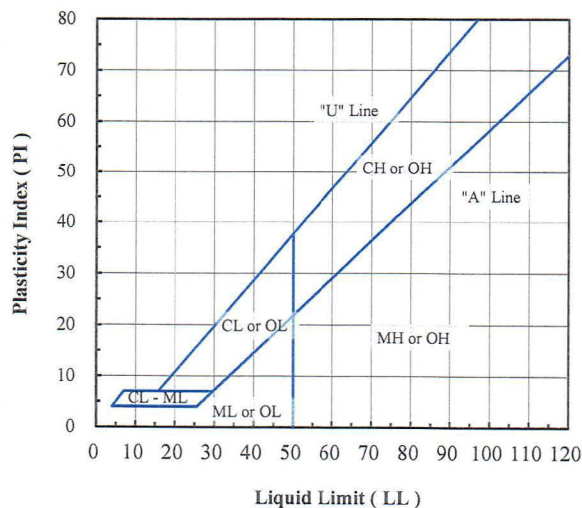
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	96.2
#20	0.850	85.8
#40	0.425	73.3
#60	0.250	58.7
#100	0.150	46.8
#200	0.075	37.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	62.1
Fines (%):	37.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
-----------------------	--



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-02-SS06	18E052	22.9	37.9	NP	NP	NP	

Note(s):

7-12-2018
DB/MSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

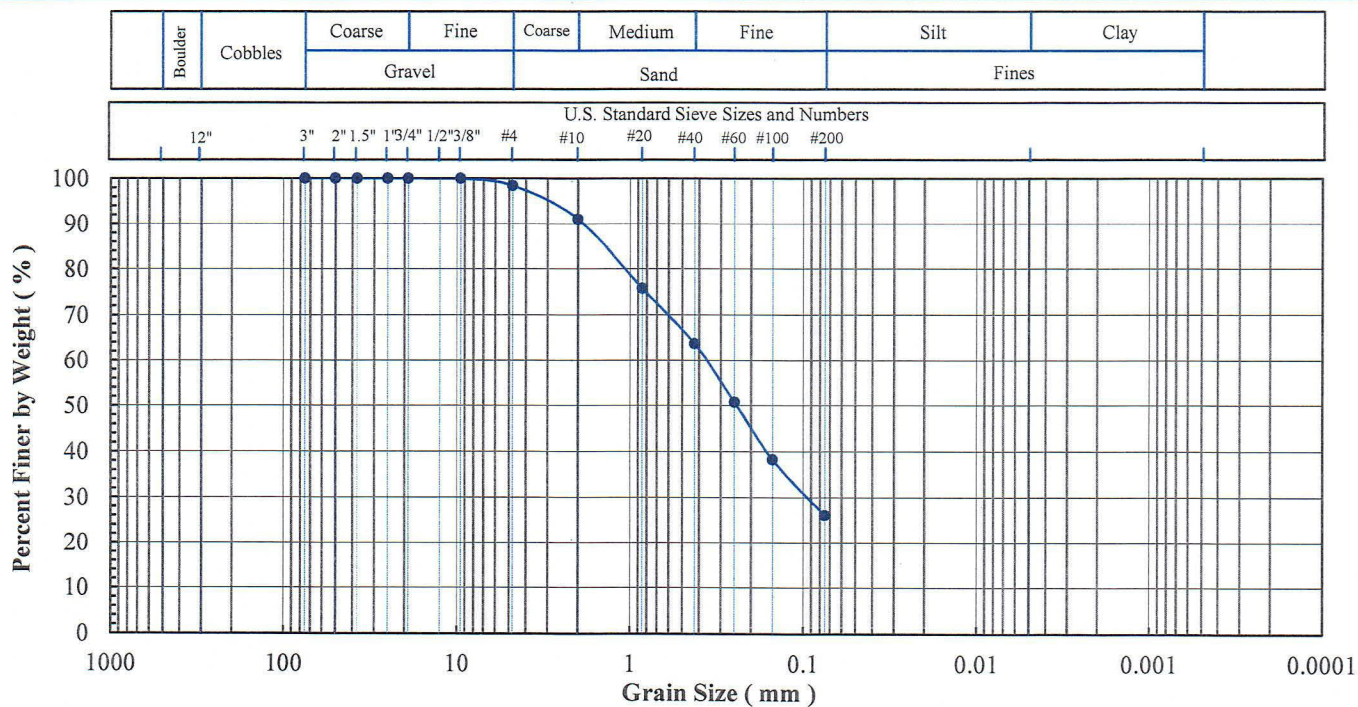
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-02-SS08 & CCRLF-02-SS09
Lab Sample No: 18E054 & 18E055

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



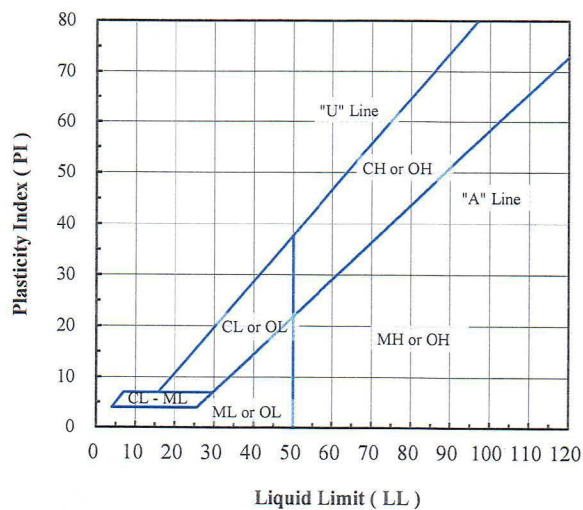
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.4
#10	2.00	91.0
#20	0.850	75.7
#40	0.425	63.7
#60	0.250	50.8
#100	0.150	38.3
#200	0.075	26.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.6
Sand (%):	72.3
Fines (%):	26.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
-----------------------	--



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-02-SS08 & CCRLF-02-SS09	18E054 & 18E055	13.4	26.1	NP	NP	NP	

Note(s):

7-12-2018
DB/MSR



Excel Geotechnical Testing, Inc.
"Excellence in Testing"

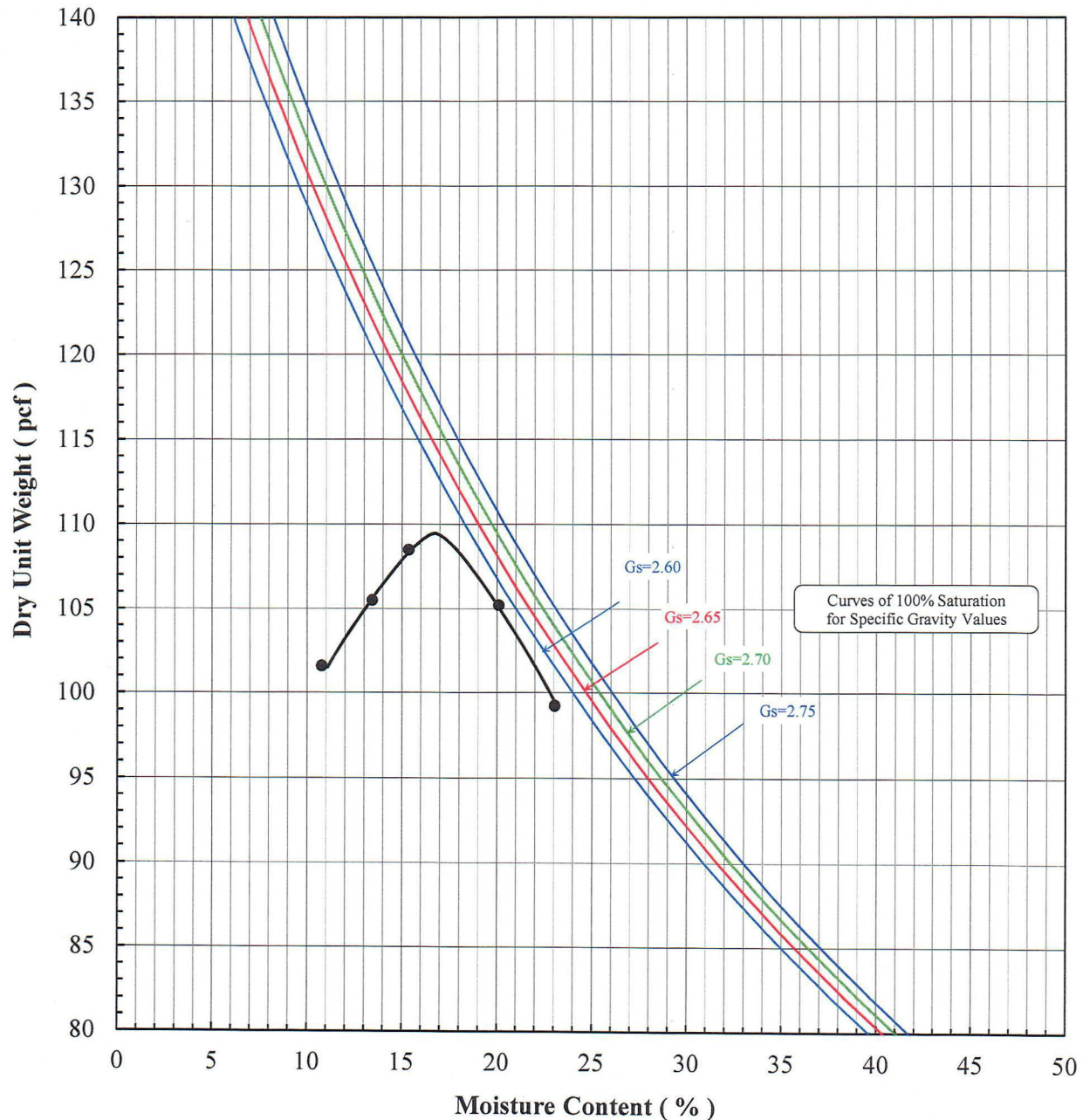
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotechnical Analyses
Project No: 896
Client Sample ID: CCRLF-03-Bulk
Lab Sample No: 18E011

ASTM D 698 - Method B

STANDARD PROCTOR COMPACTION

Moist Preparation



Client/Site Sample ID.	Lab Sample No.	Maximum Dry Unit Weight (pcf)	Optimum Moist. Content (%)	Laboratory Visual Soil Description (-)
CCRLF-03-Bulk	18E011	109.3	16.8	Brown silty clay

Note(s): Unless coarse correction is required, all particles passed through 1.0 in. Sieve were used.
From the bucket received, all particles were smaller than 1.0 inch.

7-12-2018
AA1N3A



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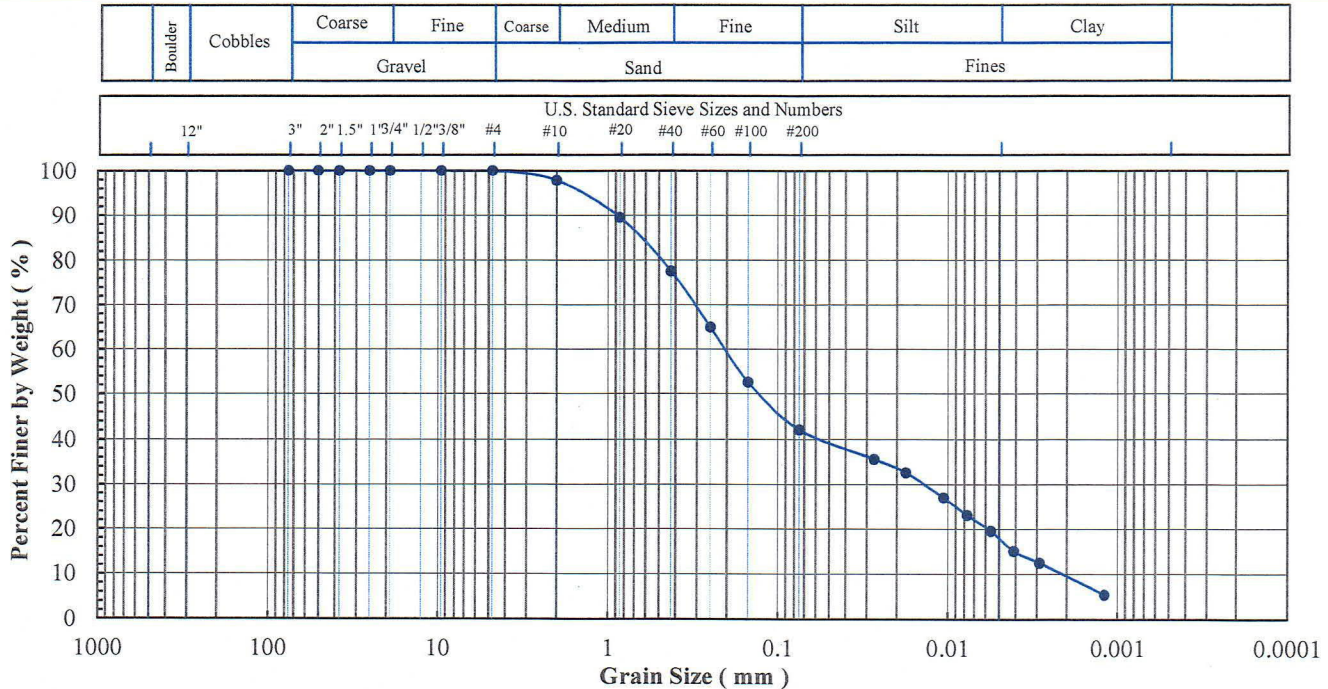
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-03-Bulk
Lab Sample No: 18E011

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

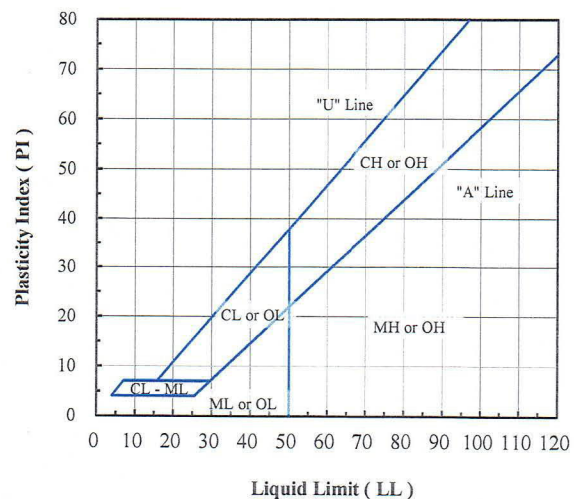
Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	97.8
#20	0.850	89.5
#40	0.425	77.5
#60	0.250	65.0
#100	0.150	52.6
#200	0.075	42.1

Hydrometer Particle Diameter (mm)	% Finer
0.0272	35.6
0.0106	27.0
0.0056	19.6
0.0029	12.5
0.0012	5.5

Gravel (%):	
Sand (%):	57.9
Fines (%):	42.1
Silt (%):	24.3
Clay (%):	17.8



Specific Gravity (-):	2.834
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Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-03-Bulk	18E011	21.4	42.1	NP	NP	NP	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

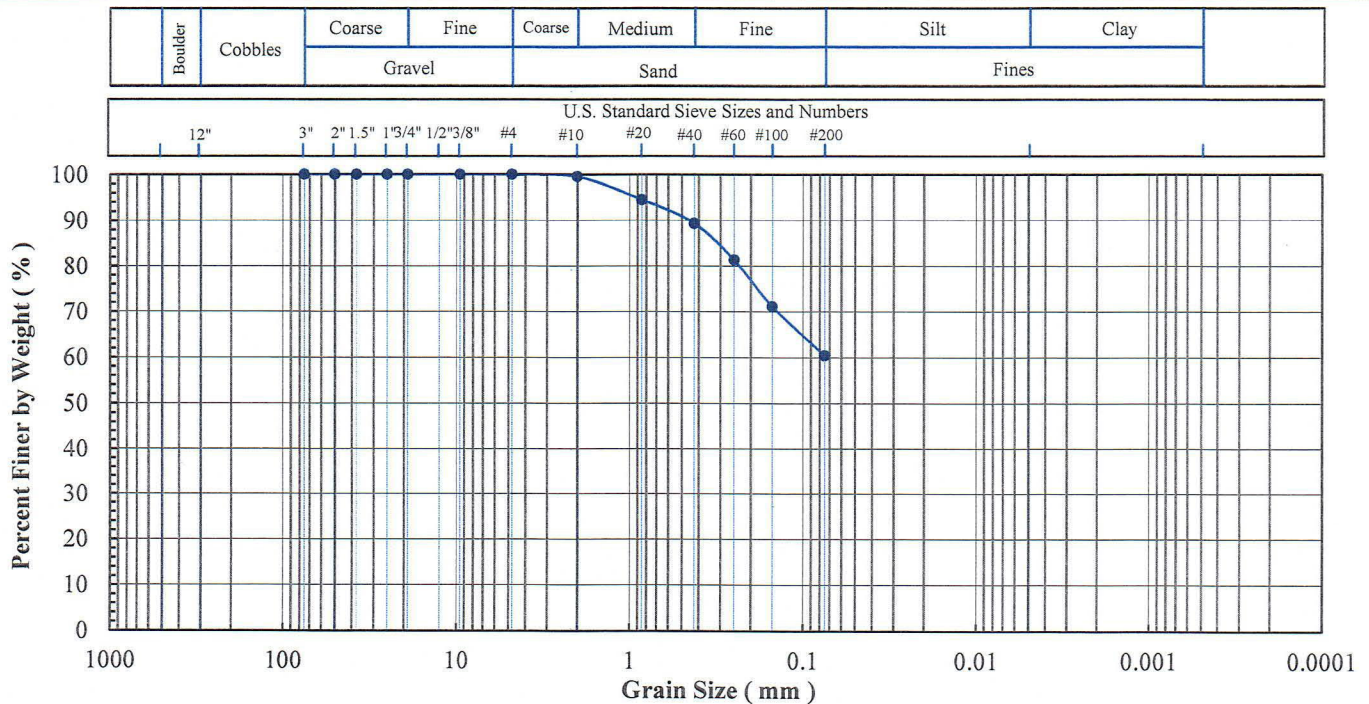
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-03-SS02 & CCRLF-03-SS03
Lab Sample No: 18E190 & 18E191

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits

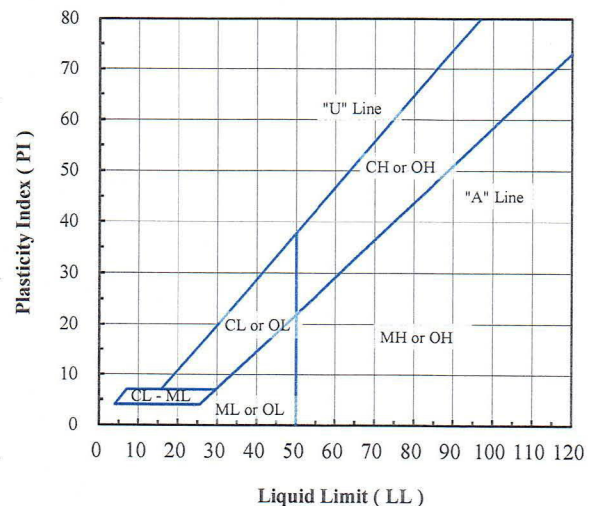


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.5
#20	0.850	94.4
#40	0.425	89.3
#60	0.250	81.3
#100	0.150	71.1
#200	0.075	60.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	39.6
Fines (%):	60.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-03-SS02 & CCRLF-03-SS03	18E190 & 18E191	32.2	60.4	NP	NP	NP	

Note(s):

7-12-2018
DB/NSA



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

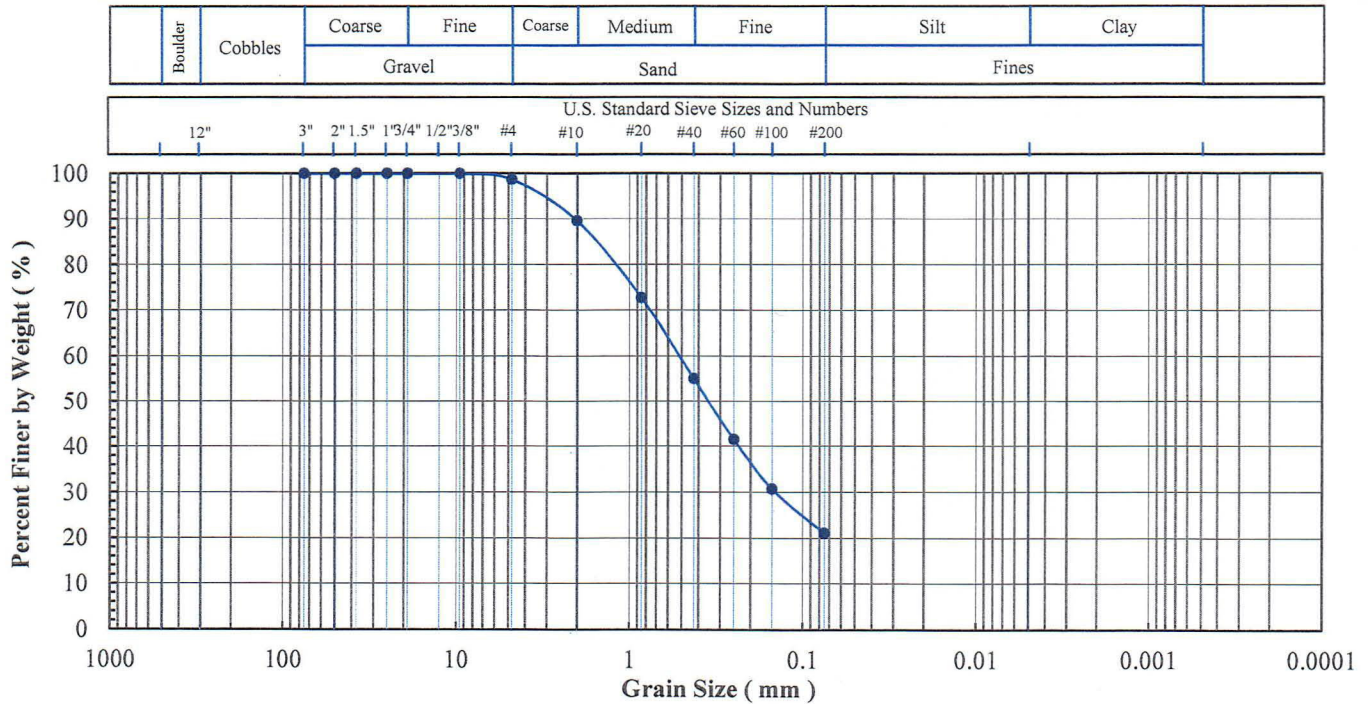
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-03-SS06 & CCRLF-03-SS07
Lab Sample No: 18E194 & 18E195

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



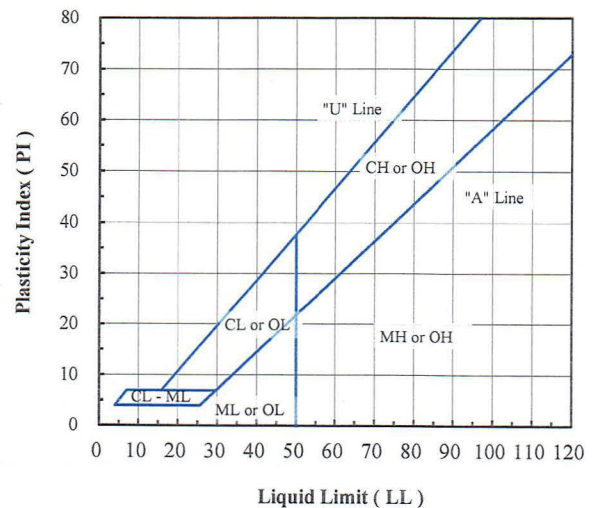
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.7
#10	2.00	89.6
#20	0.850	72.7
#40	0.425	55.0
#60	0.250	41.5
#100	0.150	30.7
#200	0.075	21.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.3
Sand (%):	77.6
Fines (%):	21.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
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Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-03-SS06 & CCRLF-03-SS07	18E194 & 18E195	10.1	21.1	NP	NP	NP	

Note(s):

7-12-2018
DB/NSR

Test Results Summary

Project Name: Former Plant Arkwright Geotechnical Analyses

Project No.: 896

[illegible]

Notes:

7-12-2013
DBINSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

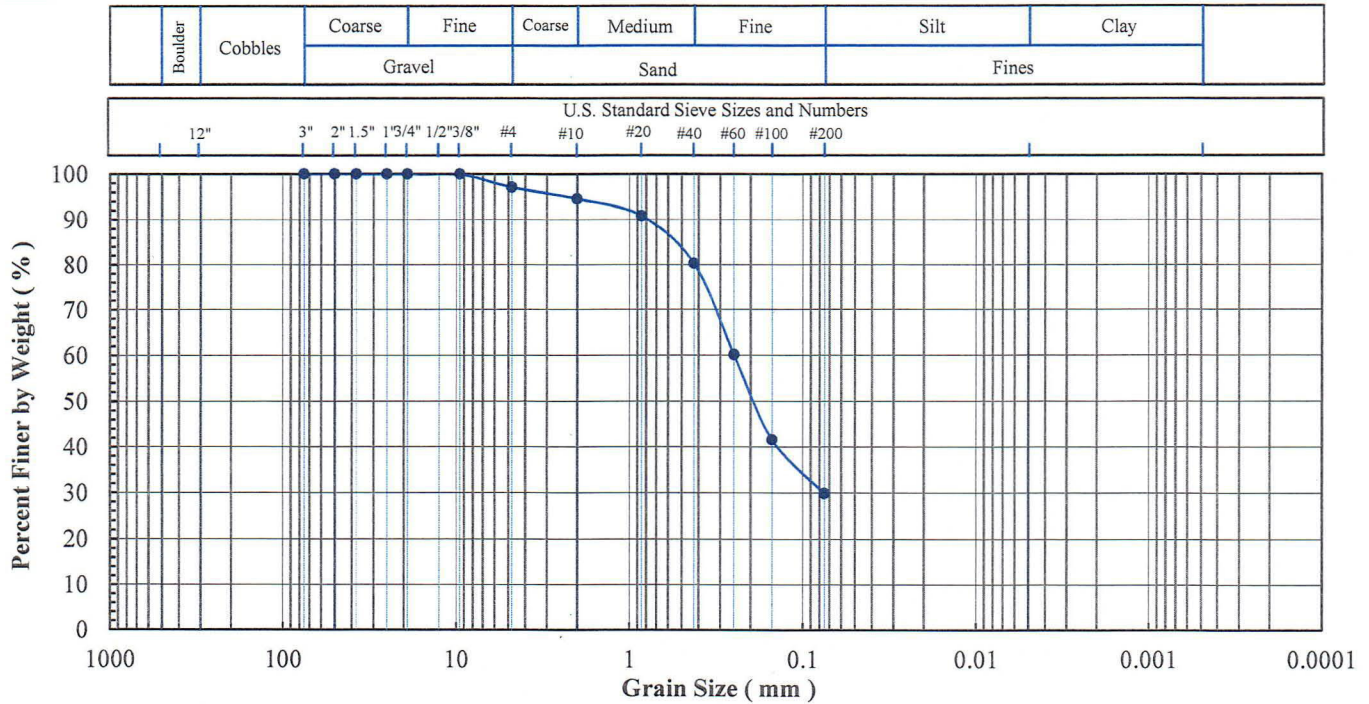
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-04-SS02 & CCRLF-04-SS03
Lab Sample No: 18E058 & 18E059

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



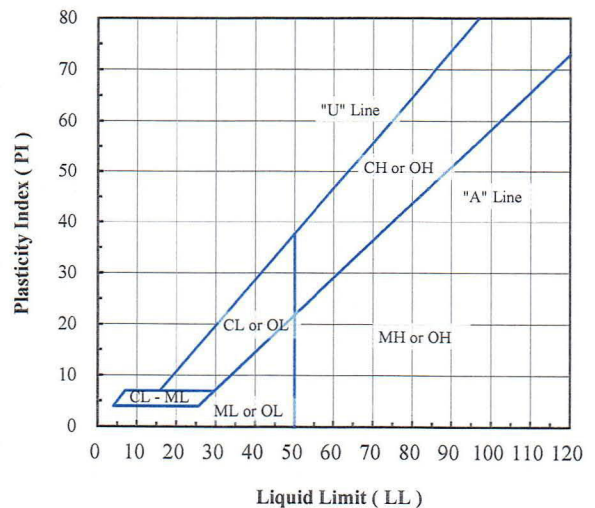
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.1
#10	2.00	94.6
#20	0.850	90.8
#40	0.425	80.3
#60	0.250	60.1
#100	0.150	41.6
#200	0.075	29.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.9
Sand (%):	67.2
Fines (%):	29.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-04-SS02 & CCRLF-04-SS03	18E058 & 18E059	21.9	29.9	NP	NP	NP	

Note(s):

7-12-2018
DB/JSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

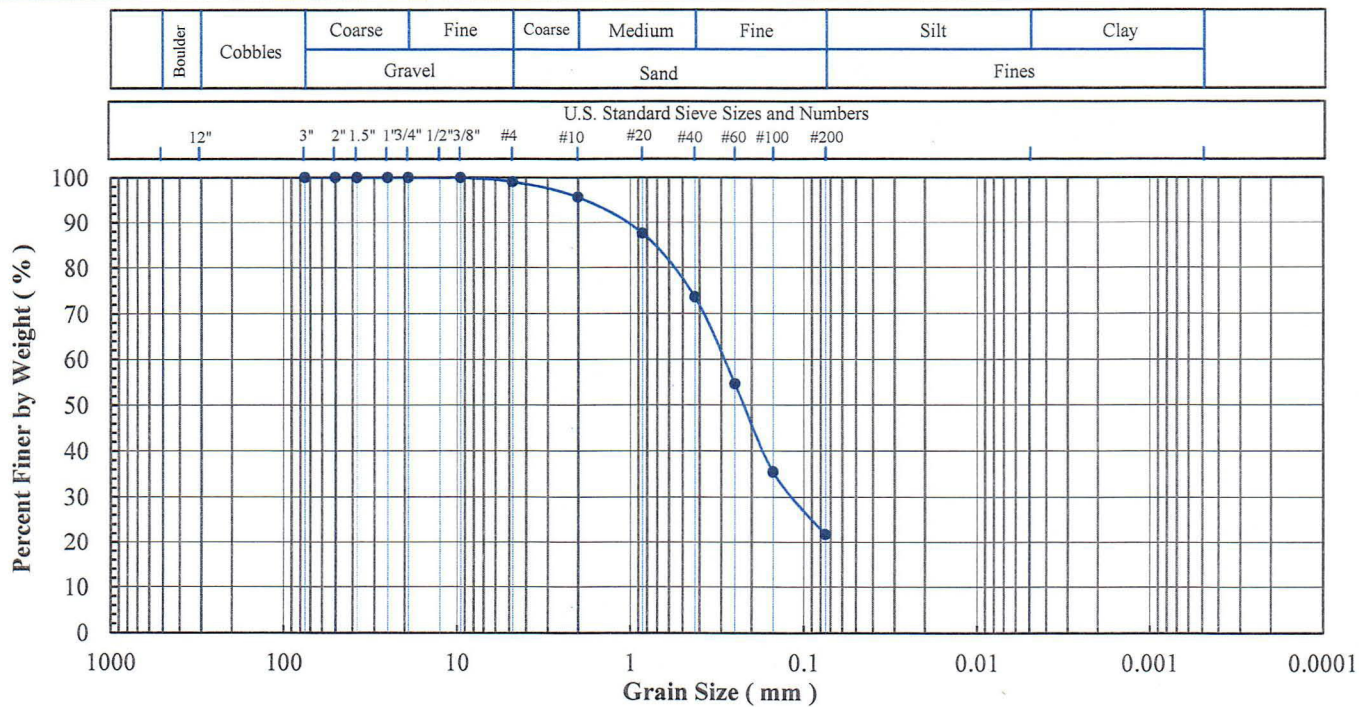
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-04-SS06 & CCRLF-04-SS07
Lab Sample No: 18E062 & 18E063

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



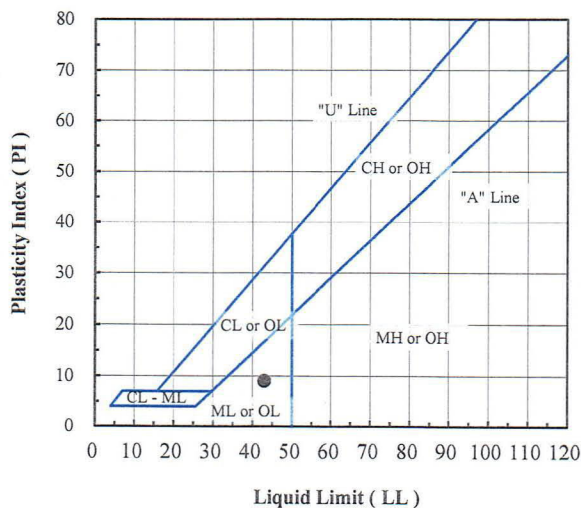
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.1
#10	2.00	95.7
#20	0.850	87.6
#40	0.425	73.6
#60	0.250	54.7
#100	0.150	35.5
#200	0.075	21.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.9
Sand (%):	77.4
Fines (%):	21.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	

Specific Gravity (-):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-04-SS06 & CCRLF-04-SS07	18E062 & 18E063	13.2	21.7	43	34	9	

Note(s):

7-12-2018
DB/NSR



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953 Forrest Street, Roswell, Georgia 30075

Tel: (770) 910 7537 Fax: (770) 910 7538

FLEXIBLE WALL PERMEABILITY TEST ⁽¹⁾

ASTM D 5084 *

Project Name:	Former Plant Arkwright Geotechnical Analyses
Project Number:	896
Client Name:	Georgia Power
Site Sample ID:	CCRLF-05-ST-01
Lab Sample Number:	18E014
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	5/18/18

Specimen Type (See Note2) (-)	Specimen Initial Conditions				Test Conditions					Hydraulic
	Specimen Final Conditions									Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid ⁽³⁾ (-)	Average Gradient (-)	(cm/s)
ST	5.63	7.17	94.8	19.4	88.0	70.0	18.0	DTW	8	6.6E-5
	5.55	7.12	95.5	29.1						

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen Type: ST = Shelby Tube, BS = Block Sample, Ot = Others
3. Type of permeant liquid: DTW = Deaired Tap Water, DDI = Deaired Deionized Water

* Deviations:

Laboratory temperature at 22±3 °C.

7-12-2018
AA, NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

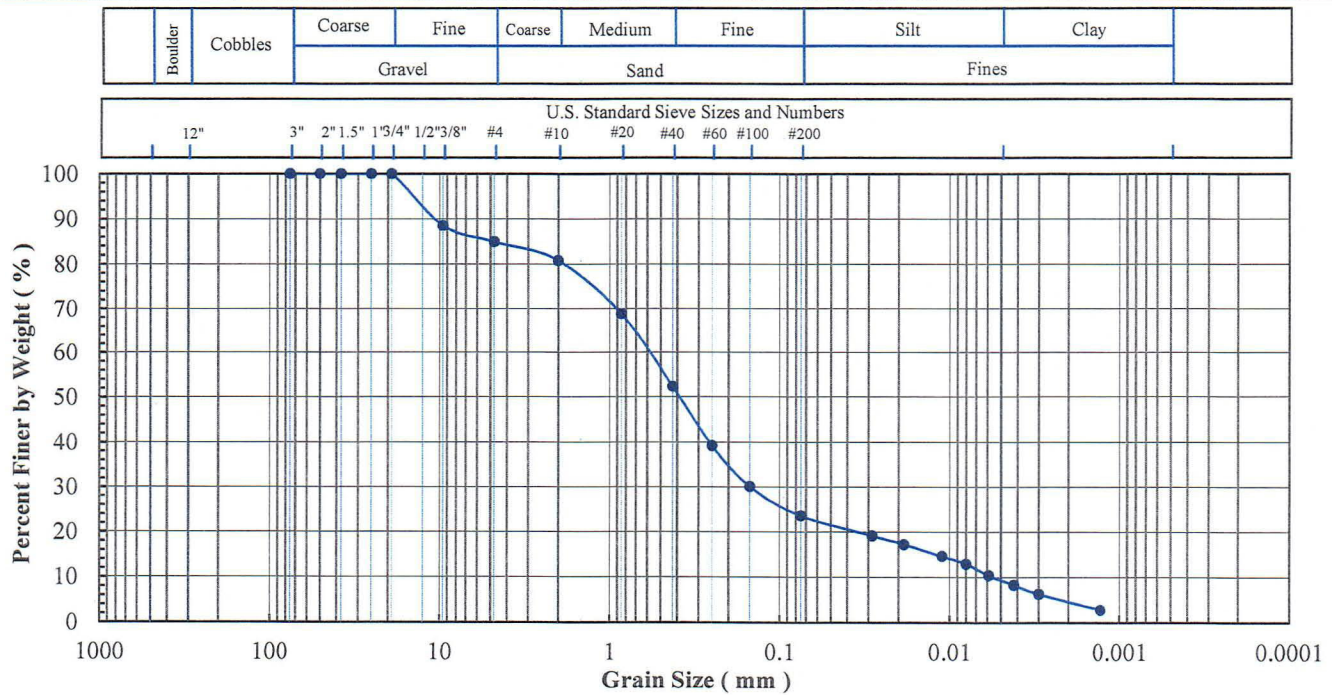
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-05-ST01
Lab Sample No: 18E014

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



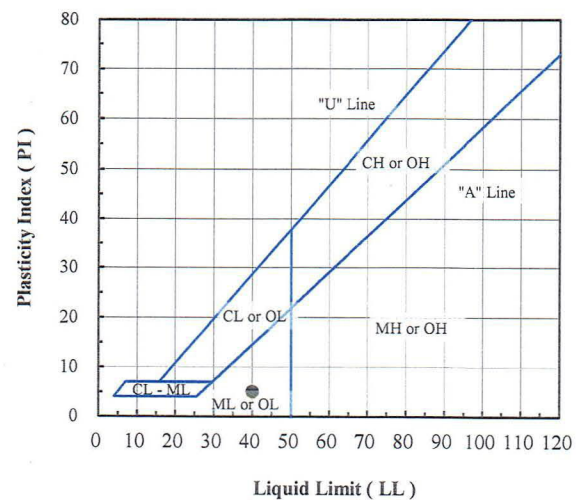
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	88.5
#4	4.75	84.9
#10	2.00	80.8
#20	0.850	68.8
#40	0.425	52.3
#60	0.250	39.2
#100	0.150	30.1
#200	0.075	23.6

Hydrometer Particle Diameter (mm)	% Finer
0.0286	19.2
0.0111	14.7
0.0059	10.5
0.0030	6.4
0.0013	2.9

Gravel (%):	15.1
Sand (%):	61.3
Fines (%):	23.6
Silt (%):	14.2
Clay (%):	9.4

Specific Gravity (-):	2.684
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Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-05-ST01	18E014	18.9	23.6	40	35	5	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

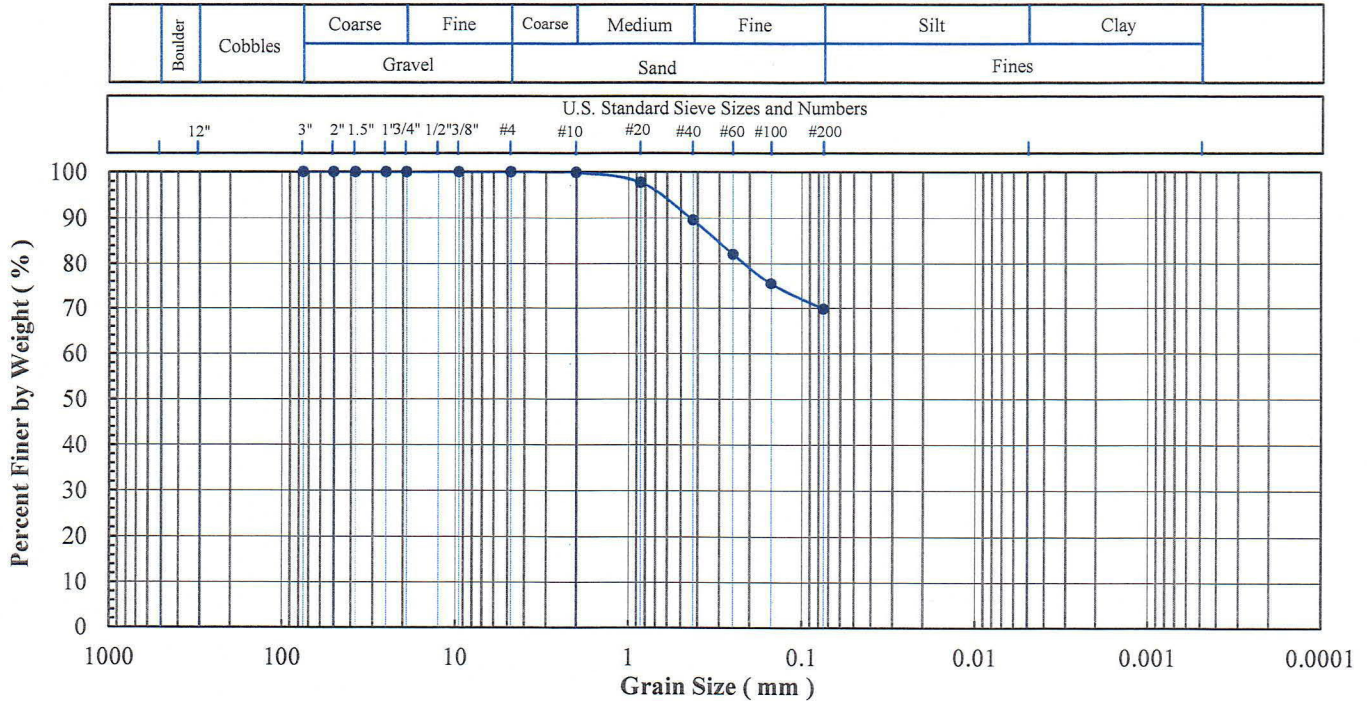
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-05-SS02 & CCRLF-05-SS03
Lab Sample No: 18E197 & 18E198

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits

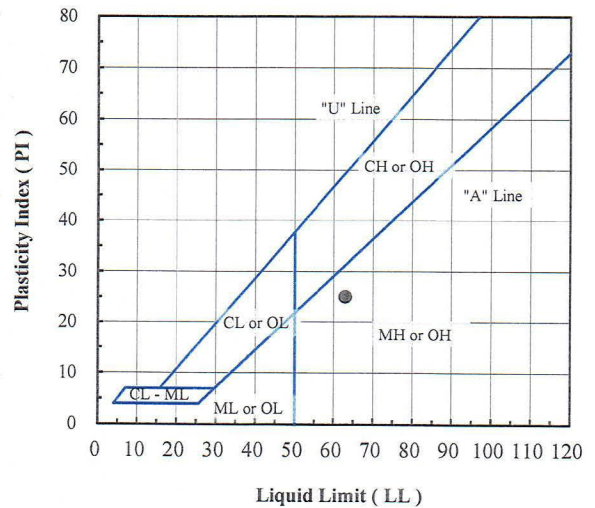


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	97.7
#40	0.425	89.6
#60	0.250	82.1
#100	0.150	75.5
#200	0.075	69.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	30.2
Fines (%):	69.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
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Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-05-SS02 & CCRLF-05-SS03	18E197 & 18E198	26.3	69.8	63	38	25	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

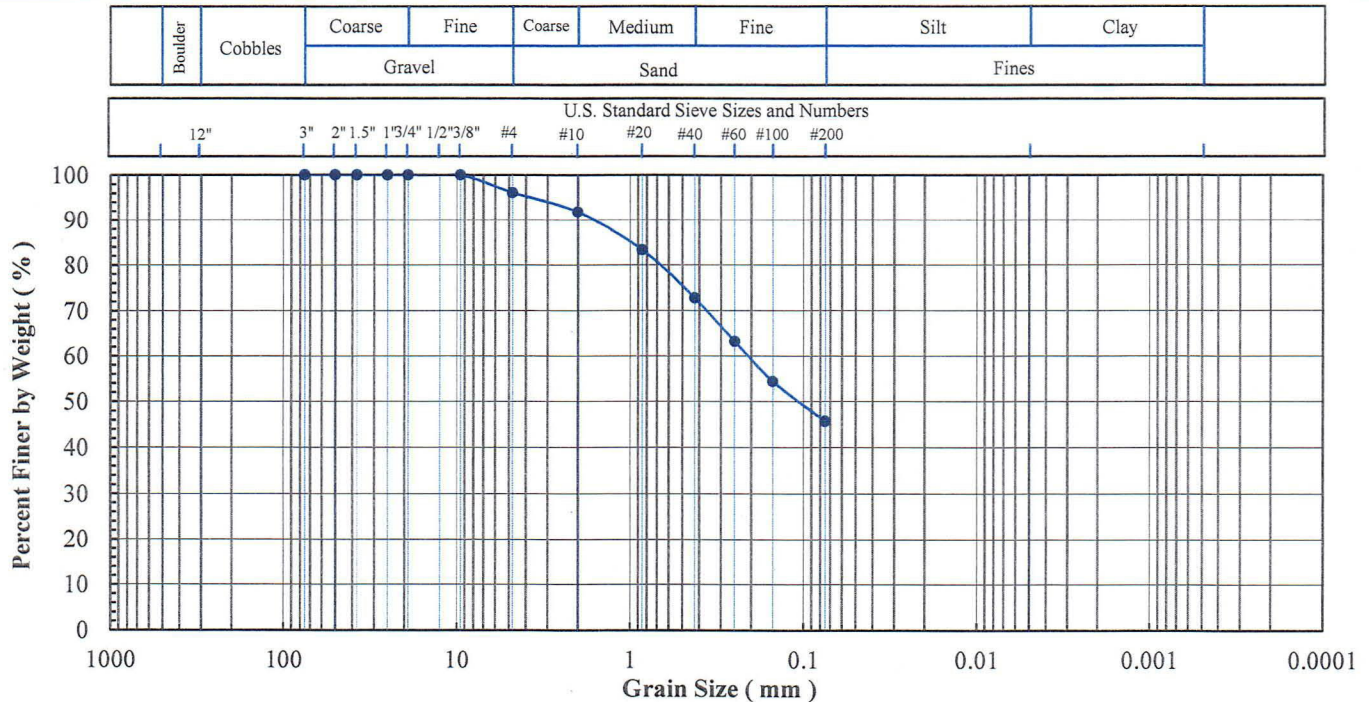
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-05-SS04 & CCRLF-05-SS05
Lab Sample No: 18E199 & 18E200

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits

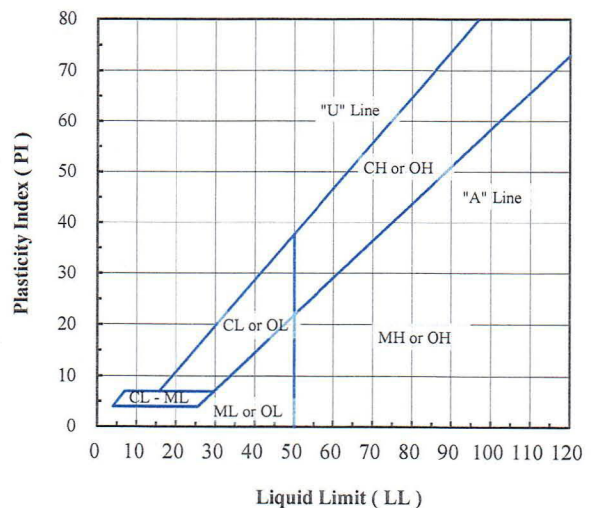


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.1
#10	2.00	91.8
#20	0.850	83.3
#40	0.425	72.7
#60	0.250	63.2
#100	0.150	54.4
#200	0.075	45.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.9
Sand (%):	50.4
Fines (%):	45.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	
-----------------------	--

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-05-SS04 & CCRLF-05-SS05	18E199 & 18E200	18.2	45.7	NP	NP	NP	

Note(s):

7-12-2018
DB/NSR



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

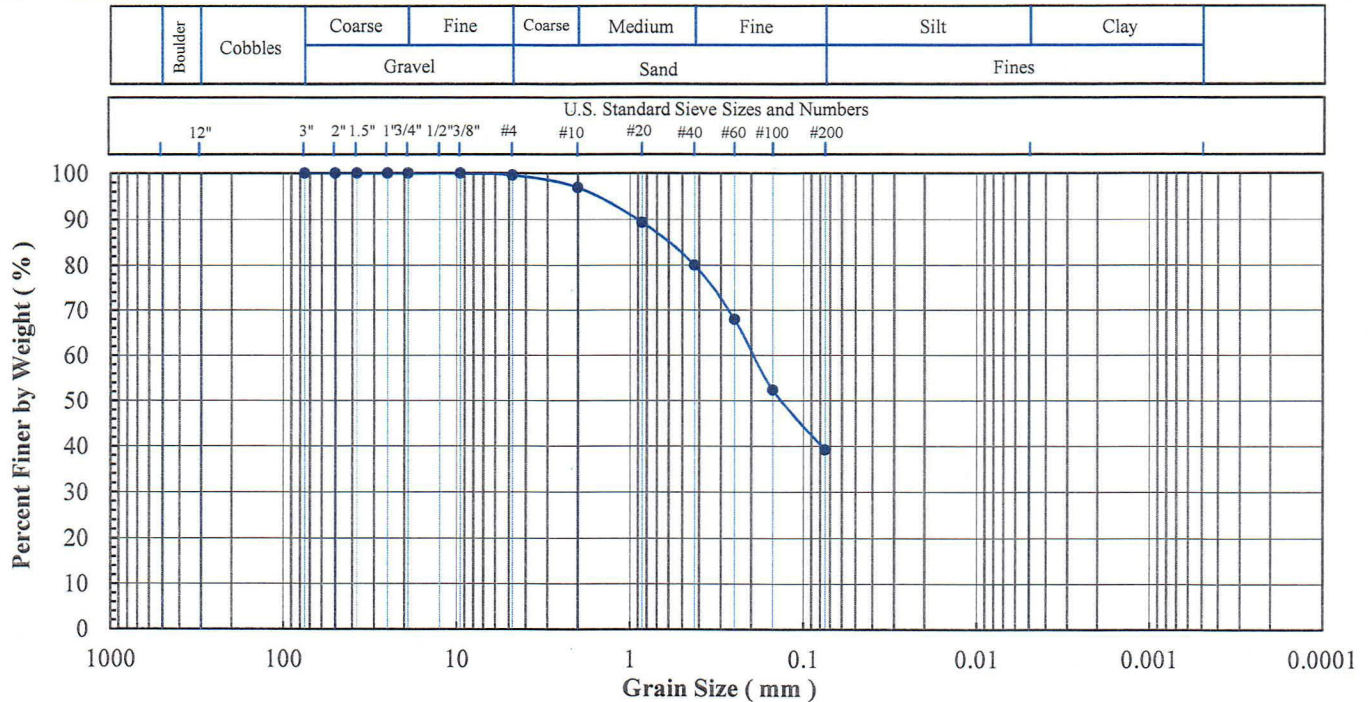
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name: Former Plant Arkwright Geotech. Analyses
Project No: 896
Client Sample ID: CCRLF-05-SS07 & CCRLF-05-SS08
Lab Sample No: 18E202 & 18E203

ASTM C 136, D 422, D 854, D 1140,
D 2216, D 2487, D 4318, D 6913, D 7928

SOIL INDEX PROPERTIES

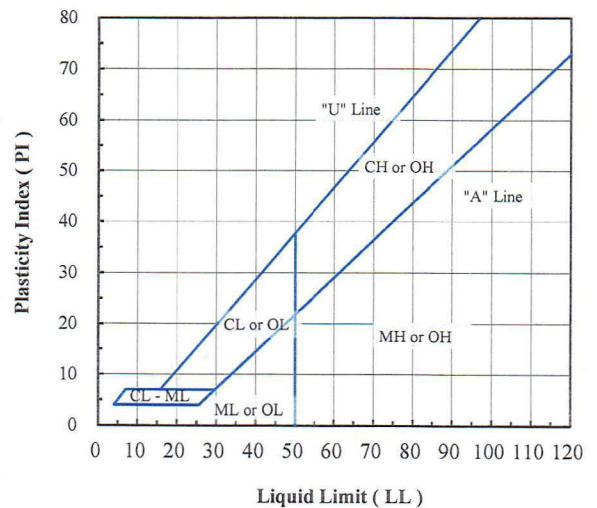
Grain Size, Spec. Gravity, Moist. Content,
Eng. Classification, Atterberg Limits



Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	96.9
#20	0.850	89.4
#40	0.425	80.0
#60	0.250	67.9
#100	0.150	52.4
#200	0.075	39.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	60.4
Fines (%):	39.2
Silt (%):	
Clay (%):	



Specific Gravity (G _s):	
-------------------------------------	--

Coeff. Unif. (C _u):	
Coeff. Curv. (C _c):	

Client Sample ID.	Lab Sample No.	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits			Engineering Classification
				LL (-)	PL (-)	PI (-)	
CCRLF-05-SS07 & CCRLF-05-SS08	18E202 & 18E203	23.7	39.2	NP	NP	NP	

Note(s):

7-12-2018
DB/NSA



Excel Geotechnical Testing, Inc.

"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075

Tel: (770) 910 7537 Fax: (770) 910 7538

LAST PAGE

Test Applicability and Limitations:

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

Storage Policy:

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of \$1.00 per sample per day will be applied after the initial 3 month storage period.
- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of \$1.30 per sample per day will be applied after the initial 3 months storage.

Appendix E. Boring Logs and Piezometer Construction Diagrams

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia

DATE STARTED 17-4-18 COMPLETED 18-4-18

GROUND ELEVATION 353.92 ft HOLE SIZE 8.25/3.38 inches

DRILLING CONTRACTOR Southern Company Services

GROUND WATER LEVELS:

DRILLING METHOD HSA - CME550X

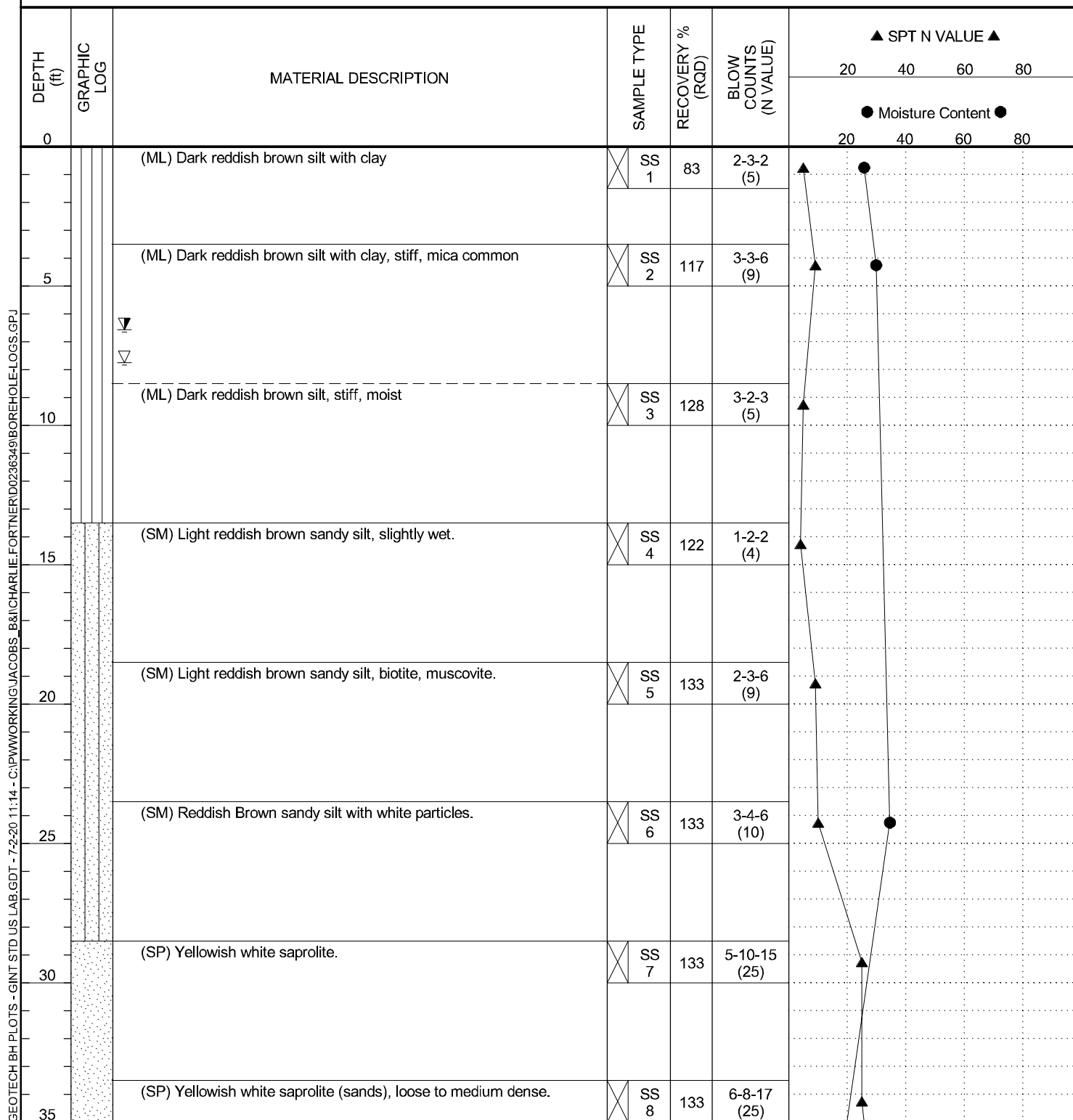
▽ AT TIME OF DRILLING 7.75 ft / Elev 346.17 ft

LOGGED BY T. Schnell CHECKED BY C. Hickman

AFTER DRILLING 6.57 ft / Elev 347.35 ft on 5/3/18

NOTES

NORTHINGS 1065801.43 EASTINGS 2437806.75



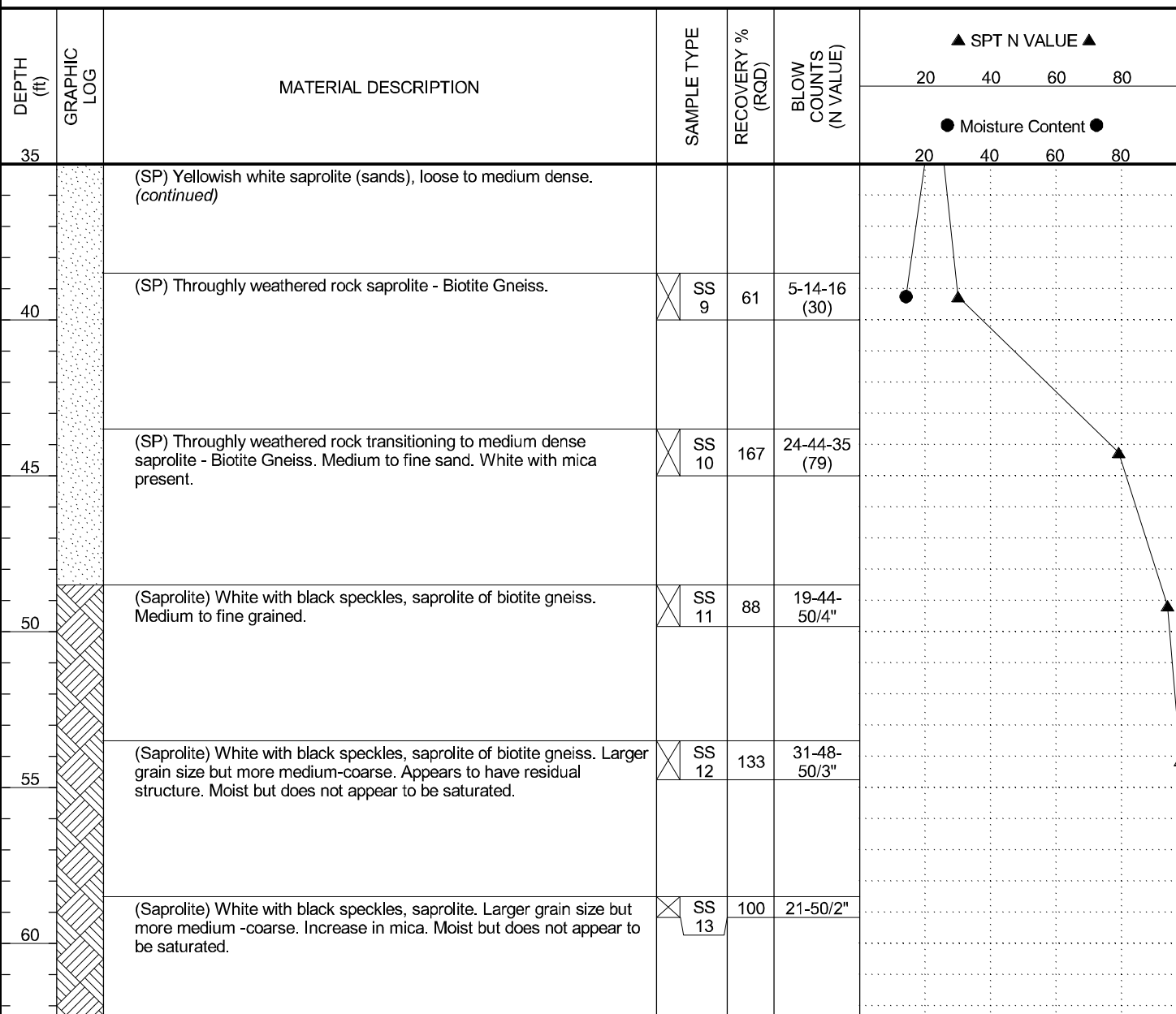
(Continued Next Page)

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia



Bottom of borehole at 62.4 feet.

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia

DATE STARTED 18-4-18 COMPLETED 19-4-18

GROUND ELEVATION 366.98 ft HOLE SIZE 8.25/3.38 inches

DRILLING CONTRACTOR Southern Company Services

GROUND WATER LEVELS:

DRILLING METHOD HSA/HQ - CME550X

▽ AT TIME OF DRILLING 27.00 ft / Elev 339.98 ft

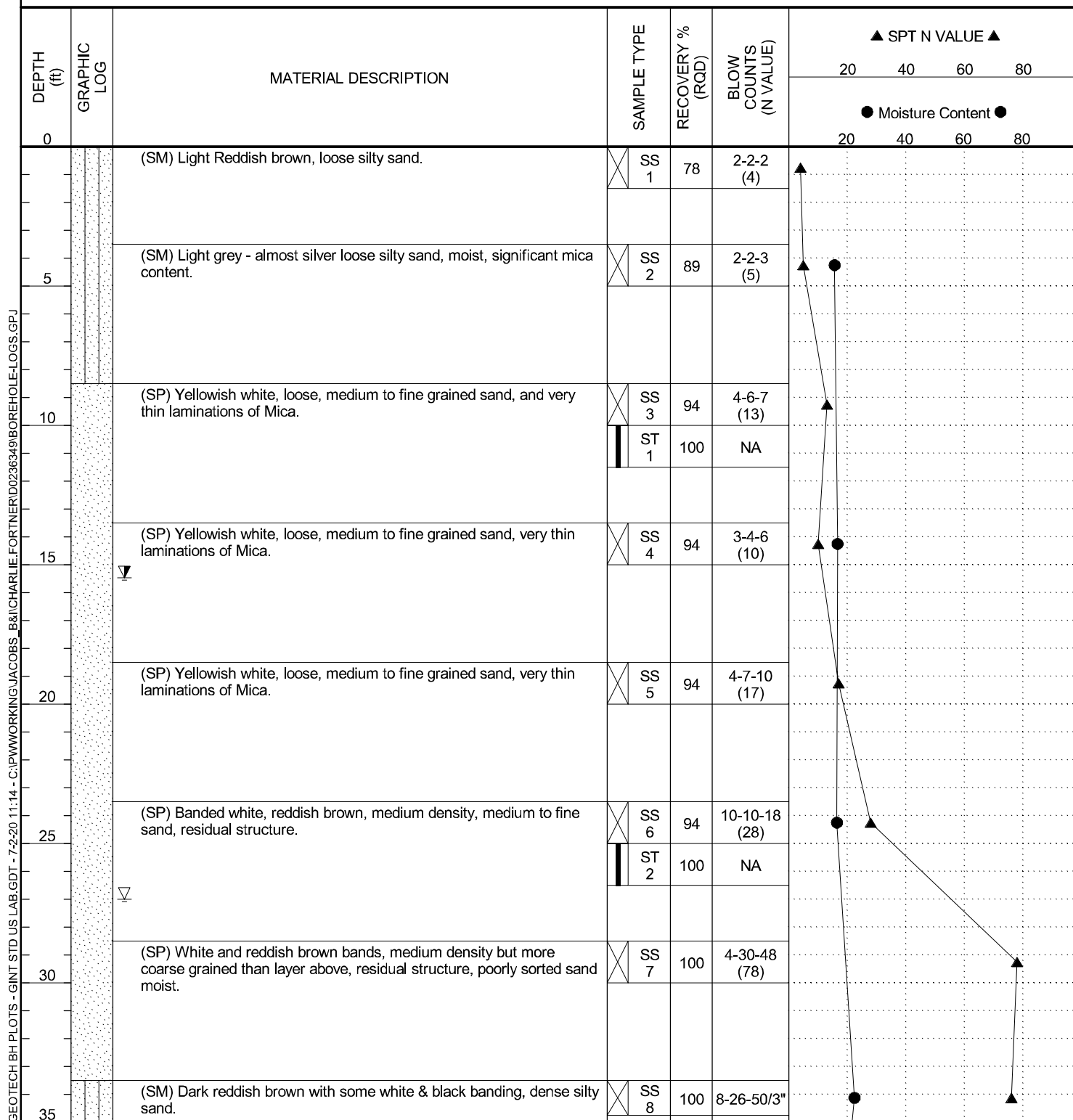
LOGGED BY T. Schnell CHECKED BY C. Hickman

AFTER DRILLING 15.47 ft / Elev 351.51 ft on 5/3/18

NOTES

NORTHINGS 1066565.73

EASTINGS 2437456.55



(Continued Next Page)

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲			
						20	40	60	80
35									
		(SM) Dark reddish brown with some white & black banding, dense silty sand. <i>(continued)</i>							
40		(SP) Dark reddish brown with some white & black banding, dense silty sand, coarse to medium grained, poorly sorted sand with more yellow-white in color.	SS 9	100	50/3"				
45		(SP) Dark reddish brown dense silty sand with some white & black banding and very coarse sand.	SS 10	100	50/2"				

Bottom of borehole at 45.0 feet.

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia

DATE STARTED 23-4-18 COMPLETED 23-4-18

GROUND ELEVATION 371.92 ft HOLE SIZE 8.25/3.38 inches

DRILLING CONTRACTOR Southern Company Services

GROUND WATER LEVELS:

DRILLING METHOD HSA - CME550X

▽ AT TIME OF DRILLING 23.42 ft / Elev 348.50 ft

LOGGED BY T. Schnell CHECKED BY C. Hickman

AFTER DRILLING 21.96 ft / Elev 349.96 ft on 5/3/18

NOTES

NORTHINGS 1066338.52

EASTINGS 2437920.97

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲			
						20	40	60	80
						● Moisture Content ●			
						20	40	60	80
0		(SM) Light reddish brown silty sand with mica, loose, traces of gravel.	SS 1	100	3-2-4 (6)				
5		(SM) Light reddish brown silty sand with mica, loose, traces of gravel with black material.	SS 2	78	3-3-4 (7)				
10		(SM) Light reddish brown silty sand with mica, loose, traces of gravel with black material.	SS 3	89	2-3-3 (6)				
15		(SM) Light reddish brown silty sand with mica, white medium grained sand, loose, dry.	SS 4	100	3-5-6 (11)				
			ST 1	100					
20		(SM) Light reddish brown silty sand with mica, white medium grained sand, loose, dry.	SS 5	100	2-4-6 (10)				
25		(SP) Black to dark reddish brown, silty sand, medium to fine grained with an increase in black fine material, decrease in mica content, and dry.	SS 6	94	8-13-16 (29)				
30		(SP) Coarse white (quartz) sand.	SS 7	82	25-50/5"				
35		(BEDROCK) GNEISS -- dark gray to greenish gray, fine- to medium-grained, garnet-amphibolite-biotite-feldspar-quartz gneiss, moderately to well-foliated. Foliation dips between 20° and 80° to core, locally contorted, very schistose layers common.	RC 1	97					

(Continued Next Page)

PROJECT NAME Former Plant Arkwright Permitting

PROJECT LOCATION Macon, Georgia

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	<div>▲ SPT N VALUE ▲</div> <div>● Moisture Content ●</div>			
						20	40	60	80
						20	40	60	80
35									
40			RC 2	100					
45			RC 3	100					
			RC 4	97					

Bottom of borehole at 47.6 feet.

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia

DATE STARTED 19-4-18 COMPLETED 20-4-18

GROUND ELEVATION 369.99 ft HOLE SIZE 8.25/3.38 inches

DRILLING CONTRACTOR Southern Company Services

GROUND WATER LEVELS:

DRILLING METHOD HSA - CME550X

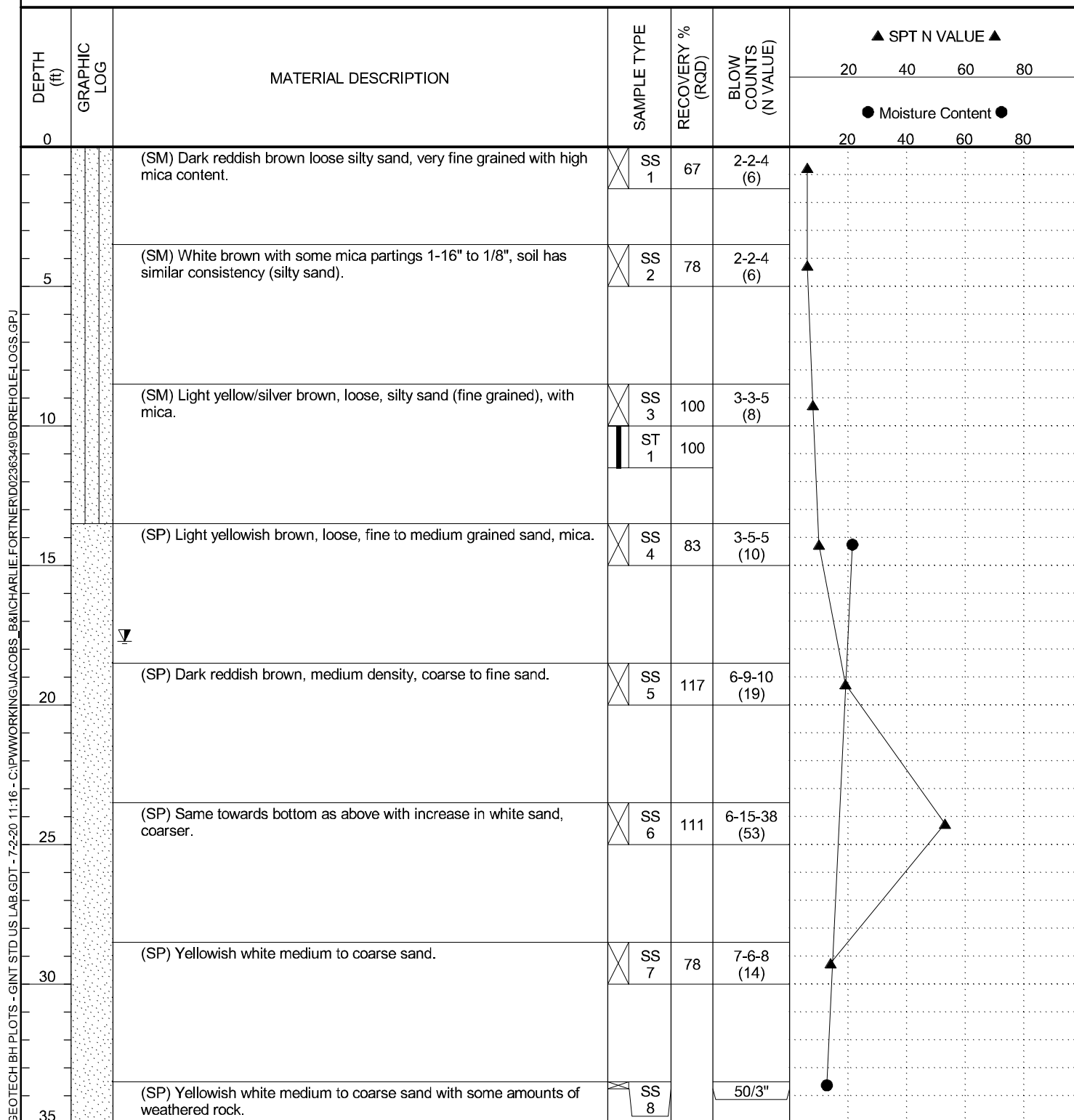
AT TIME OF DRILLING ---

LOGGED BY T. Schnell CHECKED BY C. Hickman

AFTER DRILLING 17.71 ft / Elev 352.28 ft on 5/3/18

NOTES

NORTHINGS 1066801.97 EASTINGS 2437509.21



(Continued Next Page)

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲			
						20	40	60	80
						● Moisture Content ●			
35						20	40	60	80
		(BEDROCK) GNEISS -- dark gray to greenish gray, fine- to medium-grained, garnet-amphibolite-biotite-feldspar-quartz gneiss, moderately to well-foliated. Foliation dips between 20° and 80° to core, locally contorted, very schistose layers common.	RC 1	88					
40			RC 2	97					
45			RC 3	100					

Bottom of borehole at 49.6 feet.

CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia

DATE STARTED 24-4-18 COMPLETED 24-4-18

GROUND ELEVATION 385.68 ft HOLE SIZE 8.25/3.38 inches

DRILLING CONTRACTOR Southern Company Services

GROUND WATER LEVELS:

DRILLING METHOD HSA - CME550X

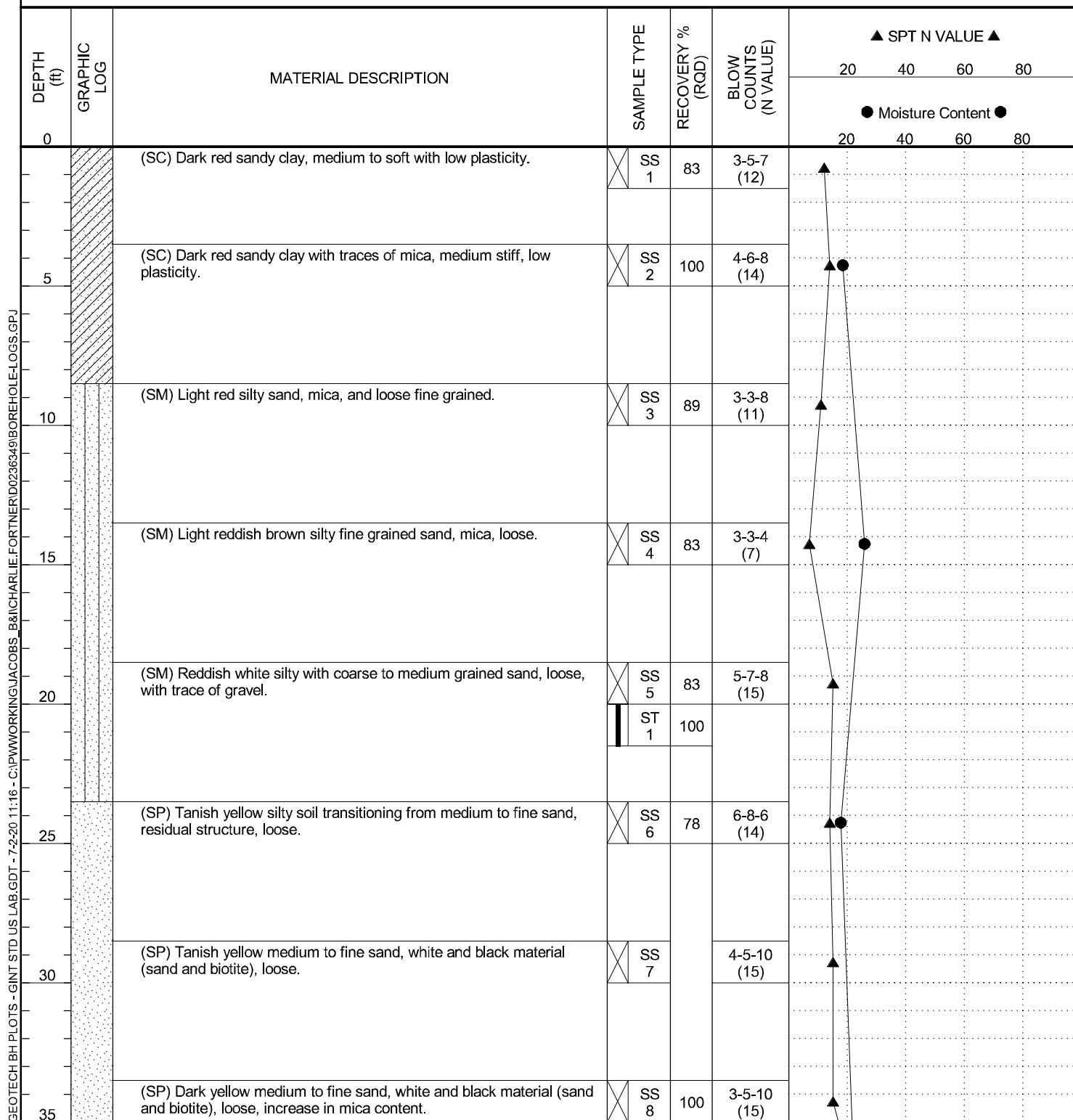
AT TIME OF DRILLING ---

LOGGED BY T. Schnell CHECKED BY C. Hickman

AFTER DRILLING 41.52 ft / Elev 344.16 ft on 5/3/18

NOTES

NORTHINGS 1066250.77 EASTINGS 2438258.03



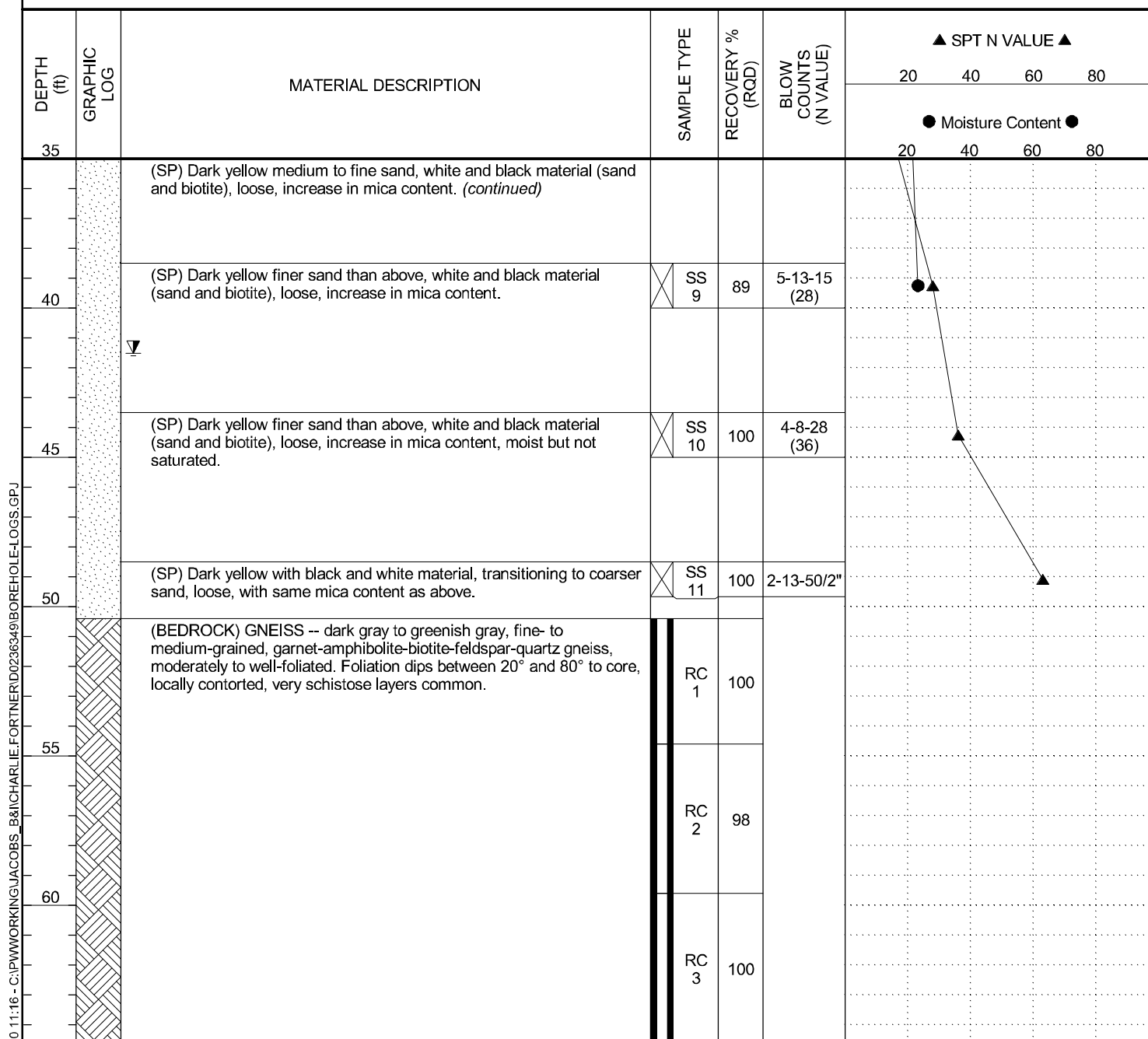
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CLIENT Georgia Power Company

PROJECT NAME Former Plant Arkwright Permitting

PROJECT NUMBER 35DK9205

PROJECT LOCATION Macon, Georgia



Bottom of borehole at 64.6 feet.



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BORING NUMBER DP-01

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CLIENT Southern Company **PROJECT NAME** Former Plant Arkwright
PROJECT NUMBER 5CGB4500 **PROJECT LOCATION** Macon, GA
DATE STARTED 14-Mar-2019 **COMPLETED** 14-Mar-2019 **HOLE SIZE** 6 inches **NORTHING** 1065700.92
DRILLING CONTRACTOR TTL **RIG** CME-45 **EASTING** 2437815.24
DRILLING METHOD 2-1/4" Hollow Stem Auger **HAMMER EFF.** 73 % **ELEVATION** 359.62
LOGGED BY M. Cosner **CHECKED BY** C. Fortner **GROUND WATER:** ☒ AT TIME OF DRILLING 21.00 ft / Elev 338.62 ft
NOTES Converted to piezometer by sonic over drilling by Cascade Drilling with TSi 150CC ATV rig.

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
	0		LEAN CLAY (CL), brown to red, moist, firm, medium plasticity, no dilatancy, jumbled texture, [FILL]						
355	5		SILTY SAND (ML), orangeish red, moist, firm, non plastic, upper contact with fill uncertain, [RESIDUUM]						
350	10								
345	15		SILT (ML), tan and brown, moist, soft, no dilatancy, little fine sand, trace mica, non-plastic, no dilatancy, [RESIDUUM]	SS 1	100	3-3-3 (6)			
340	20			SS 2	61	3-3-6 (9)			
335	25		▽ SILTY SAND (SM), tan to light brown, dry, layered, fine sand, [SAPROLITE]	SS 3	83	3-3-14 (17)			
330	30			SS 4	72	29-33-25 (58)			
325	35			SS 5	82	34-50/5"			

(Continued Next Page)



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BORING NUMBER DP-01

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CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
35									
320	40		Light brown with reddish orange, moist, speckled	SS 6	91	36-50/5"			>>▲
315	45			SS 7	100	50			>>▲
310	50			SS 8	100	50/4"			>>▲

Refusal at 51.0 feet.
Bottom of borehole at 51.0 feet.



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BORING NUMBER DP-02

PAGE 1 OF 2

CLIENT Southern Company **PROJECT NAME** Former Plant Arkwright
PROJECT NUMBER 5CGB4500 **PROJECT LOCATION** Macon, GA
DATE STARTED 14-Mar-2019 **COMPLETED** 14-Mar-2019 **HOLE SIZE** 6 inches **NORTHING** 1065093.96
DRILLING CONTRACTOR Southern Company Services **RIG** CME-550 **EASTING** 2438317.29
DRILLING METHOD 2-1/4" Hollow Stem Auger **HAMMER EFF.** 83 % **ELEVATION** 368.35
LOGGED BY M. Shearn **CHECKED BY** C. Fortner **GROUND WATER:** ▽ AT TIME OF DRILLING 40.00 ft / Elev 328.35 ft
NOTES Converted to piezometer by sonic over drilling by Cascade Drilling with TSi 150CC ATV rig.

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
368.35	0		LEAN CLAY (CL), reddish brown, moist, soft, [FILL]						
365	5								
360	10		SILTY SAND (ML), white and reddish brown, moist, soft, relict foliation layers, fine sand with mica, upper contact will fill uncertain, [SAPROLITE]						
355	15			SS 1	92	3-4-6 (10)			
350	20			SS 2	78	2-4-5 (9)			
345	25			SS 3	100	2-2-3 (5)			
340	30		Pink and pale tan with layers of reddish brown, little clay	SS 4	75	0-1-2 (3)			
335	35			SS 5	100	3-4-5 (9)			

(Continued Next Page)



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BORING NUMBER DP-02

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CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
35			Low plasticity, tan to orange brown, trace clay						
330	40	▽	20% mica	SS 6	72	5-9-14 (23)			
325	45		Saprolite of amphibolite: dark olive green, little clay	SS 7	71	8-42-50/5"			
320	50		Moderate brown with black speckles, relict foliation, 15% mica	SS 8	92	6-50/0"			

Refusal at 53.0 feet.
Bottom of borehole at 53.0 feet.

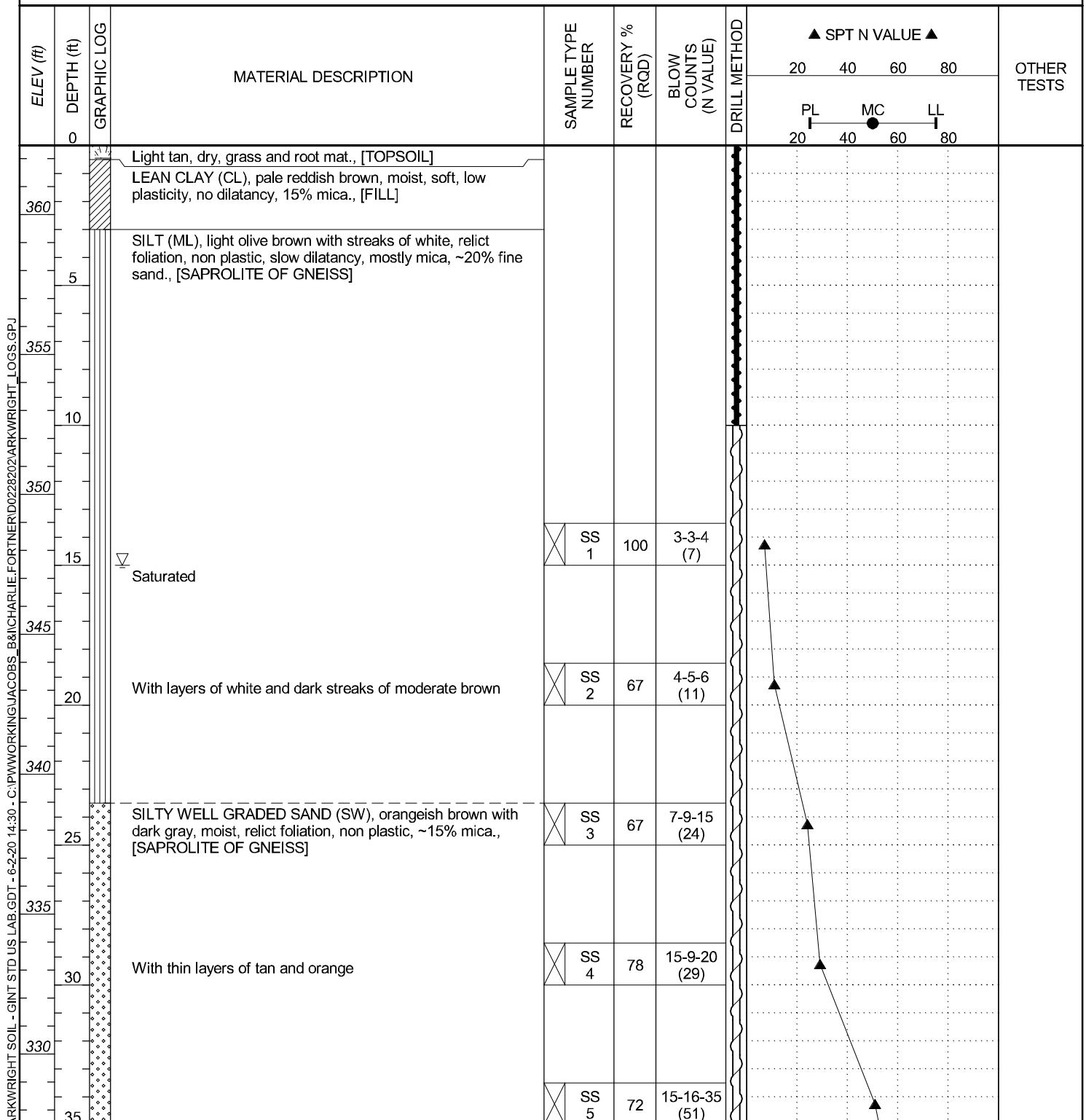


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BORING NUMBER P-01

PAGE 1 OF 2

CLIENT Southern Company **PROJECT NAME** Former Plant Arkwright
PROJECT NUMBER 5CGB4500 **PROJECT LOCATION** Macon, GA
DATE STARTED 12-Mar-2019 **COMPLETED** 12-Mar-2019 **HOLE SIZE** 6 inches **NORTHING** 1066537.71
DRILLING CONTRACTOR TTL **RIG** CME-45 **EASTING** 2437302.92
DRILLING METHOD 2-1/4" Hollow Stem Auger **HAMMER EFF.** 73 % **ELEVATION** 362.46
LOGGED BY C. Fortner **CHECKED BY** M. Cosner **GROUND WATER:** ∇ AT TIME OF DRILLING 15.00 ft / Elev 347.46 ft
NOTES Converted to piezometer by sonic over drilling by Cascade Drilling with 600T Pro-Sonic Truck rig.



(Continued Next Page)



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BORING NUMBER P-01

PAGE 2 OF 2

CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

ARKWRIGHT SOIL - GINT STD US LAB.GDT - 6-2-20 14:30 - C:\P\WORKING\JACOBS_B&I\CHARLIE.FORTNER\ID0228202\ARKWRIGHT_LOGS.GPJ

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
35									
325									
40			Fine-grained mica sand that breaks down to silt when handled	SS 6	67	12-27-35 (62)			
320									
45			Becomes olive tan with thin streaks of white	SS 7	72	19-28-48 (76)			
315									
50			With ~10% fine gravel of quartz and garnet	SS 8	100	50/3"			>>
310									
55			Drilling harder	SS 9	100	50/1"			>>

Refusal at 55.0 feet.
Bottom of borehole at 55.0 feet.
Converted to piezometer by sonic over drilling on 7-Mar-2019.

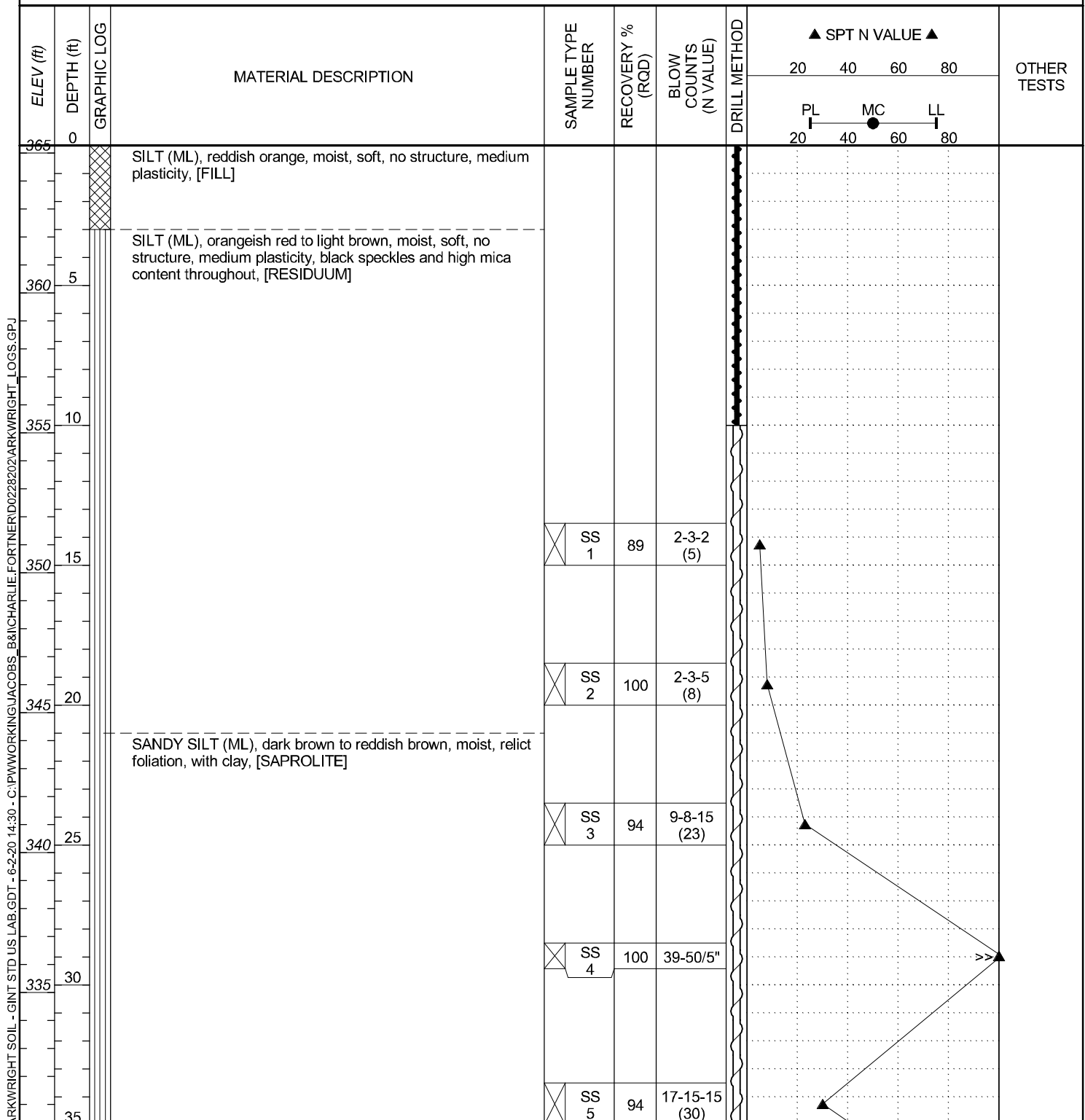


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BORING NUMBER P-02

PAGE 1 OF 2

CLIENT	Southern Company	PROJECT NAME	Former Plant Arkwright
PROJECT NUMBER	5CGB4500	PROJECT LOCATION	Macon, GA
DATE STARTED	12-Mar-2019	COMPLETED	12-Mar-2019
HOLE SIZE	6 inches	NORTHING	1066268.73
DRILLING CONTRACTOR	TTL	RIG	CME-45
DRILLING METHOD	2-1/4" Hollow Stem Auger	EASTING	2437560.83
LOGGED BY	C. Fortner	HAMMER EFF.	73 %
CHECKED BY	M. Cosner	ELEVATION	365.26
GROUND WATER:	AT TIME OF DRILLING	---	
NOTES	Converted to piezometer by sonic over drilling by Cascade Drilling with TSi 150CC ATV rig.		



(Continued Next Page)



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BORING NUMBER P-02

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CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

ARKWRIGHT SOIL - GINT STD US LAB.GDT - 6-2-20 14:30 - C:\P\WORKING\JACOBS_B&I\CHARLIE.FORTNER\0228202\ARKWRIGHT_LOGS.GPJ

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
330	35		SILTY SAND (SM), dark grayish green to black, moist, dense, with relict foliation, Saprolite of Amphibolite, [SAPROLITE]						
				SS 6	100	50/4"			>>▲
325	40								
				SS 7	70	50/5"			>>▲
320	45								
				SS 8	100	50/3"			>>▲
315	50		@49' Dry						

Refusal at 50.5 feet.
Bottom of borehole at 50.5 feet.



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BORING NUMBER D-02

PAGE 1 OF 1

CLIENT	Southern Company	PROJECT NAME	Former Plant Arkwright
PROJECT NUMBER	5CGB4500	PROJECT LOCATION	Macon, GA
DATE STARTED	13-Mar-2019	COMPLETED	13-Mar-2019
HOLE SIZE	6 inches	NORTHING	1066259.32
DRILLING CONTRACTOR	TTL	RIG	CME-45
DRILLING METHOD	2-1/4" Hollow Stem Auger	EASTING	2437333.65
LOGGED BY	R. Karia	HAMMER EFF.	73 %
CHECKED BY	C. Fortner	ELEVATION	357.83
NOTES	GROUND WATER: AT TIME OF DRILLING ---		

ARKWRIGHT SOIL - GINT STD US LAB.GDT - 6-2-20 14:30 - C:\P\WORKING\JACOBS_B&I\CHARLIE.FORTNER\0228202\ARKWRIGHT_LOGS.GPJ

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
355	0		SILT (MH), brownish red, moist, firm, jumbled, low plasticity, with mica, [FILL]						
350	5		Dark brown with black, medium plasticity, rapid dilatancy, with gravel						
345	10		SILTY SAND (SM), brown with red, moist, no structure, non plastic, rapid dilatancy, with mica, [RESIDUUM]	SS 1	100	5-5-7 (12)			PA
340	15		Tan to light brown, with patches of black	SS 2	72	2-2-3 (5)			
335	20			SS 3	69	4-5-8 (13)			PA

Bottom of borehole at 20.0 feet.



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BORING NUMBER CV-15

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CLIENT	Southern Company	PROJECT NAME	Former Plant Arkwright
PROJECT NUMBER	5CGB4500	PROJECT LOCATION	Macon, GA
DATE STARTED	19-Mar-2019	COMPLETED	19-Mar-2019
HOLE SIZE	6 inches	NORTHING	1065221.91
DRILLING CONTRACTOR	TTL	RIG	CME-45
DRILLING METHOD	2-1/4" Hollow Stem Auger	EASTING	2438172.08
LOGGED BY	M. Cosner	HAMMER EFF.	73 %
CHECKED BY	C. Fortner	ELEVATION	359.45
NOTES		GROUND WATER:	AT TIME OF DRILLING ---

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
	0		LEAN CLAY (CL), dark brown and red, moist, soft, no structure, medium plasticity, [FILL]						
	5		SILTY SAND (SM), brown and red, moist, very soft, with some black speckles, upper contact with fill uncertain, [RESIDUUM]						
	10								
	15		Light brown and red, well graded	SS 1	94	2-2-3 (5)			
	20			SS 2	100	6-10-11 (21)			

Bottom of borehole at 23.0 feet.
Auger refusal at 23.0 feet

ARKWRIGHT SOIL - GINT STD US LAB.GDT - 20-2-20 10:44 - C:\P\WORKING\JACOBS_B&I\CHARLIE.FORTNER\0228202\ARKWRIGHT_LOGS.GPJ



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BORING NUMBER CV-16

PAGE 1 OF 1

CLIENT	Southern Company	PROJECT NAME	Former Plant Arkwright
PROJECT NUMBER	5CGB4500	PROJECT LOCATION	Macon, GA
DATE STARTED	18-Mar-2019	COMPLETED	18-Mar-2019
HOLE SIZE	6 inches	NORTHING	1065368.18
DRILLING CONTRACTOR	Southern Company Services	RIG	CME-550
DRILLING METHOD	2-1/4" Hollow Stem Auger	EASTING	2438037.15
LOGGED BY	M. Shearn	HAMMER EFF.	83 %
CHECKED BY	C. Fortner	ELEVATION	360.75
NOTES	GROUND WATER: ∇ AT TIME OF DRILLING 25.00 ft / Elev 335.75 ft		

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
360	0		LEAN CLAY (CL), reddish brown, moist, soft with little mica, [FILL]						
	5		SILTY SAND (SM), reddish brown, moist, upper contact with fill uncertain, [RESIDUUM]						
355									
	10								
350									
	15		SILTY SAND (SM), white and brown, moist, coarse sand, [SAPROLITE]	SS 1	78	3-3-3 (6)			PA
345			With light brown speckles						
	20			SS 2	100	3-3-4 (7)			
340									
	25		Black with brownish orange	SS 3	67	6-6-7 (13)			PA
335									
	30			SS 4	77	18-50/5"			

Bottom of borehole at 30.0 feet.

ARKWRIGHT SOIL - GINT STD US LAB.GDT - 20-2-20 10:44 - C:\PWWORKING\JACOBS_B&I\CHARLIE.FORTNER\0228202\ARKWRIGHT_LOGS.GPJ

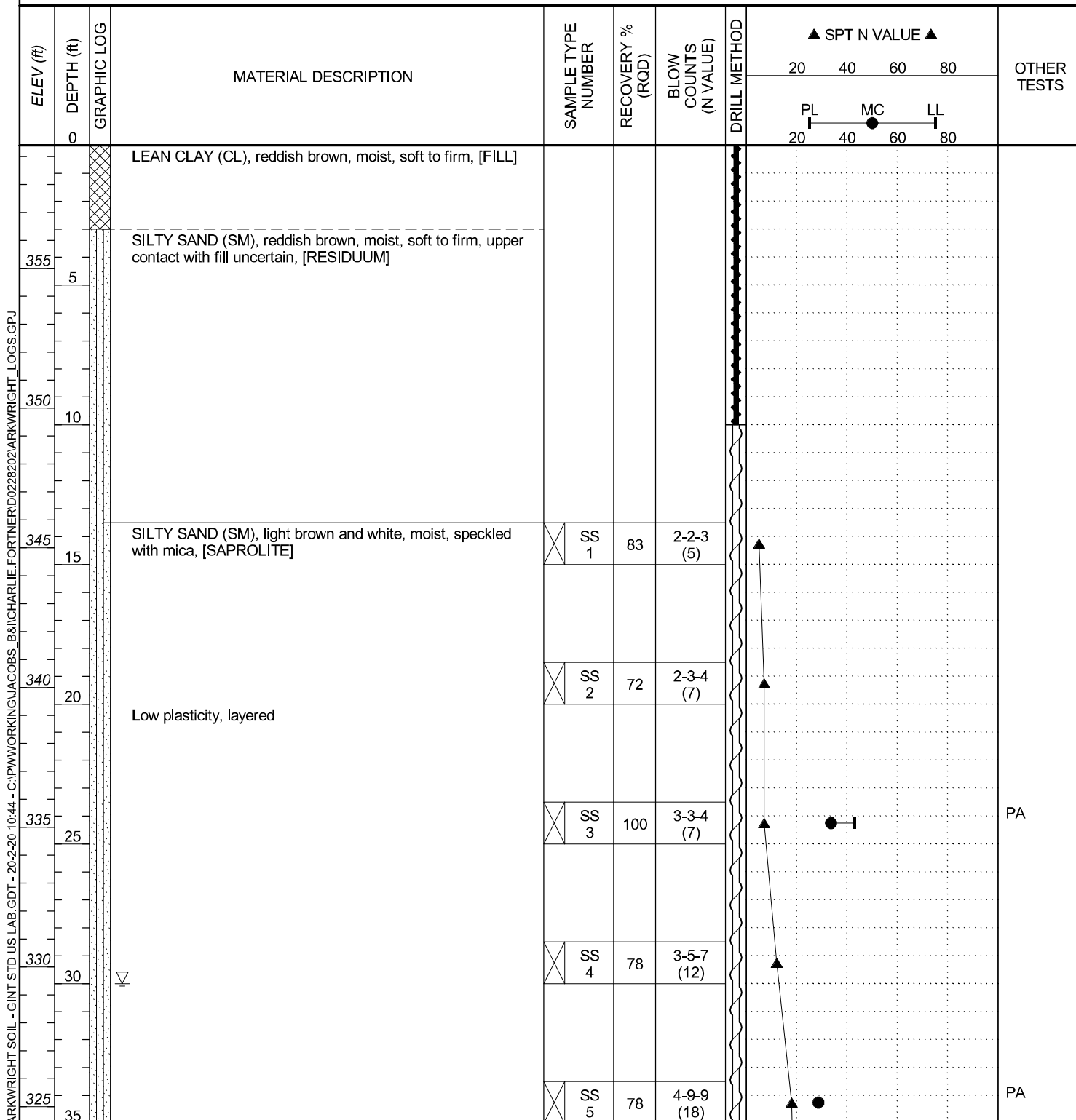


Jacobs Engineering Group
10 10th Street NE
Suite 1400
Atlanta, GA 30309

BORING NUMBER CV-17

PAGE 1 OF 2

CLIENT	Southern Company	PROJECT NAME	Former Plant Arkwright
PROJECT NUMBER	5CGB4500	PROJECT LOCATION	Macon, GA
DATE STARTED	18-Mar-2019	COMPLETED	18-Mar-2019
HOLE SIZE	6 inches	NORTHING	1065534.24
DRILLING CONTRACTOR	Southern Company Services	RIG	CME-550
DRILLING METHOD	2-1/4" Hollow Stem Auger	EASTING	2437926.27
LOGGED BY	M. Shearn	HAMMER EFF.	83 %
CHECKED BY	C. Fortner	ELEVATION	359.40
NOTES	GROUND WATER: ∇ AT TIME OF DRILLING 30.00 ft / Elev 329.40 ft		



(Continued Next Page)



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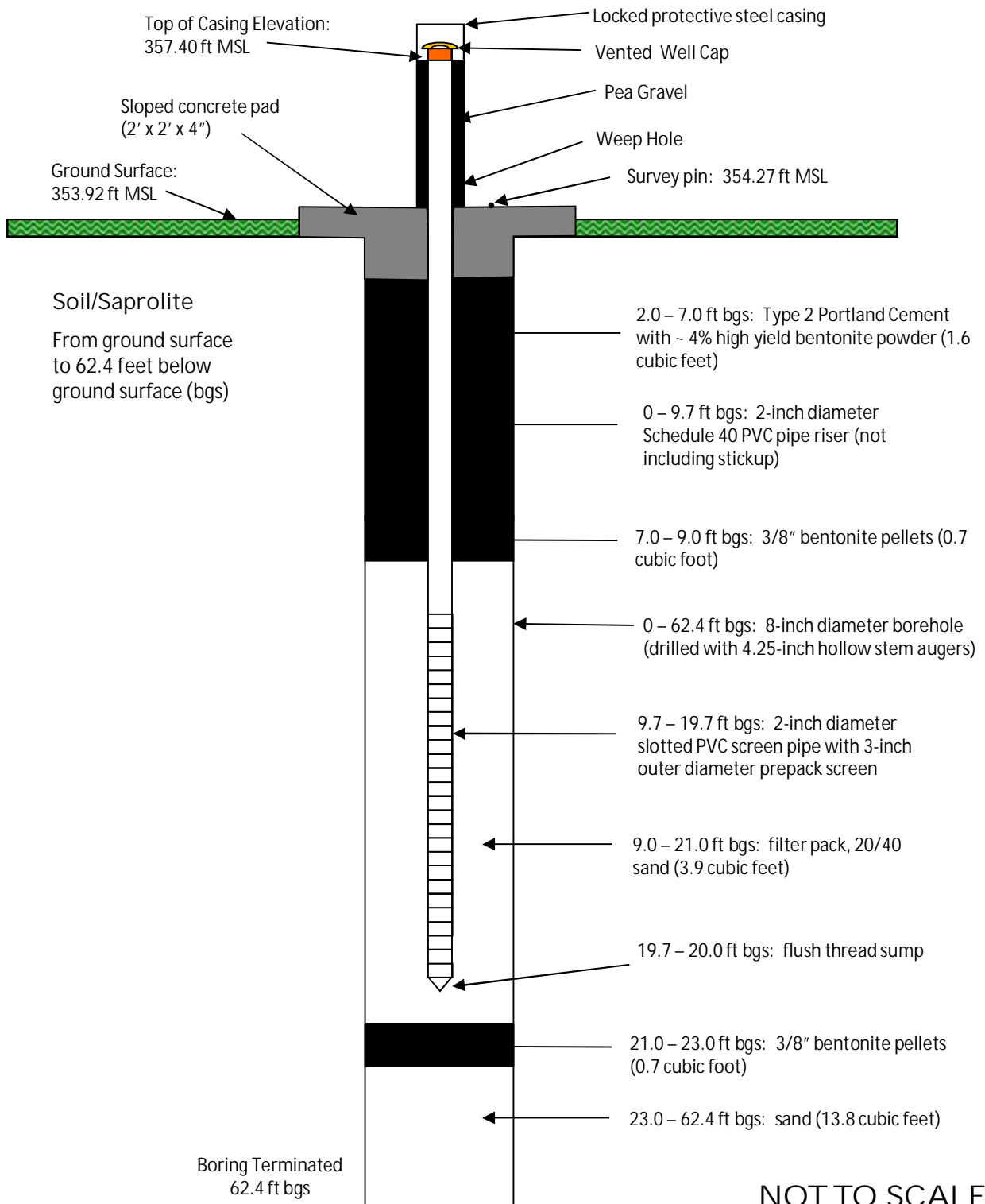
BORING NUMBER CV-17

PAGE 2 OF 2

CLIENT Southern Company PROJECT NAME Former Plant Arkwright
PROJECT NUMBER 5CGB4500 PROJECT LOCATION Macon, GA

ELEV (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DRILL METHOD	▲ SPT N VALUE ▲	OTHER TESTS
								20 40 60 80 PL MC LL 20 40 60 80	
35									
320									
40									

Bottom of borehole at 40.0 feet.



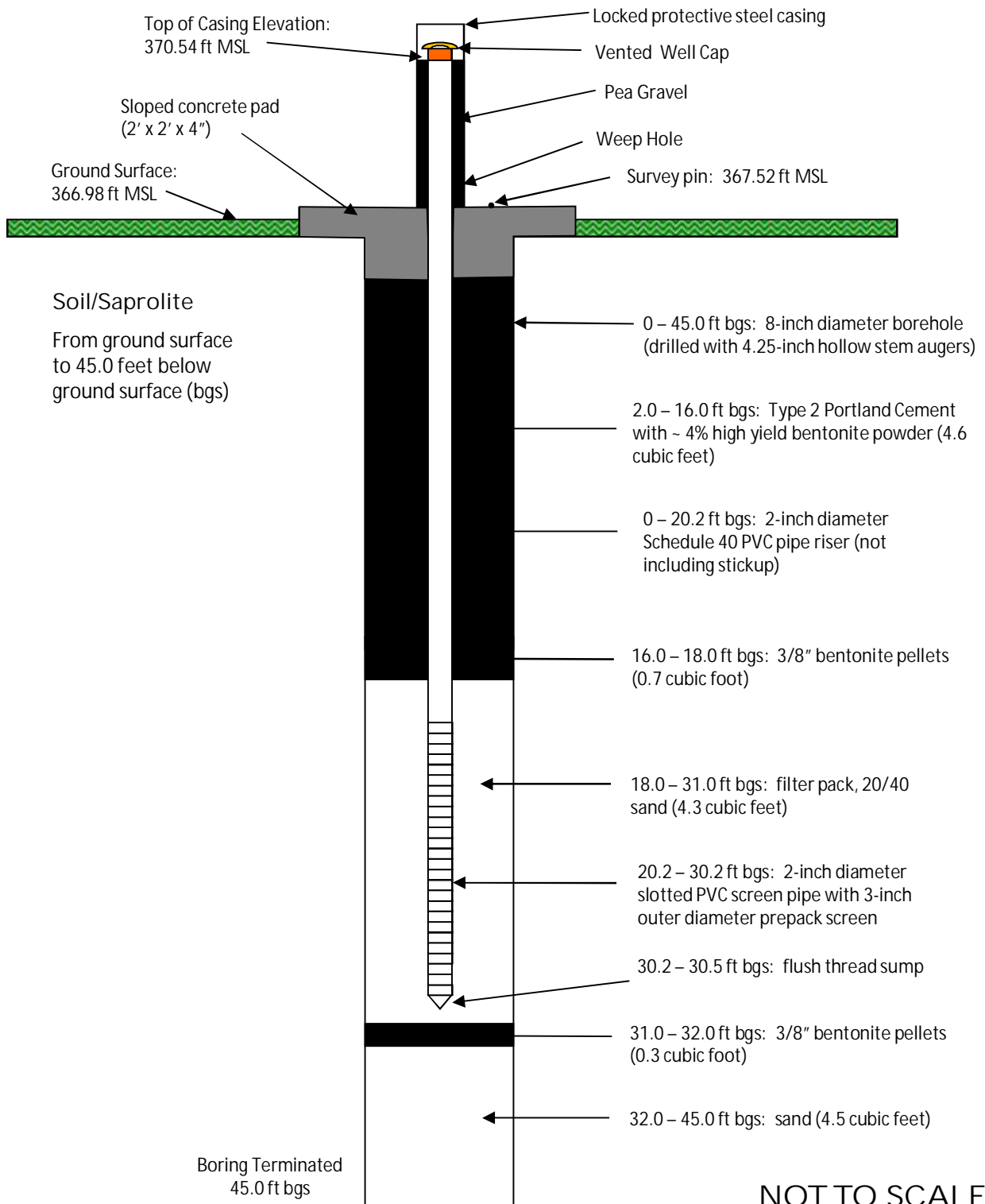
JACOBS

Georgia Power Former Plant Arkwright
Bibb County, Georgia

CCRLF-1
Construction Diagram

DATE April 18, 2018
SCALE NA
JOB NO.: 35DK9205

AS - BUILT



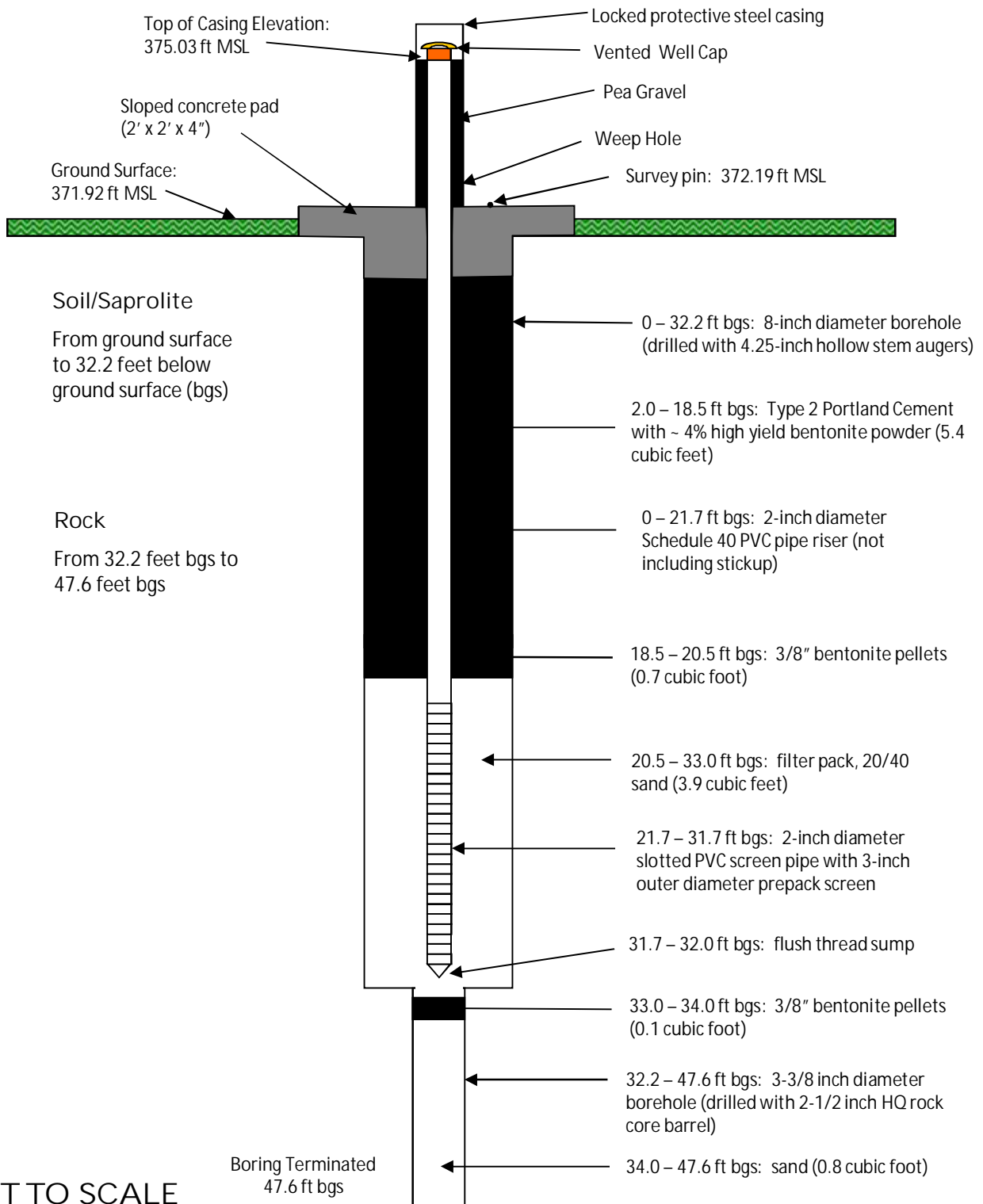
JACOBS

Georgia Power Former Plant Arkwright
Bibb County, Georgia

CCRLF-2
Construction Diagram

DATE April 19, 2018
SCALE NA
JOB NO.: 35DK9205

AS - BUILT



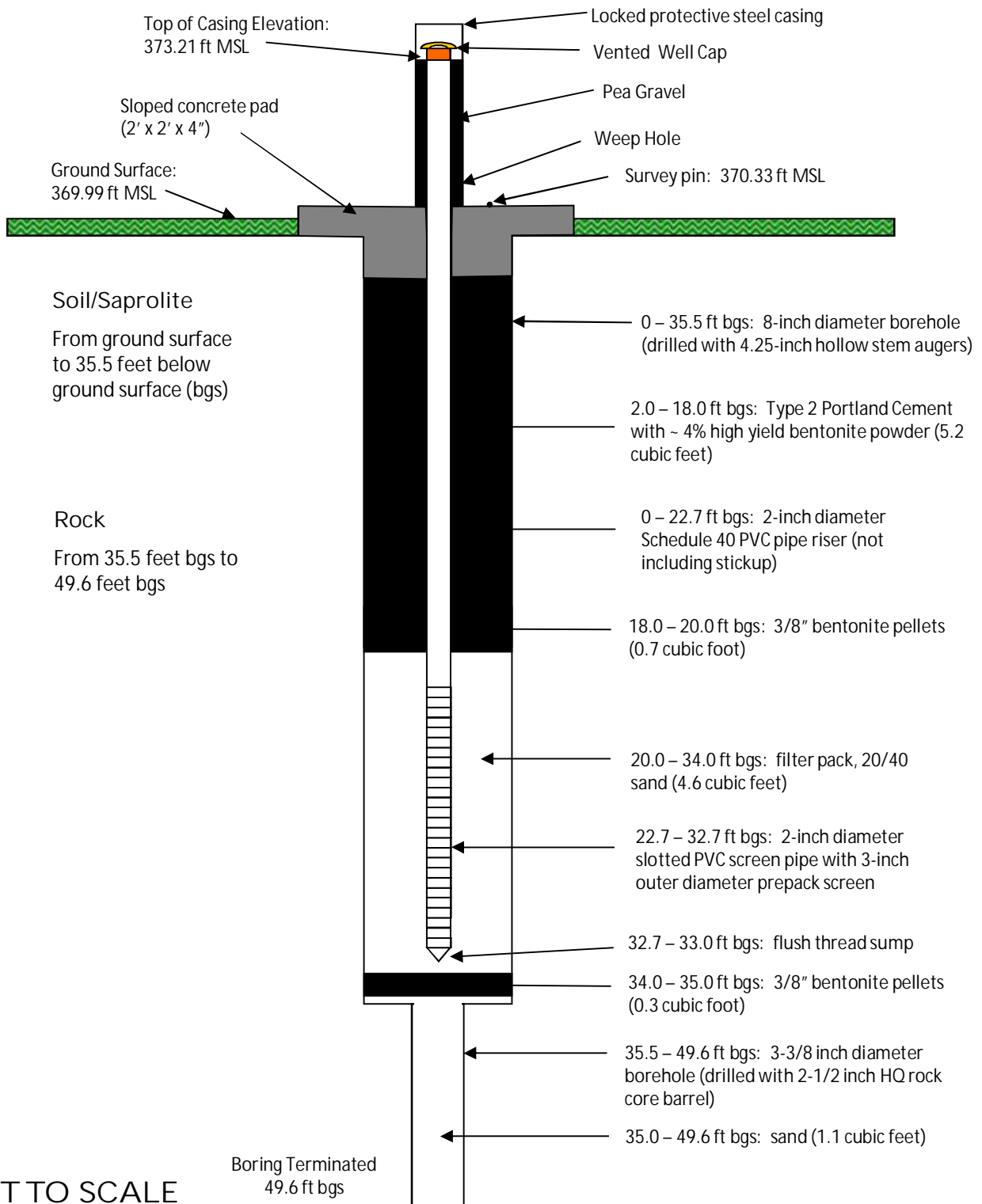
JACOBS

Georgia Power Former Plant Arkwright
Bibb County, Georgia

CCRLF-3
Construction Diagram

DATE April 23, 2018
SCALE NA
JOB NO.: 35DK9205

AS - BUILT



NOT TO SCALE

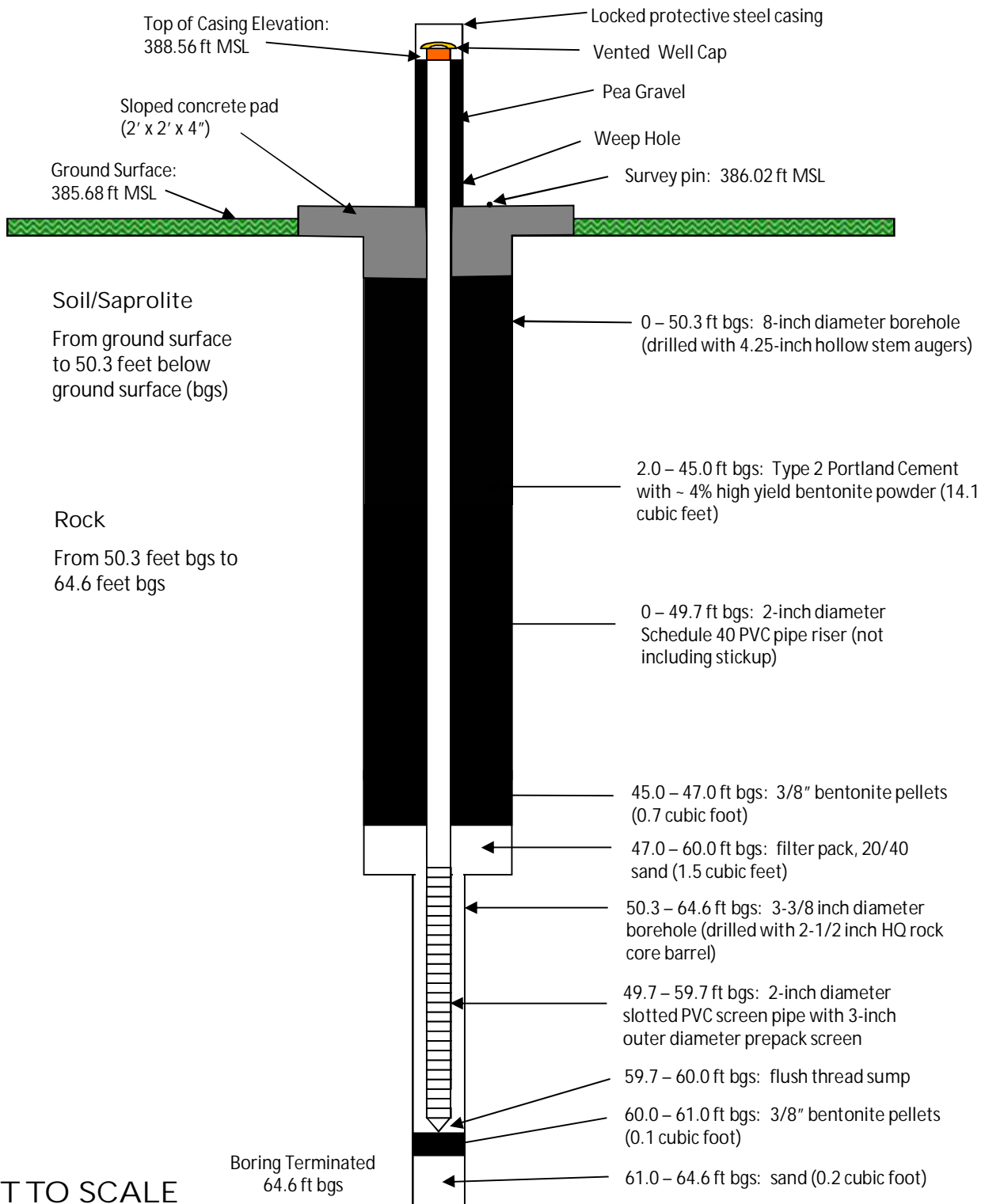
JACOBS

Georgia Power Former Plant Arkwright
Bibb County, Georgia

CCRLF-4
Construction Diagram

DATE April 20, 2018
SCALE NA
JOB NO.: 35DK9205

AS - BUILT



JACOBS

Georgia Power Former Plant Arkwright
Bibb County, Georgia

CCRLF-5
Construction Diagram

DATE April 24, 2018
SCALE NA
JOB NO.: 35DK9205

AS - BUILT

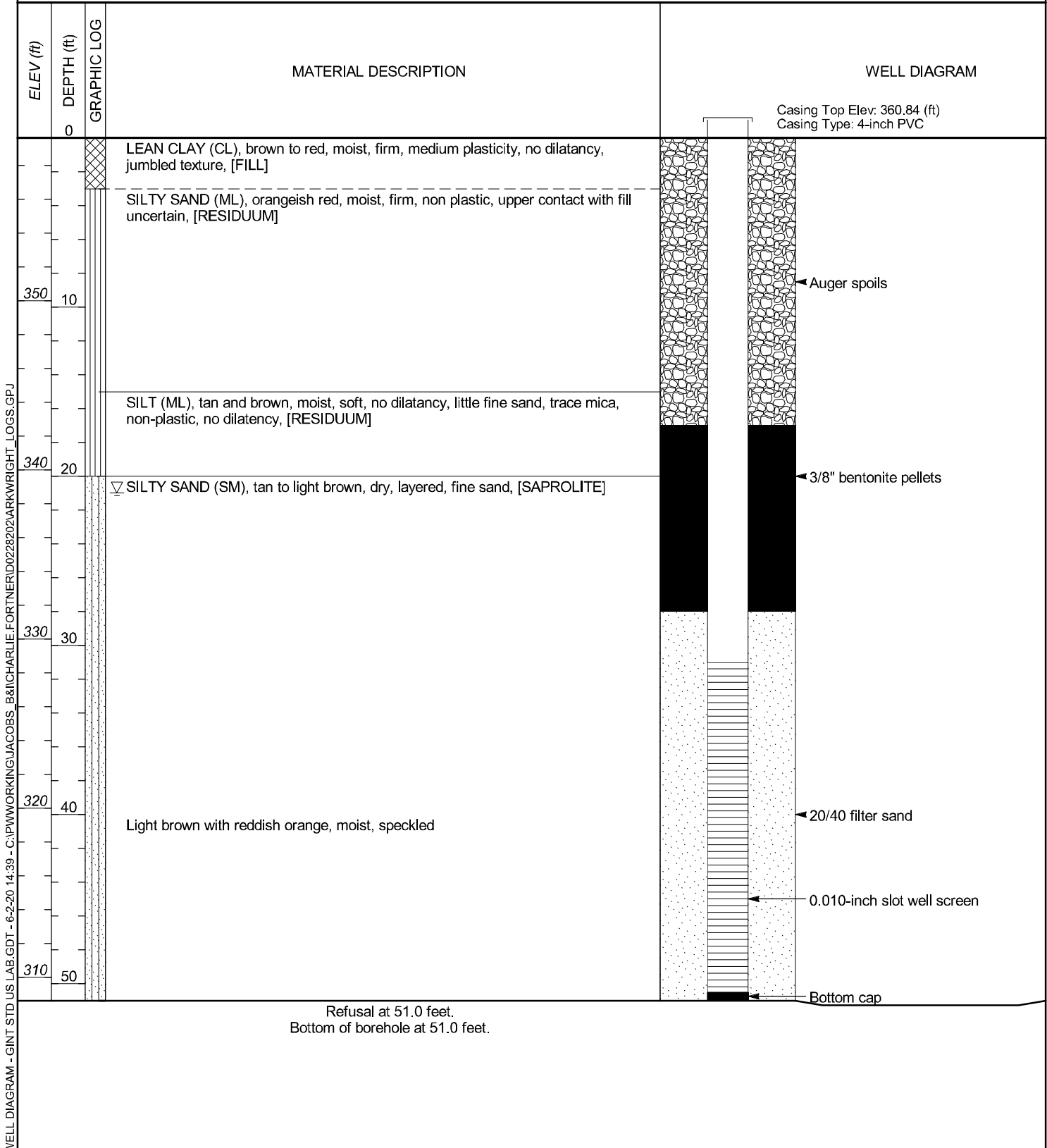
CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

Well Construction Diagram



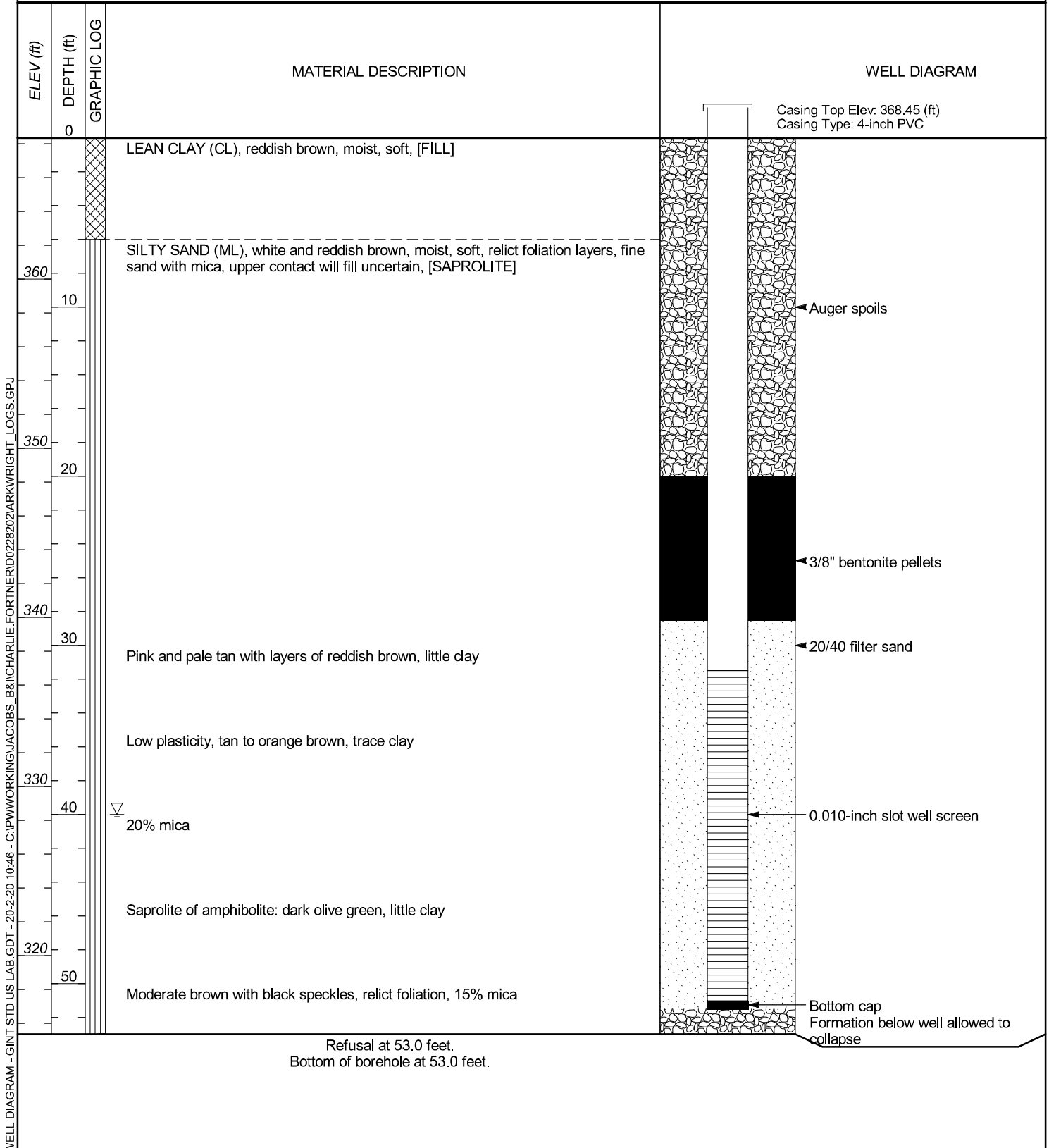
CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

Well Construction Diagram



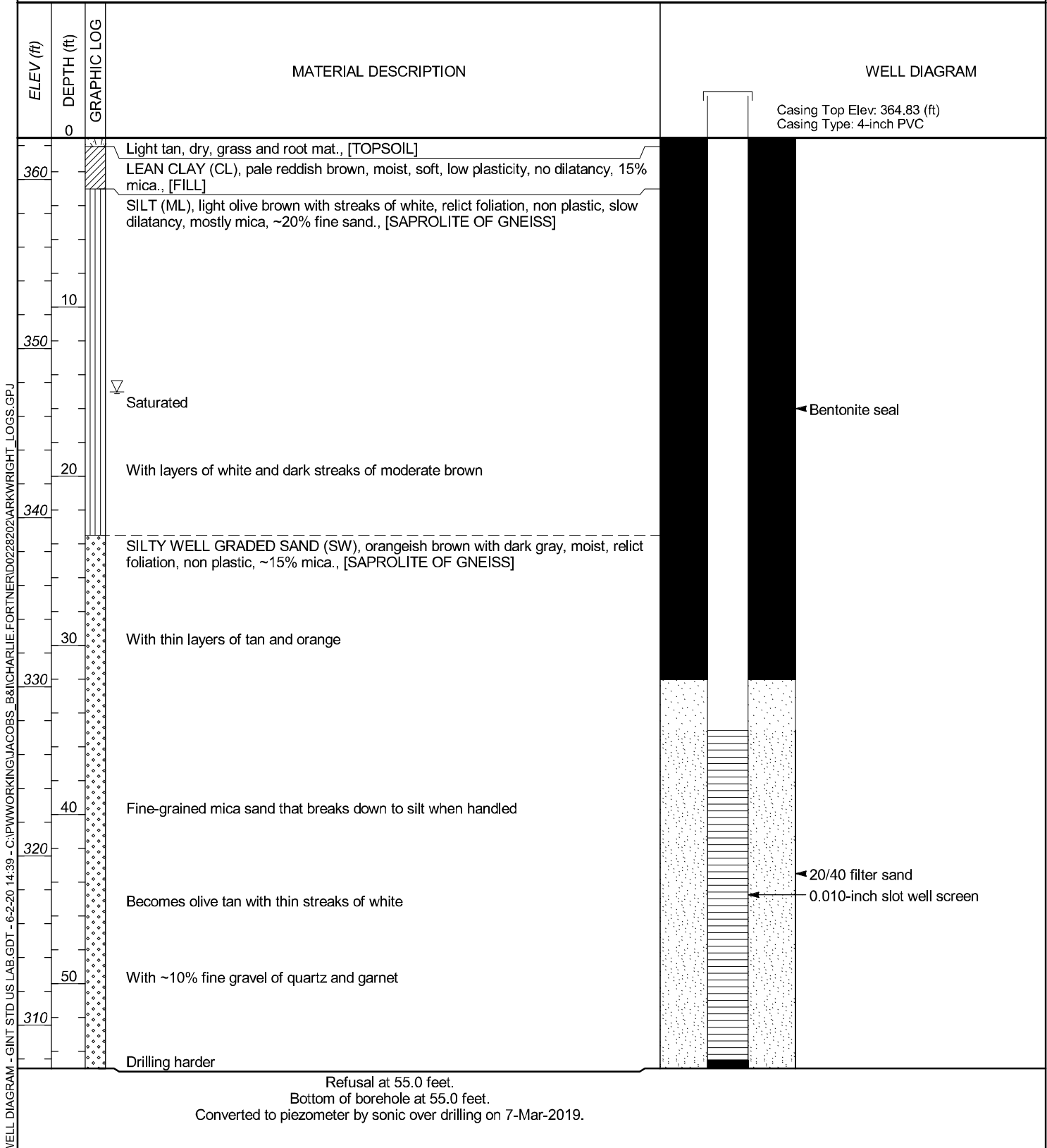
CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

Well Construction Diagram



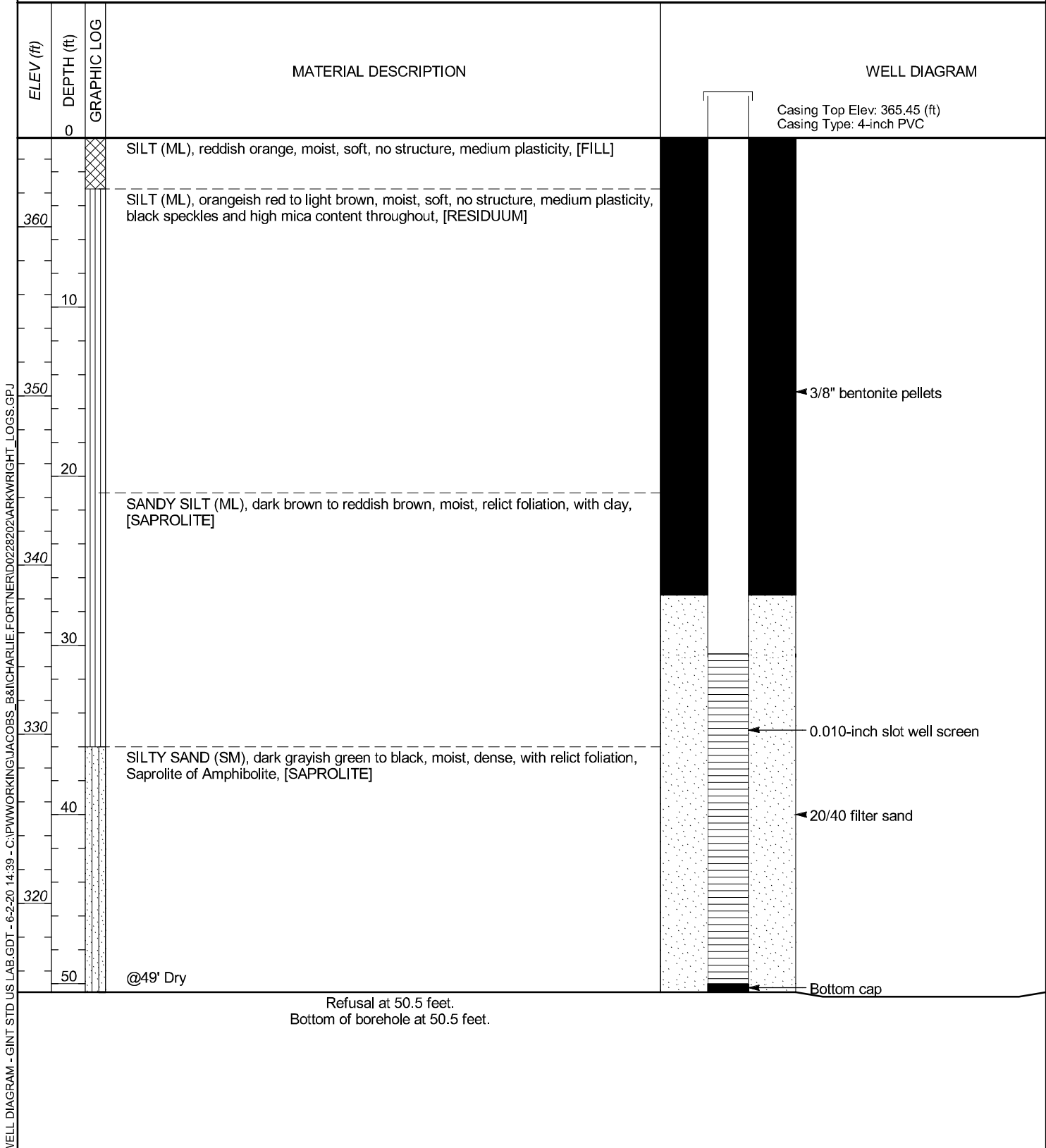
CLIENT Southern Company

PROJECT NAME Former Plant Arkwright

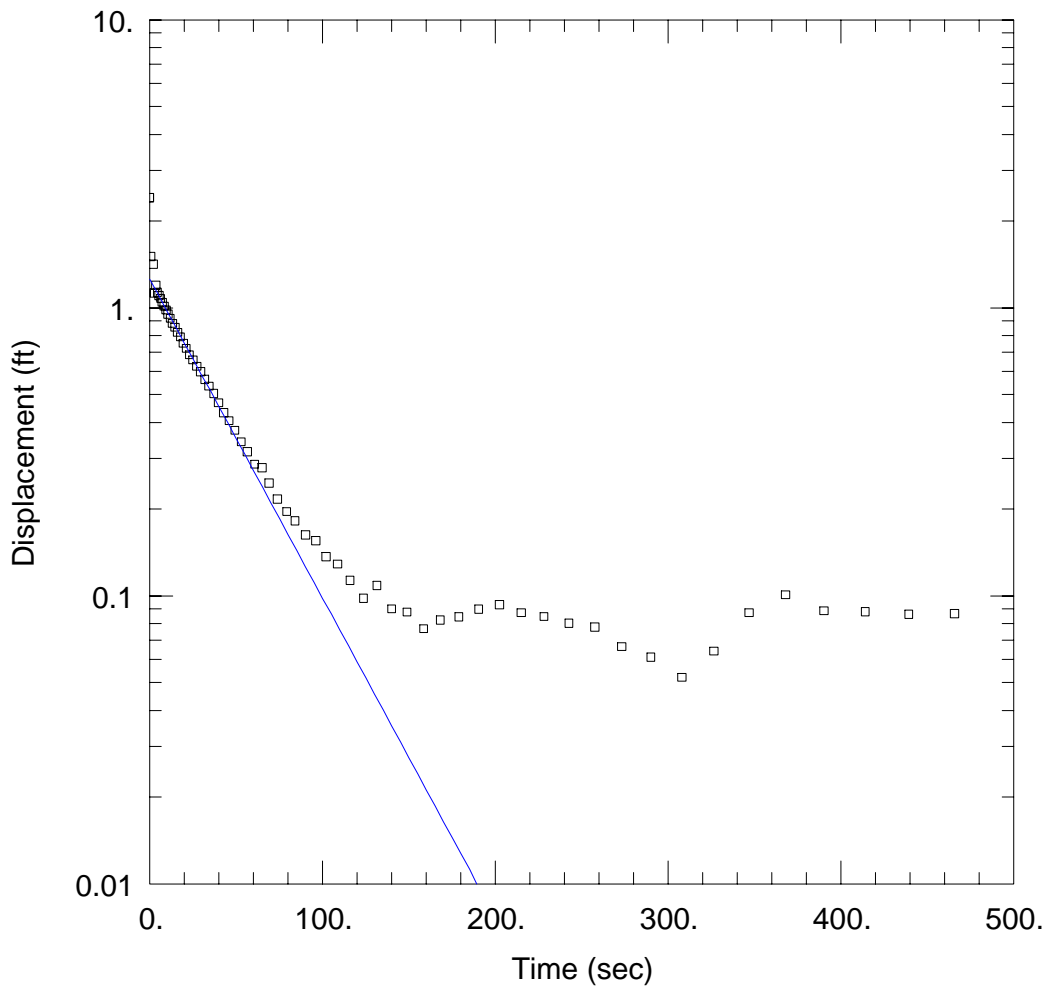
PROJECT NUMBER 5CGB4500

PROJECT LOCATION Macon, GA

Well Construction Diagram



Appendix F. Slug Test Data



WELL TEST ANALYSIS

Data Set: P:\...\CCRLF1 IN.aqt
 Date: 05/31/18

Time: 13:06:39

PROJECT INFORMATION

Company: Atlantic Coast Consulting
 Client: Plant Arkwright
 Location: Macon
 Test Well: CCRLF1 IN
 Test Date: 5/3/2018

AQUIFER DATA

Saturated Thickness: 100. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (CCRLF-1)

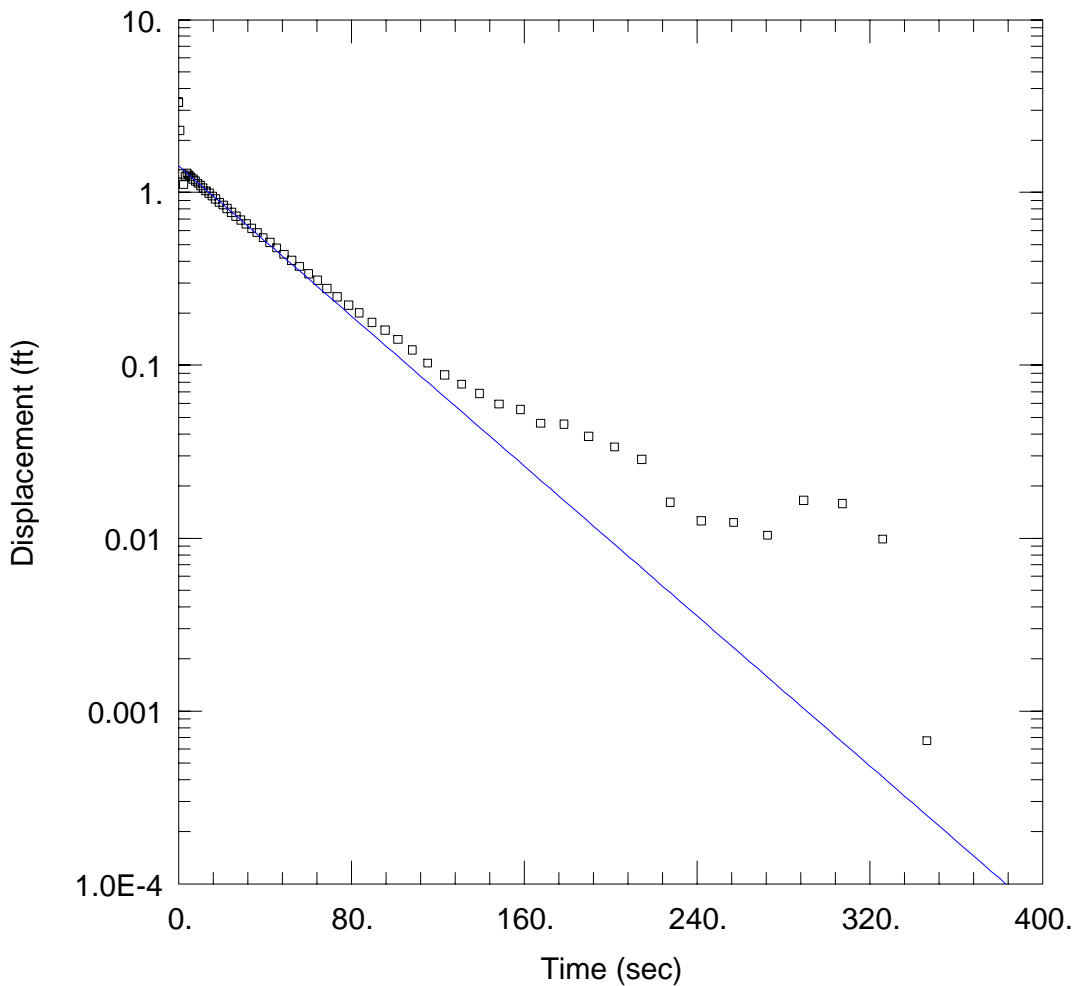
Initial Displacement: 2.41 ft
 Total Well Penetration Depth: 15.28 ft
 Casing Radius: 0.0833 ft

Static Water Column Height: 15.28 ft
 Screen Length: 10. ft
 Well Radius: 0.25 ft
 Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
 $K = 0.002275$ cm/sec

Solution Method: Bouwer-Rice
 $y_0 = 1.256$ ft



WELL TEST ANALYSIS

Data Set: P:\...\CCRLF1 OUT.aqt

Date: 05/31/18

Time: 15:05:01

PROJECT INFORMATION

Company: Atlantic Coast Consulting

Client: Plant Arkwright

Location: Macon

Test Well: CCRLF1 OUT

Test Date: 5/3/2018

AQUIFER DATA

Saturated Thickness: 100. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (CCRLF-1 OUT)

Initial Displacement: 3.329 ft

Static Water Column Height: 15.28 ft

Total Well Penetration Depth: 15.28 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

Gravel Pack Porosity: 0.3

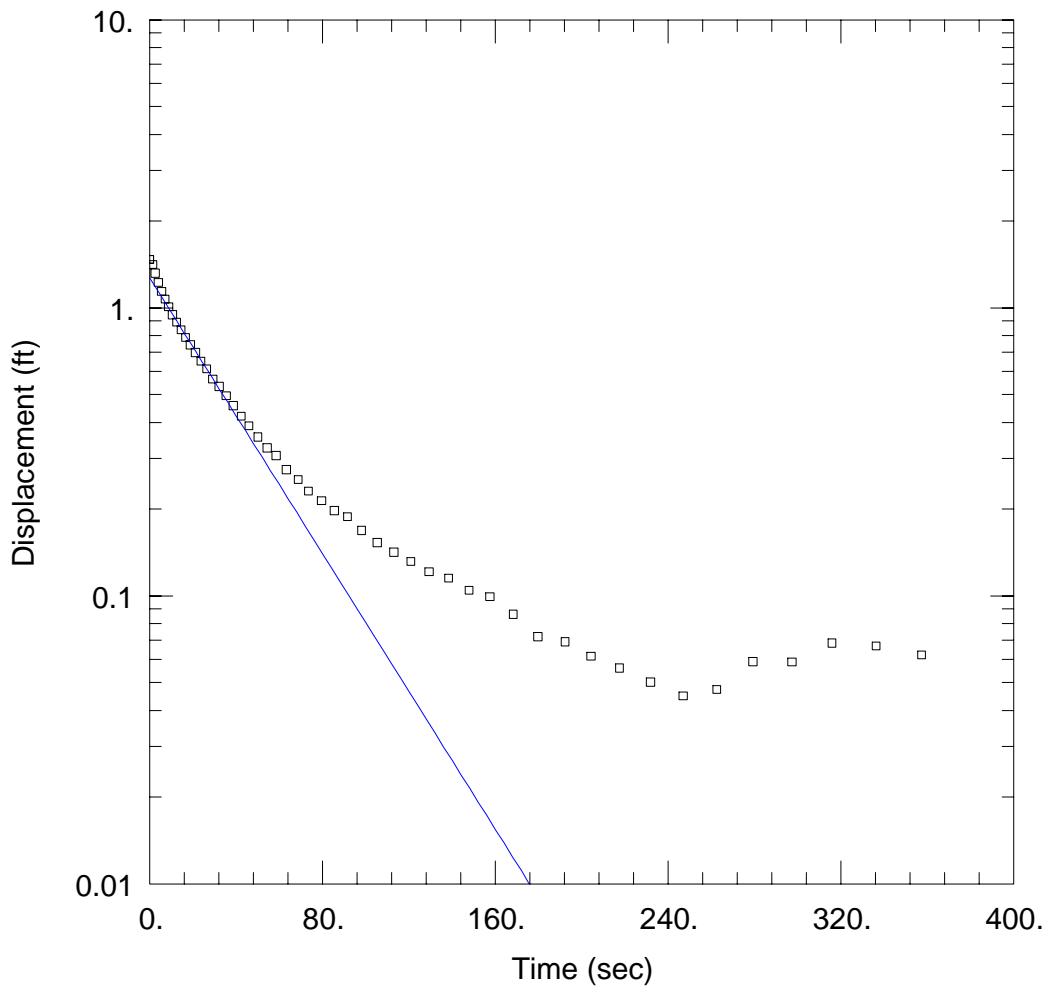
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.002227$ cm/sec

$y_0 = 1.419$ ft



WELL TEST ANALYSIS

Data Set: P:\...\CCRLF4 IN.aqt
 Date: 05/31/18

Time: 13:07:33

PROJECT INFORMATION

Company: Atlantic Coast Consulting
 Client: Plant Arkwright
 Location: Macon
 Test Well: CCRLF4 IN
 Test Date: 5/3/2018

AQUIFER DATA

Saturated Thickness: 100. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (CCRLF-4 IN)

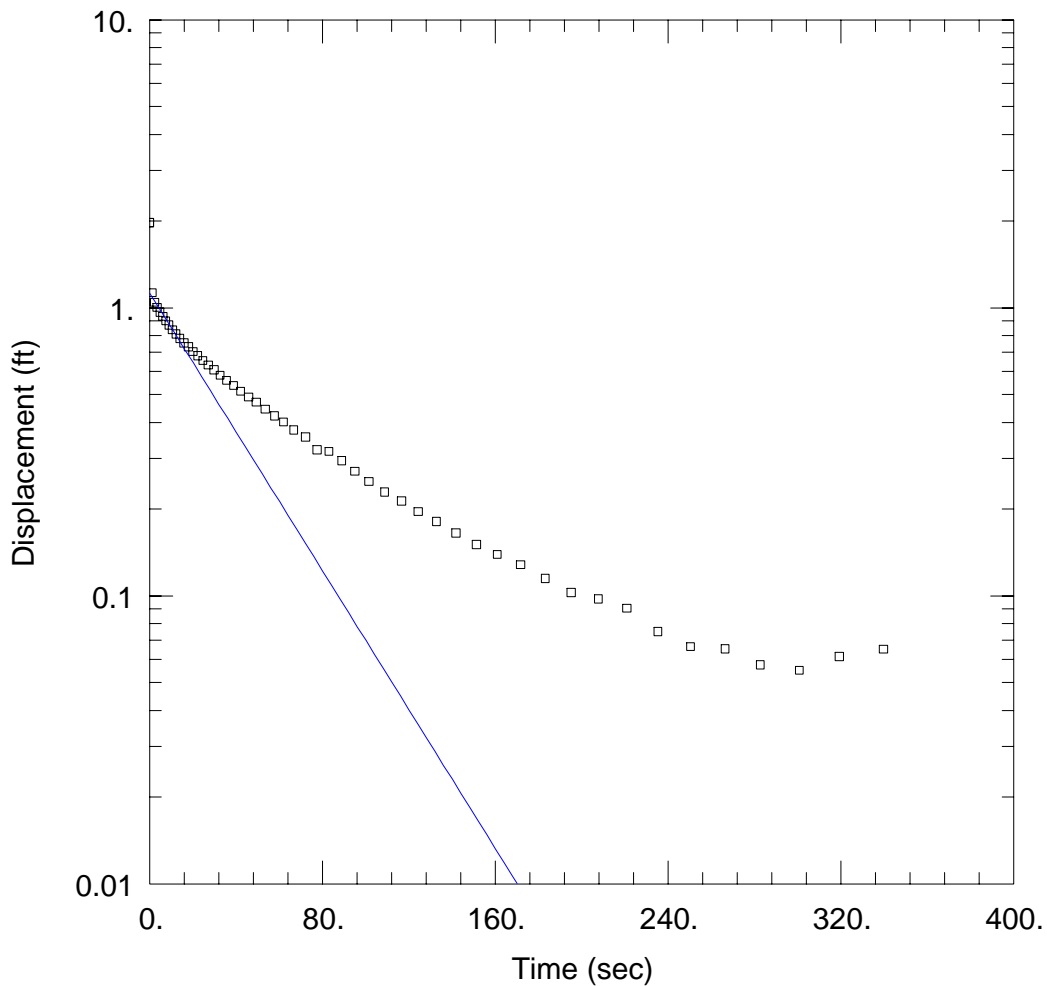
Initial Displacement: 1.473 ft
 Total Well Penetration Depth: 15.11 ft
 Casing Radius: 0.0833 ft

Static Water Column Height: 15.11 ft
 Screen Length: 10. ft
 Well Radius: 0.25 ft
 Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
 $K = 0.002451$ cm/sec

Solution Method: Bouwer-Rice
 $y_0 = 1.266$ ft



WELL TEST ANALYSIS

Data Set: P:\...\CCRLF4 OUT.aqt
 Date: 05/31/18

Time: 13:08:03

PROJECT INFORMATION

Company: Atlantic Coast Consulting
 Client: Plant Arkwright
 Location: Macon
 Test Well: CCRLF4 OUT
 Test Date: 5/3/2018

AQUIFER DATA

Saturated Thickness: 100. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (CCRLF-4 OUT)

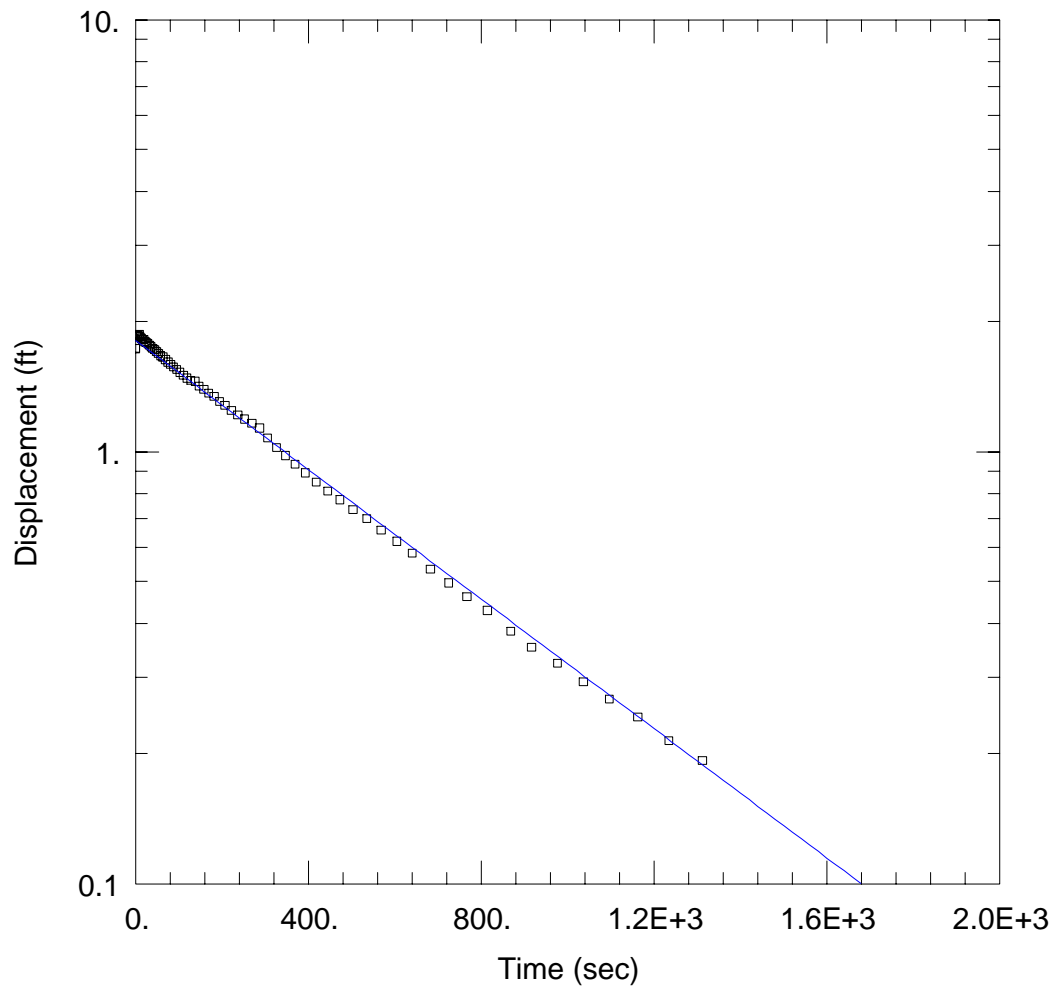
Initial Displacement: 1.974 ft
 Total Well Penetration Depth: 15.11 ft
 Casing Radius: 0.0833 ft

Static Water Column Height: 15.11 ft
 Screen Length: 10. ft
 Well Radius: 0.25 ft
 Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
 $K = 0.00247$ cm/sec

Solution Method: Bouwer-Rice
 $y_0 = 1.121$ ft



WELL TEST ANALYSIS

Data Set: P:\...\CCRLF5 IN.aqt

Date: 05/31/18

Time: 13:08:33

PROJECT INFORMATION

Company: Atlantic Coast Consulting

Client: Plant Arkwright

Location: Macon

Test Well: CCRLF5 IN

Test Date: 5/3/2018

AQUIFER DATA

Saturated Thickness: 100. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (CCRLF-5)

Initial Displacement: 1.73 ft

Static Water Column Height: 18.18 ft

Total Well Penetration Depth: 18.18 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

Gravel Pack Porosity: 0.3

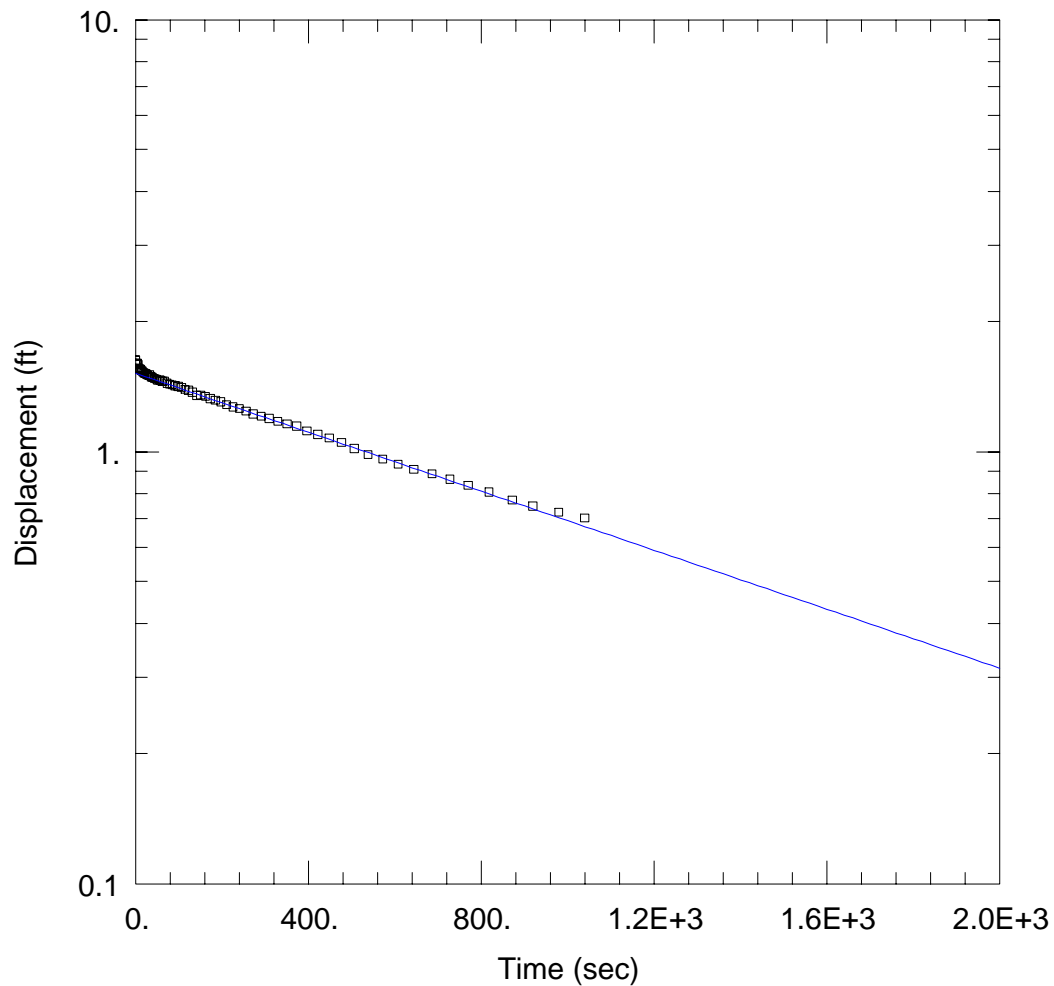
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 0.0001581$ cm/sec

$y_0 = 1.808$ ft



WELL TEST ANALYSIS

Data Set: P:\...\CCRLF5 OUT.aqt

Date: 05/31/18

Time: 13:09:28

PROJECT INFORMATION

Company: Atlantic Coast Consulting

Client: Plant Arkwright

Location: Macon

Test Well: CCRLF5 OUT

Test Date: 5/3/2018

AQUIFER DATA

Saturated Thickness: 100. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (CCRLF-5)

Initial Displacement: 1.628 ft

Static Water Column Height: 18.18 ft

Total Well Penetration Depth: 18.18 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

Gravel Pack Porosity: 0.3

SOLUTION

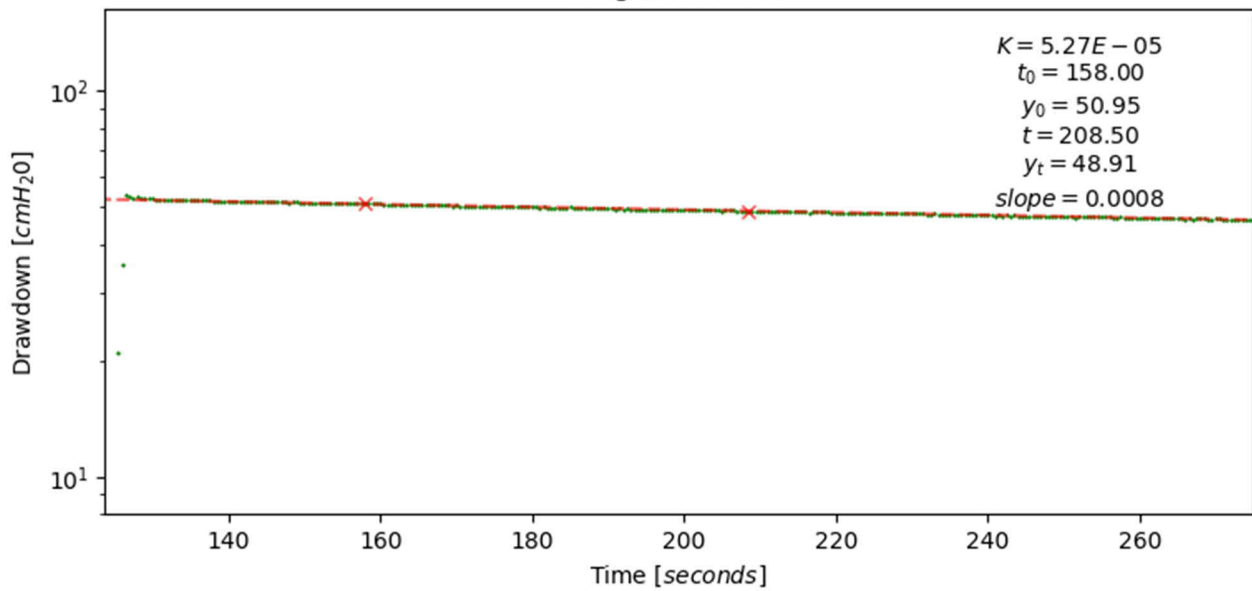
Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 7.208E-5$ cm/sec

$y_0 = 1.517$ ft

Slug test in P01



Slug test in P02

