HYDROGEOLOGIC ASSESSMENT REPORT (REVISION 01)

ASH POND 3 (AP-3)
PLANT HAMMOND
FLOYD COUNTY, GEORGIA

FOR

Georgia
Power

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LIST OF ACRONYMS

AP	Ash Pond
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulation
cm/s	Centimeters per second
EDR	Environmental Data Resources
EVS	Environmental Visualization System
ft bgs	Feet below ground surface
ft/day	Feet per day
ft/ft	Feet per foot
ft^2/d/ft	Square feet per day per foot
GA EPD	Georgia Environmental Protection Division
GEL	GEL Geophysics
Geosyntec	Geosyntec Consultants
Golder	Golder Associates
Georgia Power	Georgia Power Company
HAR	Hydrogeologic Assessment Report
K_h	Horizontal Hydraulic Conductivity
K_v	Vertical Hydraulic Conductivity
LETCO	Law Engineering Testing Company
LIDAR	Light Detection and Ranging
NRMSE	Normalized root mean square error
PVC	Polyvinyl Chloride
SCS	Southern Company Services
Spotlight	Spotlight Geophysical Services
SPT	Standard Penetration Test
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1. INTRODUCTION AND GENERAL SITE AREA

1.1 Introduction

Plant Hammond (Plant) is a former four-unit, coal-fired electric generating facility owned and operated by Georgia Power Company (Georgia Power). The Plant is located along the Coosa River, approximately 10 miles west of Rome, Floyd County, Georgia. The physical address of the Plant is 5963 Alabama Highway, Rome, Georgia, 30165. The Plant has been in operation since 1954 and over the course of power generation at the facility, four (4) Coal Combustion Residuals (CCRs) ponds, identified as ponds AP-1, AP-2, AP-3, and AP-4, were utilized. **Figure 1-1** shows a plan view of the Plant. Georgia Power submitted an Integrated Resource Plan to the Georgia Public Service Commission in January 2019 which called for the decertification of Plant Hammond and the four units. The Public Service Commission issued a supporting order for the Plant's closure in July 2019.

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published in the Federal Register requirements regarding the management and disposal of CCR titled "*40 CFR Parts 257 and 261: Hazardous and Solid Waste Management System; Disposal of Coal Combustible Residuals from Electric Utilities; Final Rule*" (i.e., the USEPA CCR Rule). The USEPA CCR Rule, which became effective on October 19, 2015, established regulations regarding the design, operation, closure, post-closure care, monitoring, and corrective action for inactive, existing and new CCR surface impoundments and existing and new landfills. In November 2016, the Georgia Environmental Protection Division (GA EPD) adopted amendments to the state's Rules for Solid Waste Management that address CCR (GA EPD 391-3-4-.10, i.e., the State CCR Rule). The State CCR Rule incorporates by reference most of the provisions of the USEPA CCR Rule.

AP-3 (or Site) is an inactive CCR surface impoundment located on the northeastern corner of the Plant property. Georgia Power closed AP-3 by capping it in place in second quarter 2018. A Hydrogeologic Assessment Report (HAR) was prepared for AP-3 in November 2018 and included in Section 2 of Part B of the closure permit application submitted the same month. The HAR was completed in accordance with relevant sections of the State and USEPA CCR Rule and provided information regarding the hydrogeologic conditions at AP-3 and supported the development of the monitoring well network for AP-3.

This HAR Revision 01 (HAR Rev. 01) is a stand-alone document, updating and replacing the original HAR. HAR Rev. 01 provides the documents included with the original HAR supplemented with additional hydrogeologic investigation results and groundwater data analysis. These include surface and borehole geophysical investigation results, groundwater modeling results, groundwater quality from the background and detection monitoring program, a most current conceptual site model, and groundwater monitoring well network information at the Site.

1.2 Description of the Area

The Plant occupies about 1,100 acres and is bordered by Georgia Highway 20 (GA-20) on the north, the Coosa River on the south, Cabin Creek and industrial land on the east, and sparsely populated, forested, rural and industrial land on the west. AP-3 is located at the northeast corner of the Plant and is surrounded by GA-20 on the north, AP-1 on the south, Cabin Creek on the east and Pisgah Church on the west.

AP-3 was constructed by Georgia Power in 1973 and 1974 covering a surface area of 25 acres. AP-3 was completely contained by an earthen embankment of approximately 4,000 feet in length and maximum embankment height of 28 feet. The embankment was constructed of sandy lean clay and gravelly sandy clay obtained from within the pond and from an offsite borrow source north of the Plant. The surface area of the pond at the design water surface elevation of 605 feet above mean sea level (ft MSL) was approximately 23 acres. Ash sluicing and placement operations at AP-3 commenced in June 1977. AP-3 was converted into a dry ash disposal area in 1982. In the early 1990's, the pond stopped receiving CCR materials, prior to the effective date of the CCR rule promulgated in April 2015. A notification of intent to initiate closure of the inactive CCR surface impoundment was submitted on December 7, 2015. AP-3 closure activities commenced in 2016 and were conducted in compliance with the USEPA CCR Rule requirements. Final capping of the pond with a low-permeability cover system was completed in the second quarter 2018.

1.3 Topographic Description and Geology

The Plant Hammond site is located in the Valley and Ridge Physiographic Province (Valley and Ridge) of northwest Georgia, which is characterized by Paleozoic sedimentary rocks that have been folded and faulted into the ridges and valleys that gave this region its name. The topography of the valleys and ridges reflects the underlying geology of the variably eroded and folded layers of alternating bedrock units. Ridges are composed of relatively erosion-resistant rocks such as sandstone, conglomerate, or chert whereas valley floors are underlain by more-easily eroded rocks such as limestone, dolomite, and shale.

Geologic mapping performed at the Plant by Petrologic Solutions, Inc. (Golder, 2018) indicates that the Site is underlain by the middle units of the Cambrian age Conasauga Formation (Ccls), consisting of mostly shaley or argillaceous limestone (referred to as limestone). Subsurface investigations at the Site generally describe the bedrock as limestone or shaley limestone. The geologic map prepared by Petrologic and Golder Associates (Golder) is included in **Appendix A**. Faults in the Valley and Ridge province are thrust faults, where sheets of limestone, sandstone, and shale have been pushed northwestward on top of each other for distances of tens of miles. The Rome fault, just to the north of the Site, is a major thrust fault extending hundreds of miles from Tennessee through Georgia and into Alabama. In the area of the Site, it has uplifted the older middle and lower units of the Conasauga Formation to the northwest and brought it into contact with the younger aged (Silurian, Devonian, and Mississippian) formations to the north. The faulting and displacement along the faults in this region occurred during the Paleozoic Era (approximately 250 million years ago) and are not considered to be active.

Generally, the property slopes gently southeastward towards the Coosa River and Cabin Creek, as shown in the topographic map in **Figure 1-2**. The natural topographic relief across the facility is less than 20 feet, with higher elevations north of the Site towards GA-20 (600 ft, relative to the North American Vertical Datum of 1988), and lower elevations south toward the Coosa River (580 ft). The artificial fill berms around the perimeter of AP-3 reach elevations of approximately 610 ft, with stacked and capped CCR within AP-3 reaching nearly 615 ft. Surface water drainage is oriented generally north to south in the area of the Site, with tributaries, including Cabin Creek, feeding into the westward flowing Coosa River.

2. SUBSURFACE INVESTIGATIONS

The following sections summarize subsurface investigations performed to characterize the hydrogeology beneath and surrounding AP-3, based on historic investigations.

2.1 Drilling and Sampling Program

Data from boring, piezometer, and monitoring well logs generated from multiple subsurface investigations are summarized in the soil and lithologic descriptions discussed in Section 3 below, and are also summarized in a series of geologic cross-sections presented in that section. Historical borings, piezometers, and wells located around AP-3 and nearby portions of AP-1 are shown on **Figure 2-1**. Boring and well construction logs are provided in **Appendix B**.

2.1.1 Georgia Power/LETCO Investigations (1976 and 1977)

Georgia Power and Law Engineering Testing Company (LETCO) performed soil boring, rock coring, piezometer installation, and observation well installation in 1976 and 1977 at AP-3. A total of 60 borings were advanced, and 26 piezometers and six observation wells were installed. These borings were advanced to depths of 7.5 to 100 feet below ground surface (ft bgs) and standard penetration tests (SPTs) were performed. These borings were generally located along the top and at the toe of the perimeter dike of AP-3.

Rock core borings were drilled using an NQ-size wireline core barrel (approximately 3.0-inch diameter borehole) and were terminated approximately 30 ft into rock. The purpose of the rock core borings was to aid in defining the contact between the unconsolidated overburden and bedrock, measurement of dips of bedding, jointing, and structural features in the bedrock.

Around mid-July 1977, seepage began occurring at AP-3 from a source within the pond. A rise in water levels were observed in piezometers located west of the embankment. Georgia Power immediately began investigations to determine and mitigate the cause of the seepage. The investigation involved installation of observation wells, rock coring (to define depth of rock, to measure dip angle of rocks, joints and structural features, and to install piezometers screened in the top of rock), permeability testing, dye tracer testing, and analysis of water samples for electrical conductivity and pH. The investigation results indicated that the water loss was likely occurring in the northwest-central portion of the pond through solution cavities in an area where borrow excavation extended close to the rock surface.

Documented historical water loss from AP-3 during the early stages of operation (late 1970's) were related to wet-sluicing and the likely presence of solution-enhanced joints and fractures in the underlying bedrock. These conditions were mitigated with repair of the area of water loss and conversion to dry-handling operations at AP-3 in 1982. No additional seeps, water loss, suspected cavities, or other issues have been encountered since the Plant's conversion to dry-handling in 1983. Additionally, the final engineered AP-3 closure measure, including removal of any free water and installation of a low permeability cover, was designed and constructed in a manner to minimize the potential for adverse effects on the structural components of the unit.

2.1.2 SCS Investigations (2010, 2014, and 2016)

Southern Company Services (SCS) conducted multiple site investigations to install groundwater monitoring wells and piezometers at the Plant. During the investigation in March 2010, SCS advanced 3 borings with SPTs to depths varying from 30 to 47 ft bgs to install piezometers at AP-3. During the investigation in 2014, seven wells and piezometers were installed at AP-3, which were advanced to depths of approximately 24 to 36 ft bgs. During the investigation in 2016, an additional two piezometers were advanced to depths of 35 ft bgs and 67 ft bgs at AP-3.

The borings installed by SCS during the 2014 field investigation were advanced using hollow-stem auger drilling methods and wireline rock coring. Boreholes were advanced through the unconsolidated overburden using the hollow-stem augers to the top of the bedrock surface. Piezometers were installed in these boreholes. At locations advanced into bedrock, a larger diameter PVC casing was installed and grouted in place to the top of the bedrock surface and HQ-size (approximately 3.75-inch diameter borehole) rock coring was used to reach target depths.

2.1.3 Golder Investigations (2015)

Golder installed piezometers west of AP-3 and around AP-1 in 2015. Samples were collected for geotechnical analysis during borehole drilling. The depth of piezometers range between 20 and 47.3 ft bgs. Piezometer installation was completed using rotasonic drilling and continuous core collection. Drilling was conducted using a 4-inch diameter core barrel and 6-inch diameter outer casing to advance boreholes to target depths. Piezometers were constructed of Schedule 40 PVC riser and 10-ft pre-packed slotted (0.010-inch) PVC screen. An approximately 2-ft thick seal of time-release coated bentonite pellets was placed above the filter pack, and the remaining annular spaced was grouted using a cement-bentonite grout via the tremie pipe method.

2.1.4 Geosyntec Investigations (2017)

Geosyntec Consultants (Geosyntec) performed field and laboratory investigations at the Site between January and February 2017. Thirteen (13) borings (AP3-B1 through AP3-B11[1]) were advanced to various depths into bedrock, using rotasonic drilling methods with a 4-inch diameter core barrel and 6-inch diameter outer casing and continuous core collection. All AP3-B borings (AP3-B-1 through AP3-B-11) were extended into the rock and terminated from 20 to 72 feet into unweathered limestone bedrock. The borings were located along the perimeter dike and within the footprint of AP-3. Borehole geophysical logging was conducted at four locations. Aquifer testing using slug tests and single-packer tests was performed at select locations. Boreholes were abandoned and sealed with bentonite at the conclusion of the field investigation.

2.2 Geophysical Investigations

In February 2017, Spotlight Geophysical Services (Spotlight) and GEL Geophysics (GEL) conducted surface geophysical and borehole geophysical investigations, respectively. The purpose of the geophysical investigations was to characterize lithologies and their physical properties, to determine depths and orientation of bedrock fractures, and to inspect for the presence of solution cavities in the rock underlying the pond.

Spotlight conducted a microgravity survey within the AP-3 footprint to evaluate the presence and lateral extent of subsurface anomalies that could be interpreted as karst features in the underlying bedrock. Additionally, microgravity can be used to identify low-density features within the unconsolidated material. Microgravity data were acquired along nine survey lines within AP-3. The survey lines were oriented in a north-south direction and spaced approximately 100 feet apart with measurement stations marked at 20-foot spacing along the survey lines. Details of the microgravity survey are included in **Appendix C**. The results of the microgravity survey are discussed in Section 3.

GEL performed borehole geophysical logging in four boreholes (AP3-B-2, AP3-B-3, AP3-B-4, and AP3-B-9) located within AP-3. The boreholes were installed by Geosyntec as part of the 2017 investigation (**Figure 2-1**). The borehole geophysical survey included acoustic televiewer, 3-arm caliper, and impeller flow meter. Natural gamma and borehole

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[1] Location AP3-B6 consisted of three clustered temporary piezometers (shallow, intermediate and deep), hence the total count of 13 borings.

video logging were conducted in borehole AP3-B-9. The borehole geophysical logging was conducted to further evaluate the no recovery zones or soft zones encountered in the boreholes during drilling. Borehole geophysical data were analyzed for fractures and other features using WellCAD software. The borehole geophysical investigation results are discussed in Section 3. Details of GEL's geophysical logging are included in **Appendix C**.

2.3 Hydraulic Conductivity Testing

Aquifer testing was conducted by LETCO in 1977, SCS in 2014, and Geosyntec in 2017 to evaluate hydraulic conditions in the vicinity of AP-3. Horizontal hydraulic conductivity (K_h) testing was conducted using slug testing for lithologic units above the top of bedrock. Single packer testing was used to estimate K_h for bedrock intervals. K_h values estimated by the Bouwer-Rice method were used to calculate the mean hydraulic conductivity for each lithologic unit. Geosyntec collected undisturbed samples from the residuum for vertical hydraulic conductivity (K_v) testing.

3. SUBSURFACE INVESTIGATION RESULTS

The following sections present a summary of results from the drilling and sampling program, surface and borehole geophysical investigations, and hydraulic conductivity testing.

3.1 Description of Geologic Conditions

Previous subsurface investigations identified five (5) lithologic units in the area of AP-3 in addition to the CCR. From top to bottom, these units are: fill, terrace alluvium, residuum, highly weathered/fractured limestone bedrock, and limestone bedrock. The extent of these units across the site is presented in cross-sections A-A', B-B', C-C', and D-D', presented as **Figures 3-1A** through **3-1D**, respectively. **Table 3-1** summarizes construction details for borings, piezometers, and wells at the Site that are included in the geologic cross-sections. Boring logs for locations shown on the cross-sections are included in **Appendix B**. The cross sections presented on Figures 3-1A through 3-1D illustrate post-closure conditions (i.e., AP-3 capped); the cross sections included with the original HAR, which depicted pre-closure conditions, are included in **Appendix D**.

The units below the CCR are described in the following paragraphs in more detail, noting their composition and thickness. Unit descriptions are mainly from the more recent subsurface investigations (Geosyntec in 2017) and unit thickness ranges were compiled from all borings used to compose the geologic cross-sections.

3.1.1 Fill

Fill material was used to construct the perimeter dikes of AP-3 and was encountered in five AP3-B borings (AP3-B-1 through AP3-B-5). Fill thickness ranged from 17 to 44 feet in AP3-B borings. The fill is composed mostly of lean clay or gravelly lean clay with sand, sometimes identified by the presence of wood or roots. Variable classifications for three samples submitted for laboratory testing, ranged from well-graded sand with silt, to sandy lean clay, to gravelly fat clay with sand.

3.1.2 Terrace Alluvium

The terrace alluvium consists of unconsolidated sediments associated with deposition from the Coosa River and Cabin Creek and was encountered in three of the AP3-B borings (AP3-B-1 through AP3-B-3). Thicknesses of alluvium noted in the geologic cross-sections ranged from 3 to 18.5 ft. Three samples collected from Terrace Alluvium and submitted for laboratory testing resulted in variable classifications, including clayey sand, sandy clay, and gravelly silty clay.

3.1.3 Residuum

Residual or native soils have been derived from in-place weathering of the limestone bedrock. All 13 of the 2017 Geosyntec borings (AP3-B-1 through AP3-B-11) encountered a residuum unit above the limestone bedrock, with thicknesses noted in the geologic cross-sections ranging from 3 to 27 ft. The residuum was generally described in the field as fat clay with typically only trace amounts of sand, and rarely gravel. Sixteen residuum samples were collected from borings AP3-B-1 through AP3-B-9 for classification purposes. Thirteen of the sixteen samples classified as fat clay, with two of these containing more than 15 percent sand (fat clay with sand, and sandy fat clay). The remaining three samples classified as either sandy lean clay or elastic silt. Laboratory results agreed with field descriptions, with most samples containing no gravel, and most containing less than 3 percent sand.

3.1.4 Highly Weathered/Fractured Limestone Bedrock

The highly weathered/fractured limestone zone occurs as an intermediate weathering stage between the residuum and the unweathered limestone bedrock. Just below the residuum clay layer of completely weathered rock is a gradational zone of varying proportions of clayey residuum and sand, gravel, and cobble-sized angular pieces of partially weathered limestone, grading into a zone of fractured limestone, before grading into unweathered, fresh limestone. The upper highly weathered zone appears more as residuum with various sized rock fragments. The lower zone becomes less clayey with depth and is approximately 5 feet thick.

Samples were collected from the highly weathered/fractured limestone interval from AP3-B-2 and AP3-B-6 for laboratory classification. The AP3-B-6 sample collected from 64 to 65 feet contained a large amount of clay and classified as a sandy lean clay, with approximately 33 percent sand and some gravel. The AP3-B-2 sample was collected from a more gravel rich zone in this unit, classifying as a silty gravel with sand, with approximately 87 percent gravel and sand.

3.1.5 Limestone Bedrock

The limestone bedrock encountered during the Geosyntec field investigation was very similar in composition and texture between borings. Infrequently the limestone had a more massive appearance, but most of the limestone was medium to dark gray with a slabby or flaggy habit when broken in pieces by the sonic drilling. The limestone was very finely laminated with lighter and darker gray layers and contained interbeds of calcareous shale.

Drilling observations and borehole geophysical logging indicated that the bedrock is generally solid with numerous bedding plane fractures and joints. Solution openings, likely formed by dissolution of the limestone along the bedding planes and joints, were observed in prior investigations. Most of these features were noted in boring logs as filled with clay, mud, or other sediment. The backfilling of the borings advanced during the 2017 geophysical investigation discussed in Section 2.1.4 was routine and easily accomplished using an anticipated volume of bentonite material generally equivalent to the borehole volume. This is indicative that the mud filled soft zones encountered within the unweathered limestone during drilling were consistent with the conceptual site model and attributed to the weathering of shaley limestone layers within the Conasauga Formation along bedding plains and joints, and not representative of extensive open cavities within the bedrock formation.

3.2 Summary of Geophysical Investigation Results

The microgravity data indicated a strong gradient from high to low Bouguer gravity values inward from the edges of AP-3. This gradient is due to low-density ash surrounded by relatively higher-density clay (fill or residuum) and shaley limestone bedrock. Low gravity values are concentrated in the southern half of AP-3, with the lowest values forming a west/southwest to east/northeast trend. The low-gravity anomaly may be associated with a concentration of mud-filled cavities in the shaley limestone. Soil boring AP3-B-9, which encountered mud-filled zones in the bedrock, is located within this low gravity anomaly area. Borings AP3-B-10 and AP3-B-11 were added to the drilling program to further evaluate this low microgravity zone. Consistent with the conceptual model for the site, similar no recovery/soft material zones within the limestone bedrock were encountered at these two borings and no evidence of large open cavities within the bedrock was observed (**Figures 3-1A** through **3-1D**). Small pockets of low gravity were measured north of the berm at the western side of AP-3. Geophysical investigation reports are provided in **Appendix C**.

Borehole geophysics at select locations were used to further evaluate the subsurface conditions and to supplement the microgravity survey. The investigation results from locations AP3-B-2, B-3, B-4, and B-9 indicated that aside from the few solution openings in the borings that are on the order of a few inches up to almost a foot, the limestone bedrock within these borings is solid with numerous bedding plane fractures or partings on the scale of only millimeters or less. Comparison of solution openings in other borings indicate that the fractures are not laterally continuous.

3.3 Description of Hydrogeologic Conditions

Hydrogeologic regimes in the Valley and Ridge are characterized by three lithologic units that develop as the solid sedimentary rock weathers in place. From the surface, these units are the residuum, the interface between the soil and the competent bedrock, and the competent unweathered bedrock. These units form an unconfined aquifer and groundwater table contours generally mimic the land surface, with topographic highs forming groundwater divides and perennial streams forming linear lows in the water table.

The Valley and Ridge aquifers are recharged by precipitation falling on outcrop areas, through residual soils to the bedrock, or directly onto bedrocks on valley floors. The precipitation percolates downward through the residuum, slowly infiltrating to the highly weathered/fractured bedrock, and then moving primarily as flow along steeply inclined fractures or solution conduits developed by dissolution of the rock along joints and bedding planes. The rate of this infiltration is generally considered to be very slow, as the clay-rich residuum present across most of the Site retards recharge from the uppermost aquifer into the highly weathered and fractured underlying bedrock.

The uppermost aquifer at AP-3 is an unconfined regional groundwater aquifer that occurs in the residuum and within the highly weathered and fractured bedrock. Based on the June 2020 measurement, depth to groundwater in the uppermost aquifer ranges from approximately 8 ft bgs upgradient of AP-3 to approximately 14 ft bgs downgradient of AP-3. Depth to groundwater on top of the embankment averaged 39 ft bgs. Under capped conditions the water table surface is expected to be a subdued reflection of the topography, with groundwater generally flowing east.

Based on field observations of the residuum, laboratory soil classification of the residuum as fat clay, and low horizontal hydraulic conductivity values (discussed in Section 3.3.2 below), the movement of groundwater in the residuum, and to a degree the highly weathered bedrock zone, can be characterized as low-permeability, porous media flow. Groundwater flow in the underlying bedrock is characterized as fracture flow.

The limestones of the Conasauga Formation may potentially be affected by dissolution of the carbonate rock units present throughout the region. However, in a review of 7.5-minute USGS topographic maps (Rock Mountain, GA and Livingston, GA) of the area identified as potentially karst in the vicinity of AP-3, the typical surface expressions of karst features, such as sinkholes and sinking or disappearing streams are not exhibited. The presence of few springs and wet-weather seeps in western Floyd County suggests that while karst processes have occurred in the region, large-scale karst dissolution features are not a major influence on local groundwater flow and hydrogeology.

3.3.1 Groundwater Levels

The potentiometric surface map from June 2020 (**Figure 3-2**) presents available groundwater elevations measured from the existing monitoring wells and piezometers in and around AP-3. The June 2020 dataset represents typical groundwater elevation and flow direction noted around AP-3. Groundwater flows generally towards the east with a hydraulic gradient of approximately 0.011 feet per foot (ft/ft), calculated from June 2020 groundwater elevations along the direction of groundwater flow between well pair MW-21 and HGWC-125.

3.3.2 Hydraulic Conductivity of Lithologic Units

Results of hydraulic conductivity testing are summarized in **Table 3-2**. Hydraulic conductivity testing results are included in **Appendix E**. The following paragraphs discuss the estimated hydraulic conductivity values of lithologic units in more detail.

Fill: Eight K_h measurements were available from previous slug testing performed by LETCO (1977). K_h values of the fill ranged from 7.6×10^{-7} to 1.0×10^{-5} centimeters per second (cm/s), with a geometric mean of 3.3×10^{-6} cm/s.

Terrace Alluvium: Four K_h measurements from slug testing (LETCO, 1977) were available for the terrace alluvium material, ranging from 4.3×10^{-5} to 3.8×10^{-4} cm/s, with a geometric mean of 2.1×10^{-4} cm/s.

Residuum: Thirteen (13) slug tests were conducted on wells screened in the residuum: eight by LETCO (1977), four by SCS (2014), and one by Geosyntec (2017). The K_h results ranged from 6.1×10^{-7} to 3.6×10^{-3} cm/s, with a geometric mean of 1.5×10^{-4} cm/s. Geosyntec conducted six permeability tests on Shelby tubes collected from the residuum, yielding K_v measurements ranging from 1.0×10^{-7} to 1.4×10^{-6} cm/s, with a geometric mean of 2.9×10^{-7} cm/s. The K_v for the clay residuum is more than two orders of magnitude lower than the K_h.

Highly Weathered/Fractured Limestone Bedrock: K_h values were available from slug tests conducted by LETCO (1977) on piezometers screened across the bottom of residuum and the top of bedrock. The K_h values range from 5.1 x 10^{-5} to 2.4 x 10^{-2} cm/s, with a geometric mean of 9.8 x 10^{-4} cm/s.

This zone of fractured limestone just between the highly-weathered residuum/limestone horizon and the unweathered limestone, is likely the zone of predominant groundwater flow in the subsurface. The existing groundwater monitoring network targets this higher flow zone for placement of groundwater well screens (discussed in Section 4.3).

Limestone Bedrock: K_h values were estimated from the single-packer testing conducted in five boreholes and slug testing completed in two piezometers. The K_h values ranged from 5.0 x 10^{-5} to 2.9 x 10^{-3} cm/s, with a geometric mean of 4.5 x 10^{-4} cm/s.

3.3.3 Hydraulic Gradient and Groundwater Flow Velocity

The calculation of groundwater flow velocity was made using representative hydraulic gradients and effective porosity values, and both average and highest observed hydraulic conductivity values. The representative hydraulic gradient for AP-3 in June 2020 is 0.011 ft/ft, measured across the AP-3 site along the direction of groundwater flow between well pair MW-21 and HGWC-125. An effective porosity of 0.15 was used to represent average AP-3 conditions for the highly weathered limestone, based on published ranges for materials (Heath, 1983 and Morris and Johnson, 1967) and professional judgement.

Groundwater flow velocity calculations were performed using the geometric mean value for K_h of the highly weathered/fractured rock of 9.8 x 10^{-4} cm/s, or 2.76 feet per day (ft/day), and a highest observed value for K_h of 2.4 x 10^{-2} cm/s or 66.6 ft/day, a hydraulic gradient of 0.011 ft/ft, and an assumed effective porosity of 0.15. These calculations yielded a groundwater flow velocity of 7.1 x 10^{-5} cm/s or 0.20 ft/day for typical (average) AP-3 conditions, and 1.7 x 10^{-3} cm/s or 4.7 ft/day in highest observed conditions.

3.3.4 Description of Confined Aquifers

No confined aquifers were encountered at AP-3. The uppermost aquifer is considered as unconfined; however, localized, semi-confined conditions may be encountered due to the low-permeability clayey nature of the residual soils, or as a result of perched groundwater or poorly interconnected fracture networks in the bedrock.

4. CONCEPTUAL SITE MODEL AND GROUNDWATER MODELING

4.1 Conceptual Site Model

AP-3 is underlain primarily by five lithologic units; (i) fill material, (ii) terrace alluvium, (iii) residuum, (iv) highly weathered/fractured limestone bedrock, and (v) unweathered limestone bedrock. The uppermost aquifer at AP-3 is an unconfined aquifer that occurs in the residuum and within the highly weathered and fractured bedrock. The aquifer is recharged from infiltration of precipitation and from release of stored water in the lower permeability residuum to the underlying units. Groundwater flow in the uppermost aquifer occurs primarily in the highly weathered limestone and in the solution-enhanced joints in the competent bedrock. Localized preferential flow may also occur in the coarse facies of the terrace alluvium, but this unit is not laterally extensive across AP-3. Groundwater flow direction is controlled primarily by the regional groundwater flow regime. Flow is generally from west to east as shown in the potentiometric surface map in **Figure 3-2**.

Solution openings observed in borings, through drilling and borehole geophysical investigation, likely formed by dissolution of limestone along the bedding planes and joints. The openings are mostly filled with mud and, based on collective review of Site boring logs, are not laterally continuous. Due to the discrete and discontinuous nature of these solution features, linear preferential flow pathways for groundwater are not expected, but rather flow is along the highly weathered bedrock unit atop the underlying competent bedrock.

Dissolution of the limestone bedrock takes place over geologic time, on the order hundreds of thousands of years. The solution features present at the Site are not expected to be actively enlarging. Structural instability due to karst features in similar environments are typically due to a combination of mechanisms that favor displacement of the residuum and surface soils. These mechanisms involve (i) an elevated water table resulting in increased head pressure and downward seepage gradients; (ii) the collapse or erosion of residuum into the solution-enhanced joint system due to the downward seepage forces and gravity; and (iii) the progressive upward propagation of downward soil collapse or erosion under the forces of downward seepage and gravity. When all these mechanisms are present, displacement is possible. However, if one or more of these conditions are mitigated, then these mechanisms are decoupled from the process and the risk of displacement is substantially reduced.

AP-3 was closed in place in compliance with the State CCR Rule and the USEPA CCR Rule. This was accomplished by dewatering sufficiently to remove the free liquids and to an extent to provide a stable base for the construction of the final cover system. The final cover system consists of a 60 mil High Density Polyethylene (HDPE) liner, geo-composite drainage media, a minimum 18-inch protective soil cover, and a 6-inch vegetative cover to establish vegetation. The final closure of AP-3 with this low-permeability cover system eliminates recharge within the footprint of the impoundment. This cover system, along with removal of the free water in nearby AP-1 during closure of that impoundment, is expected to reduce groundwater levels and the hydraulic gradient in the vicinity of AP-3. These engineering measures have also mitigated the factors that would contribute to conditions that may lead to displacement as discussed above.

4.2 Groundwater Modeling

In 2017, Geosyntec created a three-dimensional (3D), steady-state groundwater numerical model of the AP-3 site. The objectives of the numerical groundwater flow modeling were: (i) to construct a steady-state groundwater model of the Site that is calibrated to representative groundwater conditions; and (ii) to simulate groundwater conditions within AP-3 under the final closure scenario. The following sections discuss aspects of the numerical model, which are detailed in the groundwater modeling report provided in **Appendix F**.

4.2.1 Summary of Model Construction

The numerical groundwater flow model is conceptualized as a single aquifer system, composed of ash and 5 geologic layers (i.e., fill, terrace material, residuum, highly weathered rock, and unweathered limestone). The geological layers were further vertically discretized to better evaluate flow in the model domain. The geometric mean of K_h discussed in Section 3.3.2 was used for the fill, and residuum. Based on boring logs and microgravity survey results, K_h of terrace material, highly weathered rock, and highly fractured rock were altered to more appropriately represent the materials (e.g. gravel or fractures that may indicate a greater than average hydraulic conductivity value than suggested by the geometric mean of measured values) found in these zones. The bottom of AP-3 was determined using as-built drawings.

The modular, 3D, finite difference groundwater flow model (MODFLOW), created by the USGS, was used as the modeling program to simulate groundwater flow. Specifically, a Newton formulation of MODFLOW, MODFLOW-NWT (Niswonger, et al., 2011) was utilized because of its capabilities in solving non-linear equations associated with unconfined aquifers and non-linear boundary conditions, conditions relevant to the Site. The well package, constant head package, and the drain package (Niswonger, 2011) were used to simulate wells, rivers/creeks, and ephemeral steams, respectively. The recharge package (Niswonger, 2011) was used to simulate recharge. Parameter estimation software (PEST) is a model independent parameter estimation program (Watermark Numerical Computing, 1994) that was used during the calibration process to assist in estimating model parameters such as hydraulic conductivity. Since MODFLOW assumes groundwater flow in a porous medium (not fractures), it is necessary to understand the scale of the fractured rock system where groundwater flow is the same as in a porous medium. Therefore, borehole geophysical data were reviewed to evaluate the average open fracture spacing. The evaluation indicated that in the borings where geophysics data were available that the average open fracture spacing varied from 0.25 to 0.65 fractures per foot with an average of 0.45 fractures per foot.

The model domain consists of 344 rows, 344 columns, and 9 vertical layers. The model cell size varies from approximately 10 ft by 10 ft near AP-3 and telescopes outward toward the model boundary (i.e., illustrated on Figure 16, **Appendix F**). The model boundaries generally consist of (i) a topographic ridge located north and west of the Site; (ii) an unnamed ephemeral stream along the western boundary of AP-2; (iii) the Coosa River south of the Plant; and (iv) Cabin Creek east of the Site. Ground surface elevations were based on a combination of actual ground surface topography from publicly available regional LIDAR data and a Site topographic map. Lithology and layer elevations of the five geologic units were based on boring log descriptions and historical maps of AP-3 construction. Data from these sources were imported into a 3D visualization software Environmental Visualization System (EVS) and interpolated to create surfaces for the top and bottom of each model layer. In general, a minimum model layer thickness of 0.1 ft was applied to areas where interpolation of artificial pinch-outs was created due to a lack of geological data control points, or where physical pinch-outs of geologic units were observed (e.g. terrace material directly beneath AP-3). Groundwater monitoring wells were assigned to model layers based on their screen elevations.

The Coosa River and Cabin Creek were modeled by assigning a constant head boundary condition. The topographic ridge located north and west of the Site was assigned a no flow boundary condition as surface water runoff appears to collect in streams or water bodies on either side of the ridge. AP-1 and AP-2 were both modeled as constant head boundary conditions.

A USGS recharge study performed for the Coosa River basin (USGS, 1996) estimated that the average recharge rate for the entire basin was 13.2 inches per year, but may be as low as 3.2 inches per year during droughts. These recharge estimates were used as bounds for calibration of recharge within the model domain. For example, the area north of Cabin Creek was assigned a recharge of 13.2 inches per year as it is the headwaters area for Cabin Creek. AP-3 was assigned a recharge rate of 3.7 inches per year. This recharge rate depicts groundwater model baseline conditions during a period when the AP-3 cover system was incomplete (i.e., February 9, 2017). This value was assigned to reflect that rainfall is directed to an inner perimeter stormwater collection system.

The model was calibrated to groundwater elevation targets based on measurements at monitoring wells and surface water locations made by Geosyntec on February 9, 2017. The groundwater flow model was calibrated to the actual on-site groundwater conditions by setting drain conductance to 10 square feet per day per foot ($ft^2/d/ft$) and then modifying recharge and hydraulic conductivity using PEST version 13.6 (USGS, 1994) to allow the named parameters to vary within measured ranges until the best statistical fit between measured and observed head elevations was obtained. The model was considered calibrated once simulated output closely approximated observed field conditions (e.g., inferred groundwater flow directions, groundwater gradients, groundwater elevations at monitoring wells observed on Site), and when calibration statistics indicated a low residual mean error and a normalized root mean square error (NRMSE) less than 10%. NRMSE is used to measure the difference between observed groundwater values and model predicted values. The smaller the difference between observed and predicted values, the smaller the NRMSE percentage. Typically, groundwater models are considered calibrated when NRMSE is less than 10%.

4.2.2 Predictive Simulations of the Groundwater Model

After calibration, the groundwater model was used to evaluate the predictive scenario for pre-closure conditions (i.e., calibration run) and final closure design at steady state.

4.2.2.1 Scenario 1: Existing Condition (Base Case, Pre-Closure)

This scenario is the calibrated model representing the conditions present at the Site before completion of the cover system, i.e. the “existing condition” at the time of model construction (i.e., 2017). This is shown on **Figure 4-1**.

4.2.2.2 Scenario 2: Install Cover at AP-3; AP-1 at Current Pool Level (Post-Closure)

Scenario 2 represents the conditions at the Site following completion of the cover system at AP-3 but prior to the dewatering and closure of AP-1. Under this scenario, recharge over AP-3 was reduced to zero and the constant head boundary condition at AP-1 was set at 585.09 ft to represent the pool water level measured February 9, 2017, as described in the enclosed modeling report.

4.2.2.3 Scenario 3: Install Cover at AP-3 and Drain AP-1 (Post-Closure)

Scenario 3 represents the conditions at the Site following completion of the cover system at AP-3 and the anticipated closure of AP-1. Under this scenario, recharge over AP-3 was reduced to zero and the constant head boundary condition at AP-1 is removed to represent the removal of free water and closure of that unit. The results shown on **Figure 4-2**.

4.3 Rationale for Certified Monitoring Well Network

The groundwater monitoring well network at AP-3 was intended to monitor the uppermost aquifer at the Site and provide early detection of potential releases of CCR-impacted groundwater from the unit. Based on hydrogeologic data collected at the Site, as well as the conceptual site model for groundwater flow, groundwater flow velocities are expected to be significantly higher in the highly-fractured limestone zone than in the overlying low permeability terrace alluvium and residuum. Therefore, the monitoring wells were screened in the highly weathered bedrock and upper portion of the bedrock, where the primary groundwater flow is likely to occur and thus the greatest likelihood of early detection of any releases. If releases were to occur at AP-3, it is anticipated that they would be via diffuse flow through this zone, rather than along linear flow pathways. Therefore, evenly spaced wells in the downgradient direction are appropriate. The location of the wells was selected based on the prevailing groundwater flow direction in the vicinity of AP-3 using groundwater elevations recorded during background monitoring. The monitoring wells included in the compliance monitoring well network are shown in **Figure 4-3** and the monitoring well construction details shown in **Table 4-1**. Seven wells (i.e., HGWA-1, HGWA-2, HGWA-3, HGWA-43D, HGWA-44D, HGWA-45D, and HGWA-122) are designated for monitoring background conditions upgradient of AP-3 and five wells (HGWC-120, HGWC-121A, HGWC-124, HGWC-125, and HGWC-126) are designated for monitoring conditions downgradient of AP-3. The downgradient monitoring wells provide adequate coverage to detect a potential release from the closed CCR unit. The original well network, consisting of wells HGWA-122, HGWC-120, HGWC-121A, and HGWC-124, was certified by a professional engineer (PE) on April 17, 2019. Wells HGWC-125 and HGWC-126 were added to the network in May 2020 at the request of GA EPD. Wells HGWA-1, HGWA-2, HGWA-3, HGWA-43D, HGWA-44D, and HGWA-45D were incorporated into the AP-3 compliance well network in September 2020 to supplement HGWA-122 and characterize background groundwater conditions upgradient of AP-3. Of this subset, wells HGWA-1, HGWA-2, and HGWA-3 were installed before January 2016 and also establish background groundwater conditions for AP-1 and AP-2. Wells HGWA-43D, HGWA-44D, and HGWA-45D were installed in August 2020 and screened in bedrock to characterize groundwater conditions within lower portions of the aquifer than that provided by HGWA-1, HGWA-2, HGWA-3, and HGWA-122. Data from these three deeper wells will establish background conditions for AP-1, AP-2, and AP-3.

Any change to the groundwater monitoring network once the permit is issued will be made by a minor modification to the permit pursuant to 391-3-4-.02(4)(b)7. Boring and well construction logs of the wells in the current monitoring well network are provided in **Appendix G**.

5. GROUNDWATER QUALITY

Groundwater monitoring-related activities have been performed for AP-3 since August 2016 in support of establishing the detection monitoring program for the CCR unit in accordance with 40 CFR § 257.94. All groundwater sampling was performed in accordance with 40 CFR § 257.93.

5.1 Detection Monitoring Program

Pursuant to 40 CFR § 257.94, Georgia Power established a detection monitoring program for AP-3 which consisted of (i) collecting eight independent samples from the certified monitoring well network to establish a baseline dataset and (ii) conducting the initial semiannual detection monitoring sampling event.

A minimum of eight independent samples were collected from the original AP-3 monitoring well network (HGWA-122, HGWC-120, HGWC-121A, and HGWC-124) between August 2016 and October 2018 and analyzed for Appendix III and IV constituents as part of the background monitoring period pursuant to 40 CFR § 257.94(b). Following background monitoring, the initial detection monitoring event was completed in April 2019, during which groundwater samples were collected from HGWA-122, HGWC-120, HGWC-121A, and HGWC-124 and analyzed for Appendix III constituents according to 40 CFR 257.94(a).

Appendix III data collected during the detection monitoring event were statistically compared against the background values in accordance with 40 CFR § 257.93(h). Detailed discussion of the detection monitoring program is presented in the *2019 Annual Groundwater Monitoring and Corrective Action Report* for AP-3, submitted to GA EPD in July 2019 (Geosyntec, 2019).

5.2 Assessment Monitoring Program

Because statistically significant increases of Appendix III constituents over background prediction limits were identified during the initial detection monitoring event, Georgia Power initiated an assessment monitoring program for groundwater at AP-3. Pursuant to 40 CFR 257.95, samples were collected from HGWA-122, HGWC-120, HGWC-121A, and HGWC-124 in August 2019 and analyzed for Appendix IV constituents. The first and second semiannual assessment monitoring events were conducted in October 2019 and March 2020. During the semiannual reporting period for the March 2020 event, Georgia Power established groundwater protection standards (GWPS) for Appendix IV constituents in accordance with 40 CFR § 257.95. Statistical evaluation of the October

2019 assessment monitoring data indicated the presence of statistically significant levels (SSL) of lithium and molybdenum in exceedance of the state GWPS, but not the federal GWPS, in well HGWC-120. A similar statistical analysis of the March 2020 groundwater data identified an SSL of molybdenum in HGWC-120 above the state GWPS and below the federal GWPS; lithium was not identified as an SSL for this event. Details of these sampling events and statistical analyses are provided in the report *2020 Annual Groundwater Monitoring & Corrective Action Report – Plant Hammond Ash Pond 3 (AP-3)* (Geosyntec, 2020).

Pursuant to 40 CFR § 257.96, an assessment of corrective measures (ACM) was initiated for AP-3 on July 9, 2020. An ACM Report will be subsequently prepared for AP-3 and submitted to GA EPD in December 2020. In accordance with 40 CFR § 257.96(b), groundwater continues to be monitored at AP-3 under the assessment monitoring program while the ACM phase is implemented.

5.3 Expansion of the Monitoring Well Network

In a closure permit review letter dated April 28, 2020, GA EPD requested the reclassification of an existing piezometer to become a compliance monitoring well. In response, Georgia Power has incorporated piezometer MW-31 into the compliance well network and renamed the well id to "HGWC-126". GA EPD's second request was for Georgia Power to install a compliance monitoring well between HGWC-120 and HGWC-121A, resulting in the installation of well HGWC-125 in May 2020. Separate from the GA EPD requests, Georgia Power installed additional compliance wells upgradient of AP-3 in August 2020. Wells HGWA-43D, HGWA-44D, and HGWA-45D were installed and screened in bedrock to characterize groundwater conditions within lower portions of the aquifer. The data will supplement groundwater data from the background wells screened in the shallower residuum and highly weathered bedrock. The locations of these new wells in relation to the existing compliance monitoring well network are shown on **Figure 4-3**. The boring and well construction logs for the current well network are included in **Appendix G**. Well survey data certified by a Georgia-registered professional surveyor are included in **Appendix H**.

Pursuant to 40 CFR § 257.94(b), eight independent groundwater samples (i.e., background monitoring events) should be collected from the new compliance wells to statistically establish background conditions in the wells. For wells HGWC-125 and HGWC-126, the first of eight independent sampling events occurred in May 2020; for wells HGWA-43D, HGWA-44D, and HGWA-45D the first of eight sampling events occurred in September 2020.

6. REFERENCES

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TABLES

Table 3-1
Boring, Piezometer, and Well Construction Details
Plant Hammond AP-3, Floyd County, Georgia

Boring/Well ID (Historical ID)(3), (4)	Purpose	Northing (1)	Easting (1)	Date Installed	Top of Screen Elevation(2) (ft NAVD88)	Bottom of Screen Elevation(2) (ft NAVD88)	Well Depth (ft bgs)	Screened Media
AP1-MW-6	MW	1548381.22	1941686.57	11/4/2014	559.30	549.30	29.90	Terrace Material, highly weathered Limestone
AP3-B-10	SB	1550500.71	1942345.89	2/16/2017	-	-	-	NA
AP3-B-11	SB	1550545.31	1942643.26	2/16/2017	-	-	-	NA
AP3-B4	MW	1550709.19	1942920.34	2/2/2017	554.89	549.89	77.00	Limestone
AP3-B-6	MW	1550530.98	1942124.44	1/31/2017	528.76	518.76	89.00	Limestone
AP3-B-7	MW	1551042.74	1942387.32	2/10/2017	520.86	515.86	90.00	Limestone
AP3-B-8	MW	1551323.29	1942521.40	2/7/2017	522.09	517.09	88.00	Limestone
AP3-B-9	SB	1550662.39	1942654.24	2/9/2017	-	-	-	NA
AP3-MW-23	MW	1551641.44	1942496.83	11/24/2014	563.10	553.10	29.50	Highly weathered Limestone/Limestone
AP3-MW-25	MW	1550634.52	1943060.52	11/12/2014	556.90	546.90	35.40	Residuum, Limestone
AP3-MW-26	MW	1550383.19	1942809.85	11/12/2014	563.80	553.80	31.10	Residuum, highly weathered Limestone and Limestone
MW-21	MW	1550270.15	1941809.76	12/3/2014	570.40	560.40	23.60	Residuum, highly weathered limestone, and limestone
MW-32	MW	1551092.83	1943021.47	11/26/2019	559.30	549.30	33.80	Residuum, highly weathered limestone, and limestone
MW-39	MW	1551111.45	1943089.26	3/16/2020	564.93	554.93	23.00	Residuum, highly weathered limestone, and limestone
MW-41	MW	1551158.16	1943196.47	5/18/2020	563.20	553.20	22.00	Residuum (clay)
MW-46D	MW	1551056.48	1942929.10	8/18/2020	513.92	503.92	99.50	Limestone
HGWA-1	MW	1550423.32	1940770.00	12/3/2014	573.12	563.12	29.70	Highly weathered shaley limestone, competent shaley limestone
HGWA-2	MW	1549796.87	1939845.15	12/2/2015	570.29	560.29	25.00	Terrace alluvium
HGWA-3	MW	1549794.41	1939833.39	12/2/2015	553.23	543.23	42.00	Highly weathered shaley limestone
HGWA-43D	MW	1550422.85	1940753.80	8/26/2020	544.08	534.08	58.25	Limestone
HGWA-44D	MW	1550409.13	1940756.18	8/25/2020	491.76	481.76	110.50	Limestone
HGWA-45D	MW	1551157.68	1941907.54	8/19/2020	535.23	525.23	60.00	Limestone
HGWA-122 (AP3-MW-22)	MW	1551251.42	1941887.11	11/20/2014	570.70	560.70	24.90	Residuum, highly weathered Limestone and Limestone
HGWC-121A	MW	1550607.97	1943030.44	7/17/2017	556.71	546.71	35.60	Residuum, highly weathered Limestone and Limestone
HGWC-10 (AP1C-4)	MW	1551157.68	1941907.54	12/3/2015	566.66	556.66	20.00	Terrace Material
HGWC-120 (P20)	MW	1551067.24	1942926.62	6/27/2016	548.83	538.83	64.01	Limestone
HGWC-124 (AP3-MW-24)	MW	1551624.93	1942781.05	11/13/2014	557.80	547.80	32.50	Highly weathered Limestone/Limestone
HGWC-125	MW	1550821.41	1942962.87	5/4/2020	556.03	546.03	60.00	Residuum, partially weathered limestone
HGWC-126 (MW-31)	MW	1550422.03	1942689.40	11/26/2019	552.72	542.72	66.00	Highly weathered Limestone/Limestone

Table 3-1

Boring, Piezometer, and Well Construction Details
Plant Hammond AP-3, Floyd County, Georgia

Boring/Well ID (Historical ID)$^{(3), (4)}$	Purpose	Northing (1)	Easting (1)	Date Installed	Top of Screen Elevation$^{(2)}$ (ft NAVD88)	Bottom of Screen Elevation$^{(2)}$ (ft NAVD88)	Well Depth (ft bgs)	Screened Media
P18	PZ	1551449.11	1942253.83	8/2/1977	569.30	564.30	45.00	Terrace Material, Residuum
P21	PZ	1551052.327	1942936.178	8/1/1977	562.90	557.90	51.00	Terrace Material
P22	PZ	1551045.17	1942916.44	8/4/1977	576.20	571.20	38.00	Highly weathered Limestone
P-5L	MW	1551480.44	1942237.23	2/8/1977	562.60	557.60	41.50	Residuum, highly weathered Limestone
P-5U	MW	1551480.44	1942237.23	2/8/1977	583.10	578.10	21.00	Terrace Material
P6	PZ	1551519.30	1942219.87	2/8/1977	566.20	561.20	23.20	Residuum, highly weathered Limestone
P8	PZ	1551079.751	1943011.072	2/9/1977	558.80	553.80	29.10	Highly weathered Limestone
Z12	SB	1550982.93	1942797.73	12/21/1976	-	-	-	NA
Z14	SB	1551046.92	1942114.19	12/17/1976	-	-	-	NA
Z16	SB	1551121.60	1942011.91	12/28/1976	-	-	-	NA
Z18	SB	1551522.59	1942439.61	12/27/1976	-	-	-	NA
Z18A	SB	1551522.59	1942439.61	12/27/1976	-	-	-	NA
Z18B	SB	1551522.59	1942439.61	1/20/1977	-	-	-	NA
Z25	SB	1550506.58	1941971.60	1/28/1977	-	-	-	NA
Z26	SB	1550312.71	1941950.33	1/21/1977	-	-	-	NA
Z5	SB	1551299.18	1942235.52	12/20/1976	-	-	-	NA

Notes:

ID = identification
ft = feet
bgs = below ground surface
NA = not applicable
MW = Monitoring Well
PZ = Piezometer
SB = Soil Bore

(1) Coordinates in North American Datum (NAD) 1983, State Plane, Georgia West Zone, feet.

(2) Vertical elevations are in feet relative to the North American Vertical Datum (NAVD) 1988.

(3) Wells HGWA-1, HGWA-2, HGWA-3, HGWA-122, HGWC-120, HGWC-121A, HGWC-124, HGWC-125, HGWC-126, MW-21, MW-23, MW-32, MW-39, and MW-41 were re-surveyed May 11-14, 2020.

(4) Wells HGWA-43D, HGWA-44D, HGWA-45D and MW-46D were surveyed September 1-2, 2020.

Table 3-2

Summary of Hydraulic Conductivity Values
Plant Hammond AP-3, Floyd County, Georgia

Lithologic Unit	**Range of K_h or K_v (cm/s)**	**Geometric Mean K_h or K_v (cm/s)**
Horizontal Hydraulic Conductivity		
Ash	4.13×10^{-2}	4.13×10^{-2}
Fill	7.62×10^{-7} to 1.02×10^{-5}	3.33×10^{-6}
Terrace Alluvium	4.27×10^{-5} to 3.76×10^{-4}	2.14×10^{-4}
Residuum	6.10×10^{-7} to 3.57×10^{-3}	1.47×10^{-4}
Highly Weathered/Fractured Limestone	5.08×10^{-5} to 2.35×10^{-2}	9.76×10^{-4}
Unweathered Limestone	4.98×10^{-5} to 2.91×10^{-3}	4.46×10^{-4}
Vertical Hydraulic Conductivity		
Residuum	1.00×10^{-7} to 1.40×10^{-6}	2.91×10^{-7}

Notes:
K_h - horizontal hydraulic conductivity
K_v - vertical hydraulic conductivity
cm/s - centimeters per second

Table 4-1

AP-3 Monitoring Well Network

Plant Hammond AP-3, Floyd County, Georgia

Well ID	Northing (1)	Easting (1)	Ground Surface Elevation (2) (ft NAVD88)	Top of Casing Elevation (ft NAVD88)	Top of Screen Elevation (ft NAVD88)	Bottom of Screen Elevation (ft NAVD88)	Well Depth (3) (ft BTOC)	Monitoring Designation	Screened Media
HGWA-1	1550423.32	1940770.00	592.32	595.21	573.12	563.12	32.49	Upgradient	Highly weathered shaley limestone, competent shaley limestone
HGWA-2	1549796.87	1939845.15	585.29	587.92	570.29	560.29	27.95	Upgradient	Terrace alluvium
HGWA-3	1549794.41	1939833.39	585.23	587.74	553.23	543.23	44.51	Upgradient	Highly weathered shaley limestone
HGWA-43D	1550422.85	1940753.80	592.08	595.08	544.08	534.08	61.25	Upgradient	Limestone
HGWA-44D	1550409.13	1940756.18	592.01	594.79	491.76	481.76	113.28	Upgradient	Limestone
HGWA-45D	1551157.68	1941907.54	584.08	586.95	535.23	525.23	62.87	Upgradient	Limestone
HGWA-122	1551251.42	1941887.11	585.04	587.90	570.54	560.54	26.96	Upgradient	Residuum, highly weathered limestone, and limestone
HGWC-120	1551067.24	1942926.62	602.83	605.82	548.83	538.83	66.60	Downgradient	Limestone
HGWC-121A	1550607.97	1943030.44	582.31	584.69	556.71	546.71	37.98	Downgradient	Residuum, highly weathered limestone, and limestone
HGWC-124	1551624.93	1942781.05	579.80	582.52	557.80	547.80	34.32	Downgradient	Highly weathered limestone and limestone
HGWC-125	1550821.41	1942962.87	605.70	608.89	556.20	546.20	62.39	Downgradient	Highly weathered limestone
HGWC-126	1550422.03	1942689.40	608.72	611.24	552.72	542.72	68.52	Downgradient	Highly weathered limestone and limestone

Notes:

ft = feet

ft BTOC = feet below top of casing

(1) Coordinates in North American Datum (NAD) 1983, State Plane, Georgia West Zone, feet. Surveyed May 11-14, 2020. Wells HGWA-43D, HGWA-44D, HGWA-45D, and MW-46D surveyed September 1-2, 2020.

(2) Vertical elevations are in feet relative to the North American Vertical Datum (NAVD) 1988. "Ground surface" elevation defined at the survey nail installed within the well pad. Surveyed May 11-14, 2020. Wells HGWA-43D, HGWA-44D, HGWA-45D, and MW-46D surveyed September 1-2, 2020.

(3) Total well depth accounts for sump if data provided on well construction logs.

FIGURES

N

0 300 600 1,200
Feet

Notes:
1. Aerial photograph source: Google Earth Pro, August 2019.

Plant Hammond Site Map

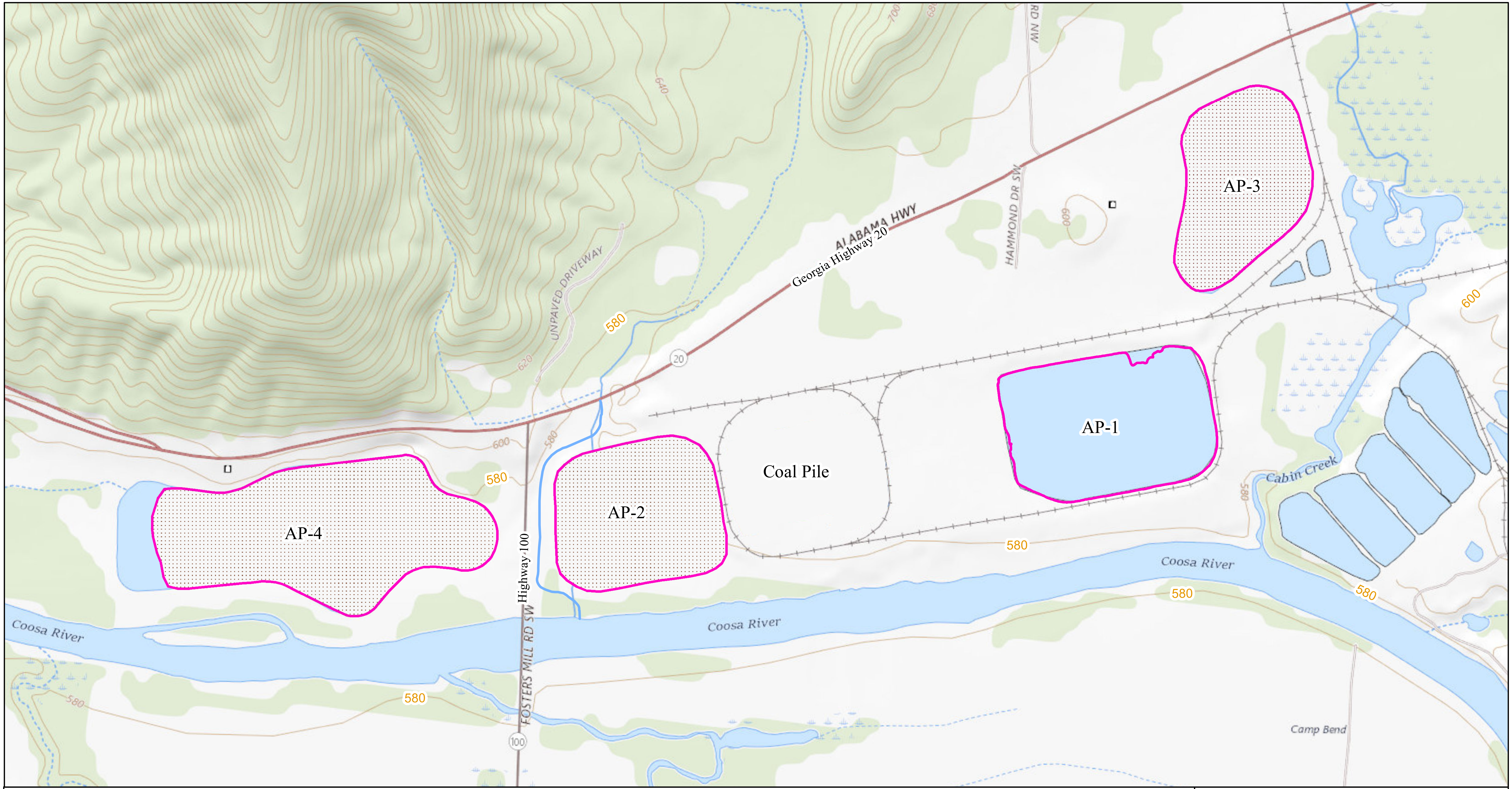
Georgia Power Company
Plant Hammond AP-3
Rome, Floyd County, Georgia

Geosyntec
consultants

Kennesaw, GA
September 2020

Figure
1-1

N:\GA Power\Plant Hammond GW Mon-Rpt Proposal\Siting and Hydrogeo Reports\AP-3\Combined Siting and HydroGeo\GIS\mxd\2020\Figure1-1_SiteMap.mxd 9/18/2020 5:51:14 PM



Notes:

1. Topo map provided by United States Geological Survey Rock Mountain and Livingston, GA, 7.5 Minute Quadrangles.
2. Conditions depicted on the available USGS map for ash ponds at the site do not reflect current conditions. Currently, AP-2, AP-3, and AP-4 do not contain free water. Overlays have been added to represent current dry conditions. AP-1 currently contains free water as shown but the unit boundary was modified since the unit's original construction, as shown in the overlay. The creek shown entering AP-2 was rerouted along the western boundary of the unit at the time of construction. The current alignment of the creek is shown as an overlay in the map.

N

0 325 650 1,300 Feet

Site Vicinity and Topography

Georgia Power Company
Plant Hammond AP3
Rome, Floyd County, Georgia

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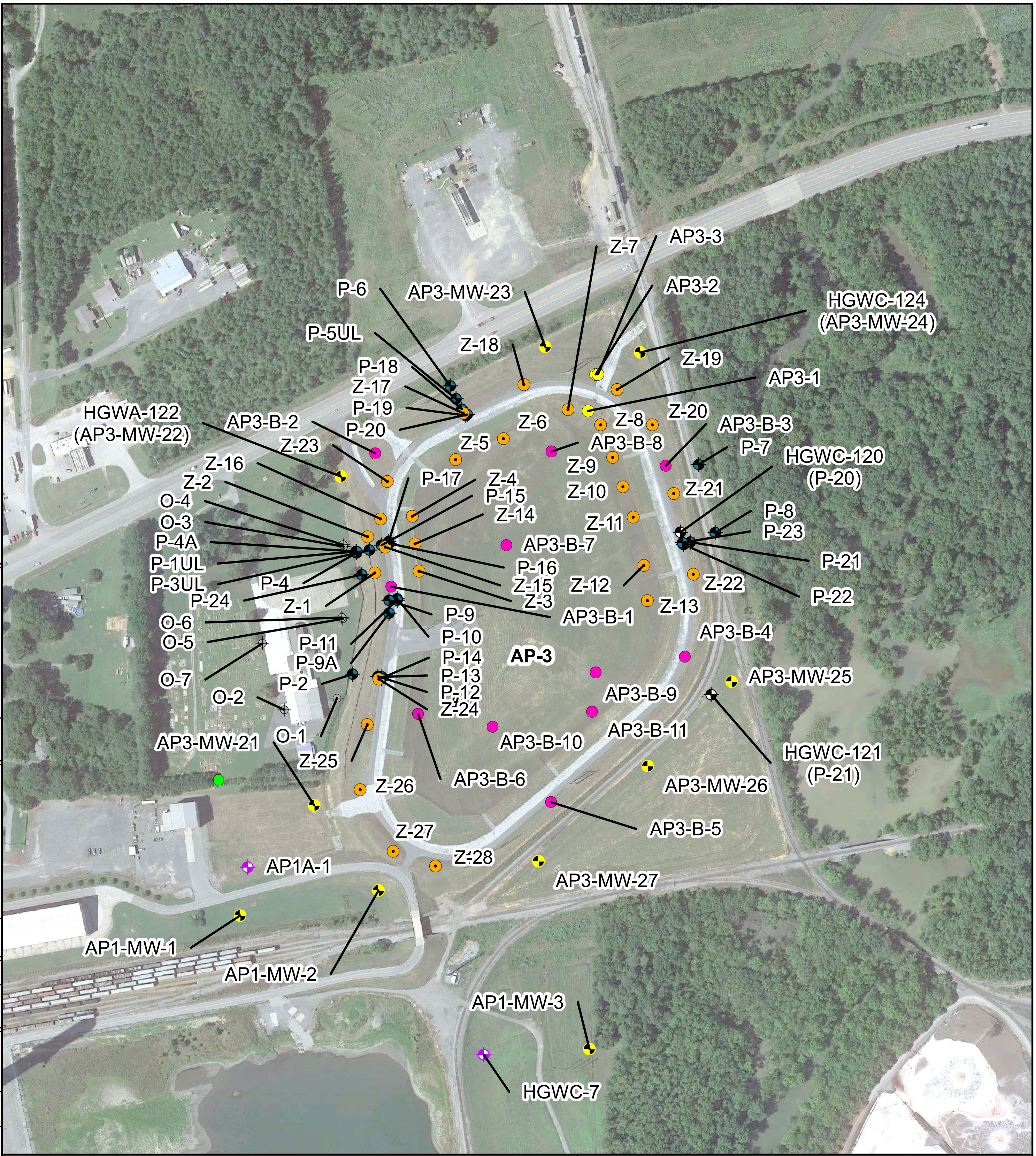
consultants

Kennesaw, GA | May 2020

Figure

1-2

N:\GA Power\Plant Hammond GW Mon-Rpt Proposal\Siting and Hydrogeo Reports\AP-4\GIS\mxd\Figure2-1_Topo_Map.mxd 5/12/2020 1:27:49 PM



- ● Boring (Installed 2017)
- ● Boring (Installed 2015)
- ⊙ Boring (Installed 1976-1977)
- ⊕ Well/Piezometer (Installed 2016)
- ⊕ Monitoring Well (Installed 2015)
- ⊕ Well/Piezometer (Installed 2014)
- ○ Piezometer (Installed 2010)
- ⊕ Piezometer (Installed 1976-1977)
- ⊕ Observation Well - Abandoned

N

0 200 400 800
Feet

Notes:
1. Aerial photograph source: Google Earth Pro, August 2019.

Boring, Piezometer and Groundwater Monitoring Well Locations

Georgia Power Company
Plant Hammond AP-3
Rome, Floyd County, Georgia

Geosyntec consultants

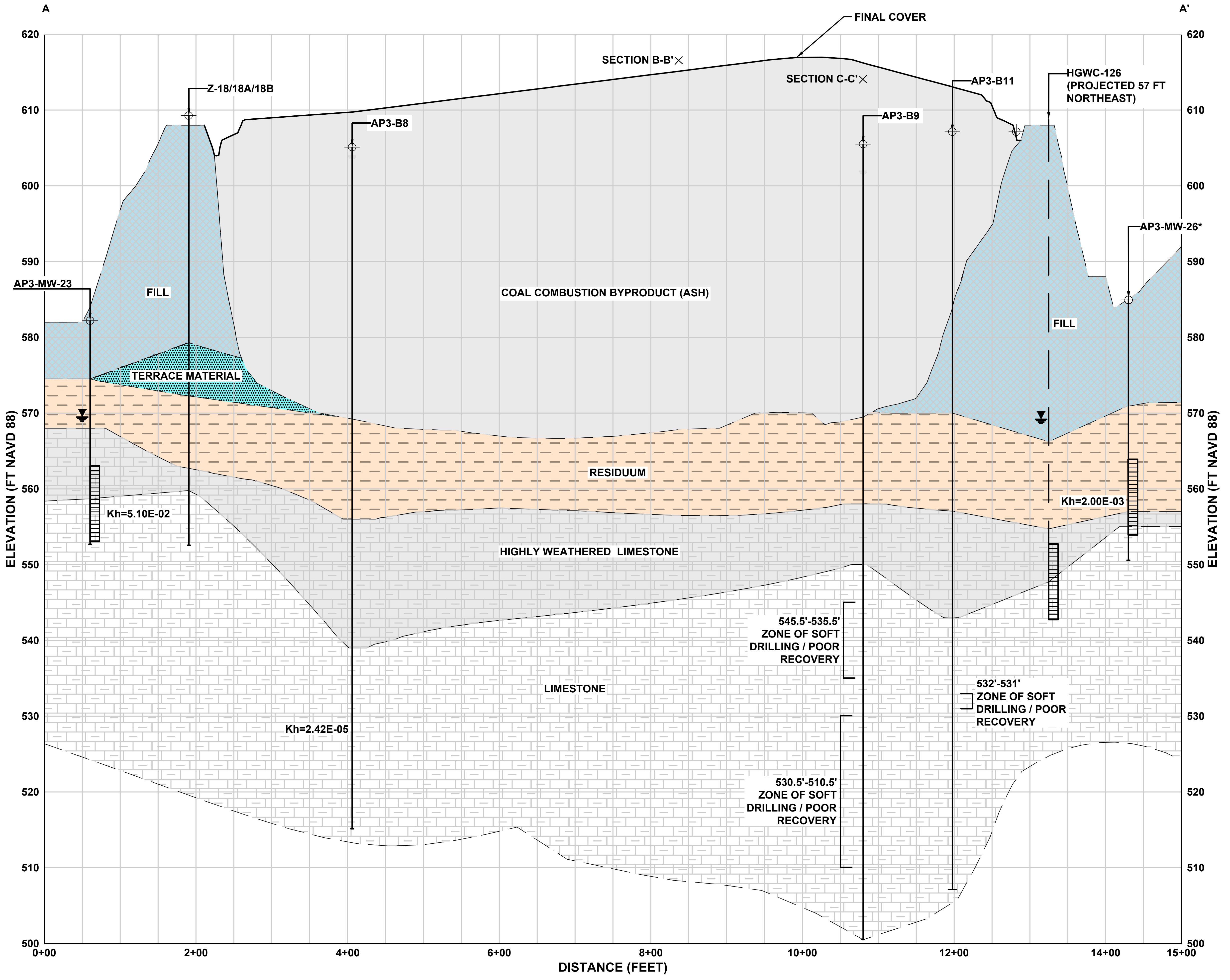
Kennesaw, GA

September 2020

Figure

2-1

N:\GA Power\Plant Hammond GW Mon-Rpt Proposal\Siting and Hydrogeo Reports\AP-3\Combined Siting and HydrogeoGeo\GIS\mxd\2020\Figure2-1_Piez_Wells_Letter.mxd 9/18/2020 6:34:21 PM

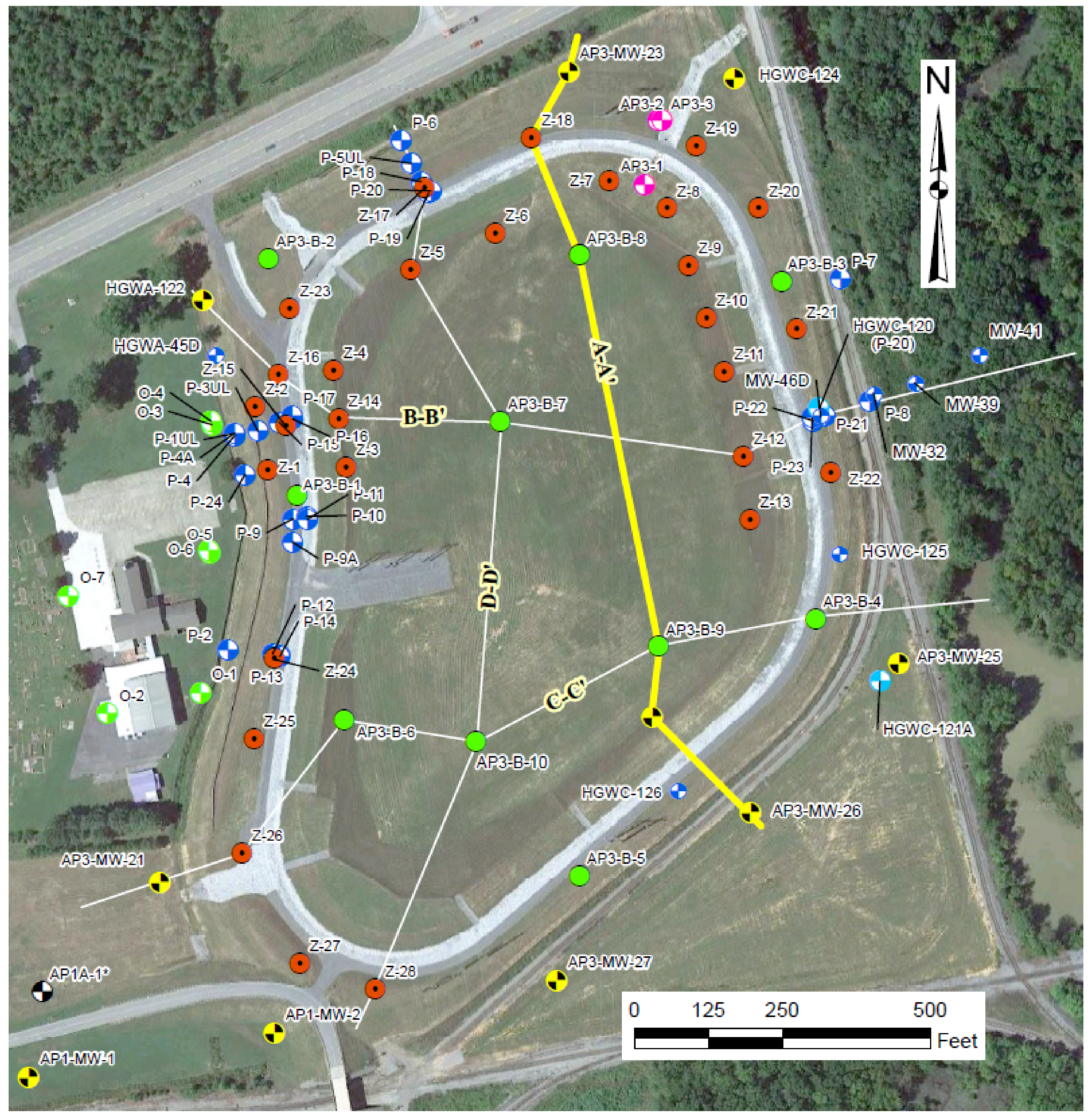


1 SECTION A-A'

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X



KEY MAP

LEGEND

SOIL BORING (DASHED WHERE PROJECTED)

GROUNDWATER ELEVATION (SEPTEMBER 14, 2020)

SCREEN INTERVAL

FINAL COVER

SOIL LAYER DESCRIPTIONS

COAL COMBUSTION BYPRODUCT (ASH)

FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)

TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)

RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)

HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)

LIMESTONE

NOTES:

1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE INTERPRETED BASED ON AVAILABLE INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
3. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS Z1 THROUGH Z28 AND P1 THROUGH P24 (1976 & 1977), AP3-1, AP3-2, AND AP3-3 (2010), MONITORING WELLS AROUND ASH PONDS AP1 AND AP3 (2014), P20 AND P21 (2016) WERE PROVIDED BY SOUTHERN COMPANY SERVICES. SOIL BORINGS/PIEZOMETERS AP3-B1 THROUGH AP3-B11 WERE INSTALLED BY GEOSYNTEC CONSULTANTS IN FEBRUARY 2017. MONITORING WELL HGWC-126 WAS INSTALLED BY GEOSYNTEC CONSULTANTS IN 2019.
4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC.
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.
6. THE FINAL COVER CONSISTS OF A 60 MIL HDPE (HIGH DENSITY POLYETHYLENE) LINER, GEOCOMPOSITE DRAINAGE MEDIA, A MINIMUM 18-INCH PROTECTIVE SOIL COVER, AND A 6-INCH VEGETATIVE LAYER TO ESTABLISH VEGETATION.

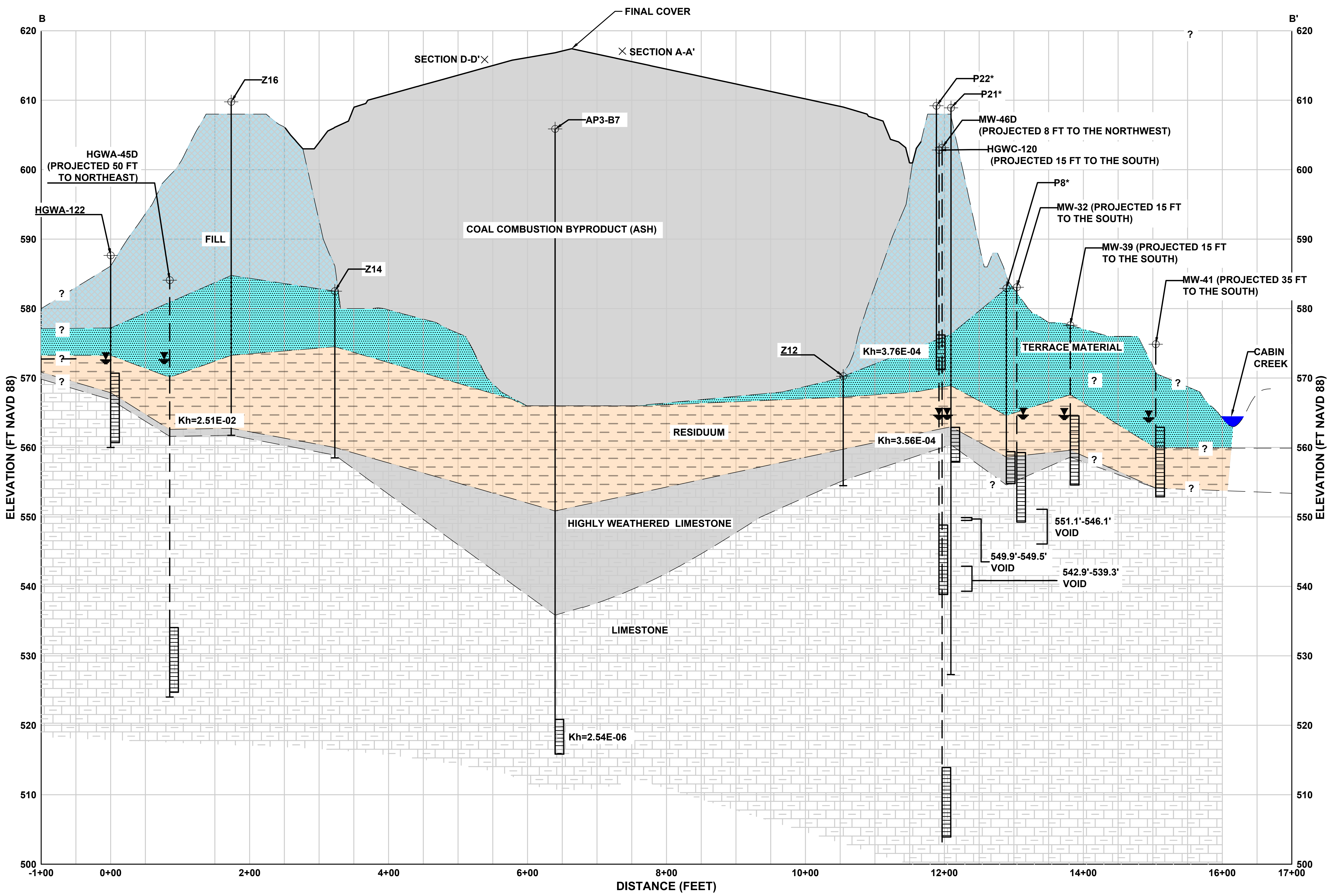
Geologic Section A-A'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

Geosyntec consultants

Kennesaw, GA | September 2020

FIGURE
3-1A

L:\CADD\G\GEORGIA POWER\PLANT HAMMOND GR6242\CROSS SECTION\2020-09-24\GR6556.001_XSECA-A'

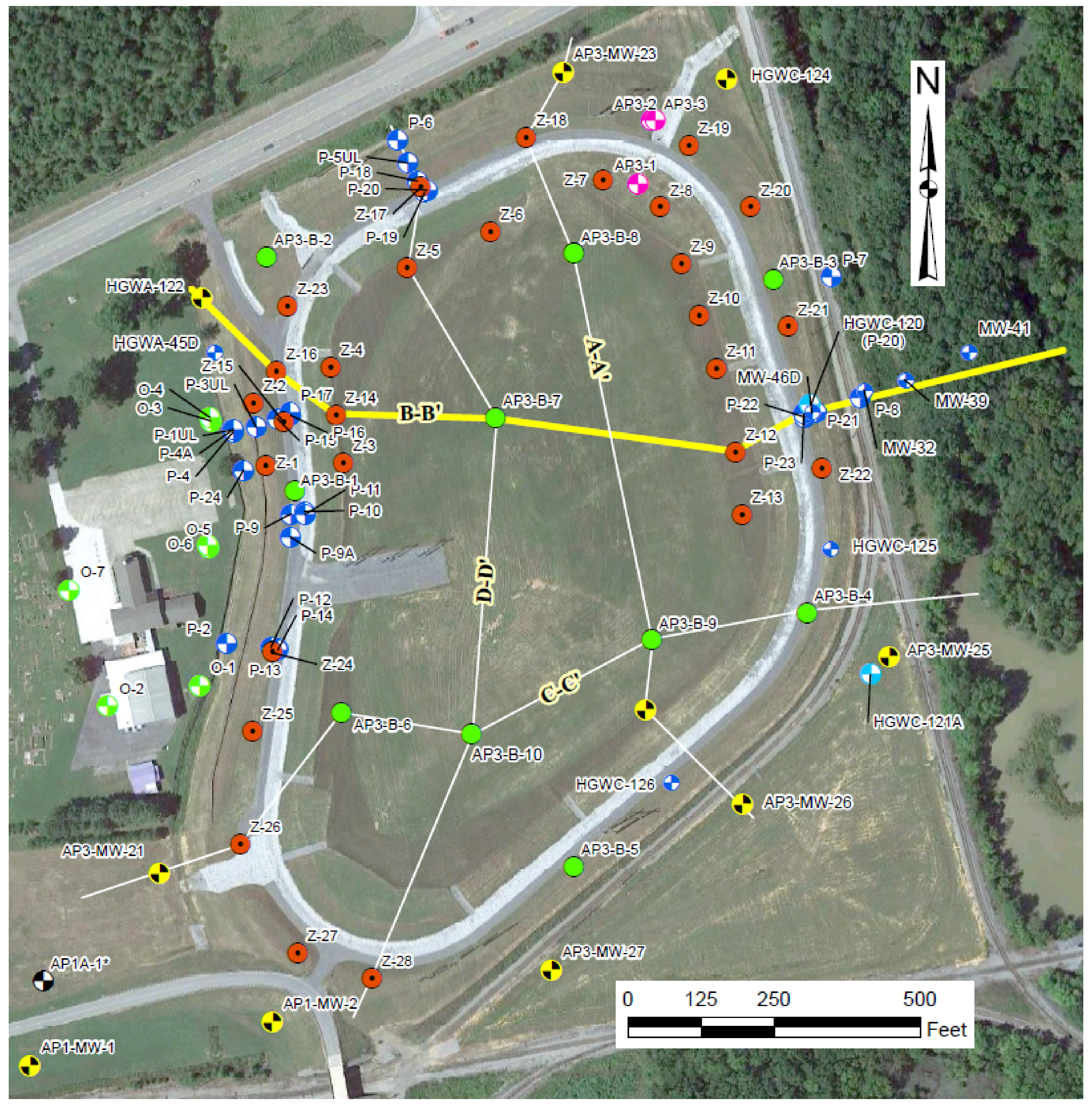


1 SECTION B-B'
---

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X



KEY MAP

LEGEND

- SOIL BORING (DASHED WHERE PROJECTED)
- GROUNDWATER ELEVATION (SEPTEMBER 14, 2020)
- SCREEN INTERVAL
- FINAL COVER

SOIL LAYER DESCRIPTIONS

- COAL COMBUSTION BYPRODUCT (ASH)
- FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)
- TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)
- RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)
- HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)
- LIMESTONE

NOTES:

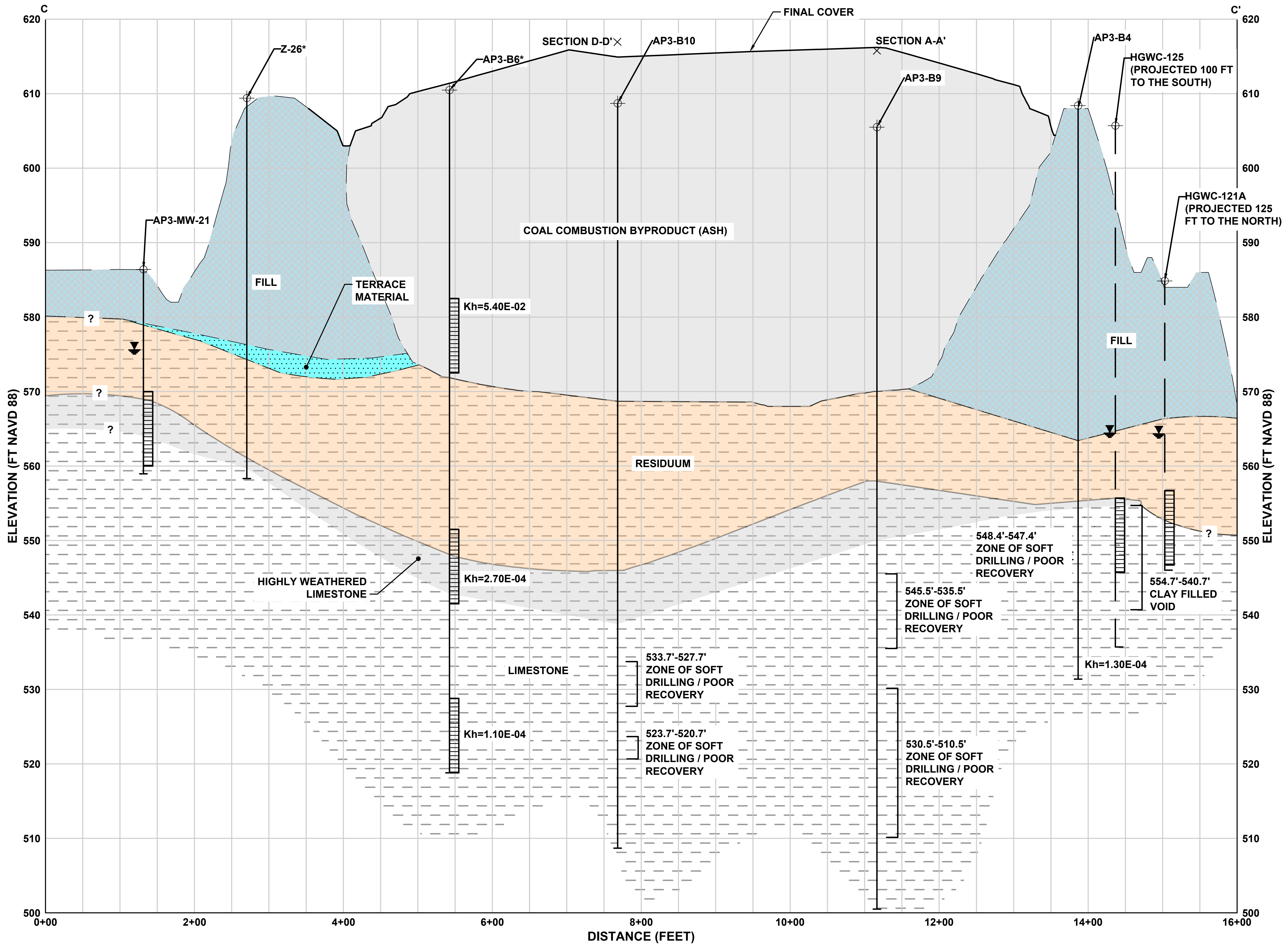
1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE INTERPRETED BASED ON AVAILABLE INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
3. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS Z1 THROUGH Z28 AND P1 THROUGH P24 (1976 & 1977), AP3-1, AP3-2, AND AP3-3 (2010), MONITORING WELLS AROUND ASH PONDS AP1 AND AP3 (2014), P20 AND P21 (2016) WERE PROVIDED BY SOUTHERN COMPANY SERVICES. SOIL BORINGS/PIEZOMETERS AP3-B1 THROUGH AP3-B11 WERE INSTALLED BY GEOSYNTEC CONSULTANTS IN FEBRUARY 2017.
4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC.
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.
6. THE FINAL COVER CONSISTS OF A 60 MIL HDPE (HIGH DENSITY POLYETHYLENE) LINER, GEOCOMPOSITE DRAINAGE MEDIA, A MINIMUM 18-INCH PROTECTIVE SOIL COVER, AND A 6-INCH VEGETATIVE LAYER TO ESTABLISH VEGETATION.

L:\CADD\G\GEORGIA POWER\PLANT HAMMOND GR6242\CROSS SECTION\2020-09-24\GR6556.001_XSECB-B'

Geologic Section B-B'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

Geosyntec consultants
Kennesaw, GA
September 2020

FIGURE
2-3B



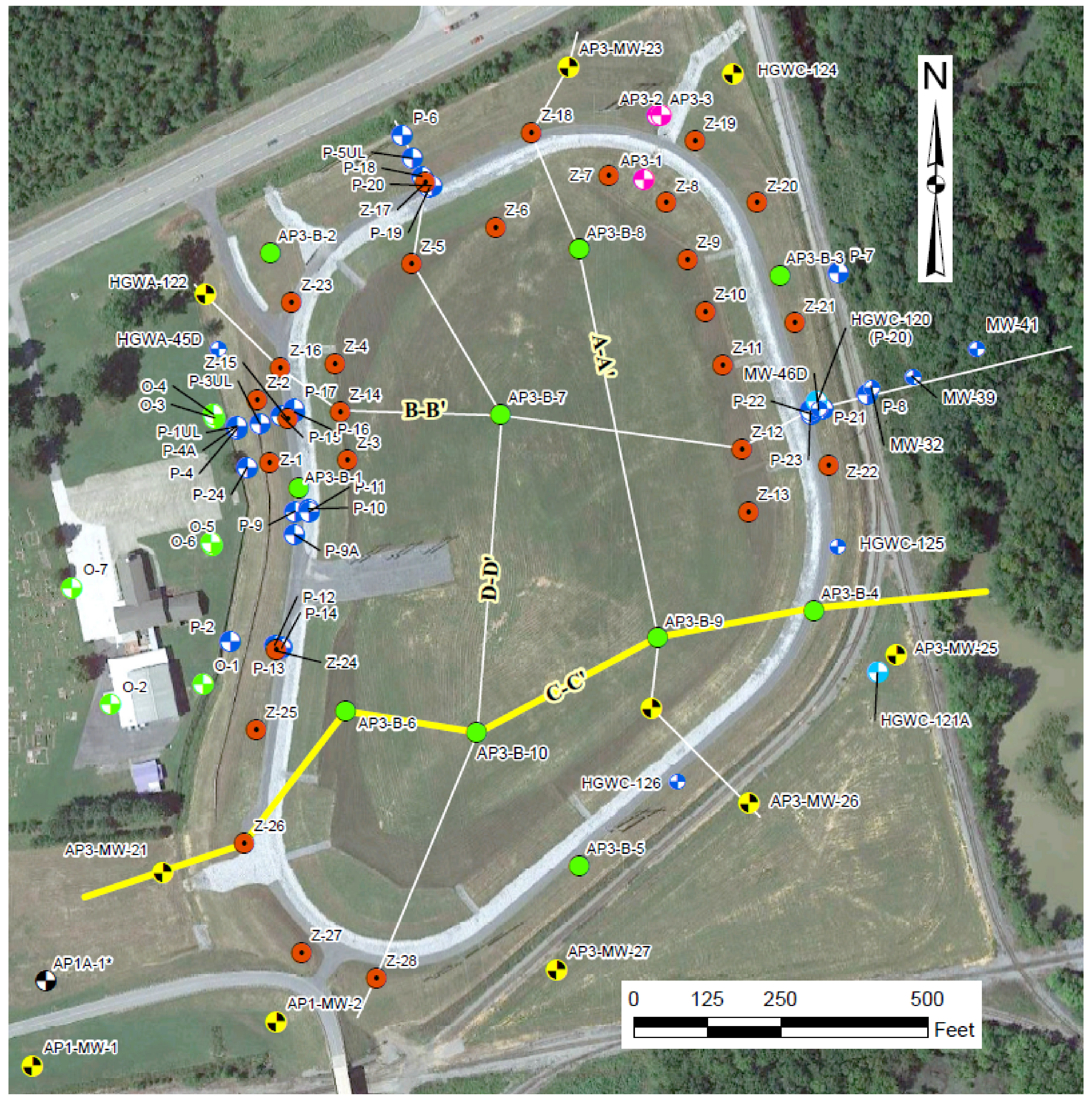
1 / ---

SECTION C-C'

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X



KEY MAP

LEGEND

┬	SOIL BORING (DASHED WHERE PROJECTED)
▼	GROUNDWATER ELEVATION (SEPTEMBER 14, 2020)
▤	SCREEN INTERVAL
─	FINAL COVER

SOIL LAYER DESCRIPTIONS

▨	COAL COMBUSTION BYPRODUCT (ASH)
▨	FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)
▨	TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)
▨	RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)
▨	HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)
▨	LIMESTONE

NOTES:

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4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC.
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.
6. THE FINAL COVER CONSISTS OF A 60 MIL HDPE (HIGH DENSITY POLYETHYLENE) LINER, GEOCOMPOSITE DRAINAGE MEDIA, A MINIMUM 18-INCH PROTECTIVE SOIL COVER, AND A 6-INCH VEGETATIVE LAYER TO ESTABLISH VEGETATION.

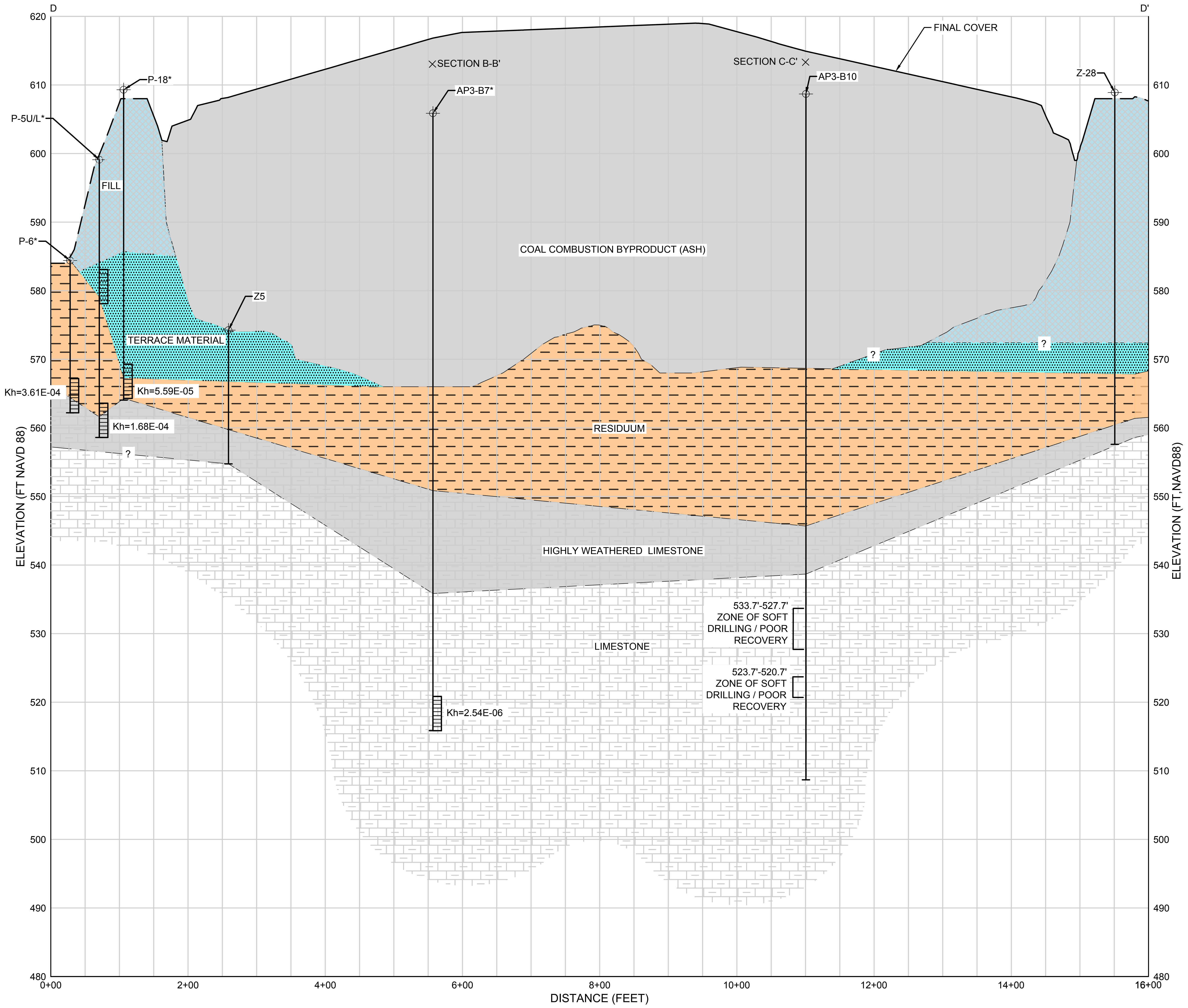
L:\CADD\G\GEORGIA POWER\PLANT HAMMOND GR6242\CROSS SECTION\2020-09-24\GR6556.001_XSECC-C'

Geologic Section C-C'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

Geosyntec
consultants

Kennesaw, GA
September 2020

FIGURE
2-3C

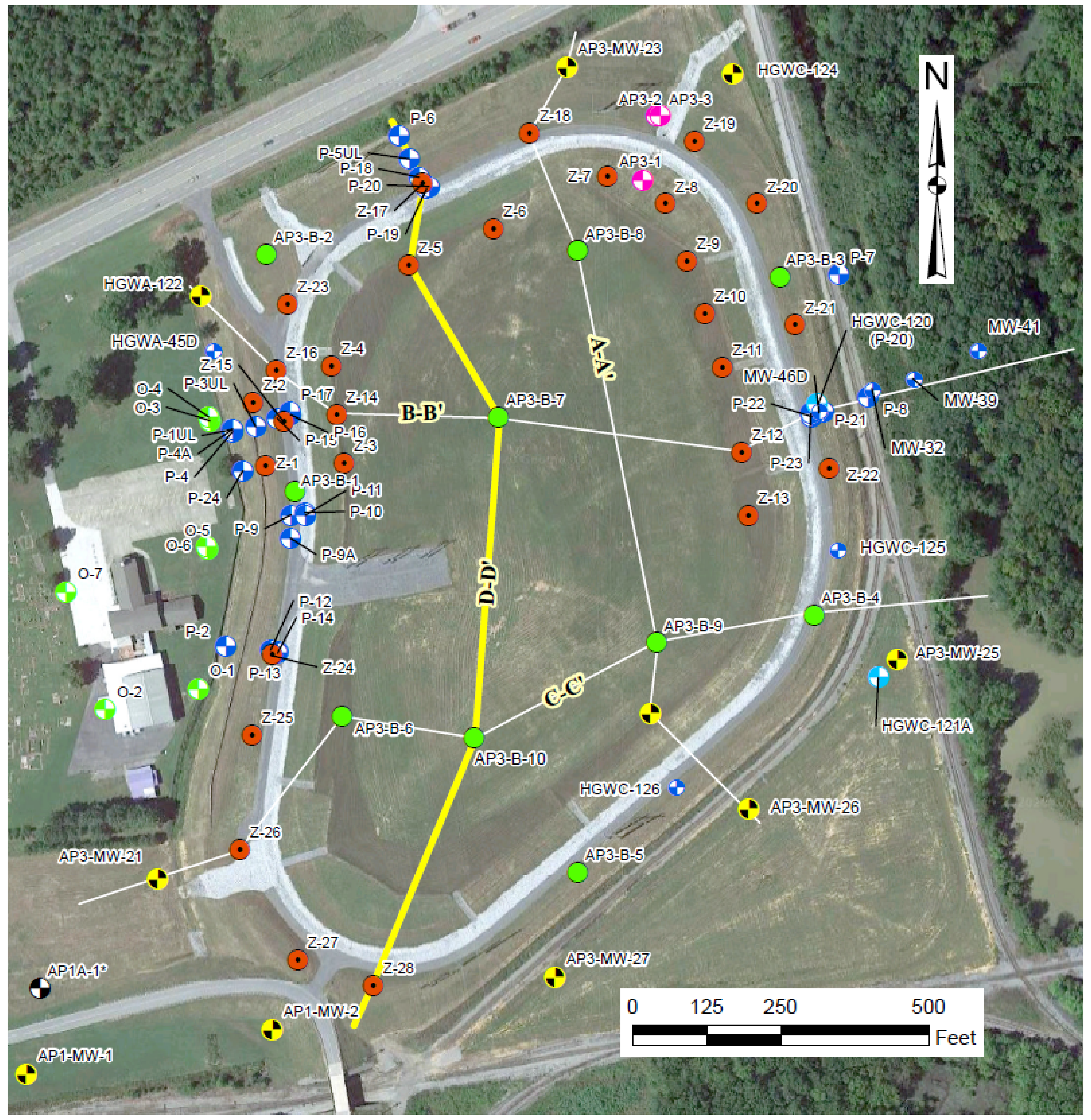


1 SECTION D-D'
---

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X



KEY MAP

LEGEND

┴ SOIL BORING (DASHED WHERE PROJECTED)

▤ SCREEN INTERVAL

── FINAL COVER

SOIL LAYER DESCRIPTIONS

▨	COAL COMBUSTION BYPRODUCT (ASH)
▨	FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)
▨	TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)
▨	RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)
▨	HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)
▨	LIMESTONE

NOTES:

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3. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS Z1 THROUGH Z28 AND P1 THROUGH P24 (1976 & 1977), AP3-1, AP3-2, AND AP3-3 (2010), MONITORING WELLS AROUND ASH PONDS AP1 AND AP3 (2014), P20 AND P21 (2016) WERE PROVIDED BY SOUTHERN COMPANY SERVICES. SOIL BORINGS/PIEZOMETERS AP3-B1 THROUGH AP3-B11 WERE INSTALLED BY GEOSYNTEC CONSULTANTS IN FEBRUARY 2017.

4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC.

5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.

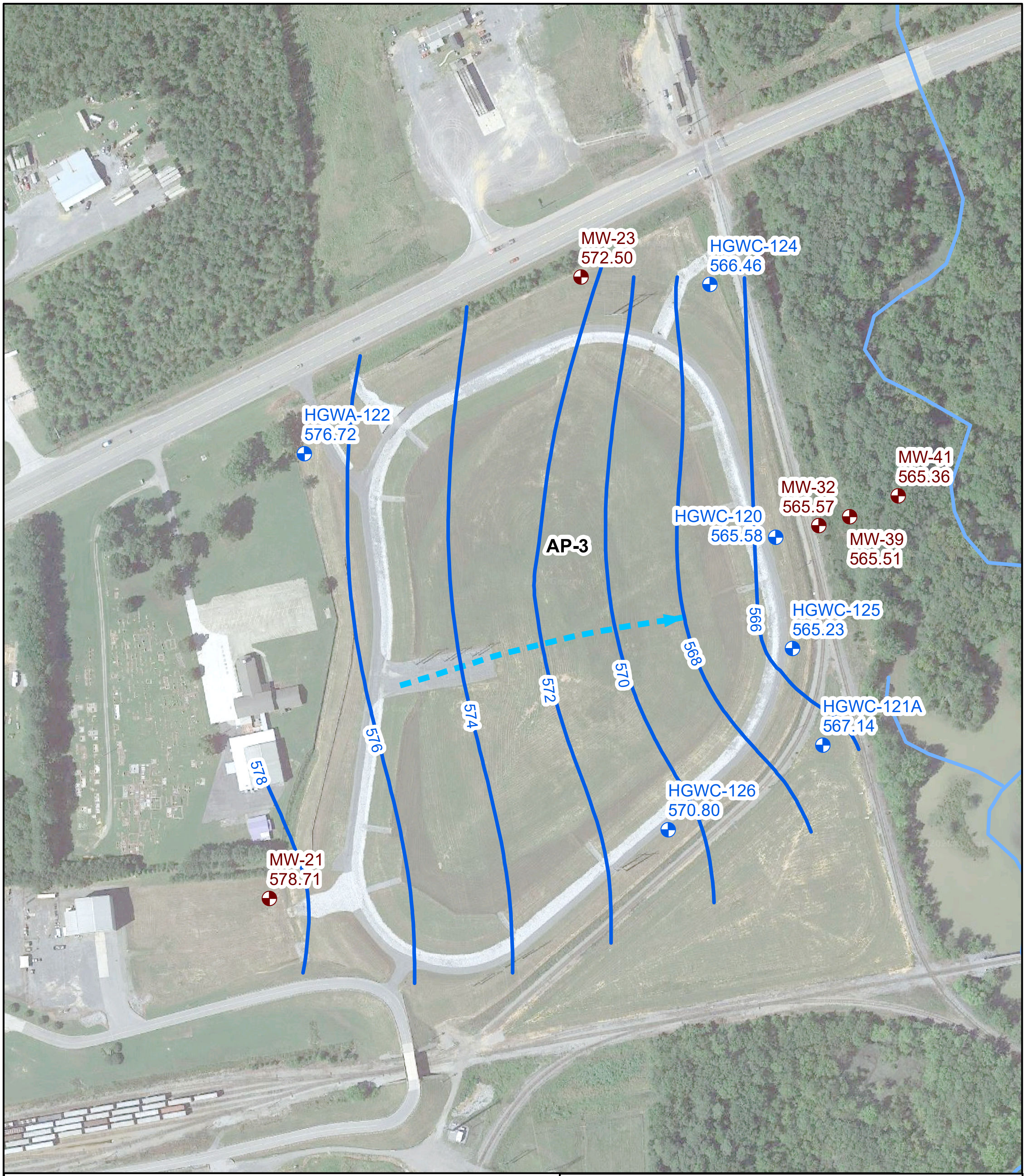
6. THE FINAL COVER CONSISTS OF A 60 MIL HDPE (HIGH DENSITY POLYETHYLENE) LINER, GEOCOMPOSITE DRAINAGE MEDIA, A MINIMUM 18-INCH PROTECTIVE SOIL COVER, AND A 6-INCH VEGETATIVE LAYER TO ESTABLISH VEGETATION.

Geologic Section D-D'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

Geosyntec consultants

Kennesaw, GA | September 2020

FIGURE
3-1D



● Compliance Monitoring Well

● Piezometer

— Groundwater Elevation Iso-Contour

➤ Approximate Groundwater Flow Direction

— Cabin Creek

N

Notes:
1. Water level elevation recorded on June 4, 2020. Elevation provided in feet (ft) referenced to the North American Vertical Datum (NAVD) 88.
2. The map shows only the wells/piezometers currently installed at the time of the gauging event.
3. Aerial photograph source: Google Earth Pro, August 2019.

0 150 300 600
Feet

Potentiometric Surface Contour Map
June 2020

Georgia Power Company
Plant Hammond AP-3
Rome, Floyd County, Georgia

Geosyntec
consultants

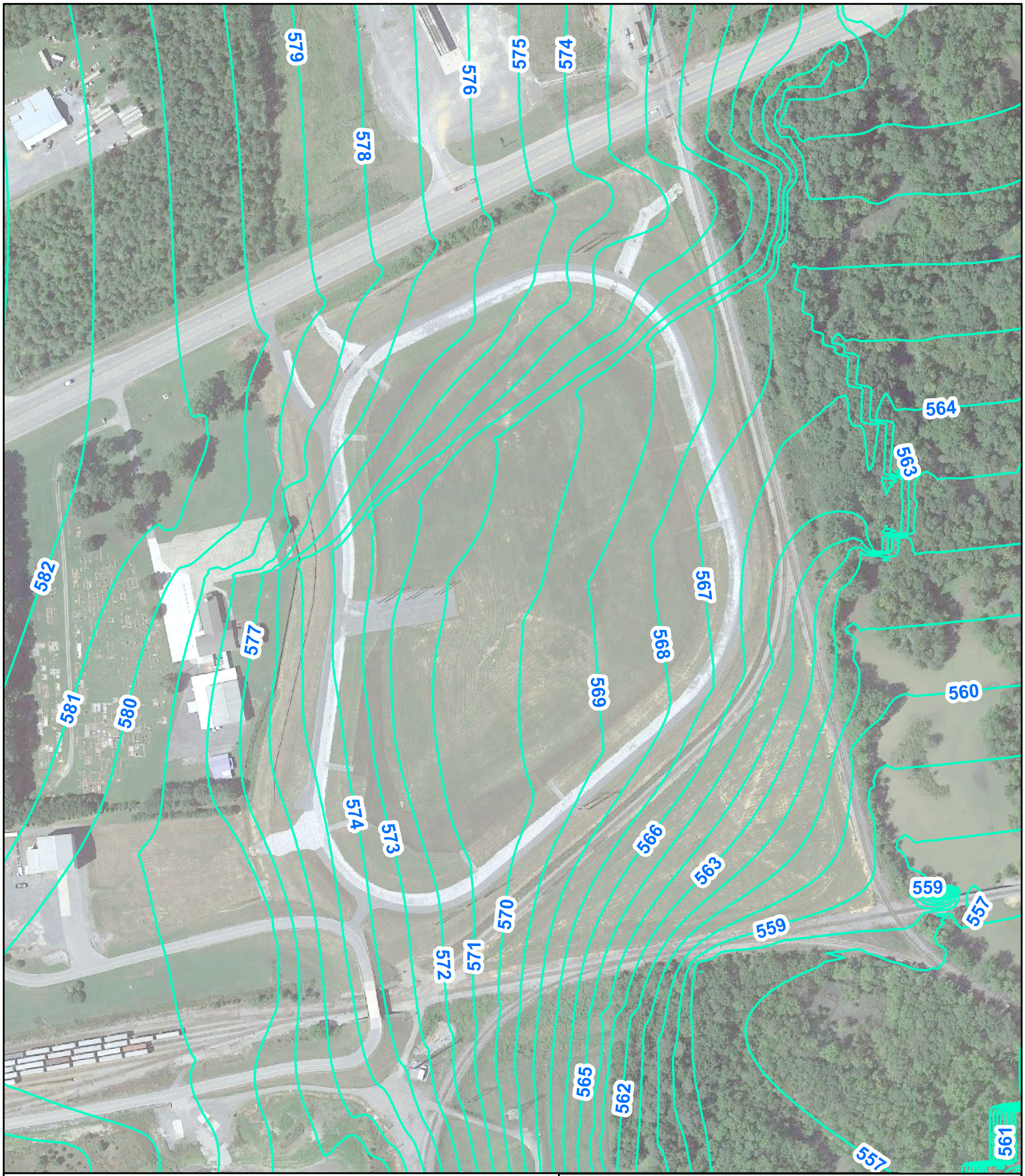
Kennesaw, GA

September 2020

Figure

3-2

N:\GA Power\Plant Hammond GW Mon-Rpt Proposal\Siting and Hydrogeo Reports\AP-3\Combined Siting and HydroGeo\GIS\mxd\2020\Figure3-2_June2020 pot map.mxd 9/18/2020 6:21:05 PM



Baseline Groundwater Elevation Contour (ft, MSL)

Aerial photograph source: Google Earth Pro, August 2019.

Groundwater Flow Model: Baseline, Pre-Closure Conditions

Georgia Power Company
Plant Hammond AP-3
Rome, Floyd County, Georgia

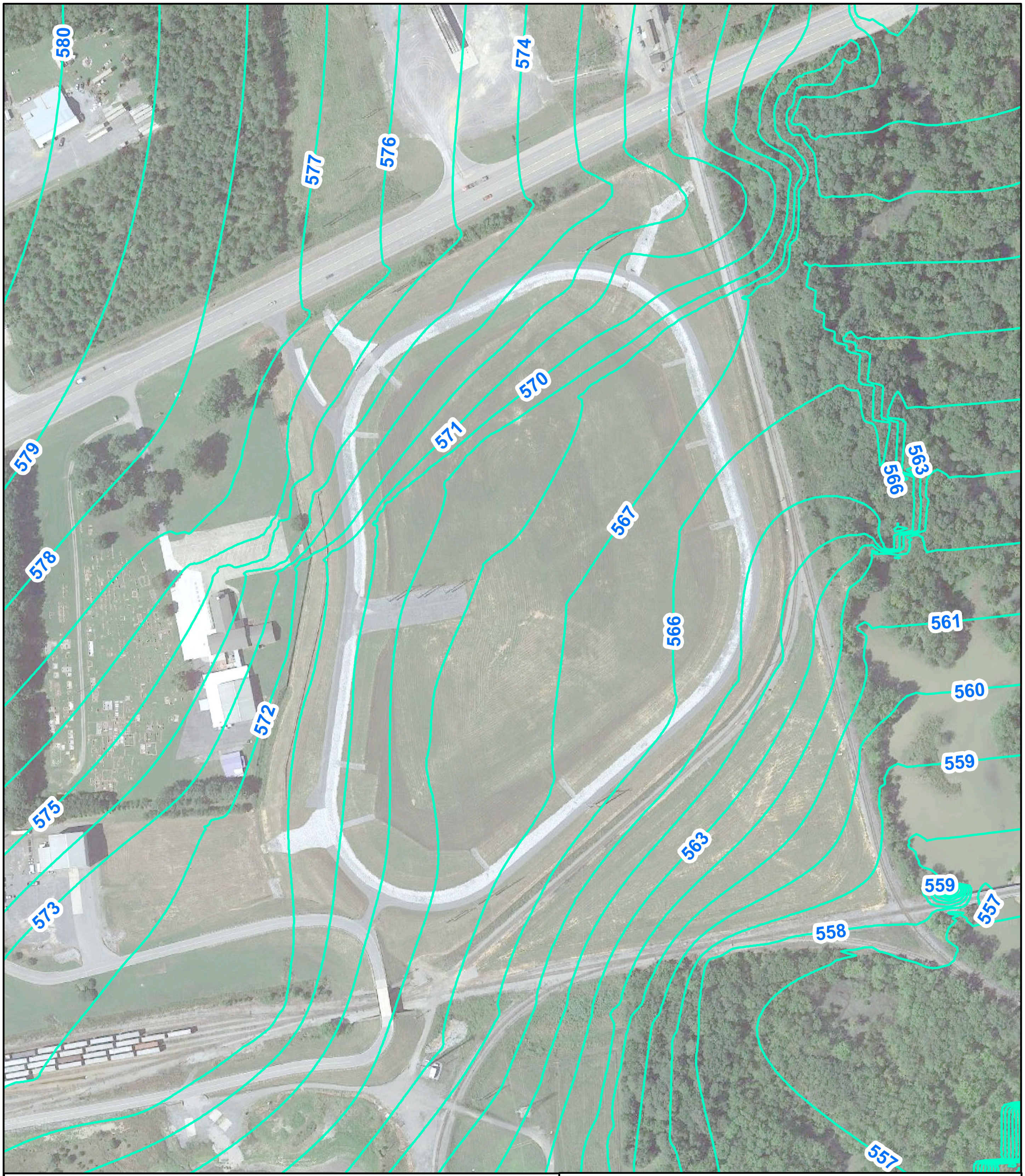
Geosyntec consultants

Kennesaw, GA

September 2020

Figure 4-1

N:\GA Power\Plant Hammond GW Mon-Rpt Proposal\Siting and Hydrogeo Reports\AP-3\Combined Siting and HydroGeo\GIS\mxd\2020\Figure4-1_AP3 Particle Tracking for HAR Revision 01_potrait.mxd 9/18/2020 6:25:36 PM



— Predicted Groundwater Elevation Contour (ft, MSL)

N

0 150 300 600 Feet

Notes:
1. Aerial photograph source: Google Earth Pro, August 2019.
2. Post-Closure conditions represent predicted condition after installation of low permeability cover system and dewatering and closure of AP-1.

Groundwater Flow Model: Post-Closure Conditions

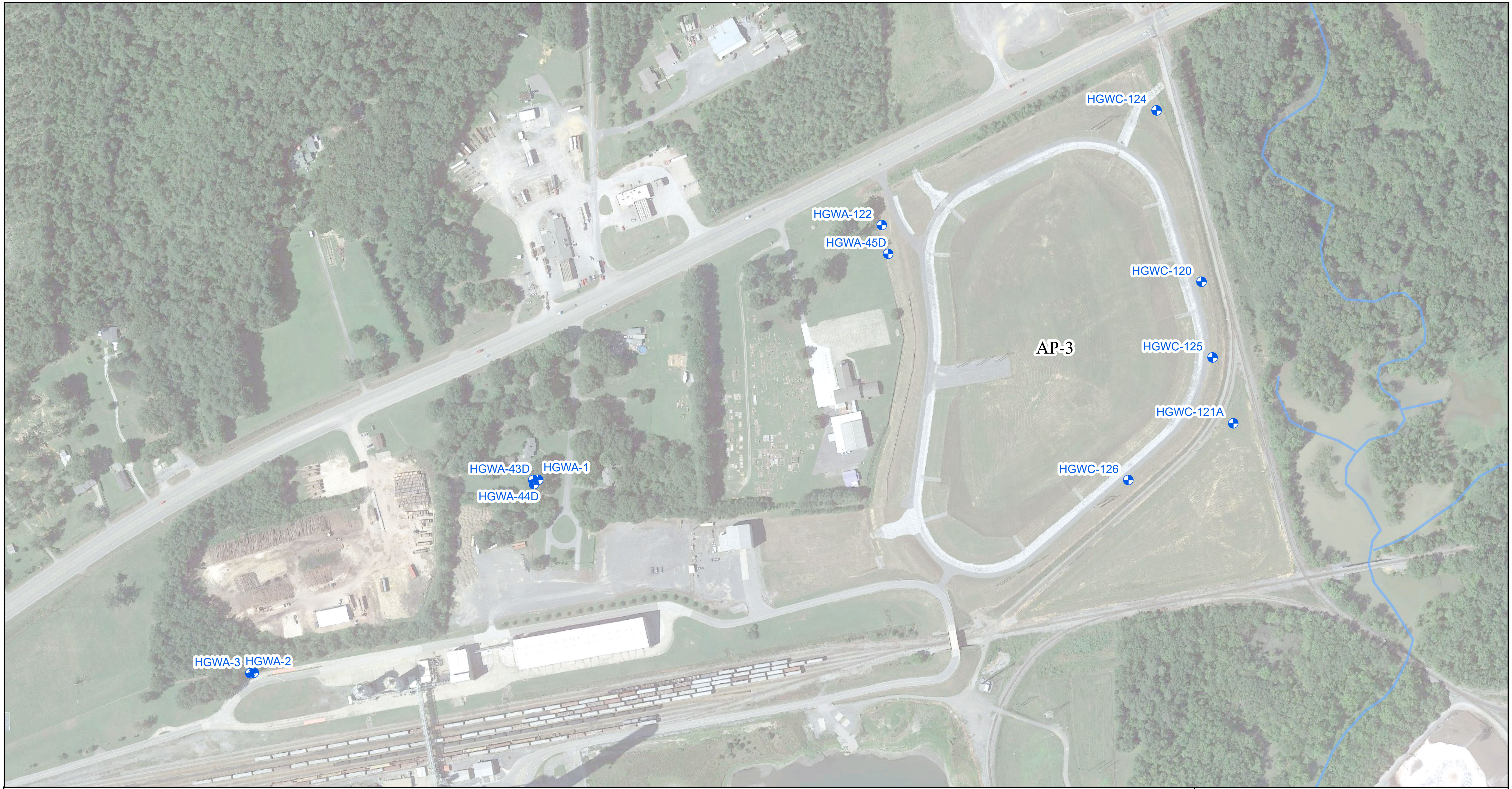
Georgia Power Company
Plant Hammond AP-3
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | September 2020

Figure 4-2

N:\GA Power\Plant Hammond GW Mon-Rpt Proposal\Siting and Hydrogeo Reports\AP-3\Combined Siting and HydroGeo\GIS\mxd\2020\Figure4-2_AP3 Particle Tracking with CAP for HAR Revision 01_potrait.mxd 9/18/2020 6:29:54 PM



● Compliance Monitoring
— Cabin Creek

Notes:
1. Aerial photograph source: Google Earth Pro, August 2019.

AP-3 Monitoring Well Network

Georgia Power Company
Plant Hammond AP-3
Rome, Floyd County, Georgia

Geosyntec
consultants

Kennesaw, GA | November 2020

Figure
4-3

N:\GA Power\Plant Hammond GW Mon-Rpt Proposal\Siting and Hydrogeo Reports\AP-3\Combined Siting and HydroGeo\GIS\mxd\2020\Figure4-4_WellMap_no PZ.mxd 11/12/2020 9:28:11 PM

APPENDIX A

Site Geologic Map
(Petrologic Solutions, Inc.)

NOTES

1. GEOLOGIC MAPPING PERFORMED BY PETROLOGIC SOLUTIONS, INC.

2. BASED ON DISCUSSIONS WITH SCS DURING A OCTOBER 23, 2015 SITE MEETING, THE MW-20 MONITORING WELL LOCATION IS SITUATED ON PROPERTY OWNED BY SCS. THE PARCEL BOUNDARY DEPICTED HER IS ONLY APPROXIMATE AND COULD NOT BE CORROBORATED WITH FLOYD COUNTY, GA TAX INFORMATION OR ONLINE GIS SERVICES.

3. SCS IS REPORTED TO OWN THE 147.87 ACRE PARCEL NORTH OF AP-4 AND ACROSS GA-20. THE PARCEL AND BOUNDARY LINES SHOWN ARE BASED ON INFORMATION PROVIDED BY SCS; HOWEVER, THIS INFORMATION CONFLICTS WITH TAX PARCEL INFORMATION SHOWN ON THE FLOYD COUNTY, GA ONLINE GIS MAP SYSTEM.

LEGEND

🟦	MDu - UNDIFFERENTIATED EAST OF TURNIP MOUNTAIN (MISSISSIPPIAN/DEVONIAN)	—··—··—	PROPERTY BOUNDARY (AS PROVIDED BY SOUTHERN COMPANY SERVICES, INC.)	●	€cls - SHALEY LIMESTONE IN ROCK CORE
🟩	Dac - ARMUCHEE CHERT (DEVONIAN) & CHATTANOOGA SHALE (DEVONIAN)	— — —	INTERPRETED GEOLOGIC CONTACT	●	€csl - GRAY & BROWN CALCAREOUS SHALE IN ROCK CORE
🟥	Srm - RED MOUNTAIN FORMATION (SILURIAN)	┴	BEDDING	●	MDu - FISSILE, BLACK SHALE IN ROCK CORE
🟧	€cls - CONASAUGA FORMATION MIDDLE UNITS (CAMBRIAN)	▚	GEOLOGIC MAP STATION		
🟨	€csl - CONASAUGA FORMATION LOWER UNITS (CAMBRIAN)	▼—▼	THRUST FAULT		
		f.a.⟶29	FOLD AXIS		

REFERENCES

1. USGS 7.5 MINUTE QUADRANGLE, LIVINGTON AND ROCK MOUNTAIN, 2014.

CLIENT
Southern Company

CONSULTANT
Golder Associates

YYYY-MM-DD	2017/10/13
DESIGNED	-
PREPARED	SEP
REVIEWED	TIR
APPROVED	RPK

PROJECT
PLANT HAMMOND HYDROGEOLOGIC SITE CONCEPTUAL MODEL AND GROUNDWATER MONITORING NETWORK RECOMMENDATIONS

TITLE
GEOLOGIC MAP

PROJECT NO.	REV.	FIGURE
1534855	-	3

Path: \\atlanta\cadd\Southern Company\Plant Hammond\1534855\Production\ | File Name: 1534855-03-Geologic Map.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

0 1 in

APPENDIX B

Boring Logs for Locations Shown on Geologic Cross-Sections

TRANSECT A-A’ LOGS

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

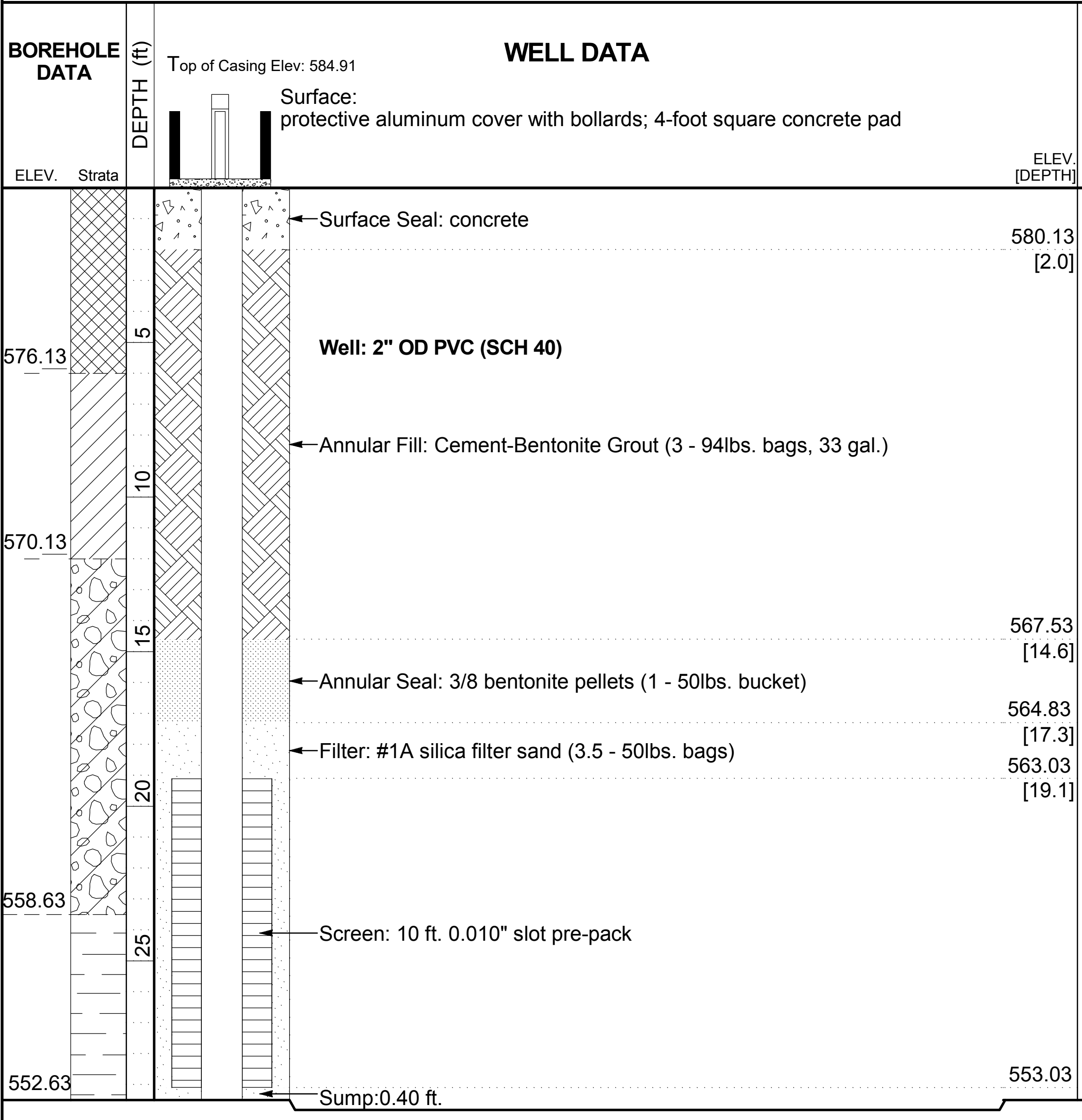
WELL: AP03-MW23
PAGE 1 OF 1
ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/24/2014 **COMPLETED** 11/24/2014 **SURF. ELEV.** 582.13 **COORDINATES:** N:1551641.44 E:1942496.83
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 29.5 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 8.9 ft. after 72 hrs.
NOTES Well installed. Refer to well data sheet.

BOREHOLE DATA | **WELL DATA** | **COMMENTS**



Easting and Northing in NAD 1983.
Elevation in NAVD 88.

SHEET 1 OF 1

SSI
Soil Systems, Inc.

LOG OF BORING

PROJECT GA. POWER PLANT HAMMOND SS - 753 BORING No. Z-18

DRILL CREW MEMBERS N. MEEKINS, M. DICKERSON DATE 12-27-76

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS/6"	RECOV.	
	Tan cl. sand w/ rock frags	5.0'	1	SP	15-23-24		
		6.0'					— REFUSAL @ 6'

GWATOB-
GW24hrs.- NONE
REFUSAL- 6.0'
BORING Z-18
TERMINATED- 6.0'

SHEET 1 OF 1

Soil Systems, Inc.

LOG OF BORING

PROJECT Ga. Power Plant Hammond SS = 753 BORING No. Z-18A

DRILL CREW MEMBERS N. Meekins, M. Dickerson DATE 12-27-76

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	NOTES
	Tan cl sand w/Rock Frags	5.0'	1	SP	14-21-26		
	Tan cl sand w/Rock Frags	10'	2	SP	9-10-17		
	Tan silty sand	15'	3	SP	14-20-27		
	Tan & Gray silty sand w/Rock Frags	20'	4	SP	10-15-21		
	Gray Weathered Shale	25'	5	SP	14-22-20		
	Br. si f-m sa @ cl & Rk. frags	300	6	SP	21/23/20		
	Br. si f-m sa.	35.0	7	SP	100/5½"		
	Br. cl f-m sa @ Rk. frags	365	8	SP	22/16/20		
	Yell-Br. si cl	380	9	SP	11/17/21		
	Same	39.5	10	SP	5/8/12		
	Same	41.0	11	SP	5/7/28		
	Tan si cl	425	12	SP	2/3/4		609.3 47.5
	Same	440	13	SP	1/2/2		561.8
	Same	45.5	14	SP	3/3/3		
	Gr. si cl @ weath shale	470	15	SP	1/1/100/1"		
	Gr. weath shale	485	16	SP	100/2"		

GWATOB- 45.0"
GW24hrs.- 34.5'
REFUSAL- 47.5"
BORING Z-18A
TERMINATED- 47.5"

SHEET 1 OF 1

SSI
Soil Systems, Inc.

LOG OF BORING

PROJECT Plant Hammond SS -753 BORING No. Z-18-B

DRILL CREW MEMBERS M. Meatyard, M. Dickerson, E. Williams DATE 1-20-77

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES NO.	SAMPLES TYPE	SAMPLES BLOWS/6"	SAMPLES RECOV.	NOTES
							Set 48.0' NX casing
		47.3					
	Start Core @ 47.3'						
							Run- 1.3
							Rec - .4
		48.6	1				
							Run- 2.4
							Rec- 1.5
		51.0	2				
							Run- 2.7
							Rec- 1.7
		53.7	3				
							Run- 3.6
							Rec- 2.4
		57.3	4				GWATOB-
	Bot. Hole @ 57.3						GW24hrs.-
							REFUSAL-
							BORING
	% Rec. = 60.0%						TERMINATED-

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-8
Page: 1 of 5

Drilling Start Date:	**02/04/2017**	Boring Depth (ft):	**90**
Drilling End Date:	**02/07/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**32**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.09**
Logged By:	**Nardos Tilahun/James Griffin**	Easting, Northing (X, Y):	**1942521.4, 1551323.29**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
0				CB	3.0		(0') Ash (COAL COMBUSTION BYPRODUCT), SILT with gravel (ML); little fine-coarse gravel, some fine-medium sand, mostly silt, few clay, low plasticity, soft, moist, black.		Photo represents recovered sample between 0-2 ft interval.	605
5				CB	1.8		(5') Ash (COAL COMBUSTION BYPRODUCT), poorly graded SAND (SP); mostly fine grained sand, little silt, some clay, loose, moist, black.			600
10				CB ×	3.5			Soil Grab Sample AP3-B-8(11-12)		595
15				CB	1.8					590
20										

NOTE: Hole pre-cleared to 5' on 02/04/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services
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BORING LOG

Boring No. AP3-B-8
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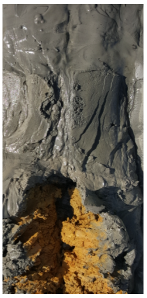
Drilling Start Date:	**02/04/2017**	Boring Depth (ft):	**90**
Drilling End Date:	**02/07/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**32**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.09**
Logged By:	**Nardos Tilahun/James Griffin**	Easting, Northing (X, Y):	**1942521.4, 1551323.29**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
20				CB	2.5		(20') Ash (COAL COMBUSTION BYPRODUCT), poorly graded SAND (SP); mostly fine grained sand, little silt, some clay, loose, moist, black. (21') Ash (COAL COMBUSTION BYPRODUCT), poorly graded SAND (SP); mostly fine grained sand, few silt, trace clay, loose, moist, dark gray.			585
25				CB	1.5		(25') Ash (COAL COMBUSTION BYPRODUCT), poorly graded SAND (SP); mostly fine grained sand, few silt, trace clay, loose, wet, dark.			580
30		▼					(30') Ash (COAL COMBUSTION BYPRODUCT). No recovery between 30 and 35 ft.			575
35				CB	5.0		(35') Ash (COAL COMBUSTION BYPRODUCT), poorly graded SAND (SP); mostly fine grained sand, few silt, trace clay, loose, saturated, dark. (36') Fat CLAY (CH); few silt, mostly clay, medium plasticity, medium stiff, wet, light yellowish-brown, partially laminated, RESIDUUM.	Soil Grab Sample AP3-B-8(39-40)	Photo represents recovered sample between 35-37 ft interval.	570
40										

NOTE: Hole pre-cleared to 5' on 02/04/2017 by Cascade Drilling using hand auger.

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BORING LOG

Boring No. AP3-B-8
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Drilling Start Date:	**02/04/2017**	Boring Depth (ft):	**90**
Drilling End Date:	**02/07/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**32**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.09**
Logged By:	**Nardos Tilahun/James Griffin**	Easting, Northing (X, Y):	**1942521.4, 1551323.29**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
40	▨			ST	2.0		*(continued)* Fat CLAY (CH); few silt, mostly clay, medium plasticity, medium stiff, wet, light yellowish-brown, partially laminated, RESIDUUM.	Shelby Tube AP3-B8(40-42)	Vertical K = 1.80E-07 cm/sec	565
	▨			CB	7.0		(42') Lean CLAY (CL); few silt, mostly clay, medium plasticity, medium stiff, wet, light yellowish-brown, RESIDUUM. (43') Lean CLAY (CL); trace silt, mostly clay, medium plasticity, medium stiff, wet, dark brown, laminated Clay, RESIDUUM.		Photo represents recovered sample between 42-43 ft interval.	
45	▨									560
	▨			×				Soil Grab Sample AP3-B-8(48-49)		
50	▨			CB	6.5		(50') Gravelly lean CLAY (CL); some fine-coarse gravel, trace fine-medium sand, few silt, mostly clay, medium plasticity, medium stiff, wet, black, angular rock fragments of limestone (reacted with HCl), HIGHLY WEATHERED LIMESTONE.		Photo represents recovered sample between 50-51 ft interval.	555
55	▨									550
	▨			×				Soil Grab Sample AP3-B-8(59-60)		
60										

NOTE: Hole pre-cleared to 5' on 02/04/2017 by Cascade Drilling using hand auger.

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Project: **Plant Hammond Ash Pond 3**
Address: **5963 Alabama Hwy, Rome, GA**

BORING LOG

Boring No. **AP3-B-8**
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Drilling Start Date:	**02/04/2017**	Boring Depth (ft):	**90**
Drilling End Date:	**02/07/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**32**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.09**
Logged By:	**Nardos Tilahun/James Griffin**	Easting, Northing (X, Y):	**1942521.4, 1551323.29**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
60				CB	5.0		(60') SEDIMENTARY ROCK (LIMESTONE); laminated, decomposed, soft, dark bluish gray, dry, reacted with HCl.			545
							(61') Fat CLAY with gravel (CH); trace fine-coarse gravel, trace fine-medium sand, high plasticity, very soft, wet, light greenish-gray, RESIDUUM.	Soil Grab Sample AP3-B-8(62-63)		
							(63') Fat CLAY (CH); high plasticity, hard, dry, dark bluish-gray, RESIDUUM.	Soil Grab Sample AP3-B-8(64-65)		
65				CB	4.0					540
							(67') SEDIMENTARY ROCK (LIMESTONE); laminated, slightly weathered, bluish black, dry.		67-70 ft rock has been pulverized by drilling methods Photo represents recovered sample between 66-68 ft interval.	
70				CB	2.0					535
				CB	0.0					
75				CB	4.0				6-inch diameter casing installed at 75 ft	530
80										

NOTE: Hole pre-cleared to 5' on 02/04/2017 by Cascade Drilling using hand auger.

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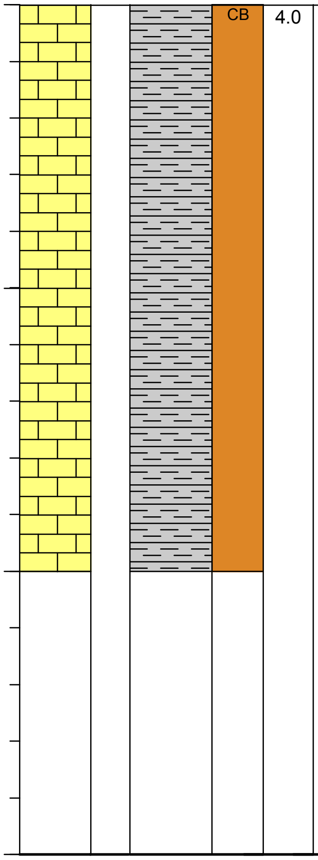
BORING LOG

Boring No. **AP3-B-8**

Page: **5 of 5**

Drilling Start Date:	**02/04/2017**	Boring Depth (ft):	**90**
Drilling End Date:	**02/07/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**32**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.09**
Logged By:	**Nardos Tilahun/James Griffin**	Easting, Northing (X, Y):	**1942521.4, 1551323.29**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
80				CB	4.0		(80') SEDIMENTARY ROCK (LIMESTONE); laminated, slightly weathered, bluish black, dry.			525
85									Horizontal K = 5.15E-04 cm/sec (from single Packer Testing between 83-88 ft).	520
90							(90') Boring terminated.			515
95										

NOTE: Hole pre-cleared to 5' on 02/04/2017 by Cascade Drilling using hand auger.

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BORING LOG

Boring No. AP3-B-9
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Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
0				CB	4.0		(0') Ash (COAL COMBUSTION BYPRODUCT), SILT with gravel (ML); trace fine-coarse gravel, trace fine-medium sand, soft, moist, dark gray.		Photo represents recovered sample between 1-2 ft interval.	605
5				CB	5.0		(6') Ash (COAL COMBUSTION BYPRODUCT), SILT with gravel (ML); little fine-coarse gravel, stiff, moist, pale yellowish-brown. (7') Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); trace fine gravel, soft, moist, dark gray.			600
10				CB	5.0					595
15				CB	5.0					590
20										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

Geosyntec consultants engineers | scientists | innovators	**Client:** **Southern Company Services** **Project:** **Plant Hammond Ash Pond 3** **Address:** **5963 Alabama Hwy, Rome, GA**	**BORING LOG** **Boring No.** **AP3-B-9** **Page:** **2 of 6**

Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
20				CB	4.0		*(continued)* Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); trace fine gravel, soft, moist, dark gray.			585
25				CB	4.0					580
30				CB	4.0					575
35				CB	4.0					570
							(36') Fat CLAY (CH); trace fine-coarse gravel, medium plasticity, stiff, moist, pale yellowish-brown, RESIDUUM.		Photo represents recovered sample between 37-38.5 ft interval.	
		▼		☒				Soil Grab Sample AP3-B-9(38-39)		
40										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services
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BORING LOG
Boring No. AP3-B-9
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Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
40				CB	4.0		*(continued)* Fat CLAY (CH); trace fine-coarse gravel, medium plasticity, stiff, moist, pale yellowish-brown, RESIDUUM.			565
				╳				Soil Grab Sample AP3-B-9(44-45)		
45				CB	4.0		(45') Fat CLAY with gravel (CH); some fine-coarse gravel, medium plasticity, stiff, moist, pale yellowish-brown, no reaction with HCl, RESIDUUM.			560
							(47') Lean CLAY with gravel (CL); some fine-coarse gravel, few medium-coarse sand, medium plasticity, soft, moist, light reddish-brown, no reaction with HCl, HIGHLY WEATHERED LIMESTONE.			
				╳				Soil Grab Sample AP3-B-9(49-50)		
50				CB	4.0					555
				╳				Soil Grab Sample AP3-B-9(53-54)	Photo represents recovered sample between 53-54 ft interval.	
55				CB	4.0		(55') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, slightly weathered, hard, dark bluish-gray, moist.		Photo represents recovered sample between 56-57 ft interval.	550
60										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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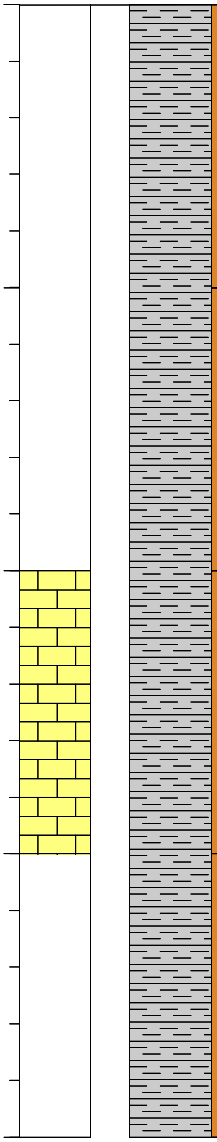
BORING LOG

Boring No. **AP3-B-9**
Page: **4 of 6**

Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**



DEPTH (ft)	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
60	CB	0.0		(60') No Recovery.		60-70 ft drilling head drop; unknown amount of water loss	545
65	CB	0.0					540
70	CB	4.0		(70') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, slightly weathered, hard, dark bluish-gray, moist.			535
75	CB	0.0		(75') No Recovery.		6-inch diameter casing installed at 75 ft. 75-80 ft soft drilling, rods advanced by pushing drill head down; no rotation or vibration Fracture at 75.9 ft (198 mm)	530
80							

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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BORING LOG

Boring No. **AP3-B-9**
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Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
80				CB	0.0		*(continued)* No Recovery.		(obtained from Geophysical Log) Geophysical logging terminated at 76.5 ft due to borehole collapse. 75-95 ft soft drilling.	525
85				CB	0.0					520
90				CB	0.0					515
95				CB	3.0		(95') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		Photo represents recovered sample between 95-96 ft interval.	510
100										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

Client: Southern Company Services
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BORING LOG

Boring No. AP3-B-9
Page: 6 of 6

Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
100				CB	3.0		*(continued)* SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		Photo represents recovered sample between 100-101 ft interval.	505
105							(105') Boring terminated.			500
110										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-11
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Drilling Start Date:	**02/16/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**26**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**37.4**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**607.12**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942643.26, 1550545.31**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
0 5				CB	10.0		(0') Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, little silt, loose, saturated, dark gray. (1') Moist to wet. (2') With some orange/brown sandy clay and trace of fine gravel. (4') Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, some silt, trace clay, poorly graded, loose, moist, dark gray. (5') Slightly clayey, with trace of fine gravel. (6') Pale gray to pale brown, predominantly sandy, less silty. (8') Pale gray.		Photo represents recovered sample between1-2 ft interval.	605 600
10 15 20				CB	6.0		(10-14') No Recovery. (14') Ash (COAL COMBUSTION BYPRODUCT), poorly graded SAND with silt (SP-SM); mostly fine grained sand, few silt, trace clay, poorly graded, medium dense, moist, gray. (15') Increasing silt content, dark gray to pale gray.		Photo represents recovered sample between 15-16.5 ft interval.	595 590

NOTE: Boring set out side power line corridor.

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BORING LOG

Boring No. **AP3-B-11**
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Drilling Start Date:	**02/16/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**26**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**37.4**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**607.12**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942643.26, 1550545.31**

DEPTH (ft)	COLLECT: Sample Type	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
20	CB	5.0	(20-21') No Recovery. (21') Ash (COAL COMBUSTION BYPRODUCT), poorly graded SAND with silt (SP-SM); mostly fine grained sand, few silt, medium dense, moist, dark gray.			585
25			(24') Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, little silt, trace clay, medium dense, wet, gray. (25') Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, little silt, poorly graded, medium dense, wet, gray.		Sample picture between 25 ft and 30 ft shows no recovery at top of the run. However, core loss is likely at bottom of run due to saturated ground. Possibly perched water level at 26.5 ft.	580
30	CB	8.0	(32') Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, little silt, poorly graded, loose, saturated, brown and gray.			575
35			(36') Lean CLAY with sand (CL); trace fine gravel, little fine sand, trace silt, mostly clay, medium plasticity, medium stiff, wet, orange, with some pale gray and pale red mottling, RESIDUUM. (37') With trace of fine gravel. (39') Gray and orange mottled. Increasing fine sand content towards 40 ft.		Photo represents recovered sample between 35.5-37.5 ft interval.	570
40						

NOTE: Boring set out side power line corridor.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-11
Page: 3 of 5

Drilling Start Date:	**02/16/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**26**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**37.4**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**607.12**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942643.26, 1550545.31**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
40				CB	8.0		(40') No Recovery.			
							(41.5') Lean CLAY with sand (CL); trace fine gravel, little fine sand, few silt, mostly clay, medium plasticity, medium stiff, wet, orange, with pale red staining, RESIDUUM.			565
45							(45') Trace of fine gravel, pale gray mottling, with some silt.			560
							(49') Becoming dark brown and dark orange, red (iron oxide) staining, trace of weakly cemented clayey sand and pebbles, RESIDUUM.			
50				CB	5.0		(50') Clayey GRAVEL (GC); mostly fine-coarse grained gravel, few fine-medium sand, trace silt, some clay, poorly graded, medium dense, saturated, dark gray, gravel is dark gray, angular limestone, with fragments up 5 diameter, HIGHLY WEATHERED LIMESTONE.		Photo represents recovered sample between 50-51.5 ft interval.	555
55							(55') No Recovery.		Driller reported no resistance between 55 ft and 60 ft.	550
60										

NOTE: Boring set out side power line corridor.

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Client: Southern Company Services

Project: Plant Hammond Ash Pond 3

Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-11

Page: 4 of 5

Drilling Start Date:	**02/16/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**26**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**37.4**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**607.12**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942643.26, 1550545.31**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	Recovery (ft)	Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
60				CB	5.0		(60') Clayey GRAVEL with sand (GC); mostly fine-coarse grained gravel, little fine-medium sand, trace silt, some clay, poorly graded, medium dense, saturated, dark gray, HIGHLY WEATHERED LIMESTONE. (62') Dry.			545
65				CB	7.0		(65') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, slightly weathered, moderately hard, dark gray, wet, drilled as fragments of core up to 5 inch length and discs of core.		Recovered sample reduced to 7 ft, fines possible washed away. 6 inch diameter casing installed at 65 ft, open hole between 65 ft and 100 ft. Driller reported moderately hard drilling from 66 ft. Photo represents recovered sample between 65-66 ft interval.	540
70										535
75							(75') No Recovery. (76') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray, wet. (79') Drilled as more competent rock fragments and intact core fragments up to 6 inches long,		Driller reported drop of rods between 75 ft and 76 ft. Loss of circulation between the 75 ft to 80 ft rod.	530
80										

NOTE: Boring set out side power line corridor.

Client: **Southern Company Services**
Project: **Plant Hammond Ash Pond 3**
Address: **5963 Alabama Hwy, Rome, GA**

BORING LOG

Boring No. **AP3-B-11**
Page: **5 of 5**

Drilling Start Date:	**02/16/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**26**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**37.4**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**607.12**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942643.26, 1550545.31**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
80				CB	6.0		*(continued)* SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray, wet.		Photo represents recovered sample between 81-82 ft interval.	525
85										520
90				CB	5.0					515
95										510
100							(100') Boring terminated.			

NOTE: Boring set out side power line corridor.

Log updated with revised survey certified 5/19/2020.

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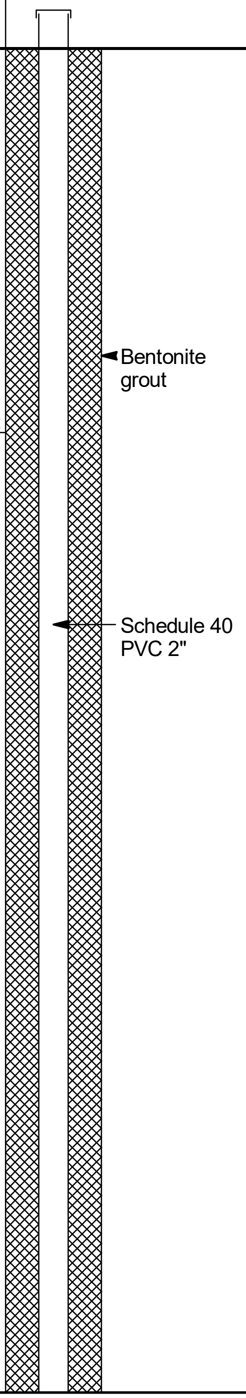
HGWC-126

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 11/25/19 **COMPLETED** 11/26/19
NORTHING 1550422.03 **EASTING** 1942689.40
DRILLER SCS Field Services
GROUND ELEVATION 608.72 **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 611.24
SAMPLING METHOD Core Barrel (4")
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Sonic TS-150
LOGGED BY B. Weinmann **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV: 608.72
0	608.72			Hydro excavation (0-10') - No sample.	
10	598.72		▨	CLAY, with SAND, Light yellow to brown, medium plasticity, fine to medium grained sand, few silt, mostly clay.	598.72
20			▨	20': With gravel.	



(Continued Next Page)

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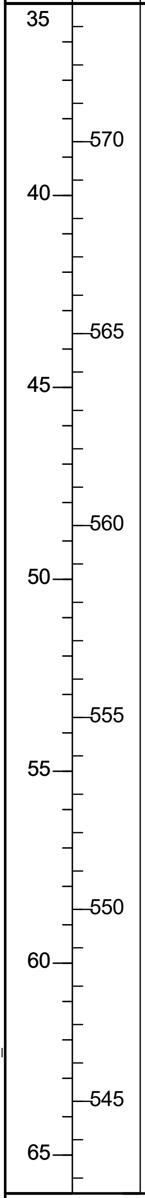
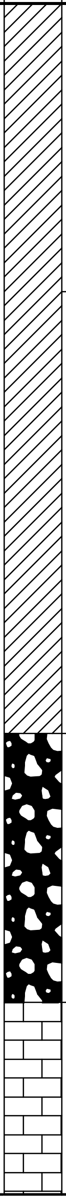
HGWC-126

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM





CLAY, with SAND, Light yellow to brown, medium plasticity, fine to medium grained sand, few silt, mostly clay. *(continued)*

566.22

CLAY with SAND, light gray and yellow to red, medium plasticity, sand is fine grained, laminated, stiff, moist.

54': With rock fragments, fine to medium grained sand, brown to gray.

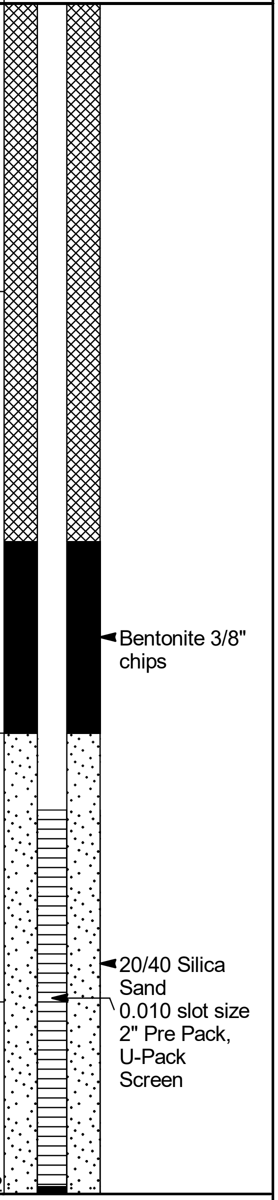
554.72

PARTIALLY WEATHERED ROCK (PWR), Gray, fine to coarse gravel sized limestone fragments and fine to medium grained sand.

547.72

LIMESTONE, Pale gray, limestone.

542.72



Bottom of borehole at 66.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

BORING AP03-MW26

PAGE 1 OF 1

ECS37736

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/12/2014 **COMPLETED** 11/12/2014 **SURF. ELEV.** 584.9 **COORDINATES:** N:34.256360 E:-85.337470

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

DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 34.3 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 15.1 ft. after 48 hrs.

NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
	▩	**Fill (CL)** - brown	583.9				
	■	**Coal Combustion Byproduct (ASH)**					
5	■	- dark gray, dry, stiff, silt size particules		SS -1	3.5-5.0	5-7-7 (**14**)	
10	■	- very dark gray to black, damp, soft		SS -2	8.5-10.0	2-1-2 (**3**)	
	■	- very dark gray to black, damp, soft	570.9	SS -3	13.5-15.0	3-2-2 (**4**)	
15	▨	▽ **Gravelly Lean Clay (CL)** - red-brown, damp, with yellow-brown mottles					
20	▨	- red-yellow, damp, stiff, with red mottling, angular gravel	561.9	SS -4	18.5-20.0	10-7-5 (**12**)	
25	▧	**Fat Clay (CH)** - brown-yellow, very moist, soft, medium to high plasticity, with dark red-brown and gray mottling	556.9	SS -5	23.5-25.0	2-1-3 (**4**)	
	▨	**Clayey Gravel (GC)** - brown and gray, very moist, very dense, angular gravel	555.6	SS -6	28.5-28.6	50/1" (**100+**)	Auger refusal at 29.3 ft.
30	▦	**SHALEY LIMESTONE** - gray and dark gray, moderately weathered, inclined, calcite filled fractures, numerous weathered fractures, strong HCl reaction	550.6	RC -1	29.3-34.3	**94** (10)	

Bottom of borehole at 34.3 feet.

2012 GEOTECH ENGINEERING LOGS - ESEE2012DATABASE.GDT - 7/13/15 10:24 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-HAMMOND\HAMMOND ASH POND PIEZ\UPDATED HAMMOND PZ BORING L

TRANSECT B-B’ LOGS

Log updated with revised survey certified 5/19/2020.

BORING HGWA-122

LOG OF TEST BORING

PAGE 1 OF 1

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers

LOCATION Plant Hammond

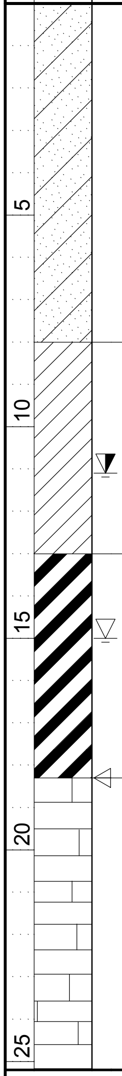
DATE STARTED 11/20/2014 **COMPLETED** 11/20/2014 **SURF. ELEV.** 585.04 **COORDINATES:** N:1551251.42 E:1941887.11

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

DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 25.2 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 11.1 ft. after 100 hrs.

NOTES Well installed. Refer to well data sheet.



DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
	Clayey Sand (SC)					
5	- yellow-brown, dry, medium dense, medium to coarse grain, with yellow-red mottling		SS -1	3.5-5.0	3-7-5 (**12**)	
		577.04				
10	**Lean Clay (CL)** - yellow-brown, damp, stiff, no to low plasticity, with red-yellow mottling, some sand		SS -2	8.5-10.0	7-7-5 (**12**)	
		572.04				
15	**Fat Clay (CH)** - brown, wet, soft, gravelly, angular gravel, weathered bedrock		SS -3	13.5-15.0	2-2-1 (**3**)	
		566.74				
20	**SHALEY LIMESTONE**		RC -1	18.3-20.2	**89** (21)	Auger refusal at 18.3 ft.
	- gray and dark gray, few weathered shale seams 1/8 to 1/4 inch thick, strong HCl reaction					
25	- shale seams thicker (up to 1 inch thick) and less weathered	555.84	RC -2	20.2-25.2	**96** (24)	

Bottom of borehole at 25.2 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

2012 GEOTECH ENGINEERING LOGS - ESEE2012DATABASE.GDT - 7/13/15 10:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-HAMMOND\HAMMOND ASH POND PIEZ\UPDATED HAMMOND PZ BORING L

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HGWA-45D

PAGE 1 OF 2

CLIENT Southern Company Services

PROJECT NAME Plant Hammond Well Installation

PROJECT NUMBER GW6581B

PROJECT LOCATION Plant Hammond

DATE STARTED 8/19/20 **COMPLETED** 8/19/20

NORTHING 1551157.68 ft **EASTING** 1941907.54 ft

DRILLER Cascade Drilling

GROUND ELEVATION 584.08 ft **BORING DIAMETER** 6 in

DRILLING METHOD Sonic

TOP OF CASING ELEVATION 586.95 ft

SAMPLING METHOD 4" core 6" override

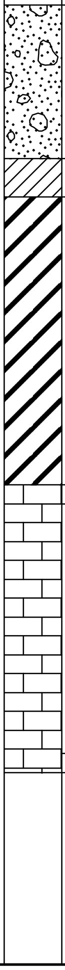
GEOPHYSICAL CONTRACTOR ---

RIG TYPE Terrasonic 1051181

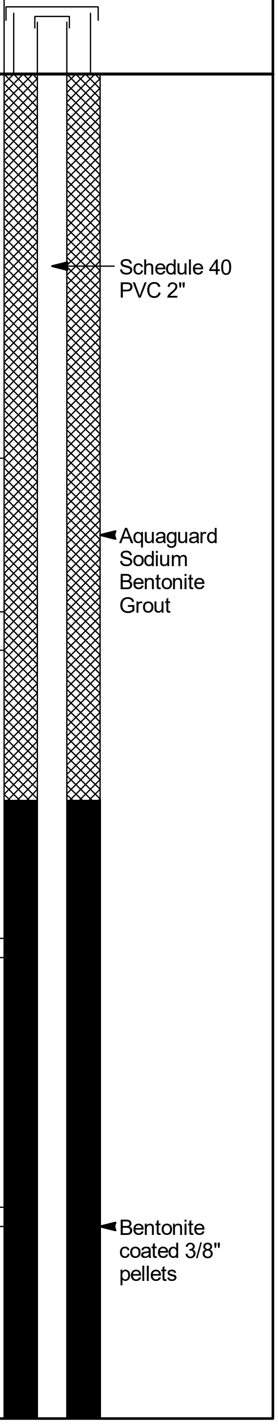
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	MATERIAL DESCRIPTION
0			Hydro Excavation (0 ft to 10 ft) NO SAMPLE
	580		
5			
	575		
10	574.1		GRAVELLEY SAND, Light gray, loose, trace clay, fine to coarse sand, angular gravel, moist.
			12 ft: Dry.
	570.1 570		CLAY, Light brown, mottled with light gray and yellowish red, laminar dark brown organic material throughout, firm, non plastic to low plasticity, moist.
15	569.1		CLAY, Light brown, some reddish yellow, moist, soft, medium to high plasticity, with some angular, fine grained gravel increasing in concentration with depth.
	565		
20			20 ft: Wet.
	561.6	22.5 ft: Increased rig chatter.	LIMESTONE, Light gray to white, hard, strong reaction with HCl, dry.
	561.1		LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.
	560		
25			
	555 554.6	30 ft to 40 ft: Very slow drilling (hard formation).	
30	554.1		HIGHLY WEATHERED ROCK, Dark bluish gray, recovered as gravelly clay and silt, non plastic, hard, wet.
			30 ft to 37 ft: No recovery.
	550		

GRAPHIC LOG



CONSTRUCTION DIAGRAM

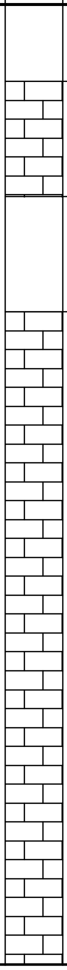


(Continued Next Page)

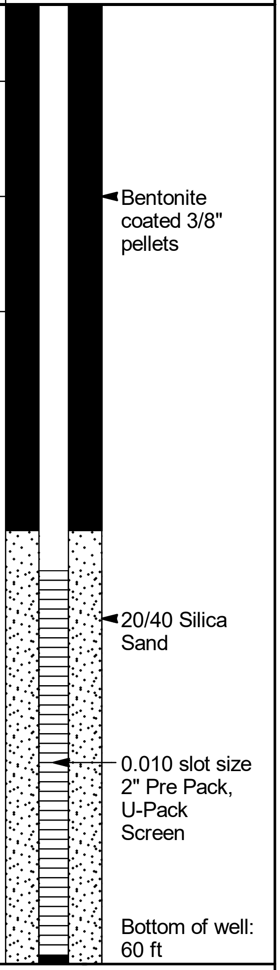
HGWA-45D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
35				30 ft to 37 ft: No recovery. *(continued)*
				547.1
				LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.
	545			
40				544.1
				40 ft to 43 ft: No recovery.
				541.1
				LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.
	540			
45				
	535			
50				
	530			
55				
	525			
60				524.1



CONSTRUCTION DIAGRAM



Bottom of borehole at 60.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

SSI

Soil Systems, Inc.

LOG OF BORING

SHEET 1 OF 1

4" pvc

PROJECT Plant Hammond SS - 753 BORING No. Z-16

DRILL CREW MEMBERS M. Meatyard, T. Bryant, M Dickerson DATE 12-27-76 12-28-76

Hollow Stem augers

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	NOTES
	Tan fm sa cl @ gravel	5.0	1	SP	15/21/25		
	BR. si cl	10.0	2	SP	9/16/19		
	Same	15.0	3	SP	11/17/19		Washout 49.0'
	Gr. shale	20.0	4	SP	13/14/10		
							Set 49' 1¼" pvc
	BR. si cl @ gravel	25.0	5	SP	8/16/14		
	Tan sa si @ gravel	30.0	6	SP	30/20/13		Set 42.5' 4" pvc
	BR. cl fm sa @ gravel	35.0	7	SP	25/26/31		
	Tan fm sa @ cl and gravel	36.5	8	SP	10/18/15		
	BR. cl si	38.0	9	SP	5/8/8		
	Same	39.5	10	SP	2/4/4		
	Same	41.0	11	SP	2/4/5		
	BR. si cl	42.5	12	SP	4/7/5		
	Tan cl si	44.0	13	SP	1/1/2	.3	45'
	BR. cl si	45.5	14	SP	3/4/4	.8	
	Gr. weath shale	47.0	15	SP	4/12/55		
	Gr. weath shale	48.5	16	SP	100/4"		
	Shale	48.0	17	SP	100=1"	No Rec.	

24 hr. WL Z-19 = 36.0'

Note WL

GWATOB- 39.0

GW24hrs.- 33.7

REFUSAL- 48.0'

BORING Z 16

TERMINATED- 48.0'

SHEET 1 OF 1

SSI
Soil Systems, Inc.

LOG OF BORING

PROJECT PLANT HAMMOND SS -753 BORING No. Z14

DRILL CREW MEMBERS John Taggart / Rickey Rolle / Melvin Gilley DATE 12-17-76

ELEV.	DESCRIPTION	DEPTH IN FEET Bottom of Sample	SAMPLES				NOTES
			NO.	TYPE	BLOWS/6"	RECOV.	
	~~TA Br sl FI SA~~ Br sl FI-COARSE SA tan Br sl FI-med SA w/weat rock	1.5	1	SP	2-3-5		
	GrBr si FI-SA / org Br clayey FI SA	3.0	2		3-3-7		~~1' of Rk frag.~~ 3.0'-4.0'
4.5'	① org Br FI SA clay ② org Br FI SA w/[illegible] rog FAS. ③ org Br cl si w/FI SA	4.5	3		7-7-10		
	org tan sl clayey silt	6.0	4		4-6-8		
6.0-7.5'	①② org Br cl silt ③ org Blk FI-med SA w/clay	7.5	5		3-5-6		
	org tan cl silt	9.0	6		3-5-6		
	org tan cl silt	10.5	7		3-3-3		
	org tan sl cl silt	12.0	8		2-2-3		
	org tan sl cl silt	13.5	9		2-2-1		
	①② org tan + Blk sl cl silt ③ org tan sl cl si	15.0	10		1-2-2		
	tan & Blk silt (weathered Rock?)	16.5	11		5-6-8		
	tan Br sl cl silt	18.0	12		4-8-13		
	tan Br med-FI SA silt (weathered rock ?)	19.5	13		9-12-18		
	①② tan Br cl si (weat rock?) ③ Br sl cl si (w/FI SA)	21.0	14		5-17-19		
	Br sl med-FI SA	22.5	15		2-3-2		22.5 PWR
		24.0	16		100=8"		auger Ref. @ 23.0'
		25.5	17				
		27.0	18				
		28.5	19				
		30.0	20				
							16

GWATOB- 12'
GW24hrs.- 9'
REFUSAL- 23.0
BORING Z14
TERMINATED-

Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG

Well No. AP3-B-7
Page: 1 of 5

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y):	**1942387.32, 1551042.74**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
0				CB	4.5		(0') Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); soft, moist, dark gray.		Photo represents recovered sample between 1-2 ft interval.	605
5				CB	4.5					600
10				CB	5.0					595
15				CB	5.0					590
20										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG

Well No. AP3-B-7
Page: 2 of 5

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y):	**1942387.32, 1551042.74**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
20				CB	5.0		*(continued)* Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); soft, moist, dark gray.			585
									Photo represents recovered sample between 23-24 ft interval.	
25				CB	5.0					580
30				CB	2.0					575
		▼								
35				CB	3.0					570
40										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

Geosyntec consultants
engineers | scientists | innovators

Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG
Well No. AP3-B-7
Page: 3 of 5

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y):	**1942387.32, 1551042.74**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
40				CB	5.0		(40') Fat CLAY with sand (CH); medium plasticity, medium stiff, moist, pale yellowish-brown, RESIDUUM.		Photo represents recovered sample between 41-42 ft interval.	565
				☒				Soil Grab Sample AP3-B-7 (44-45)		
45				CB	4.0					560
							(48') Lean CLAY with gravel (CL); trace fine-coarse gravel, medium plasticity, soft, moist, dark reddish-brown, RESIDUUM.			
50				CB	4.0					555
				☒				Soil Grab Sample AP3-B-7 (52-53)		
55				CB	4.0		(55') Lean CLAY with gravel (CL); trace fine gravel, medium plasticity, very soft, saturated, light brown, HIGHLY WEATHERED LIMESTONE.			550
				☒				Soil Grab Sample AP3-B-7(56-57)		
									Photo represents recovered sample between 57--58 ft interval.	
60										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

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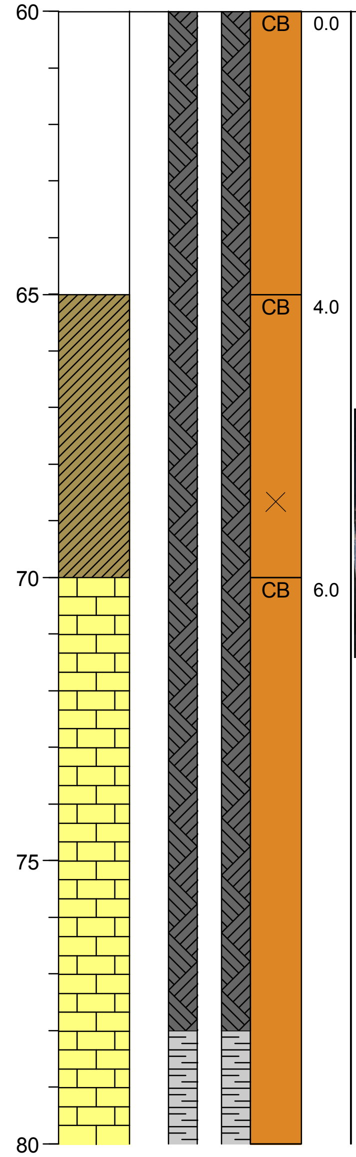
Client:	**Southern Company Services**
Project:	**Plant Hammond Ash Pond 3**
Address:	**5963 Alabama Hwy, Rome, GA**

WELL LOG

Well No. **AP3-B-7**
Page: **4 of 5**

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y:	**1942387.32, 1551042.74**	Filter Pack:	**Sand**



DEPTH (ft)	Sample Type	Recovery (ft)	Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
60	CB	0.0		(60') No Recovery.			545
65	CB	4.0		(65') Lean CLAY with gravel (CL); trace fine-coarse gravel, medium plasticity, very soft, saturated, dark purplish-brown, HIGHLY WEATHERED LIMESTONE.	Soil Grab Sample AP3-B-7(68-69)	Photo represents recovered sample between 67-68.5 ft interval.	540
70	CB	6.0		(70') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		Photo represents recovered sample between 76-77 ft interval.	535 530
75							
80							

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

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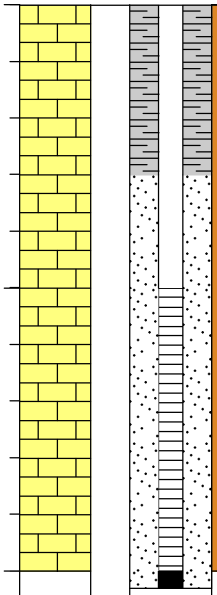
Client:	**Southern Company Services**
Project:	**Plant Hammond Ash Pond 3**
Address:	**5963 Alabama Hwy, Rome, GA**

WELL LOG

Well No. **AP3-B-7**
Page: **5 of 5**

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y):	**1942387.32, 1551042.74**	Filter Pack:	**Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	 Recovery (ft)	 Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
80				CB	6.0		*(continued)* SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		6-inch diameter boring installed at 80 ft.	525
85									Horizontal K = 3.70E-05 cm/sec (from single Slug Testing screen interval between 85-90 ft; not used in modeling).	520
90							(90') Boring terminated.			515
95										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

SHEET 1 OF 1

SSI

Soil Systems, Inc.

LOG OF BORING

PROJECT Plant Hammond SS - 753 BORING No. Z-12

DRILL CREW MEMBERS M. Mentyod, M. Dickeson, T. Bryant DATE 12-21-76

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS/6"	RECOV.	
	Br. cl f-m sa.	1.5	1	SP	0/2/3		
	BR. cl si	3.0	2	SP	7/12/14		
	Gr. BR. weath shale	4.5	3	SP	14/18/17		
	BR. cl si	6.0	4	SP	7/5/3		
	Gr. BR. si cl	7.5	5	SP	2/2/2		
	Same	9.0	6	SP	2/2/1		
	Gr. BR. weath shale	10.5	7	SP	2/1/1		
	BR. cl si. @ shale frags	12.0	8	SP	5/5/5		
	Gr. weath shale	13.5	9	SP	0/0/100/1"		
	Shale	15.0	10	SP	100+=1"		No Rec.
						10	

570.3
13.6
556.7

GWATOB- 7.0'
GW24hrs.- 4.6'
REFUSAL- 13.6
BORING Z-12
TERMINATED- 13.6'

GPC
CIVIL DIVISION
MATERIALS SECTION

TEST BORING RECORD

PROJECT PLANT HAMMOND
LOCATION ROME BORING NO. **P-22**
ELEVATION ______ DATE 8-4-77

B#	DEPTH FROM	DEPTH TO	DESCRIPTION	SAMPLE NO.	SAMPLE DEPTH	PENETRATION 1ST 6"	PENETRATION 2ND 6"	PENETRATION 3RD 6"	N	CORE REC.
P-11	0	25'	AUGAR - NO SAMPLES SET							
			PIEZOMETER AT 25'-0"							
			1¼" X 5' SCREEN							
P10	0	30'	AUGAR - 30' FLUSHED HOLE WITH NW CASING							
			SET SCREEN AT 30'-0"							
P.13	0	35'	AUGAR 35' FLUSHED HOLE WITH NW CASING							
			SET SCREEN AT 35'-0"							
P14	0	25'	AUGAR 25' - SET SCREEN AT 25'-0"							
P.23	0	25'	AUGAR 25' SET SCREEN AT 25'-0"							
P20	0	25'	AUGAR 25' SET SCREEN AT 25'-0"							
P-17	0	25	AUGAR 25 SET SCREEN AT 25'-0"							
P-16	0	35	AUGAR 35' FLUSHED HOLE WITH 2" PVC PIPE							
			SET SCREEN AT 35'-0" 2" X 5'-0"							
P10	0	30'	SET 2" X 5' SCREEN AT 30' FLUSHED							
			HOLE WITH N. W. CASING							
P13	0	35'	FLUSHED HOLE WITH NW CASING SET							
			2" X 5' SCREEN AT 35'-0"							
P19	0	37'	AUGAR 37' FLUSHED HOLE WITH 2" PIPE / 2" X 5' SCREEN SET AT 37'-0"							
22	0	38'	AUGAR 38' FLUSHED HOLE WITH 2" PVC / 2" X 5' SCREEN SET AT 38'-0"							

	FROM	TO		FROM	TO
SS			AUGER		
WASH			TRI-CONE		
___ CASING			___ CORE		
OTHER					

REMARKS

GWATOB ______ GW 24 HRS. ______ DRILLED BY ______ LOGGED BY ______

Log updated with revised survey certified 5/19/2020.

BORING HGWC-120

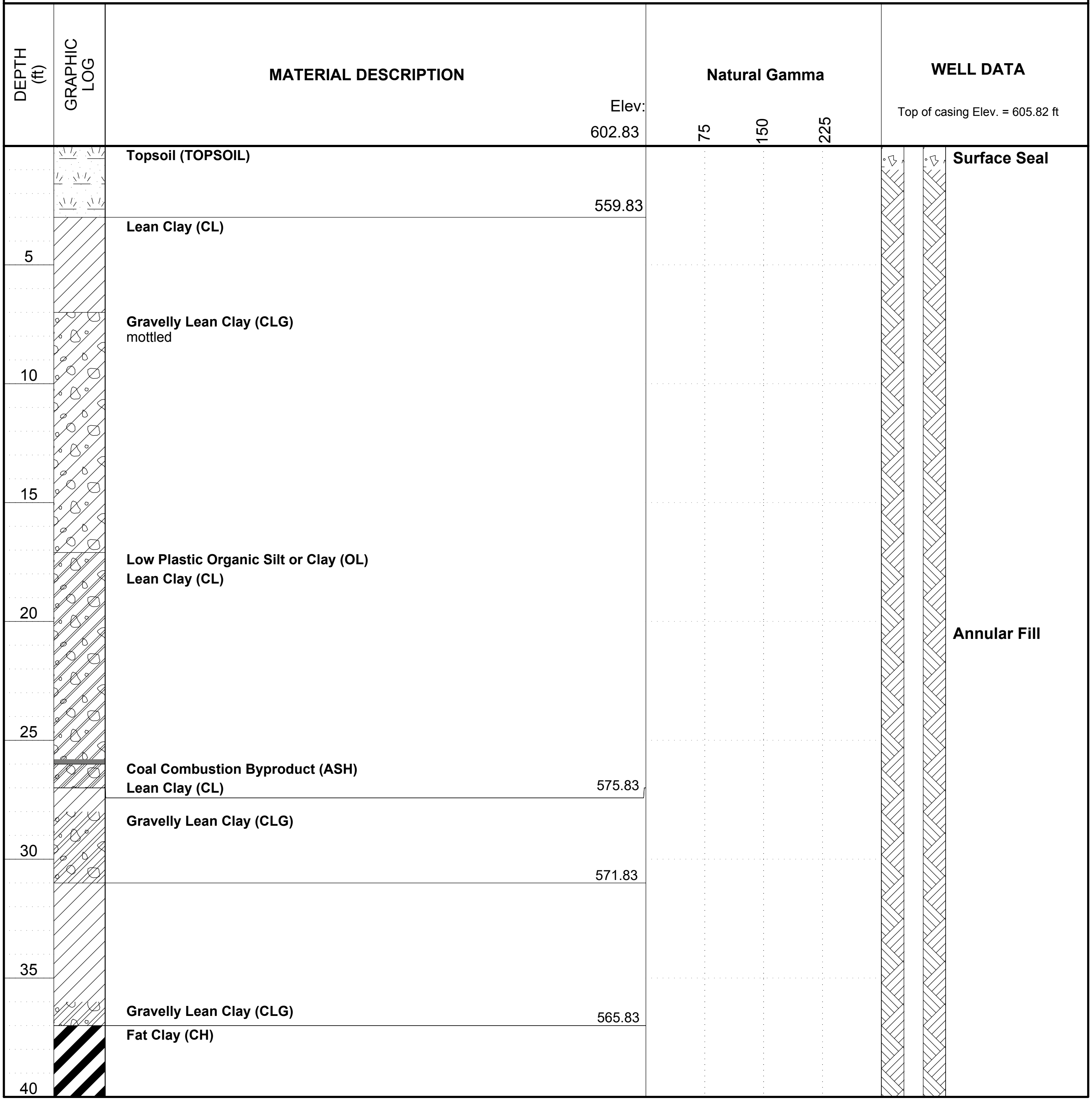
BORING LOG

PAGE 1 OF 2

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Hammond
LOCATION Rome, GA

DATE STARTED 6/27/2016 **COMPLETED** 6/27/2016 **SURF. ELEV.** 602.83 **COORDINATES:** N: 1551067.24 E: 1942926.62
CONTRACTOR Cascade **EQUIPMENT** **METHOD** Rotosonic
DRILLED BY T. Ardito **LOGGED BY** W. Newton **CHECKED BY**
BORING DEPTH 67 ft. **GROUND WATER DEPTHDURING** 47 ft. **COMP.** 42.6 ft. **DELAYED** 42.6 ft.
NOTES Begin Engineering Log at 47 ft. Well installed. Refer to well data sheet.



MATERIAL DESCRIPTION	Elev: 602.83
Topsoil (TOPSOIL)	559.83
Lean Clay (CL)	
Gravelly Lean Clay (CLG) mottled	
Low Plastic Organic Silt or Clay (OL) **Lean Clay (CL)**	
Coal Combustion Byproduct (ASH) **Lean Clay (CL)**	575.83
Gravelly Lean Clay (CLG)	571.83
Gravelly Lean Clay (CLG)	565.83
Fat Clay (CH)	

(Continued Next Page)

Log updated with revised survey certified 5/19/2020.

BORING HGWC-120

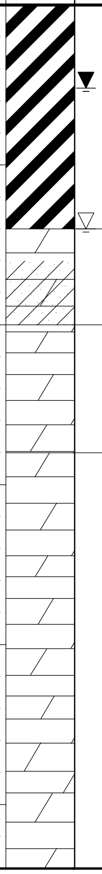
SOUTHERN COMPANY

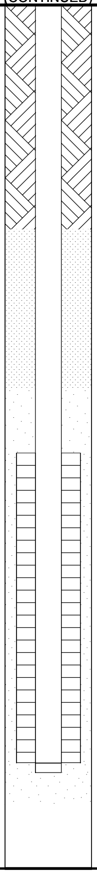
BORING LOG

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Hammond
LOCATION Rome, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Elev:	Natural Gamma 75 150 225	WELL DATA Top of casing Elev. = 605.82
		Fat Clay (CH) *(Con't)*			(CONTINUED)
45			555.83		Annular Fill
		DOLOSTONE			
		CLS			
50			552.83		Annular Seal
			548.83		Filter Pack
55		**DOLOSTONE**			Screen top elevation: 548.83
60					
65			535.83		Screen bottom Elevation: 538.83





Bottom of borehole at 67.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

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Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

MW-46D

CLIENT Southern Company Services

PROJECT NAME Plant Hammond Well Installation

PROJECT NUMBER GW6581B

PROJECT LOCATION Plant Hammond

DATE STARTED 8/18/20 **COMPLETED** 8/18/20

NORTHING 1551056.48 ft **EASTING** 1942929.10 ft

DRILLER Cascade Drilling

GROUND ELEVATION 603.17 ft **BORING DIAMETER** 6 in

DRILLING METHOD Sonic

TOP OF CASING ELEVATION 605.72 ft

SAMPLING METHOD 4" core 6" override

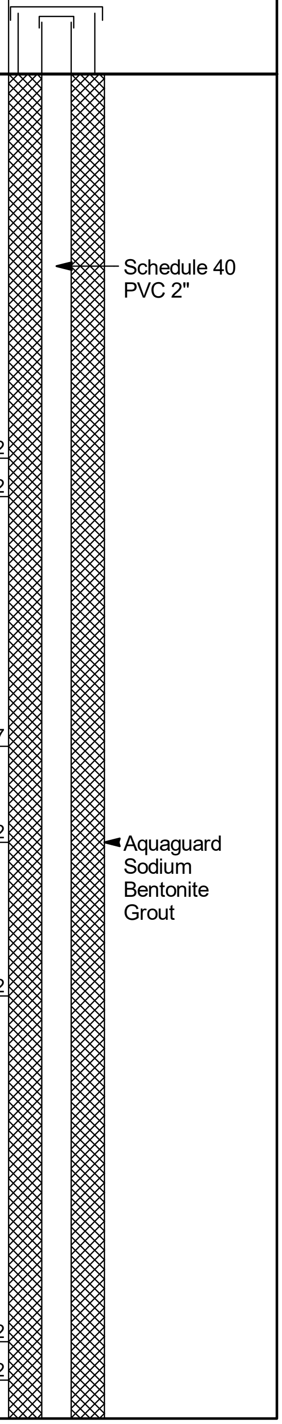
GEOPHYSICAL CONTRACTOR ---

RIG TYPE Terrasonic 1051181

LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Hydro Excavation (0 ft to 10 ft) NO SAMPLE
	600			
5				
	595			
10	593.2			SAND, Gray, loose, non plastic, fine to medium grained, some gravel from 10.5 ft to 11 ft, wet.
	592.2			CLAY, Reddish yellow, lean, low plasticity to non plastic, trace gravel to 1 in diameter, hard, moist. 12.8 ft: Gray, lean, laminated, firm, low plasticity to non plastic, moist.
	590			
15				
	585.7			GRAVELLY CLAY, Reddish yellow, lean, firm, low plasticity, moist.
	585			
20	583.2			GRAVELLY CLAY, Very pale brown, lean, low plasticity to non plastic, hard, moist.
	580			
	579.2			CLAY, Grayish brown with some gravel, low plasticity, firm, moist.
25				26.5 ft: Reddish brown, trace cobbles and dusky read around medium grained sand inclusions. Increasing gravel content with depth.
	575			
30				
	570.2			GRAVELLY CLAY, Reddish yellow, some coarse sand, medium plasticity, fat, wet.
	570			
	569.2			SANDY CLAY, Reddish yellow, low plasticity, with some gravel, firm, moist.

CONSTRUCTION DIAGRAM



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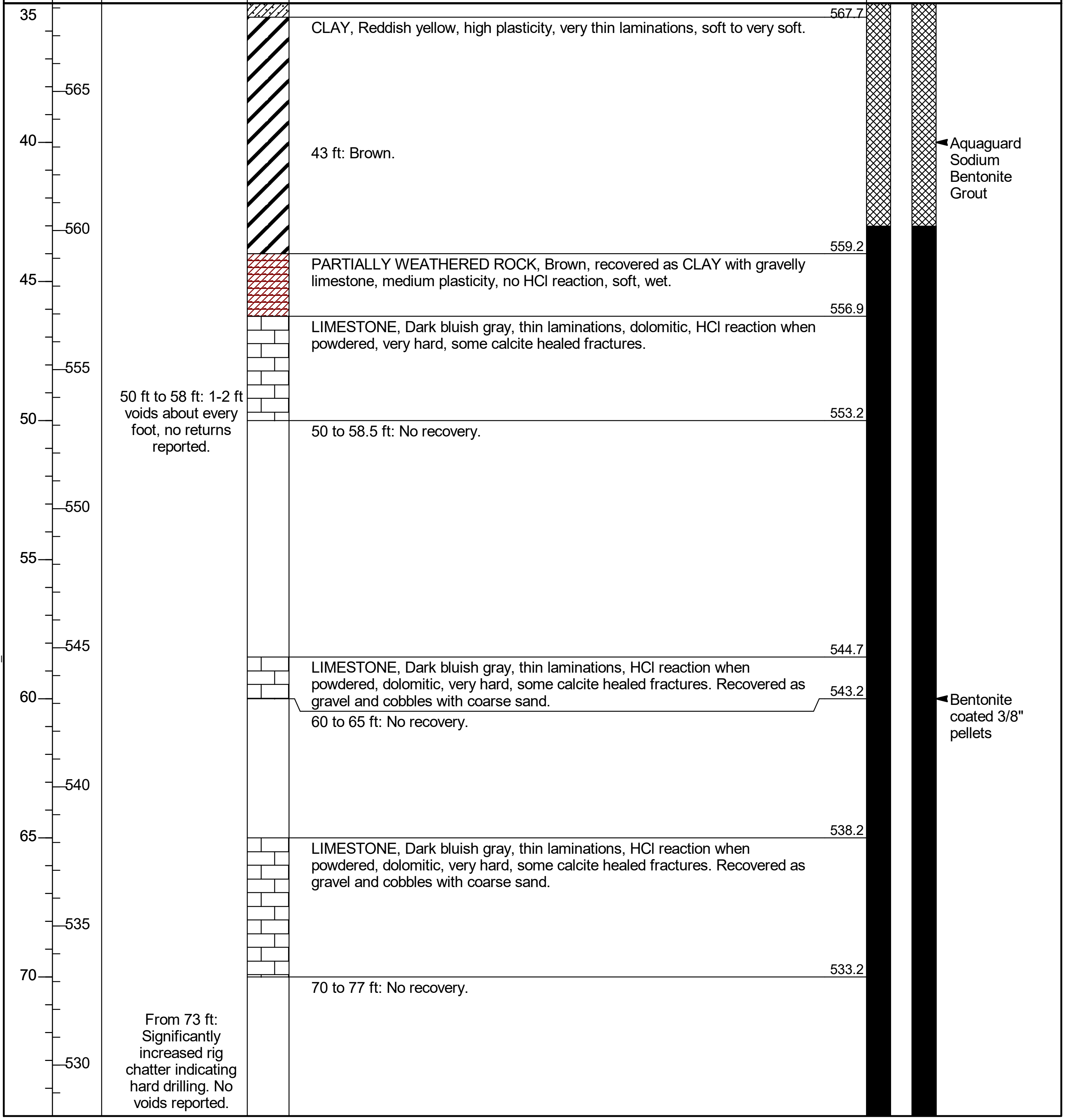
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

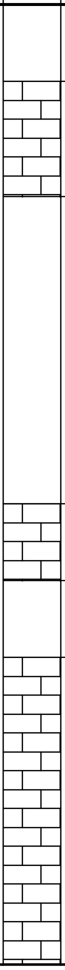


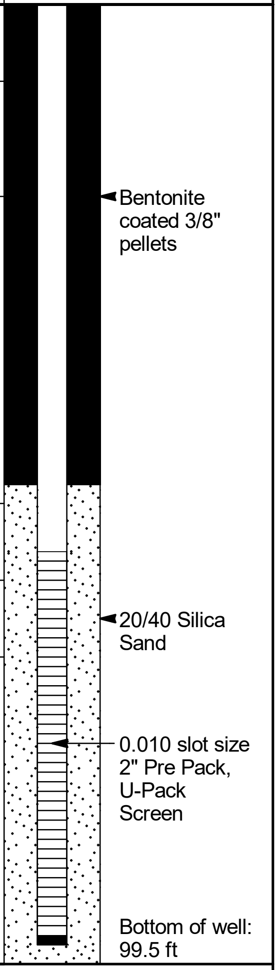
ELEVATION (ft)	REMARKS	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
567.7		CLAY, Reddish yellow, high plasticity, very thin laminations, soft to very soft. 43 ft: Brown.	Aquaguard Sodium Bentonite Grout
559.2		PARTIALLY WEATHERED ROCK, Brown, recovered as CLAY with gravelly limestone, medium plasticity, no HCl reaction, soft, wet.	
556.9		LIMESTONE, Dark bluish gray, thin laminations, dolomitic, HCl reaction when powdered, very hard, some calcite healed fractures.	
553.2	50 ft to 58 ft: 1-2 ft voids about every foot, no returns reported.	50 to 58.5 ft: No recovery.	
544.7		LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures. Recovered as gravel and cobbles with coarse sand.	
543.2		60 to 65 ft: No recovery.	Bentonite coated 3/8" pellets
538.2		LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures. Recovered as gravel and cobbles with coarse sand.	
533.2	From 73 ft: Significantly increased rig chatter indicating hard drilling. No voids reported.	70 to 77 ft: No recovery.	

(Continued Next Page)

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	MATERIAL DESCRIPTION
75			70 to 77 ft: No recovery. *(continued)*
			526.2
	525		LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures. Moderate to thin bedding.
			523.2
80		80 ft: No voids reported.	80 to 88 ft: No recovery.
	520		
85			
			515.2
	515		LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures, some coarse sand to gravel sized fragments.
			513.2
90			90 to 92 ft: No recovery.
			511.2
	510		LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, very hard, some calcite healed fractures, some coarse sand to gravel sized fragments.
95			
	505		
100			503.2





Bottom of borehole at 100.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

GPC

CIVIL DIVISION
MATERIALS SECTION

TEST BORING RECORD

PROJECT PLANT HAMMOND
LOCATION ROME BORING NO. P-21
ELEVATION ____ DATE 8-1-77

DEPTH		DESCRIPTION	SAMPLE		PENETRATION			N	CORE REC.
FROM	TO		NO.	DEPTH	1ST 6"	2ND 6"	3RD 6"		
0	23'6"	AUGAR- NO SAMPLES							
23'6"	33'6"	BROWN & GRAY SILTY CLAY FILL w/WTO SH.	1	25'	7	12	14		
		Th Bn Gyly Sa Cly - FILL PROBABLY FILL	2	30'	5	7	12		
		Th Gyly Sa Cl - TERRACE	3	32'6"	4	6	9		
33'6"	48'6"	BROWN SILTY CLAY FINE TO MED SAND							
		Th Gyly Sa Cl - Terrace SMALL TO MED GRAVEL	4	35	7	8	8		
		Th Gyly Cly Sa ~~SAND~~ -	5	37'6"	5	8	11		
		Th Bn Si Cl Resid.	6	40'	6	5	5		
48'6	51'6	Gy Th Si Cl -	7	45'	2	2	3		
48'6	51'6'	CORED 3'-0" LIMESTONE							1'0"
51'6"	56'6'	CORED 5' LIMESTONE							4'8"
		CAVITY 59' TO 59'4 LOST ALL WATER							
56'6	61'6	CORED 5'-0" LIMESTONE							4'8"
		CAVITY 65'0" TO 69'6" 4'6" CAVITY							
61'6"	66'6"	CORED 5' LIMESTONE							3,2
66'6"	71'6"	CORED5' LIMESTONE							1'9"
71'6"	76'6"	CORED 5' LIMESTONE							5'4"
76'6	81'6	CORED 5' LIMESTONE							5'2"
81'6"		BORING COMPLETE 8-2-77							

	FROM	TO		FROM	TO
SS	23'6	48'6"	AUGER	0	38'6"
WASH	38'6	48'6"	TRI-CONE		
NW CASING	0	48'6"	NQ CORE	48'6	81'6"
OTHER					

REMARKS
CASING IN PLACE GWT 30'
SCREEN SET AT 51'-0"
1¼" x 5' SCREEN

GWATOB ____ GW 24 HRS. 28'-11"

DRILLED BY RK

LOGGED BY H.M.

2M-7/76-2923-C

LOG OF BORING

Soil Systems, Inc.

SHEET 1 OF 1

CONTRACTED WITH Plant Hammond BORING No. P-9

PROJECT NAME M McIntyre/M.Dickerson.C.Williams JOB No. 753 DATE 2-9-77

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS/6"	RECOV.	
	Br. cl sa @ grav.	2.5	1	SP	9/9/7		
	Br. cl si	5.0	2	SP	3/4/5		
	Tan sa cl	7.5	3	SP	6/8/11		
	Tan sa cl @ grav.	10.0	4	SP	9/15/27		
	Tan cl sa	12.5	5	SP	4/6/5		
	Tan cl sa @ grav.	15.0	6	SP	2/3/5		
	Tan si	17.5	7	SP	2/2/3		
	Br. gr. weath. shale	20.0	8	SP	2/1/3		
	Gr. weath. shale	22.5	9	SP	5/5/11		Install PVC @ 28.1 pipe 29.1'
	Same	25.0	10	SP	5/5/10		
	Same	27.5	11	SP	2/3/5		
		30.0	12	SP	100/1"	NO REC	

GWATOB- 21.0'
GW24hrs.-
REFUSAL- 28.1'
BORING- P8
TERMINATED- 28.1'

Log updated with revised survey certified 5/19/2020.

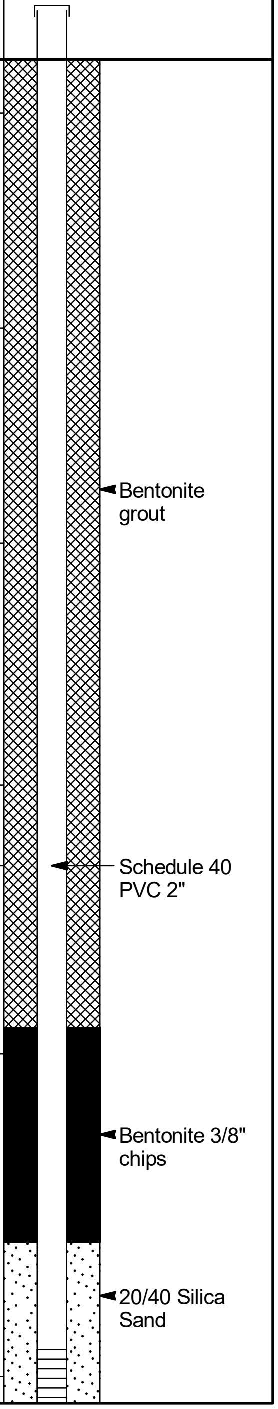
Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

MW-32

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 11/22/19 **COMPLETED** 11/26/19
NORTHING 1551092.83 ft **EASTING** 1943021.47 ft
DRILLER SCS Field Services
GROUND ELEVATION 583.10 ft **BORING DIAMETER** 8 in
DRILLING METHOD HSA + Rock Coring (NQ)
TOP OF CASING ELEVATION 585.46 ft
SAMPLING METHOD SPT
GEOPHYSICAL CONTRACTOR ---
RIG TYPE CME 550
LOGGED BY N.Tilahun **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	MATERIAL DESCRIPTION
					Top soil
	580			0-9': Hand auger.	GRAVELLY CLAY, Light brown, low plasticity, gravel is fine grained, angular, trace fien to coarse sand and silt, medium dense, moist. 3': Reddish brown to dark brown.
5	575				CLAY, Brown, medium plasticity, trace fine sand and silt, firm, moist.
10	570			9-28.3': Hollow stem auger.	9 - 13.5': No sample.
		89	2-2-2 (4)		CLAY, Brown, medium plasticity, trace angular gravel, few fine sand, firm, moist.
15	565				15 - 18.5': No sample.
		89	0-0-0 (-)	18.5-20': Weight of hammer.	CLAY, Light brown, high plasticity, very soft, laminated, wet.
20		100	0-0-0 (-)	20-21.5': Weight of hammer.	
		100	3-2-2 (4)		From 21.5': Dark brown, with weathered limestone fragments, laminated, soft, moist to wet.
	560	22	0-1-1 (2)		

CONSTRUCTION DIAGRAM



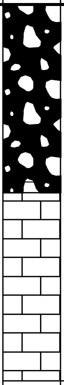
(Continued Next Page)

MW-32

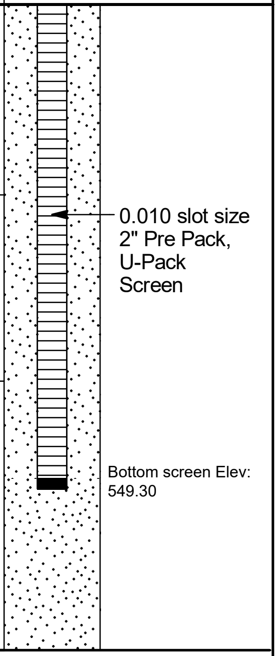
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	MATERIAL DESCRIPTION
25		67	30-40-30 (70)		PARTIALLY WEATHERED ROCK (PWR), Gray, fine to coarse gravel sized limestone fragments, very hard, wet. *(continued)*
		17	50/3" (-)		
	555	17	50/3" (-)	From 28.3': Coring.	
					LIMESTONE, Dark gray, thinly bedded, hard, slightly weathered, with light gray to white calcite filled veins.
30					
					32 - 37': Void.
	550				
35					

GRAPHIC LOG



CONSTRUCTION DIAGRAM



Bottom of borehole at 37.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

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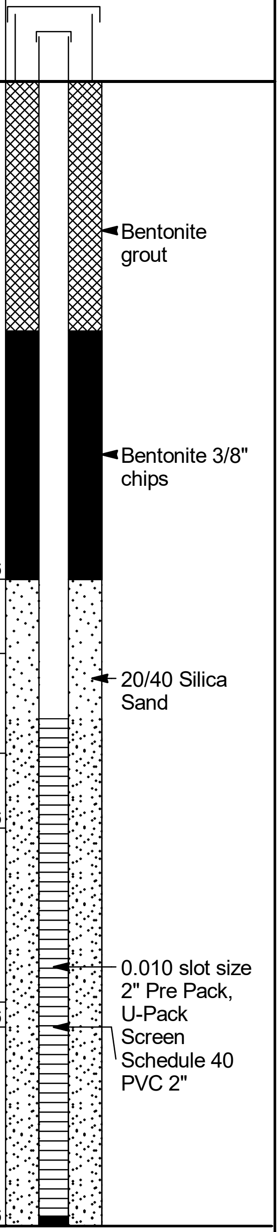
Kennesaw, GA 30144

MW-39

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 3/16/20 **COMPLETED** 3/16/20
NORTHING 1551111.45 ft **EASTING** 1943089.26 ft
DRILLER SCS Field Services
GROUND ELEVATION 577.60 ft **BORING DIAMETER** 8 in
DRILLING METHOD Hollow Stem Auger and Coring
TOP OF CASING ELEVATION 580.42 ft
SAMPLING METHOD Split Spoon
GEOPHYSICAL CONTRACTOR ---
RIG TYPE CME 550
LOGGED BY N.Tilahun **CHECKED BY** D.Yifru

DEPTH (ft)	ELEVATION (ft)	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	MATERIAL DESCRIPTION	
0 5	575 570			0 ft to 9 ft: Hand auger. 9 ft to 18.7 ft: Hollow stem auger.	GRAVELLY CLAY, Light brown, low plasticity, gravel is fine grained, angular to subangular, trace fine to coarse sand, few silt, firm to stiff.	567.6
10		100	3-2-3 (5)		CLAY, Brown, low to medium plasticity, soft to firm, trace angular gravel, trace fine sand and silt, moist.	566.1
	565				No sample.	564.1
		100	1-2-2 (4)		CLAY, Brown, medium plasticity, trace silt and fine to coarse sand, soft, fine angular gravel, moist.	562.6
15	560				No sample.	559.1
		100	50	From 18.7 ft: Coring.	PARTIALLY WEATHERED ROCK (PWR), Dark brown to black, fine grained, laminated, trace angular gravel, very hard, wet.	558.6
20	555				LIMESTONE, Dark gray to white, thinly bedded, with calcite fillings, slightly weathered, mostly mechanical breaks.	554.6

CONSTRUCTION DIAGRAM



Bottom of borehole at 23.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

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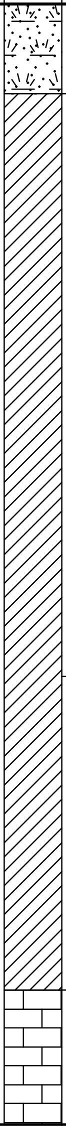
MW-41

PAGE 1 OF 1

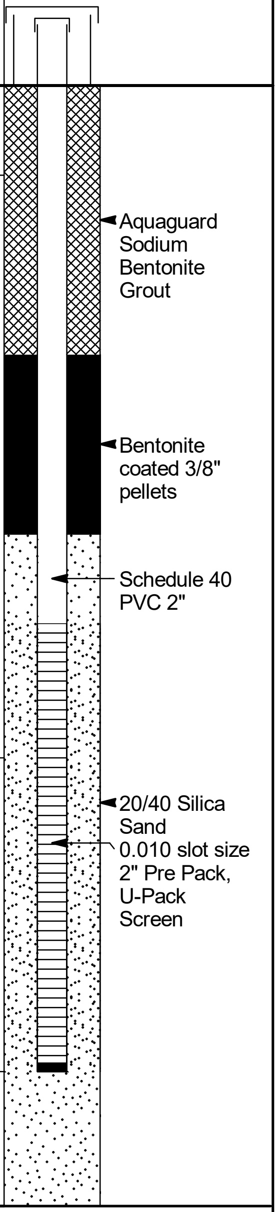
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 5/18/20 **COMPLETED** 5/18/20
NORTHING 1551158.16 ft **EASTING** 1943196.47 ft
DRILLER Cascade Drilling
GROUND ELEVATION 574.87 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 577.25 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terra Sonic Compact Crawler
LOGGED BY N.Tilahun **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	MATERIAL DESCRIPTION	
0			TOPSOIL/ORGANIC MATTER	
		Hand auger to 2 ft, refusal.		572.9
			CLAY, Yellowish brown, low to medium plasticity, trace silt and fine sand, soft.	
5	570			
10	565			
15	560			559.9
			CLAY, Dark brown, black mottles, trace fine sand and silt, few angular gravel, laminated, soft, moist.	
20	555	20 ft to 22 ft: Driller reports very soft drilling.		
				552.9
			LIMESTONE, Dark gray, crushed from drilling, dry.	
25	550			549.9

GRAPHIC LOG



CONSTRUCTION DIAGRAM



Bottom of borehole at 25.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

TRANSECT C-C' LOGS

Log updated with revised survey certified 5/19/2020.

WELL: AP03-MW21
PAGE 1 OF 1
ECS37736

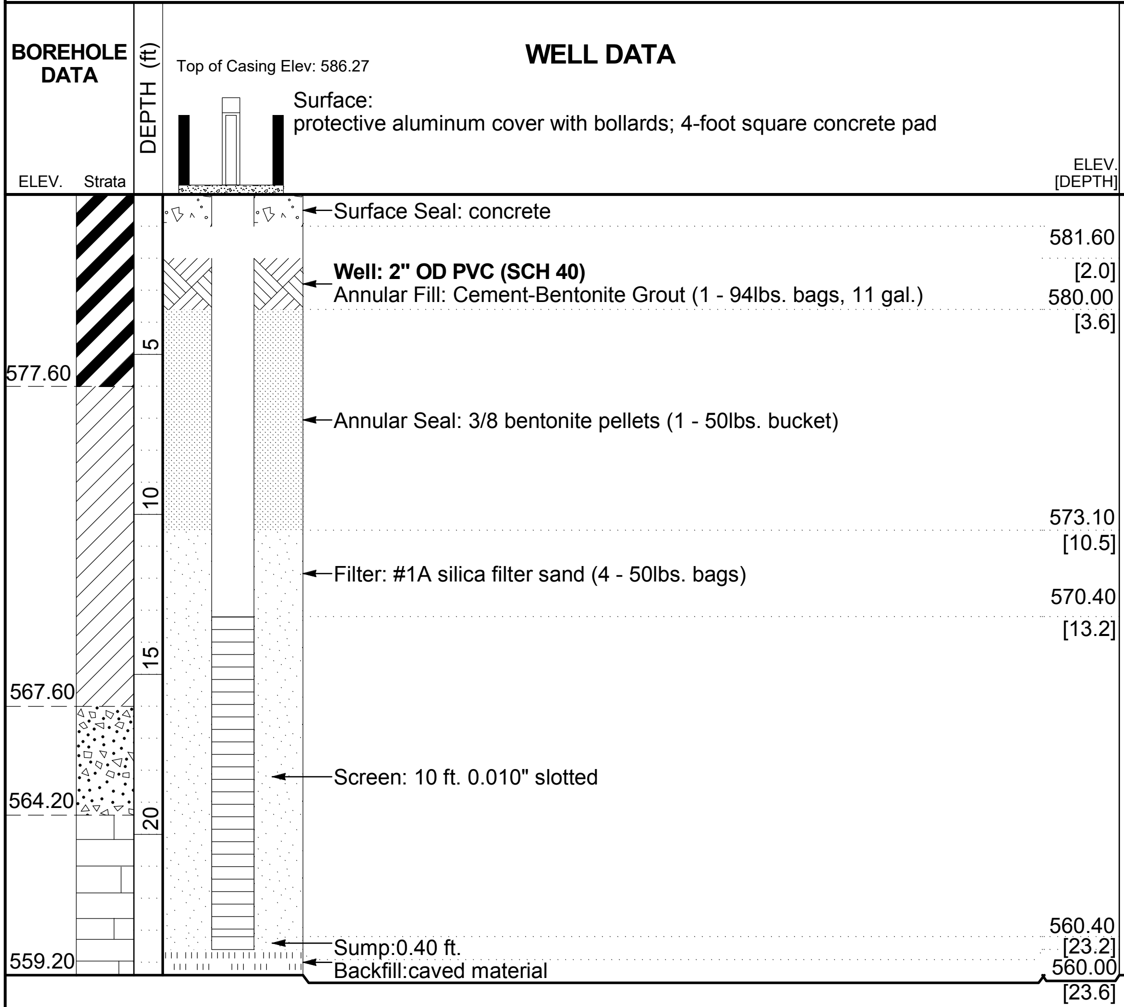
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 12/2/2014 **COMPLETED** 12/3/2014 **SURF. ELEV.** 583.60 **COORDINATES:** N: 1550270.15 E: 1941809.76
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 24.4 ft. **GROUND WATER DEPTH: DURING** 5 ft. **COMP.** **DELAYED** 6.4 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.



COMMENTS

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 7/8/15 13:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-HAMMOND\HAMMOND ASH POND PIEZ\UPDATED HAMMOND PZ BORIN

SHEET 1 OF 1

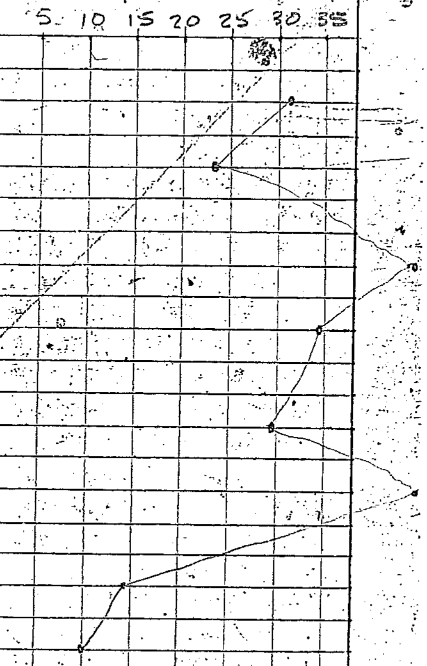
Soil Systems, Inc.

LOG OF BORING

PROJECT Plant Hammond SS -753 BORING No. Z-26

DRILL CREW MEMBERS M. Meatyard, M Dickerson, E Williams DATE 1-21-77

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS/6"	RECOV.	
	Br. cl f-m sa & grav.	5.0	1	SP	10/15/17		
	Same	10.0	2	SP	8/9/14		
	Tan si f-m sa & grav. & cl	15.0	3	SP	14/22/26		
	Br. si cl	20.0	4	SP	10/21/13		
	Gr. shale	25.0	5	SP	12/15/14		
	Br. cl si	30.0	6	SP	15/19/25		
	Tan si f-m sa	35.0	7	SP	6/8/9		
	Br. cl f-m sa & grav.	36.5	8	SP	3/4/6		
	Br. si cl	38.0	9	SP	5/5/5		
	Same	39.5	10	SP	4/5/6		
	Gr. tan cl si	41.0	11	SP	2/2/1		
	Same	42.5	12	SP	2/2/2		
	Br. weath shale	44.0	13	SP	1/1/12		
	Gr. Br. weath shale	45.5	14	SP	2/2/10		
	Same	47.0	15	SP	25/30/40		
	Gr. weath shale	48.5	16	SP	15/14/15		
	Same	50.0	17	SP	6/13/65		
	Shale	51.5	18	SP	100/2"	No Rec	GWATOB- 40.0'
	Shale	50.7	19	SP	100T/1"	No Rec	GW24hrs.-



REFUSAL- 50.7'
BORING Z-26
TERMINATED- 50.7'

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG

Well No. AP3-B-6
Page: 1 of 5

Drilling Start Date:	**01/31/2017**	Boring Depth (ft):	**89**	Well Depth (ft):	**35; 69; 89**
Drilling End Date:	**01/31/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**35.8**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**Vernon Scott**	Top of Casing Elev. (ft):	**607.76**	Seal Material(s):	**Bentonite Chips**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**1942124.44, 1550530.98**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	 Recovery (ft)	 Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
0				CB	7.0		(0') Ash (COAL COMBUSTION BYPRODUCT), Silty Sand (SM), mostly fine-medium grained sand, trace fine gravel, few silt, few silt, few clay, loose, moist, dark gray.		Photo represents recovered sample between 1.5-3 ft interval.	605
5										
				CB	10.0		(8') Ash (COAL COMBUSTION BYPRODUCT), SILT (ML); mostly silt, few clay, low plasticity, very soft, moist, dark gray.			600
10										595
15										
				CB	10.0					590
20										

NOTES: Hole pre-cleared to 5' on 01/31/2017 by Cascade Drilling using hand auger.
In addition to bedrock piezometer, two additional boreholes were installed adjacent to AP3-B-6 for placing piezometer screens.

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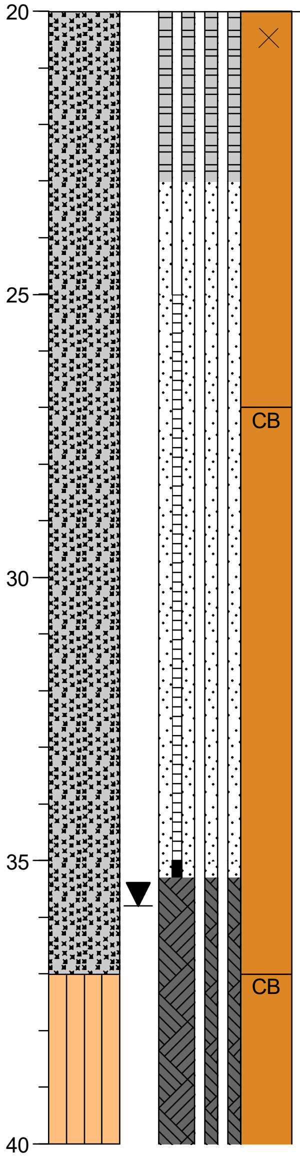
Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG
Well No. AP3-B-6
Page: 2 of 5

Drilling Start Date:	**01/31/2017**	Boring Depth (ft):	**89**	Well Depth (ft):	**35; 69; 89**
Drilling End Date:	**01/31/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**35.8**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**Vernon Scott**	Top of Casing Elev. (ft):	**607.76**	Seal Material(s):	**Bentonite Chips**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**1942124.44, 1550530.98**	Filter Pack:	**Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
20							(20') Ash (COAL COMBUSTION BYPRODUCT), SILT (ML); mostly silt, few clay, low plasticity, soft, moist, black.	Soil Grab Sample AP3-B-6(20-21)	Photo represents recovered sample between 20-21 ft interval.	
										585
25									Horizontal K = 4.13E-02 cm/sec (from Slug Testing screen interval 25-35 ft).	
				CB	8.0					
										580
30										
							(31') Ash (COAL COMBUSTION BYPRODUCT), SILT (ML); mostly silt, some clay, low plasticity, medium stiff, wet, dark gray.			
										575
							(33') Ash (COAL COMBUSTION BYPRODUCT), Well-graded SAND (SW); mostly fine-medium grained sand, trace silt, trace clay, well-graded, loose, wet, dark gray.			
35		▼								
							(35') Ash (COAL COMBUSTION BYPRODUCT), SILT (ML); mostly silt, some clay, low plasticity, medium stiff, wet, dark gray.			
				CB	12.0		(37') SILT (ML); few fine-medium sand, some silt, mostly clay, nonplastic, soft, wet, light yellowish-brown, laminated, RESIDUUM.		Photo represents recovered sample between 37-38 ft interval.	
										570
40										

NOTES: Hole pre-cleared to 5' on 01/31/2017 by Cascade Drilling using hand auger.
In addition to bedrock piezometer, two additional boreholes were installed adjacent to AP3-B-6 for placing piezometer screens.

Geosyntec consultants	**Client:** **Southern Company Services**	**WELL LOG**
engineers | scientists | innovators	**Project:** **Plant Hammond Ash Pond 3**	**Well No.** **AP3-B-6**
	Address: **5963 Alabama Hwy, Rome, GA**	**Page:** **3 of 5**

Drilling Start Date:	**01/31/2017**	Boring Depth (ft):	**89**	Well Depth (ft):	**35; 69; 89**
Drilling End Date:	**01/31/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**35.8**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**Vernon Scott**	Top of Casing Elev. (ft):	**607.76**	Seal Material(s):	**Bentonite Chips**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**1942124.44, 1550530.98**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
40				ST			(40') Elastic SILT (MH); few fine sand, some silt, mostly clay, low plasticity, soft, wet, light yellowish-brown, RESIDUUM.	Shelby Tube AP-3-B-6(40-42)	Shelby Tube collected from the second borehole drilled adjacent to the first borehole.	
				✕			(42') Elastic SILT (MH); few fine sand, some silt, mostly clay, low plasticity, soft, wet, light yellowish-brown, RESIDUUM.	Soil Grab Sample AP3-B-6(42-43)	Vertical K = 1.00E-07 cm/sec	565
45										
				CB	11.0		(47') Lean CLAY (CL); trace silt, mostly clay, medium plasticity, soft, wet, light yellowish-brown, RESIDUUM.		Photo represents recovered sample between 47-48 ft interval.	560
50										
										555
							(54') Lean CLAY (CL); trace silt, mostly clay, medium plasticity, soft, wet, dark brown, laminated clay, RESIDUUM.			
55										
				CB	11.0		(57') Lean CLAY (CL); trace silt, mostly clay, medium plasticity, soft, wet, dark brown, RESIDUUM. (58.5') Sandy fat CLAY (CH); some fine sand, some silt, little clay, high plasticity, medium stiff, wet, dark bluish-gray, RESIDUUM.		Photo represents recovered sample between 57-58 ft interval.	550
60										

NOTES: Hole pre-cleared to 5' on 01/31/2017 by Cascade Drilling using hand auger.
In addition to bedrock piezometer, two additional boreholes were installed adjacent to AP3-B-6 for placing piezometer screens.

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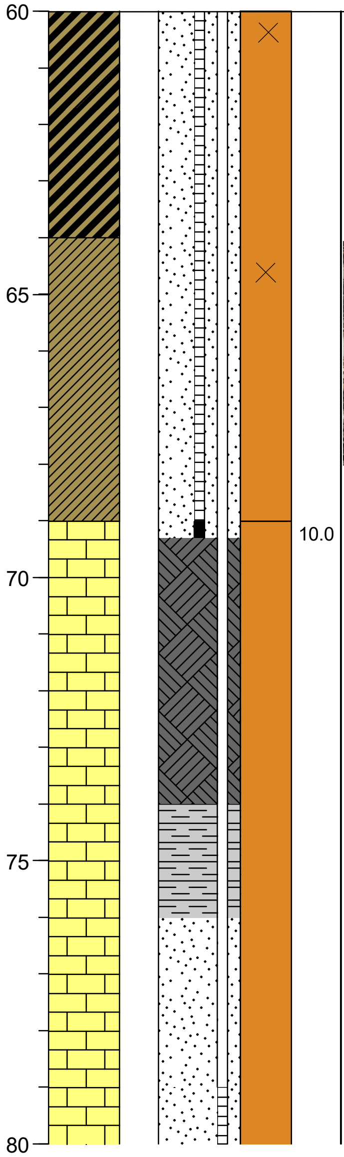
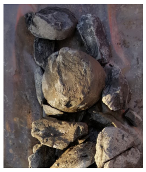
Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG

Well No. AP3-B-6
Page: 4 of 5

Drilling Start Date:	**01/31/2017**	Boring Depth (ft):	**89**	Well Depth (ft):	**35; 69; 89**
Drilling End Date:	**01/31/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**35.8**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**Vernon Scott**	Top of Casing Elev. (ft):	**607.76**	Seal Material(s):	**Bentonite Chips**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**1942124.44, 1550530.98**	Filter Pack:	**Sand**



Depth (ft)	Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS
60		*(continued)* Sandy fat CLAY (CH); some fine sand, some silt, little clay, high plasticity, medium stiff, wet, dark bluish-gray, RESIDUUM.	Soil Grab Sample AP3-B-6(60-61)	Horizontal K = 9.75E-05 cm/sec (from Slug Testing screen interval 59-69 ft).
64		(64') Sandy lean CLAY (CL); trace fine gravel, some medium-coarse sand, some silt, little clay, medium plasticity, medium stiff, saturated, black, HIGHLY WEATHERED LIMESTONE.	Soil Grab Sample AP3-B-6(64-65)	Photo represents recovered sample between 64-65.5 ft interval.
69		(69') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, slightly weathered, hard, black, wet, reacted with HCl, some light gray to white calcite fillings.		6-inch casing installed at 70 ft. Photo represents recovered sample between 70-71 ft interval.
79		(79') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, black, wet, reacted with HCl, some light gray to white calcite fillings.		

NOTES: Hole pre-cleared to 5' on 01/31/2017 by Cascade Drilling using hand auger.
In addition to bedrock piezometer, two additional boreholes were installed adjacent to AP3-B-6 for placing piezometer screens.

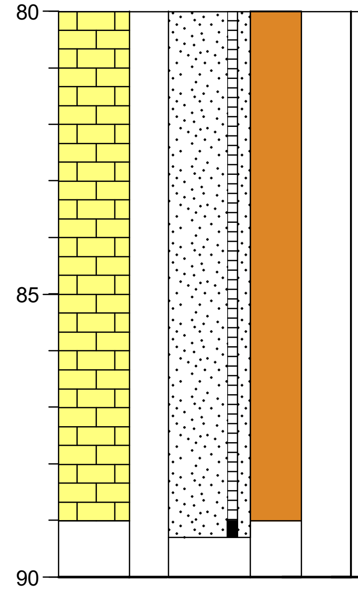
Client:	**Southern Company Services**
Project:	**Plant Hammond Ash Pond 3**
Address:	**5963 Alabama Hwy, Rome, GA**

WELL LOG

Well No. **AP3-B-6**
Page: **5 of 5**

Drilling Start Date:	**01/31/2017**	Boring Depth (ft):	**89**	Well Depth (ft):	**35; 69; 89**
Drilling End Date:	**01/31/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**35.8**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**Vernon Scott**	Top of Casing Elev. (ft):	**607.76**	Seal Material(s):	**Bentonite Chips**
Logged By:	**Nardos Tilahun**	Location (X,Y):	**1942124.44, 1550530.98**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
80–89							*(continued)* SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, black, wet, reacted with HCl, some light gray to white calcite fillings.		Horizontal K = 6.22E-05 cm/sec (from Slug Testing screen interval 79-89 ft).	525 520
89							(89') Boring terminated.			



NOTES: Hole pre-cleared to 5' on 01/31/2017 by Cascade Drilling using hand auger.
In addition to bedrock piezometer, two additional boreholes were installed adjacent to AP3-B-6 for placing piezometer screens.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-10
Page: 1 of 5

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
0				CB	5.0		(0') Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, some silt, loose, moist, dark gray.		Photo represents recovered sample between 1-3 ft interval.	
										605
							(4') Between 4 ft and 5 ft, Sandy SILT.			
5				CB	5.0		(5') Some brown sandy SILT, low plasticity and trace of fine gravel.			
							(5.5') Pale and dark gray mottled.			
										600
10				CB	10.0		(10') Layers/zones of silty sand and sandy silt, dark gray to pale gray, some brown mottling.			
										595
15										
							(15.5') Band of pale gray SAND with SILT.		Photo represents recovered sample between 16-17.5 ft interval.	
							(18') Zone of sandy SILT.			
										590
20										

NOTE: Borehole set outside overhead power line corridor.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG
Boring No. AP3-B-10
Page: 2 of 5

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
20				CB	10.0		*(continued)* Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, some silt, loose, moist, dark gray.			
							(22') Band of brown and orange clayey SAND/sandy CLAY, trace of gravel.			
										585
25							(25') Silty SAND.		Wet due to water added by driller. Photo represents recovered sample between 25-26 ft interval.	
										580
30				CB	8.0		(30-32') No Recovery. Believed to be Ash (COAL COMBUSTION BYPRODUCT).			
							(32') Ash: (COAL COMBUSTION BYPRODUCT), poorly graded SAND with silt (SP-SM); mostly fine grained sand, some silt, poorly graded, loose, moist, dark gray.			
										575
35		▽					(35') Saturated.		Photo represents recovered sample between 35.5-36.5 ft interval.	
										570
40		▼								

NOTE: Borehole set outside overhead power line corridor.

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Client: **Southern Company Services**
Project: **Plant Hammond Ash Pond 3**
Address: **5963 Alabama Hwy, Rome, GA**

BORING LOG

Boring No. **AP3-B-10**

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
40				CB	10.0		(40') Lean CLAY (CL); trace fine gravel, few fine sand, trace silt, mostly clay, medium plasticity, soft, wet, orange, with minor pale red staining/mottling, RESIDUUM.		Photo represents recovered sample between 40-41 ft interval.	
							(43') From 43 ft with pale gray, horizontal lamination and mottling.			565
45							(45') From 45 ft increasing silt content, orange, dark orange and gray mottled. Trace of weakly cemented, dark orange sandy pebbles.			560
50				CB	10.0		(50') Becoming pale brown with dark orange. With some sand.			
							(53') With brown to dark brown mottling, some fine grained sand.			555
55							(54') Gravelly lean CLAY (CL) with sand; some fine-coarse gravel, little fine-medium sand, mostly clay, medium plasticity, medium stiff, wet, dark gray, dark brown. Gravel is angular, dark gray, limestone, with some white calcareous veins, up to 4' diameter, HIGHLY WEATHERED LIMESTONE.		Photo represents recovered sample between 55-56.5 ft interval.	
							(57.5') With angular fragments of limestone up to 5 inches in diameter. Limestone is dark gray, with some calcite filled veins.			550
60										

NOTE: Borehole set outside overhead power line corridor.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-10

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
60				CB	10.0		(61') No limestone cobbles, trace of fine gravel only.			
							(63') Clayey GRAVEL (GC); some fine-coarse grained gravel, some clay, wet, dark brown, and gray, increasing gravel content with depth. Gravel is dark gray limestone. With cobbles of limestone up to 4 inches in diameter, HIGHLY WEATHERED LIMESTONE.			545
65							(66') Dry. (67') Wet. (68') Increasing size of limestone fragments, intact pieces of core up to 3 inches length.		Photo represents recovered sample between 66-68 ft interval.	540
70				CB	5.0		(70') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray, moist, with calcite veins. Drilled as gravel sized fragments between 70 and 72.5', and cobbles of limestone with gravel from 72.5'. Fines possibly washed away.		Driller reported harder drilling, adding more water. Fines in cuttings possibly washed away Photo represents recovered sample between 70-71 ft interval.	535
75							(75') No Recovery.		From 76' to end of run at 80' driller reported very soft drilling, rods can be pushed through material with minimal pressure. Rods do not sink under own weight.	530
80										

NOTE: Borehole set outside overhead power line corridor.

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Client: **Southern Company Services**
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Address: **5963 Alabama Hwy, Rome, GA**

BORING LOG

Boring No. AP3-B-10
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Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
80				CB	5.0		(80') No Recovery. (81') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, moderately weathered, hard, dark gray, wet, drilled as limestone fragments up to 4 inches diameter. Drilled with some clayey sand. (83') From 83.5' dry, pale gray to white.		Between 80 ft and 82 ft, driller reported very soft drilling. From 80 ft no water used for drilling to attempt to recover soft material. From 82' to 85': Hard drilling, slow progress.	525
85							(85') No Recovery.		Loss of circulation between 85 and 88'. Between 85 ft and 87 ft soft drilling with no resistance during drilling.	520
90				CB	5.0		(90') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, slightly weathered, hard, dark gray, moist, with calcite veins. Drilled as cobbles and coarse angular gravel.		Moderately hard and slow drilling from 88' to 100', rig occasionally chatters. 6" casing installed to 88'. No loss of circulation or soft zones encountered between 88' and 100'. Photo represents recovered sample between 92-93 ft interval.	515
95										
				CB	3.0		(97') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray, moist.			510
100							(100') Boring terminated.			

NOTE: Borehole set outside overhead power line corridor.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-9
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Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
0				CB	4.0		(0') Ash (COAL COMBUSTION BYPRODUCT), SILT with gravel (ML); trace fine-coarse gravel, trace fine-medium sand, soft, moist, dark gray.		Photo represents recovered sample between 1-2 ft interval.	605
5				CB	5.0		(6') Ash (COAL COMBUSTION BYPRODUCT), SILT with gravel (ML); little fine-coarse gravel, stiff, moist, pale yellowish-brown. (7') Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); trace fine gravel, soft, moist, dark gray.			600
10				CB	5.0					595
15				CB	5.0					590
20										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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Project: Plant Hammond Ash Pond 3
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BORING LOG

Boring No. AP3-B-9
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Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
20				CB	4.0		*(continued)* Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); trace fine gravel, soft, moist, dark gray.			585
25				CB	4.0					580
30				CB	4.0					575
35				CB	4.0					570
							(36') Fat CLAY (CH); trace fine-coarse gravel, medium plasticity, stiff, moist, pale yellowish-brown, RESIDUUM.			
		▼		✕				Soil Grab Sample AP3-B-9(38-39)	Photo represents recovered sample between 37-38.5 ft interval.	
40										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
40				CB	4.0		*(continued)* Fat CLAY (CH); trace fine-coarse gravel, medium plasticity, stiff, moist, pale yellowish-brown, RESIDUUM.			565
45				CB	4.0		(45') Fat CLAY with gravel (CH); some fine-coarse gravel, medium plasticity, stiff, moist, pale yellowish-brown, no reaction with HCl, RESIDUUM.	Soil Grab Sample AP3-B-9(44-45)		560
							(47') Lean CLAY with gravel (CL); some fine-coarse gravel, few medium-coarse sand, medium plasticity, soft, moist, light reddish-brown, no reaction with HCl, HIGHLY WEATHERED LIMESTONE.			
50				CB	4.0			Soil Grab Sample AP3-B-9(49-50) Soil Grab Sample AP3-B-9(53-54)	Photo represents recovered sample between 53-54 ft interval.	555
55				CB	4.0		(55') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, slightly weathered, hard, dark bluish-gray, moist.		Photo represents recovered sample between 56-57 ft interval.	550
60										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-9
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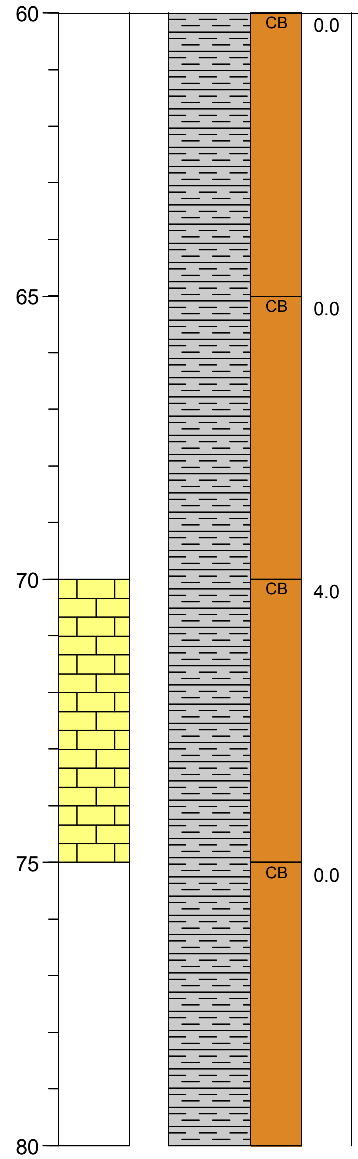
Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
60				CB	0.0		(60') No Recovery.		60-70 ft drilling head drop; unknown amount of water loss	545
65				CB	0.0					540
70				CB	4.0		(70') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, slightly weathered, hard, dark bluish-gray, moist.			535
75				CB	0.0		(75') No Recovery.		6-inch diameter casing installed at 75 ft. 75-80 ft soft drilling, rods advanced by pushing drill head down; no rotation or vibration Fracture at 75.9 ft (198 mm)	530
80										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

Client:	**Southern Company Services**	**BORING LOG**	
Project:	**Plant Hammond Ash Pond 3**	**Boring No.**	**AP3-B-9**
Address:	**5963 Alabama Hwy, Rome, GA**	**Page:**	**5 of 6**

Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	Recovery (ft)	Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
80				CB	0.0		*(continued)* No Recovery.		(obtained from Geophysical Log) Geophysical logging terminated at 76.5 ft due to borehole collapse. 75-95 ft soft drilling.	525
85				CB	0.0					520
90				CB	0.0					515
95				CB	3.0		(95') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		Photo represents recovered sample between 95-96 ft interval.	510
100										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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Client:	**Southern Company Services**	**BORING LOG**	
Project:	**Plant Hammond Ash Pond 3**	**Boring No.**	**AP3-B-9**
Address:	**5963 Alabama Hwy, Rome, GA**	**Page:**	**6 of 6**

Drilling Start Date:	**02/08/2017**	Boring Depth (ft):	**105**
Drilling End Date:	**02/09/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**38.5**
Driller Name:	**J. Triepke/L. Turner**	Ground Surface Elev. (ft):	**605.50**
Logged By:	**James Griffin**	Easting, Northing (X, Y):	**1942654.24, 1550662.39**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
100				CB	3.0		*(continued)* SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		Photo represents recovered sample between 100-101 ft interval.	505
105							(105') Boring terminated.			500
110										

NOTE: Hole pre-cleared to 5' on 02/08/2017 by Cascade Drilling using hand auger.

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Client:	**Southern Company Services**
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BORING LOG

Boring No. **AP3-B-4**
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Drilling Start Date:	**02/02/2017**	Boring Depth (ft):	**77**
Drilling End Date:	**02/02/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**41.3**
Driller Name:	**Vernon Scott**	Ground Surface Elev. (ft):	**608.39**
Logged By:	**Nardos Tilahun**	Easting, Northing (X, Y):	**1942920.34, 1550709.19**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
0				CB	8.5		(0') Lean CLAY (CL); few silt, mostly clay, medium plasticity, stiff, moist, light brown, FILL.		Photo represents recovered sample between 0-1 ft interval.	
							(2') Lean CLAY with gravel (CL); little fine-coarse gravel, few fine-medium sand, few silt, mostly clay, medium plasticity, medium stiff, moist, light brown to dark gray, FILL.			605
5							(5') Silty SAND (SM); mostly fine-coarse grained sand, few fine-coarse gravel, little silt, trace clay, medium dense, moist, dark yellowish-gray, FILL.	Soil Grab Sample AP3-B-4(5-6)	Photo represents recovered sample between 4.5-5.5 ft interval.	
							(6') Lean CLAY (CL); few silt, mostly clay, medium plasticity, stiff, moist, light reddish-brown, FILL.			
				CB	10.0		(7') Lean CLAY (CL); trace fine-coarse gravel, trace fine-medium sand, few silt, mostly clay, medium plasticity, medium stiff, moist, light brown, FILL.			600
10										
										595
15										
				CB	10.0		(17') Lean CLAY with gravel (CL); little fine-coarse gravel, few fine-medium sand, trace silt, mostly clay, medium plasticity, medium stiff, moist, light brown to dark brown, FILL.			
										590
20										

NOTE: Hole pre-cleared to 5' on 02/02/2017 by Cascade Drilling using hand auger.

Drilling Start Date:	**02/02/2017**	Boring Depth (ft):	**77**
Drilling End Date:	**02/02/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**41.3**
Driller Name:	**Vernon Scott**	Ground Surface Elev. (ft):	**608.39**
Logged By:	**Nardos Tilahun**	Easting, Northing (X, Y):	**1942920.34, 1550709.19**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
20							*(continued)* Lean CLAY with gravel (CL); little fine-coarse gravel, few fine-medium sand, trace silt, mostly clay, medium plasticity, medium stiff, moist, light brown to dark brown, FILL.		Photo represents recovered sample between 20-21 ft interval.	
										585
25										
				CB	13.5		(27') Fat CLAY with gravel (CH); little fine-coarse gravel, little fine-medium sand, little silt, mostly clay, high plasticity, medium stiff, moist, light brown, FILL.		Photo represents recovered sample between 27-28 ft interval.	
										580
30										
										575
							(34') Poorly graded SAND with silt (SP-SM); mostly fine grained sand, little silt, few clay, loose, moist, light yellowish-brown.		Photo represents recovered sample between 34-35.5 ft interval.	
35							(35') Fat CLAY with gravel (CH); little fine-coarse gravel, little fine-medium sand, little silt, mostly clay, high plasticity, medium stiff, moist, light brown, angular gravels, possibly FILL.			
				ST	1.0			Soil Grab Sample AP3-B-4(36-37) Shelby Tube AP-3-B-4(37-39)	Vertical K = 2.10E-08 cm/sec	
										570
				CB	12.0		(39') Fat CLAY with gravel (CH); little fine-coarse gravel, little fine-medium sand, little silt, mostly			
40										

NOTE: Hole pre-cleared to 5' on 02/02/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-4
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Drilling Start Date:	**02/02/2017**	Boring Depth (ft):	**77**
Drilling End Date:	**02/02/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**41.3**
Driller Name:	**Vernon Scott**	Ground Surface Elev. (ft):	**608.39**
Logged By:	**Nardos Tilahun**	Easting, Northing (X, Y):	**1942920.34, 1550709.19**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
40		▼					clay, high plasticity, medium stiff, moist, light brown, angular gravels, possibly FILL.			
							(43') Fat CLAY (CH); trace fine-medium sand, little silt, mostly clay, high plasticity, medium stiff, moist, light yellowish-brown, angular gravels, possibly FILL.			565
				×			(44') Fat CLAY (CH); trace fine-coarse gravel, trace fine-medium sand, trace silt, mostly clay, medium plasticity, medium stiff, moist, light yellowish-brown, RESIDUUM.	Soil Grab Sample AP3-B-4(44-45)		
45										
				CB	10.0		(47') Lean CLAY (CL); trace fine-coarse gravel, trace fine-medium sand, trace silt, mostly clay, medium plasticity, medium stiff, moist, light yellowish-brown, RESIDUUM.		Photo represents recovered sample between 47-49 ft interval.	
							(48') Sandy lean CLAY (CL); some fine-medium sand, few silt, mostly clay, medium plasticity, soft, wet, light yellowish-brown, RESIDUUM.			560
				×				Soil Grab Sample AP3-B-4(49-50)		
50							(50') Fat CLAY (CH); trace silt, mostly clay, medium plasticity, medium stiff, moist, dark brown, RESIDUUM.			
									Horizontal K = 9.25E-04 cm/sec (from single Packer Testing between 53.5-58.5 ft).	555
				CB	9.0		(54') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray to white, wet, reacted with HCl, some light gray to white calcite fillings.		6-inch diameter casing installed at 55 ft. Photo represents recovered sample between 54-55 ft interval.	
55										
									Fracture at 59.6 ft (97 mm) (obtained from Geophysical Log)	550
60										

NOTE: Hole pre-cleared to 5' on 02/02/2017 by Cascade Drilling using hand auger.

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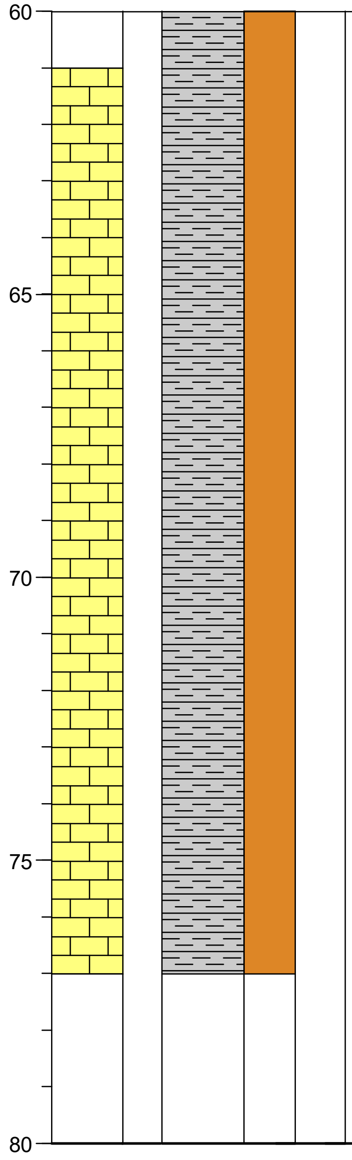
Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-4
Page: 4 of 4

Drilling Start Date:	**02/02/2017**	Boring Depth (ft):	**77**
Drilling End Date:	**02/02/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB), Shelby Tube (ST)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	
Drilling Equipment:	**T250**	DTW After Drilling (ft):	**41.3**
Driller Name:	**Vernon Scott**	Ground Surface Elev. (ft):	**608.39**
Logged By:	**Nardos Tilahun**	Easting, Northing (X, Y):	**1942920.34, 1550709.19**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				



	(60') No Recovery.	Driller reported rod dropped, lost circulation. Fracture at 61.7 ft (55 mm) (obtained from Geophysical Log)
	(61') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray to white, wet, reacted to HCl, some light gray to white calcite fillings.	
	(77') Boring terminated.	

ELEVATION (ft): 545, 540, 535, 530

NOTE: Hole pre-cleared to 5' on 02/02/2017 by Cascade Drilling using hand auger.

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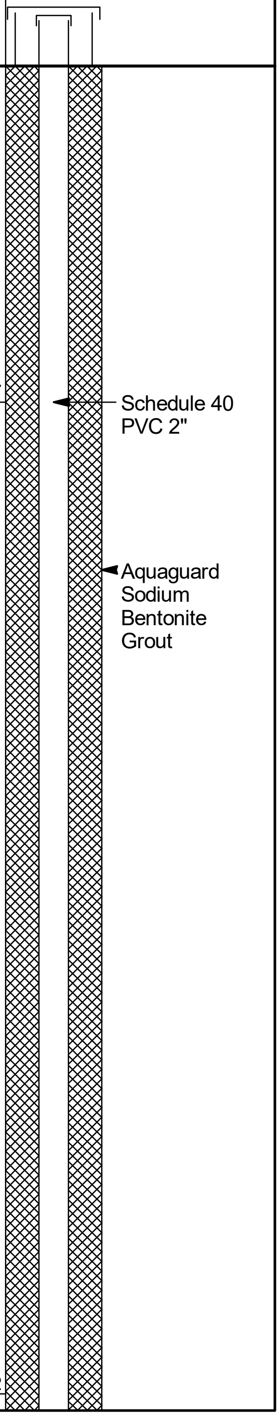
1255 Roberts Boulevard
Kennesaw, GA 30144

HGWC-125

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 5/4/20 **COMPLETED** 5/4/20
NORTHING 1550821.41 ft **EASTING** 1942962.87 ft
DRILLER Cascade Drilling
GROUND ELEVATION 605.70 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 608.89 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terra Sonic Compact Crawler
LOGGED BY N.Tilahun **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	605			Hydro Excavation (0 ft to 10 ft) NO SAMPLE
5	600			
10	595		▨	595.7 CLAY, Light to dark brown, low to medium plasticity, trace fine to medium sand, few fine to coarse angular gravel, few silt, soft to firm, moist.
15	590		▨	
20	585		▨	20 ft: Trace black mottles.
25	580		▨	
30	575		▨	
35	570		▨	566.2

CONSTRUCTION DIAGRAM



(Continued Next Page)

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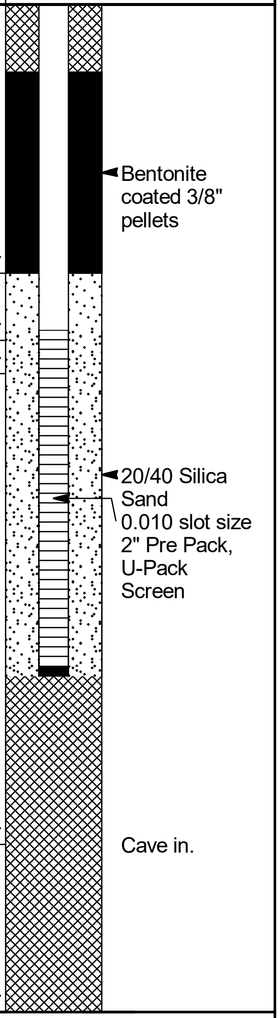
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
40 45	565 560			CLAY, Yellowish brown, medium to high plasticity, trace fine sand, few silt, firm, moist. *(continued)* 40 ft: Soft, with black mottles. 557.7
				SANDY CLAY, Dark brown to brown, low plasticity, some fine to coarse sand, trace rock fragments at the bottom, black mottles, soft. 555.7
50	555			PARTIALLY WEATHERED ROCK, Dark brown, limestone rock fragments, fine grained, platy. 554.7
55 60	550 545	51 ft to 65 ft: Very soft drilling.		(CLAY FILLED) VOID (51 ft to 65 ft) 540.7
65 70	540			LIMESTONE, Dark gray, crushed from drilling, dry, platy rock fragments, hard drilling. 535.7

CONSTRUCTION DIAGRAM



Bottom of borehole at 70.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

ERM
3200 Windy Hill Rd Ste 1500W
Atlanta, GA 30339
Telephone: 678-486-2700

WELL NUMBER HGWC-121A

PAGE 1 OF 1

CLIENT Southern Company Services, Inc.

PROJECT NAME Plant Hammond

PROJECT NUMBER 0372394

PROJECT LOCATION Ash Disposal Site #3

DATE STARTED 7/17/17 **COMPLETED** 7/17/17

GROUND ELEVATION 582.31 ft **HOLE SIZE** 6 inches

DRILLING CONTRACTOR Southern Comparny Services, Inc

COORDINATES N: 1550607.97 E: 1943030.44

DRILLING METHOD Hollow Stem Auger 2"

▽ **AT TIME OF DRILLING** 13.20 ft

LOGGED BY WV **CHECKED BY** GEJ

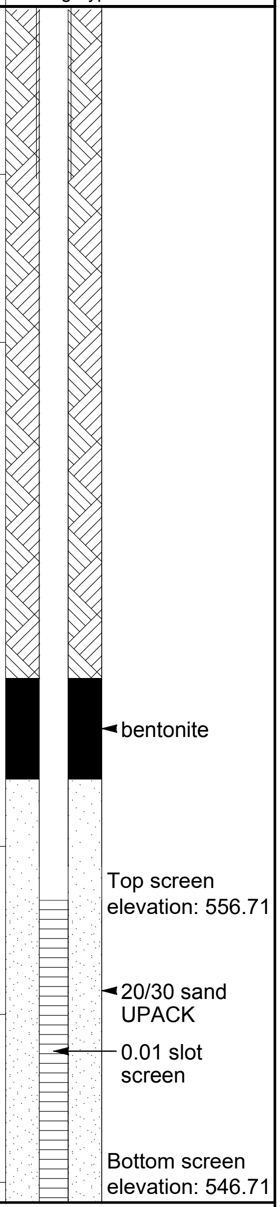
AT END OF DRILLING ---

NOTES

▼ **24hrs AFTER DRILLING** 11.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Elev:
0						582.31
	SS	70	CL-ML		(CL-ML) Silty CLAY: reddish with yellow mottling, some large angular gravel, medium stiff, low plasticity, dry	
5					5.0	577.31
	SS	63	CL		(CL) CLAY: reddish with yellow mottling, some gravel, medium dense, low plasticity, dry	
10					10.0	572.31
	SS	80	CL		(CL) CLAY: gray, some coarse sand, medium dense, moderate plasticity, moist ▼ ▽	
15						
	SS	78	CL		(CL) SAA	
20						
	SS	53	CL		(CL) SAA, wet	
25					25.0	557.31
	SS	32	CL		(CL) CLAY, gray/brown, some gravel, wet	
30					30.0	552.31
	SS	0			No recovery	
35					35.0	547.31 546.71

WELL DIAGRAM
Top of casing elevation: 584.69
Casing Type: 2" PVC



Bottom of borehole at 35.6 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

TRANSECT D-D’ LOGS

L O G   O F   B O R I N G

Soil Systems, Inc.

SHEET 1 OF 1

CONTRACTED WITH Plant Hammond

BORING No. P-6 **P-6**

PROJECT NAME M.Meatyard M.Dickerson E.Williams JOB No. 753 DATE 2-8-77

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS / 6"	RECOV.	
	Gr. weath shale	2.5	1	SP	4/4/4		
	Br. sa cl	5.0	2	SP	9/4/4		
	Br. si cl & sa.	7.5	3	SP	6/8/10		
	Br. sa si. & cl	10.0	4	SP	21/16/16		
	Tan cl sa.	12.5	5	SP	8/11/13		
	Tan si cl	15.0	6	SP	3/3/4		
	Tan cl si	17.5	7	SP	1/05/1.5		PVC set @ 22.2' = 23.2' pipe
	Gr. Br. weath shale	20.0	8	SP	3/3/4		
	Gr. weath shale	22.5	9	SP	100/3"		
		22.2	10	SP	100+ = 1"	No Rec.	

25.5
3.3
22.2

GWATOB-15.0'
GW24hrs.-
REFUSAL-22.2'
BORING-P-6
TERMINATED-22.2'

SSI

L O G   O F   B O R I N G

Soil Systems, Inc.

SHEET 1 OF 1

CONTRACTED WITH Plant Hammond BORING No. P5

PROJECT NAME M McCartyand/M Dickerson/C Williams JOB No. 753 DATE 2-8-77

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS / 6"	RECOV.	
	Yell BR. sa cl @ gravel	5.0	1	SP	7/10/13		
	GR. shale	10.0	2	SP	9/12/15		
	BR. sa cl @ gravel	15.0	3	SP	10/24/30		
	BR. sa cl	20.0	4	SP	10/10/11		
	BR. si cl	22.5	5	SP	9/10/12		
	BR si cl @ sa.	25.0	6	SP	10/11/11		
	GR. Tan si cl	27.5	7	SP	6/9/12		
	Tan si cl	30.0	8	SP	4/6/9		
	Tan si cl	32.5	9	SP	3/4/5		PVC Set
	BR. si cl	35.0	10	SP	2/3/7		Upper @ 20.0 = 21.0 pipe
	GR. weath. shale	37.5	11	SP	5/5/9		Lower @ 40.5 = 41.5 pipe
	Same	40.0	12	SP	4/3/12		
		40.5	13	SP	100+/1" No Rec		

GWATOB- 35.0'
GW24hrs.-
REFUSAL- 40.5'
BORING- 32.5'
TERMINATED- 40.5'

GPC
CIVIL DIVISION
MATERIALS SECTION

TEST BORING RECORD

PROJECT PLANT HAMMOND

LOCATION ROME BORING NO. P-18

ELEVATION ______ DATE 8-2-77

DEPTH		DESCRIPTION	SAMPLE		PENETRATION			N	CORE REC.
FROM	TO		NO.	DEPTH	1ST 6"	2ND 6"	3RD 6"		
0	23'6"	AUGAR — NO SAMPLE							
23'6"	31'	Br Gry Cly Sand — Terrace BROWN CLAY WITH SMALL TO MED	1	25	3	11	14		
		GRAVEL — Same	2	27'6"	6	10	10		
		— Same	3	30'	9	12	16		
31	36	Gy Tn Gry Sa Cly — Terrace BROWN-GRAY SILTY CLAY SOME	4	32'6"	6	8	12		
		Gy Tn Gry Sand — Terrace SMALL GRAVEL	5	35'	5	8	11		
36'	38'	— Same BROWN SILTY CLAY SMALL TO MED	6	37'6"	8	14	14		
38'	42	Gy Tn Sa Si Cly — Terrace GRAVEL MED TO COARSE SAND	7	40'	3	5	8		
42	45'3"	Gy Cl. & Lms Frag. — Resid BROWN SILTY CLAY - WITH ROCK FRAG	8	45'	20	35	13		
45'3"		REFUSAL							
		BORING COMPLETE 8-3-77							

	FROM	TO		FROM	TO
SS	23'6"	45'3"	AUGER	0	40
WASH	40	45'3	TRI-CONE		
NW CASING	0	40	CORE		
OTHER					

REMARKS

SCREEN SET AT 45'-0"

1¼" X 5' SCREEN

GWATOB ______ GW 24 HRS. 25'-10"

DRILLED BY RK LOGGED BY H.M.

2M-7/76-2923-C

SSI

Soil Systems, Inc.

LOG OF BORING

SHEET 1 OF 1

PROJECT Plant Hammond SS -753 BORING No. Z-5

DRILL CREW MEMBERS M. Meatyard, M. Dickerson DATE 12-20-76

ELEV.	DESCRIPTION	DEPTH IN FEET	SAMPLES NO.	TYPE	BLOWS/6"	RECOV.	NOTES
	Tan si. f-m sa ⓦ grav. & cl	1.5	1	SP	6/10/6		
	Br. cl si.	3.0	2	SP	3/4/6		
	Br & gr. mot. cl si.	4.5	3	SP	5/6/7		
	Same	6.0	4	SP	2/4/4		
	Br. cl si. @ shale frags	7.5	5	SP	2/3/4		
	Same	9.0	6	SP	1/1/5		
	Same	10.5	7	SP	1/1/2		
	Same	12.0	8	SP	4/5/4		
pk A 12.0-12.5	Yelbw + Br. cl si @ shale frags						
pk B 13.0-13.5	Dk. gr. shale frags	13.5	9	SP	2/4/33	A+B	samples A 12.0-12.5 B 13.0-
	Dk. gr. shale frags	15.0	10	SP	30/[illegible]/10		
	Br. cl. si. @ shale frags	16.5	11	SP	3/1/1		
	Tan cl si. @ shale frags	18.0	12	SP	1/1/100/3"		
	Shale	19.5	13	SP	100/1"	NO REC	

GWATOB- 2.0'

GW24hrs.- 0.0'

REFUSAL- 18.1'

BORING Z-5

TERMINATED- 18.1'

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG
Well No. AP3-B-7
Page: 1 of 5

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y):	**1942387.32, 1551042.74**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	 Recovery (ft)	 Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
0				CB	4.5		(0') Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); soft, moist, dark gray.		Photo represents recovered sample between 1-2 ft interval.	605
5				CB	4.5					600
10				CB	5.0					595
15				CB	5.0					590
20										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

Drilling Start Date: **02/10/2017**
Drilling End Date: **02/10/2017**
Drilling Company: **Cascade Drilling**
Drilling Method: **Sonic**
Drilling Equipment: **C100**
Driller Name: **J. Triepke/L. Turner**
Logged By: **James Griffin**

Boring Depth (ft): **90**
Boring Diameter (in): **6**
Sampling Method(s): **Core Barrel (CB)**
DTW During Drilling (ft):
DTW After Drilling (ft): **34.3**
Top of Casing Elev. (ft): **605.86**
Location (X,Y): **1942387.32, 1551042.74**

Well Depth (ft): **90**
Well Diameter (in): **2**
Screen Slot (in): **0.010**
Riser Material: **Sch 40 PVC**
Screen Material: **Sch 40 PVC Slotted**
Seal Material(s): **Bentonite Chips**
Filter Pack: **Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
20				CB	5.0		*(continued)* Ash (COAL COMBUSTION BYPRODUCT), SILT with sand (ML); soft, moist, dark gray.		Photo represents recovered sample between 23-24 ft interval.	585
25				CB	5.0					580
30		▼		CB	2.0					575
35				CB	3.0					570
40										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services

Project: Plant Hammond Ash Pond 3

Address: 5963 Alabama Hwy, Rome, GA

WELL LOG

Well No. AP3-B-7

Page: 3 of 5

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y):	**1942387.32, 1551042.74**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
40				CB	5.0		(40') Fat CLAY with sand (CH); medium plasticity, medium stiff, moist, pale yellowish-brown, RESIDUUM.			
									Photo represents recovered sample between 41-42 ft interval.	565
								Soil Grab Sample AP3-B-7 (44-45)		
45				CB	4.0					
										560
							(48') Lean CLAY with gravel (CL); trace fine-coarse gravel, medium plasticity, soft, moist, dark reddish-brown, RESIDUUM.			
50				CB	4.0					
										555
								Soil Grab Sample AP3-B-7 (52-53)		
55				CB	4.0		(55') Lean CLAY with gravel (CL); trace fine gravel, medium plasticity, very soft, saturated, light brown, HIGHLY WEATHERED LIMESTONE.	Soil Grab Sample AP3-B-7(56-57)		
										550
									Photo represents recovered sample between 57--58 ft interval.	
60										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG

Well No. AP3-B-7
Page: 4 of 5

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y:	**1942387.32, 1551042.74**	Filter Pack:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	 Recovery (ft)	 Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
60				CB	0.0		(60') No Recovery.			545
65				CB	4.0		(65') Lean CLAY with gravel (CL); trace fine-coarse gravel, medium plasticity, very soft, saturated, dark purplish-brown, HIGHLY WEATHERED LIMESTONE.	Soil Grab Sample AP3-B-7(68-69)	Photo represents recovered sample between 67-68.5 ft interval.	540
70				CB	6.0		(70') SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		Photo represents recovered sample between 76-77 ft interval.	535
75										530
80										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

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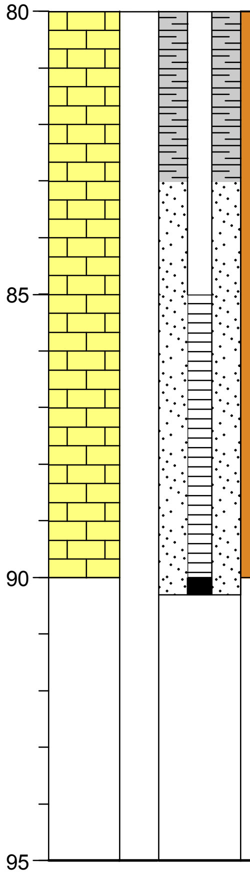
Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

WELL LOG
Well No. AP3-B-7
Page: 5 of 5

Drilling Start Date:	**02/10/2017**	Boring Depth (ft):	**90**	Well Depth (ft):	**90**
Drilling End Date:	**02/10/2017**	Boring Diameter (in):	**6**	Well Diameter (in):	**2**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**	Screen Slot (in):	**0.010**
Drilling Method:	**Sonic**	DTW During Drilling (ft):		Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**34.3**	Screen Material:	**Sch 40 PVC Slotted**
Driller Name:	**J. Triepke/L. Turner**	Top of Casing Elev. (ft):	**605.86**	Seal Material(s):	**Bentonite Chips**
Logged By:	**James Griffin**	Location (X,Y):	**1942387.32, 1551042.74**	Filter Pack:	**Sand**



DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT Sample Type	COLLECT Recovery (ft)	COLLECT Photo	SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
80				CB	6.0		*(continued)* SEDIMENTARY ROCK (LIMESTONE); moderately bedded, fresh, hard, dark bluish-gray, moist.		6-inch diameter boring installed at 80 ft.	525
85									Horizontal K = 3.70E-05 cm/ sec (from single Slug Testing screen interval between 85-90 ft; not used in modeling).	520
90							(90') Boring terminated.			515
95										

NOTE: Hole pre-cleared to 5' on 02/09/2017 by Cascade Drilling using hand auger.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-10
Page: 1 of 5

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
0				CB	5.0		(0') Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, some silt, loose, moist, dark gray.		Photo represents recovered sample between 1-3 ft interval.	
										605
							(4') Between 4 ft and 5 ft, Sandy SILT.			
5				CB	5.0		(5') Some brown sandy SILT, low plasticity and trace of fine gravel. (5.5') Pale and dark gray mottled.			
										600
10				CB	10.0		(10') Layers/zones of silty sand and sandy silt, dark gray to pale gray, some brown mottling.			
										595
15							(15.5') Band of pale gray SAND with SILT.		Photo represents recovered sample between 16-17.5 ft interval.	
							(18') Zone of sandy SILT.			
										590
20										

NOTE: Borehole set outside overhead power line corridor.

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Client: **Southern Company Services**
Project: **Plant Hammond Ash Pond 3**
Address: **5963 Alabama Hwy, Rome, GA**

BORING LOG
Boring No. **AP3-B-10**
Page: **2 of 5**

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
20				CB	10.0		*(continued)* Ash (COAL COMBUSTION BYPRODUCT), Silty SAND (SM); mostly fine grained sand, some silt, loose, moist, dark gray.			
							(22') Band of brown and orange clayey SAND/sandy CLAY, trace of gravel.			
										585
25							(25') Silty SAND.		Wet due to water added by driller. Photo represents recovered sample between 25-26 ft interval.	
										580
30				CB	8.0		(30-32') No Recovery. Believed to be Ash (COAL COMBUSTION BYPRODUCT).			
							(32') Ash: (COAL COMBUSTION BYPRODUCT), poorly graded SAND with silt (SP-SM); mostly fine grained sand, some silt, poorly graded, loose, moist, dark gray.			
										575
35		▽					(35') Saturated.		Photo represents recovered sample between 35.5-36.5 ft interval.	
										570
40		▼								

NOTE: Borehole set outside overhead power line corridor.

Geosyntec consultants engineers | scientists | innovators	**Client:** Southern Company Services **Project:** Plant Hammond Ash Pond 3 **Address:** 5963 Alabama Hwy, Rome, GA	**BORING LOG** **Boring No.** **AP3-B-10** **Page:** **3 of 5**

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
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Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
40				CB	10.0		(40') Lean CLAY (CL); trace fine gravel, few fine sand, trace silt, mostly clay, medium plasticity, soft, wet, orange, with minor pale red staining/mottling, RESIDUUM.		Photo represents recovered sample between 40-41 ft interval.	
							(43') From 43 ft with pale gray, horizontal lamination and mottling.			
										565
45							(45') From 45 ft increasing silt content, orange, dark orange and gray mottled. Trace of weakly cemented, dark orange sandy pebbles.			
										560
50				CB	10.0		(50') Becoming pale brown with dark orange. With some sand.			
							(53') With brown to dark brown mottling, some fine grained sand.			
										555
							(54') Gravelly lean CLAY (CL) with sand; some fine-coarse gravel, little fine-medium sand, mostly clay, medium plasticity, medium stiff, wet, dark gray, dark brown. Gravel is angular, dark gray, limestone, with some white calcareous veins, up to 4' diameter, HIGHLY WEATHERED LIMESTONE.			
55							(57.5') With angular fragments of limestone up to 5 inches in diameter. Limestone is dark gray, with some calcite filled veins.		Photo represents recovered sample between 55-56.5 ft interval.	
										550
60										

NOTE: Borehole set outside overhead power line corridor.

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Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-10
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Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
60				CB	10.0		(61') No limestone cobbles, trace of fine gravel only.			
65							(63') Clayey GRAVEL (GC); some fine-coarse grained gravel, some clay, wet, dark brown, and gray, increasing gravel content with depth. Gravel is dark gray limestone. With cobbles of limestone up to 4 inches in diameter, HIGHLY WEATHERED LIMESTONE. (66') Dry. (67') Wet. (68') Increasing size of limestone fragments, intact pieces of core up to 3 inches length.		Photo represents recovered sample between 66-68 ft interval.	545 540
70				CB	5.0		(70') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray, moist, with calcite veins. Drilled as gravel sized fragments between 70 and 72.5', and cobbles of limestone with gravel from 72.5'. Fines possibly washed away.		Driller reported harder drilling, adding more water. Fines in cuttings possibly washed away Photo represents recovered sample between 70-71 ft interval.	535
75							(75') No Recovery.		From 76' to end of run at 80' driller reported very soft drilling, rods can be pushed through material with minimal pressure. Rods do not sink under own weight.	530
80										

NOTE: Borehole set outside overhead power line corridor.

Client: Southern Company Services
Project: Plant Hammond Ash Pond 3
Address: 5963 Alabama Hwy, Rome, GA

BORING LOG

Boring No. AP3-B-10
Page: 5 of 5

Drilling Start Date:	**02/14/2017**	Boring Depth (ft):	**100**
Drilling End Date:	**02/16/2017**	Boring Diameter (in):	**6**
Drilling Company:	**Cascade Drilling**	Sampling Method(s):	**Core Barrel (CB)**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**35**
Drilling Equipment:	**C100**	DTW After Drilling (ft):	**39.8**
Driller Name:	**Jeremy Triepke**	Ground Surface Elev. (ft):	**608.69**
Logged By:	**Christine Hug**	Easting, Northing (X, Y):	**1942345.89, 1550500.71**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT			SOIL/ROCK VISUAL DESCRIPTION	SAMPLE	REMARKS	ELEVATION (ft)
				Sample Type	Recovery (ft)	Photo				
80				CB	5.0		(80') No Recovery.		Between 80 ft and 82 ft, driller reported very soft drilling. From 80 ft no water used for drilling to attempt to recover soft material.	
							(81') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, moderately weathered, hard, dark gray, wet, drilled as limestone fragments up to 4 inches diameter. Drilled with some clayey sand.			
							(83') From 83.5' dry, pale gray to white.		From 82' to 85': Hard drilling, slow progress.	525
85							(85') No Recovery.		Loss of circulation between 85 and 88'. Between 85 ft and 87 ft soft drilling with no resistance during drilling.	520
90				CB	5.0		(90') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, slightly weathered, hard, dark gray, moist, with calcite veins. Drilled as cobbles and coarse angular gravel.		Moderately hard and slow drilling from 88' to 100', rig occasionally chatters. 6" casing installed to 88'. No loss of circulation or soft zones encountered between 88' and 100'. Photo represents recovered sample between 92-93 ft interval.	515
95										
				CB	3.0		(97') SEDIMENTARY ROCK (LIMESTONE); thinly bedded, fresh, hard, dark gray, moist.			510
100							(100') Boring terminated.			

NOTE: Borehole set outside overhead power line corridor.

APPENDIX C

Geophysical Investigation Report

Final Technical Report

Microgravity Survey at Plant Hammond Ash Pond #3
Floyd County, Georgia

for

Geosyntec Consultants, Inc.
Kennesaw, Georgia

March 24, 2017

SGS Project No.: 2017344

Geosyntec Project No.: GR6242

CERTIFICATION

I hereby certify that this document has been prepared in accordance with generally accepted geophysical exploration and interpretation practices.

Authored by:

Ronald Kaufmann
President
Licensed Professional Geophysicist - California #1071
Licensed Professional Geologist - Tennessee #3675

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LIST OF FIGURES

BACKGROUND

Geosyntec Consultants, Inc. (Geosyntec) is investigating subsurface conditions within Ash Pond #3 (AP3) at Georgia Power Plant Hammond in Floyd County, Georgia. The dry pond is approximately 23 acres and is currently being filled and graded with additional ash before being capped. The ash is estimated to be up to 41 feet thick above clay and limestone rock.

Geosyntec retained Spotlight Geophysical Services (SGS) to carry out a microgravity survey within AP3. Microgravity is a non-invasive method that can map the magnitude and lateral extent of subsurface anomalies such as karst features (dissolution-enlarged joints, cavities, and weathered limestone) due to the inherent low-density contrast between these features and the surrounding material. Additionally, microgravity can be used to identify low-density features within the soil and ash due to erosion.

Geosyntec issued a work order for the microgravity survey under the terms of the Master Subcontractor Services Agreement dated January 16, 2015. Fieldwork was performed between February 7th and 11th, 2017.

TECHNICAL APPROACH

SURVEY AREA

Microgravity data were acquired along nine (9) survey lines within AP3, labeled 1 to 8 and 3A (Figure 1). The survey lines are oriented in a north-south direction and spaced approximately 100 feet apart within accessible portions of AP3. Data could not be acquired in areas restricted by Southern Company Services safety personnel such as the equipment staging area. The stations were marked with a 60d nail and a stake whisker at a spacing of 20 feet along the survey lines.

The station locations were surveyed with a Trimble ProXT differential GPS. The geographic locations are referenced to Georgia State Plane (west) coordinates using the NAD83 datum.

MICROGRAVITY SURVEY

A microgravity survey measures variations in the Earth's gravitational field caused by changes in subsurface density. A microgravity survey consists of making sensitive gravity measurements at discrete points along a profile line or within a grid (ASTM, 2005). Microgravity data can be used to map karst-related features, variations in depth to bedrock, faults, voids, soft zones, and man-made features such as mines and tunnels. *Note: In this report the terms “Microgravity” and “Gravity” are synonymous.*

Data Acquisition

Microgravity data were acquired at a total of 323 locations, including one base station (Base0). Precise relative elevations of the microgravity stations were obtained with a Topcon DL-102 digital level. The elevations are tied to the gravity base station Base0 with an elevation of 600.935 feet, provided by on-site land surveyors using an RTK GPS. The elevations were measured with a loop closure precision within 0.01 feet per linear-mile, which is within the necessary precision for the microgravity data processing.

Microgravity data were obtained with a Scintrex CG-5 gravimeter (S/N 40800077), using a 30-second averaging window and automatic corrections for tides and meter leveling. The data were recorded to a field notebook and digitally to the gravimeter memory. The data were downloaded to a computer after each day of data acquisition.

Data Processing

The gravity data were reduced to Bouguer values using standard reduction formulas in Microsoft EXCEL (Long and Kaufmann, 2013). Note that since this is a local microgravity survey, the data were not tied to an absolute gravity datum. The Bouguer values were calculated with the corrections applied as shown in Equation 1.

Eqn. (1) $$g_{Boug} = g_o - g_d - g_t - g_l + g_{fa} - g_{slab} + g_{tc}$$

Where: g_o= observed gravity values;
g_d = instrument drift;
g_t = tide correction;
g_l = latitude correction;
g_{fa} = free air correction;
g_{slab} = Bouguer slab correction; and
g_{tc} = terrain correction.

INSTRUMENT DRIFT

All relative gravity meters have an inherent drift that must be corrected for by repeated occupations at base stations during the survey. Base station “Base0” was established on a concrete footing for a large pipe on the west side of the pond (Figure 1). Data were acquired at Base0 at the start and end of each day of data acquisition and at approximately 3-hour intervals during data acquisition. At least three consistent measurements with a standard deviation within ±5 μGals were acquired at each base station occupation. The drift during a full day of surveying was less than 10 μGals. The drift was removed from the raw data by assuming a linear drift between base station occupations.

TIDAL CORRECTION

The gravitational effects of the sun and moon can be as much as 300 µGals over the course of a day (Long and Kaufmann, 2013). The Scintrex CG-5 automatically removes the tidal effects using the Longman formula (Seigel, 1995; Longman, 1959). Any residual tidal effects (< 10 µGals) due to tidal loading and earth deformation are removed during the drift correction.

LATITUDE CORRECTION

There is an increase in gravity with increasing latitude. Standard equations for the latitude correction are presented in Long and Kaufmann (2013) and Telford et al. (1990). The calculation of the gravitational gradient due to latitude is shown in Equation 2.

Eqn. (2): $g_l = \frac{\Delta g}{\Delta s} = 0.811 \sin 2\varphi \ mGal/km$

Where: $\frac{\Delta g}{\Delta s}$ is the gravity change (mGal) in the north-south distance (km) and φ is the latitude in degrees.

FREE AIR CORRECTION

Since gravity varies inversely with the square of the distance, it is necessary to apply a *free air correction* that accounts for changes in gravity due to elevation (Long and Kaufmann, 2013; Telford et al., 1990). The free air correction is 94.06 µGals/foot of elevation. Precise elevations were measured with a Topcon DL-102 digital level as described above and used to calculate the free air correction. In order to account for variations in the gravity meter height above the ground surface, a free air correction (94.06 µGals/foot) for the gravity meter height was also applied to the data. The meter height was measured at each station using a standard tape measure with a precision of 0.01 feet.

BOUGUER SLAB CORRECTION

The *Bouguer Slab Correction* accounts for the attraction of the material between the measurement station and a constant datum (Long and Kaufmann, 2013; Telford et al., 1990). The calculation of the Bouguer slab correction is shown in Equation 3.

Eqn. (3): $$g_{slab} = \frac{\Delta g}{\Delta r} = 0.01278\, \rho\, mGal/ft$$

Where: $\frac{\Delta g}{\Delta r}$ is the gravity change (mGals) per foot of elevation change and ρ is the density in g/cc.

In this survey, a Bouguer slab density of 1.6 g/cc was used to approximate the density of moist coal ash, based on density measurements at similar Southern Company sites (G.B. Dyer, personal communication).

BOUGUER GRAVITY

Bouguer gravity values (Equation 1) are directly related to subsurface density variations. The median value was removed from the dataset to show relative high and low gravity values across the site.

RESIDUAL GRAVITY

In order to remove the gravitational effects of ash thickness variations, residual gravity values were calculated in the following process:

- Ash thickness was calculated below each gravity station by subtracting the original pond bottom elevation (Georgia Power, 1971) from the current surface elevation.
- The change in gravity due to the ash was calculated by using the overburden thickness approximation (Telford et al., 1990). A density contrast of 0.49 g/cc between the ash and surrounding clay and limestone was used since it produced gravity residual values with the least correlation to the ash thickness.
- The change in gravity due to the ash was added to the Bouguer gravity values and the resulting values are referred to as the *Residual Gravity*.

Interpretation

The microgravity data were assessed for low-gravity zones that may be due to subsurface mass deficits such as karst-related features within the limestone and density variations within the soil and ash. The gravity data were modeled with standard formulas for gravity interpretation (Long and Kaufmann, 2013; Telford et al., 1990) using IX2D-GM software (Interpex, Ltd.). The modeling included iterative forward and inverse modeling by fitting simplified cross-sectional subsurface density variations to the observed data in the IX2D-GM software. The pre-ash pond bottom (Georgia Power, 1971) and top of weathered rock data provided by Geosyntec were used to constrain the microgravity models.

Quality Control and Calibration

The Scintrex gravimeter and Topcon level were set-up and operated in accordance with the manufacturer's instructions and ASTM standards (ASTM, 2005). The Topcon DL-102 level was calibrated prior to the fieldwork (Appendix A). The level calibration of the gravimeter was checked daily (Appendix A).

The data quality was monitored by re-acquiring data at stations throughout the survey in a pseudo-random fashion and checking the repeatability of the measurements. Data were re-acquired at a total of 54 stations (17% of total) and have an average deviation of ±3 µGals, which indicates a low level of ambient noise for the site.

Limitations

Microgravity data will respond to variations in subsurface density and can be used to map the lateral locations of anomalous areas. However, microgravity data alone cannot determine the vertical distribution of the anomalous zones or the absolute depth to stratigraphic layers. Borings must be used to positively identify the causes of the microgravity variations and the depth of the anomalous features.

The microgravity data are presented in a plan-view contour map with interpolated values between survey lines using the kriging gridding method. It is possible that low-density features exist between survey lines that have not been detected by the microgravity survey.

DETECTABILITY AND RESOLUTION

The detectability of subsurface features with microgravity is dependent on their density contrast, depth, size, and geometry. Shallow targets produce a short wavelength (narrow) response. Deeper targets produce a longer wavelength (wide) response. In order to be detected, a subsurface feature must be large enough and shallow enough to produce a response above the noise threshold with a wavelength that can be defined by the survey station layout. Conservatively, anomaly magnitudes larger than 5 µGals with full widths of 40 feet or more are detectable in this survey.

Lateral resolution is limited by the spacing between measurements and by the geometry of subsurface targets. The lateral resolution of a discrete subsurface feature is approximately 20% of its depth (i.e. a target at a depth of 50 feet can be defined with a lateral resolution of approximately ±10 feet).

RESULTS

Figure 2 shows a contour map of the Bouguer gravity data, with values ranging between -160 and +394 μGals (relative to the median value of 0 μGals). There is a strong gradient from high to low Bouguer gravity values inward from the edges of the pond. This gradient is due to the low-density ash surrounded by relatively higher-density residuum and weathered limestone. The lowest gravity values (shaded purple) form a WSW-ENE trend in the southern portion of AP3.

Based on the original pond bottom map (Georgia Power, 1971), the ash thickness ranges between 0 and 41 feet. The gravitational effects of ash thickness variations were calculated and removed from the Bouguer gravity data. The resulting *residual gravity* data are shown in Figure 3 with values ranging between -106 and +278 μGals (relative to the median value of 0 μGals). If the pond bottom map accurately represents the true bottom of the ash, the residual gravity values should represent variations in density within the residuum and weathered limestone beneath the ash.

Low residual gravity values are concentrated in the southern half of AP3, with the lowest values forming a WSW-ENE trend. It appears that this trend may continue beyond the limits of the survey. Smaller pockets of low residual gravity are also evident north and east of the berm located on the western side of AP3.

Cross-Sectional Models

In order to visualize the possible causes of the low-gravity trend, cross-sectional models were developed along Line 5 and through the combined profile of Lines 2, 3A, and 3. The modeled ash thickness is constrained by the original pond bottom map (Georgia Power, 1971) and the top of limestone is constrained by existing borings (Geosyntec). The pond bottom elevation was held fixed in the model, while the top of limestone was iteratively varied to match broad trends in the observed data. A density of 1.6 g/cc was used to approximate the density of ash, while a density of 1.9 g/cc was used to approximate the density of the residuum. A density of 2.4 g/cc was used for the upper limestone.

Figure 4 shows the cross-sectional model along Line 5. The modeled gravity (solid line in Figure 4) fits the observed gravity (filled circles in Figure 4) well, except in the low-gravity anomaly between Stations 100 and 360. Since the effects of the ash thickness and top of limestone variations are accounted for in the model, the low-gravity anomaly must be due to other low-density features that may include karst dissolution within the limestone.

Figure 5 shows the cross-sectional model of the combined profile of Lines 2, 3A, and 3. The modeled gravity fits the observed gravity well, except in the low-gravity anomaly between Stations 100 and 420. The low-gravity anomaly must be due to other low-density features that may include karst dissolution within the limestone.

CONCLUSIONS

Microgravity data were acquired at a total of 323 locations within AP3. The microgravity data have excellent repeatability (low-levels of noise) and indicate anomalous conditions within a portion of AP3.

After removing the gravitational effects of the relatively low-density ash from the Bouguer Gravity, the residual gravity values contain a WSW-ENE trending low-gravity anomaly in the southern portion of AP3 that may extend beyond the boundaries of AP3. The low-gravity anomaly may be associated with karst features within the limestone, including dissolution-enlarged fractures and cavities. Due to inherent limitations of the microgravity method, a conclusion cannot be made about the exact size, depth, and number of low-density features that may be contributing to the low-gravity anomaly. Additional geophysical surveying (e.g., electrical resistivity) and exploratory borings may be needed to further characterize the low-gravity anomaly.

> *"Anomaly" is defined as a deviation from uniformity in physical properties (Sheriff, 2002). It is a term often used in geophysics to denote an area that is different than surrounding materials. Anomalies identified in this report are not confirmed until they are drilled and verified.*

REFERENCES

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Telford, W.M., Geldart, L.P., and Sheriff, R.E., 1990, *Applied Geophysics,* Cambridge University Press, Second Edition, 770 p.

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APPENDIX A

INSTRUMENT CALIBRATION

Lengemann
LENGEMANN ALTOONA, FLORIDA
Surveying Equipment • GPS • Construction Lasers • Machine Control • Drafting Supplies • Repairs • Rentals

CERTIFICATE OF CONFORMANCE

Date: July 7, 2016

Purchase Order No. Ronald Kaufmann

To : Spotlight Geophysical Service
4618 NW 96 Ave.
Doral , Fl. 33178

Make : Topcon

Model No : DL-102

Serial No **: GM1449**

We hereby certify that the above instrument has been checked and calibrated, and complies with the original manufacturer's specifications. Collimeter traceable to N.B.S. # 738/235969-86 and # 731/221617.

Sincerely,

Lengemann Of Florida

Mike Smith

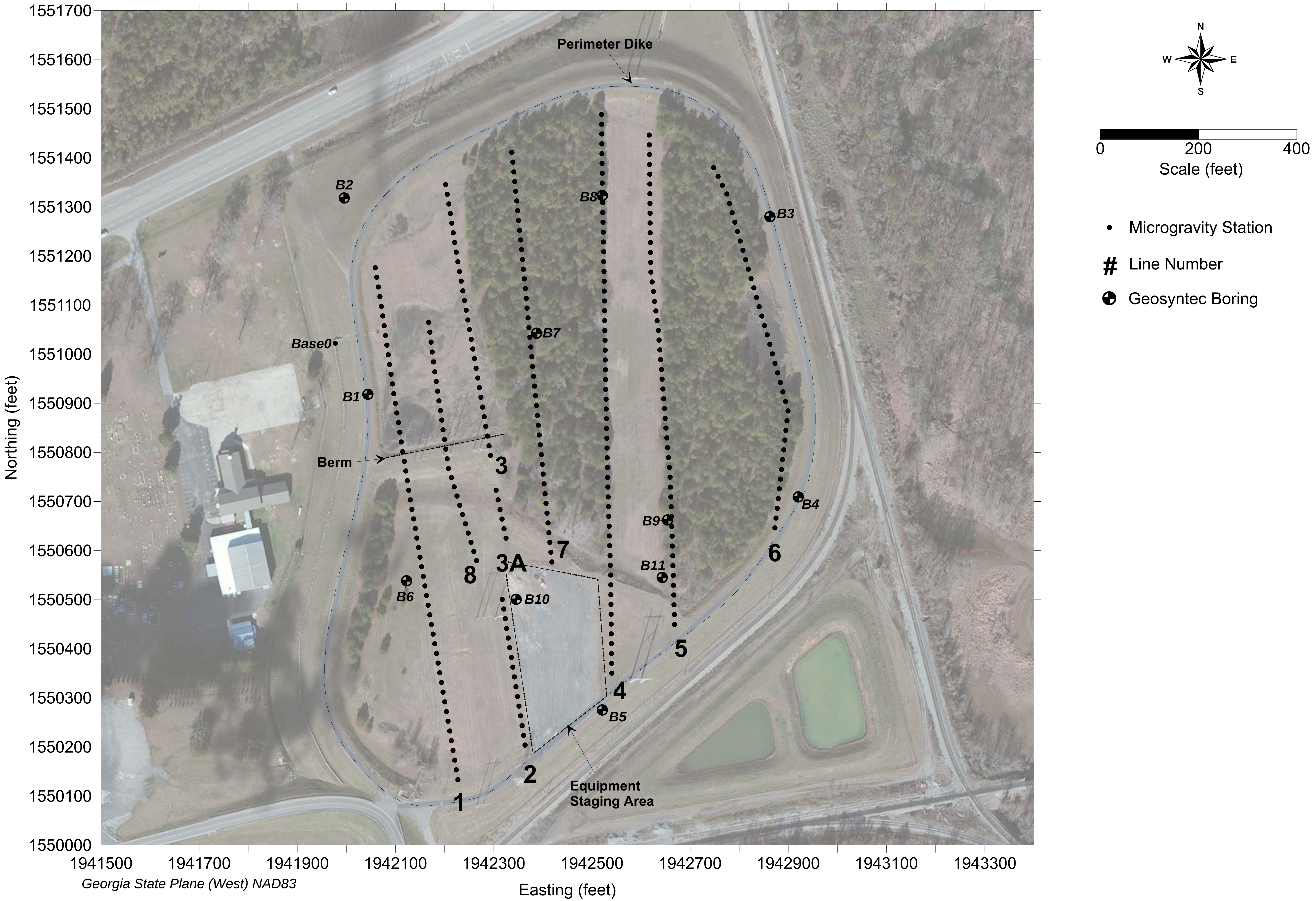
Service Technicain

43316 SR 19
Altoona, Florida 32702
352-669-2111
800-342-9238
FAX 352-669-4244
www.lengemann.us

Sctrintrex CG-5 S/N 40800077

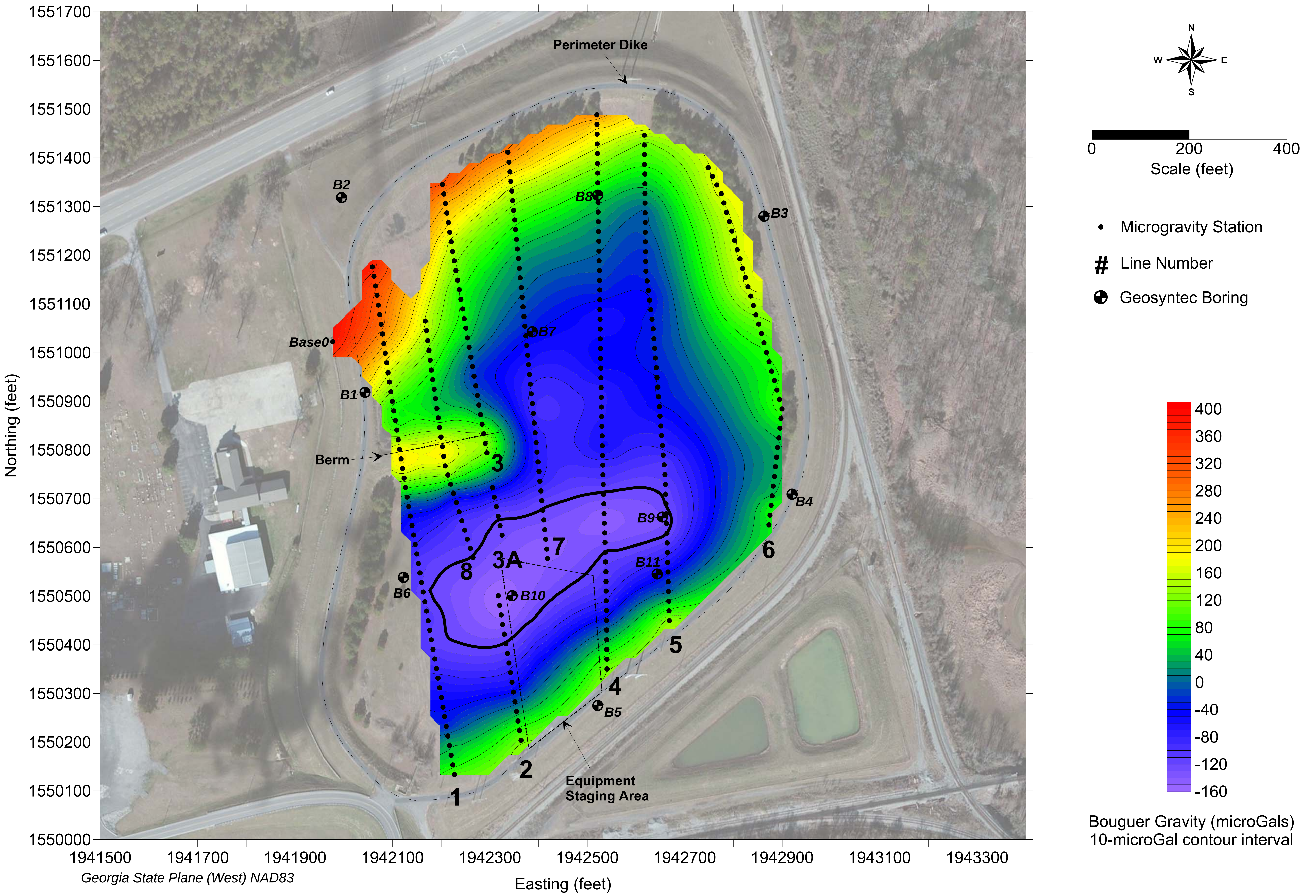
Note: There is no NIST or other international standard calibration for a relative gravimeter and no factory calibration is necessary. Spotlight Geophysical Services performs regular checks of the drift and level constants for the meter. The manufacturer recommends that these constants be checked every few months. However, the X and Y level offset constants were checked daily before each day of data acquisition since they can drift during instrument transport to and from the site.

Date	**Level X-Offset**	**Level Y-Offset**	**Level X-sensitivity**	**Level Y-sensitivity**	**Drift**
2/8/17	-35.0	-80.2	511.6	551.3	0.295
2/9/17	-33.0	-69.6	511.6	551.3	0.295
2/10/17	-34.9	-79.2	511.6	551.3	0.295
2/11/17	-34.6	-77.7	511.6	551.3	0.295



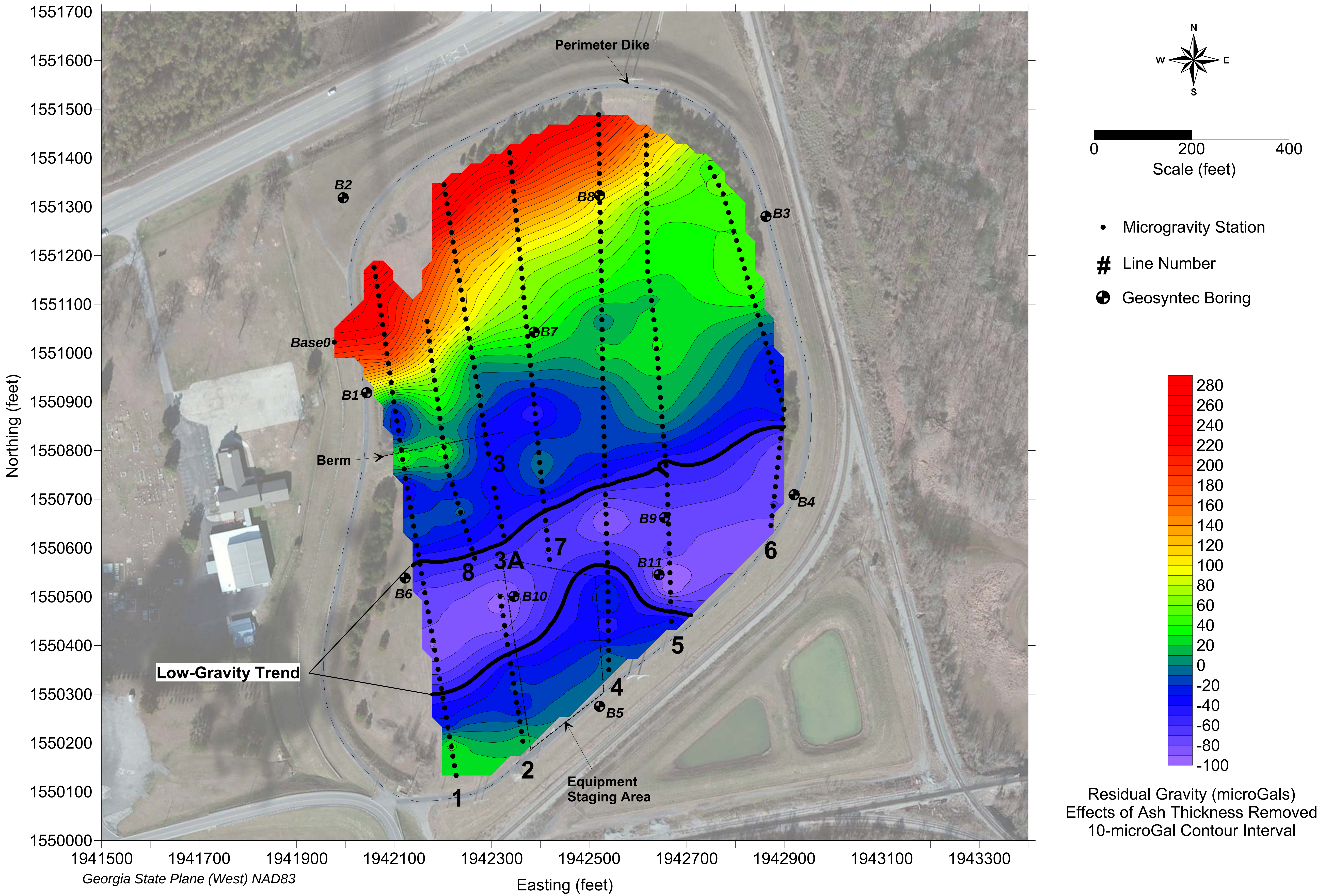
SPOTLIGHT
GEOPHYSICAL SERVICES

Figure 1. Microgravity station locations



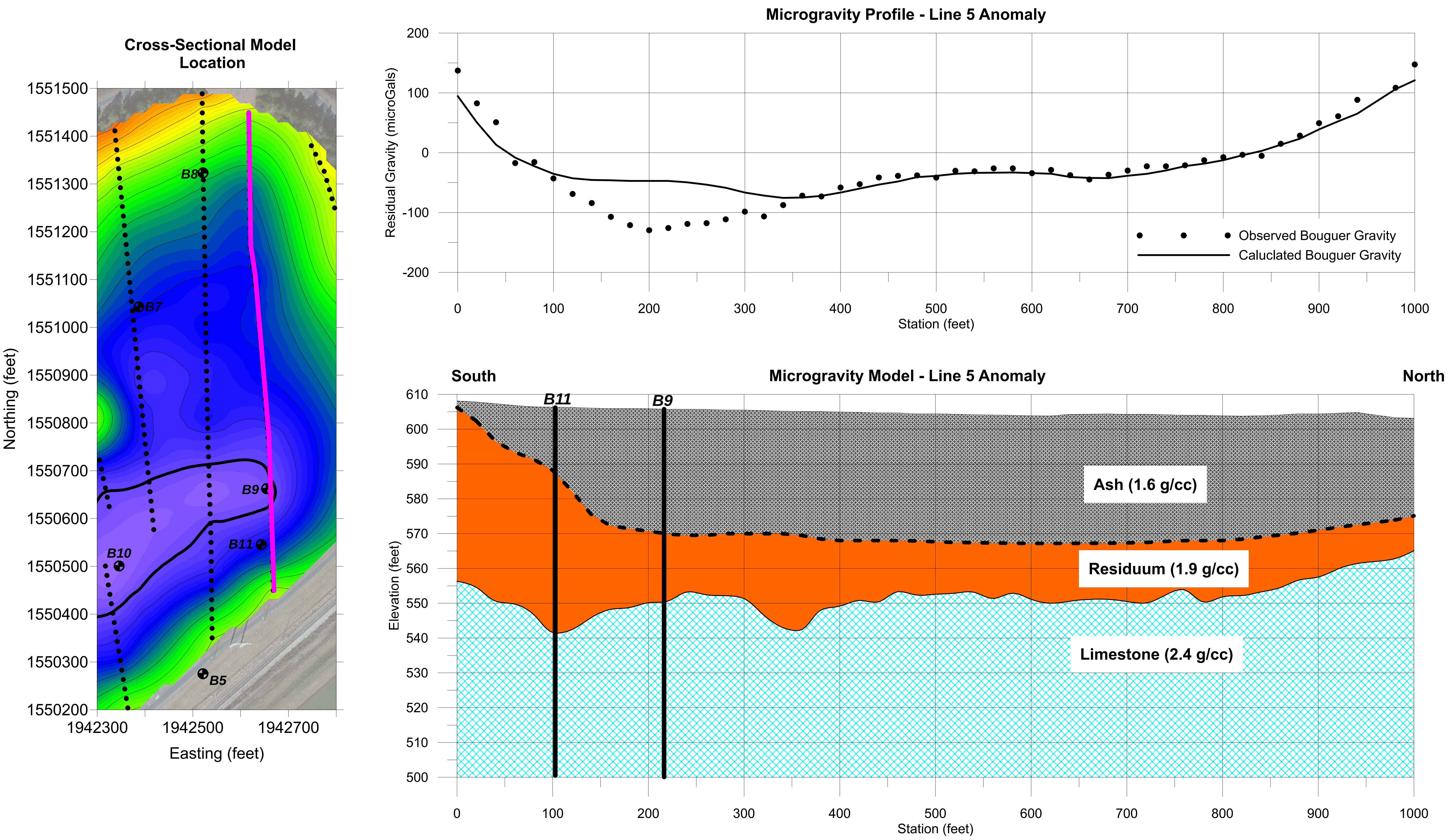
SPOTLIGHT
GEOPHYSICAL SERVICES

Figure 2. Microgravity contour map (Bouguer values)



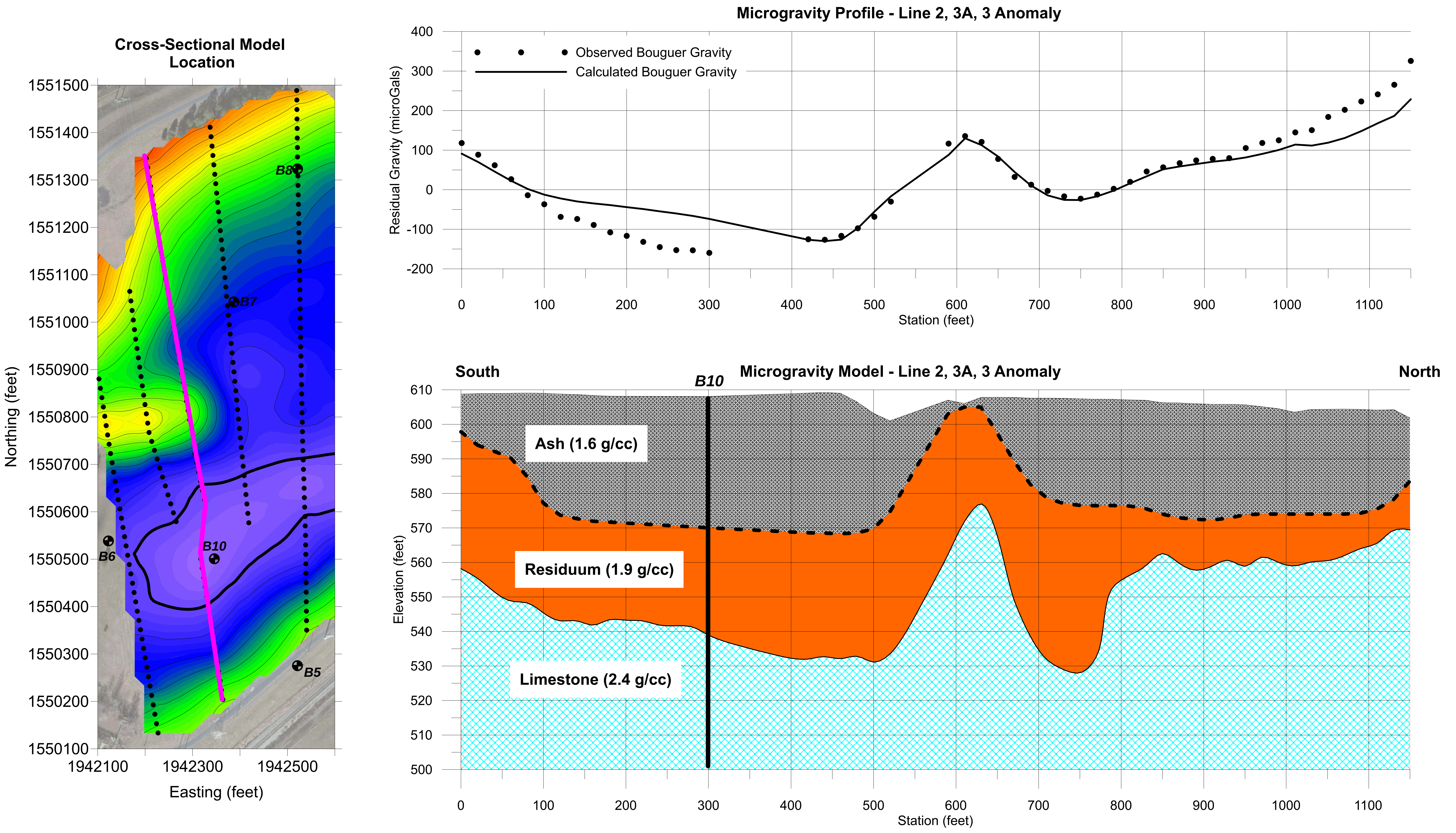
SPOTLIGHT
GEOPHYSICAL SERVICES

Figure 3. Microgravity contour map (Residual Values)



SPOTLIGHT
GEOPHYSICAL SERVICES

Figure 4. Line 5 microgravity model



SPOTLIGHT
GEOPHYSICAL SERVICES

Figure 5. Lines 2, 3A and 3 microgravity model

Geophysical Logging Report

Georgia Power Plant Hammond

Rome, Georgia

Performed for:

Geosyntec

February 17, 2017

Geophysical Logging Report
Georgia Power Plant Hammond
Rome, Georgia

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Signature Page

This report, entitled “Geophysical Logging Report, Georgia Power Plant Hammond, Rome, Georgia” has been prepared for Geosyntec located in Kennesaw, Georgia. It has been prepared under the supervision of Mr. Jorgen Bergstrom at the request of and the exclusive use of Geosyntec. This report has been prepared in accordance with accepted quality control practices and has been reviewed by the undersigned.

GEL Geophysics, LLC
A Member of the GEL Group, Inc.

Jorgen Bergstrom, P.Gp.
Senior Geophysicist

Scott D. Carney
Director

February 17, 2017

Date

Geophysical Logging Report
Georgia Power Plant Hammond
Rome, Georgia

EXECUTIVE SUMMARY

GEL Geophysics performed geophysical borehole logging services in four borings located at the Georgia Power Plant Hammond in Rome, Georgia. The field investigation was performed on February 8, 2017 and February 10, 2017. These investigations were conducted to aid Geosyntec in evaluating potential fractures and other features in bedrock at the site. Acoustic televiewer, caliper and impeller flowmeter logging was conducted in all four borings. In boring B9, natural gamma and borehole video logging was also conducted.

The logging data was analyzed to determine the location, orientation, and aperture of fractures; and other features. In addition to these data sets, synthetic caliper logs were calculated from the acoustic televiewer travel time data to aid in the interpretation. Dip, azimuth (dip direction), and aperture were calculated for each detected fracture based on the televiewer dataset. Flowmeter logging data was analyzed to assess water producing features.

Geophysical Logging Report
Georgia Power Plant Hammond
Rome, Georgia

1.0 INTRODUCTION

GEL Geophysics performed geophysical borehole logging services in four borings located at the Georgia Power Plant Hammond in Rome, Georgia. Acoustic televiewer, 3-arm caliper and impeller flowmeter logging was conducted in all four borings. In boring B9, natural gamma and borehole video logging was also conducted. The field investigation was performed on February 8, 2017 and February 10, 2017. The logging data was analyzed to determine the location, orientation, and aperture of fractures; and other features. In addition to these data sets, synthetic caliper logs were calculated from the acoustic televiewer travel time data to aid in the interpretation.

2.0 EQUIPMENT AND METHODOLOGY

The information below is an overview of the geophysical methodologies used for this investigation. The intent of this overview is to give the reader a better understanding of each method, and background information as to what is actually measured, the resolution of the method, and the limitations imposed by site-specific subsurface conditions.

2.1 Acoustic Televiewer

Acoustic televiewer logging produces a high resolution, magnetically oriented digital image to map the location, aperture and orientation of intersecting fractures, foliations, and lithologic contacts. The Acoustic televiewer tool emits a rotating, narrow, acoustic beam that is reflected off the borehole wall. The travel time and amplitude of the reflected wave are recorded by the tool and used to create borehole images. Both datasets are useful for identifying the location, aperture and orientation of fractures. The amplitude of the reflected signal will decrease at the location of fractures and the travel time will increase. The travel time data can also be used for developing a high resolution caliper log for a more comprehensive analysis of fractures. Acoustic televiewers can only be used in fluid filled boreholes. However, the fluid does not have to be optically clear for the method to work. The acoustic televiewer has a vertical resolution of 2 millimeters.

2.2 3-Arm Caliper

Caliper logging is used to generate a profile of the borehole diameter with depth. The tool measures the borehole diameter using three spring-loaded arms. Narrow enlargements in the borehole diameter can, in most cases, be attributed to fractures. Caliper logging can be conducted above and below the water surface.

2.3 Natural Gamma

Natural gamma tools measure the gamma radiation from the formation. These logs can be used to discriminate between different formations by utilizing variations in the concentration of naturally occurring radioactive isotopes such as potassium, uranium and thorium. These logs are particularly popular for correlating logs and locating clay and shale formations since radioactive elements tend to concentrate in these materials. Natural gamma logging can be conducted in cased and uncased boreholes, water-filled and dry.

2.4 Impeller Flowmeter

The impeller (spinner) flowmeter consists of a lightweight three-bladed impeller and a fiber-optic sensing mechanism to detect spinner rotation. Continuous logs of flow rates may be made at a constant logging speed and supplemented by more accurate stationary measurements at selected depths. The main shortcoming of impeller-type flowmeters is the lack of sensitivity to low-velocity flow.

2.5 Borehole video logging

Borehole video logging is typically conducted to visually inspect and investigate well conditions, geological strata, voids and fractures. The color video well logging system is equipped with a submersible camera mounted on a Kevlar reinforced, small diameter coaxial cable. Lights are housed in the camera and provide lighting for the down hole image. The control unit provides all the controls to operate the camera and reel assembly, and is equipped with a 7-inch LCD color video monitor. The survey is recorded on a flash drive during data collection and is later transferred to a PC.

3.0 FIELD PROCEDURES

The following equipment and software was used for this investigation:

Data Acquisition System: Mount Sopris Matrix data logger
Logging Winch: MX system with 1,500 feet of cable
Acoustic Televiewer: QL40-ABI-2G
3-Arm Caliper: QL40-CAL
Impeller Flowmeter: QL40-SFM
Natural Gamma: 2PGA-1000
Logging interpretation software: WellCAD v 5.1 by Advanced Logic Technology
Borehole video system: Pearpoint Flexiprobe P340 camera system

Acoustic televiewer, caliper, and impeller flowmeter logging was conducted in all for borings. Natural gamma and borehole video inspection was conducted in B9 only. A summary of the configuration of the boreholes is provided below. All depth measurements are referenced from ground surface. All borings are surface cased and open hole below the casing.

Well ID:	**B2**	**B3**	**B4**	**B9**
Ground surface elevation (ft):	595.80	609.15	608.39	605.50
Bottom of casing (ft):	40.2	55.3	55.8	47.7
Casing material:	STEEL	STEEL	STEEL	STEEL
Casing diameter (in):	5.25	5.25	5.25	5.40
Total depth logged (ft):	104.0	105.0	70.3*	77.2*
Open hole diameter (in):	4.75	4.75	4.75	5.00

* Acoustic televiewer logging stopped short of the total depth logged in B4 and B9 due to obstructions

4.0 DATA PROCESSING AND RESULTS

The logs were analyzed for fractures and other features using WellCAD software, manufactured by Advanced Logic Technology. The travel time data from the acoustic televiewer log was used to develop synthetic caliper logs. Fractures were interpreted through a complete data analysis of all logs. The logs are presented in Appendix 1 and a fracture summary for each well is provided below. Dip, azimuth (dip direction), and aperture were calculated for each detected fracture where available in acoustic televiewer data. Fractures with no orientation noted were detected with caliper only. The fracture data was corrected from apparent to true dip and azimuth using deviation logs included with the televiewer dataset. The azimuth or dip direction is measured clockwise from magnetic north (Figure 1). Attributes for all identified fractures for the borings listed in the tables following this section. Dominating fractures are shown in bold and italics text, medium size fractures are shown in bold, and smaller fractures in normal text. Fracture rose diagrams are presented on Appendix 2. Flow logs and fracture characteristics are shown on Appendix 3. The borehole video log for boring B9 has been submitted to Geosyntec in a digital format. A couple of screenshots are included in Appendix 4. All depth measurements are referenced from ground surface.

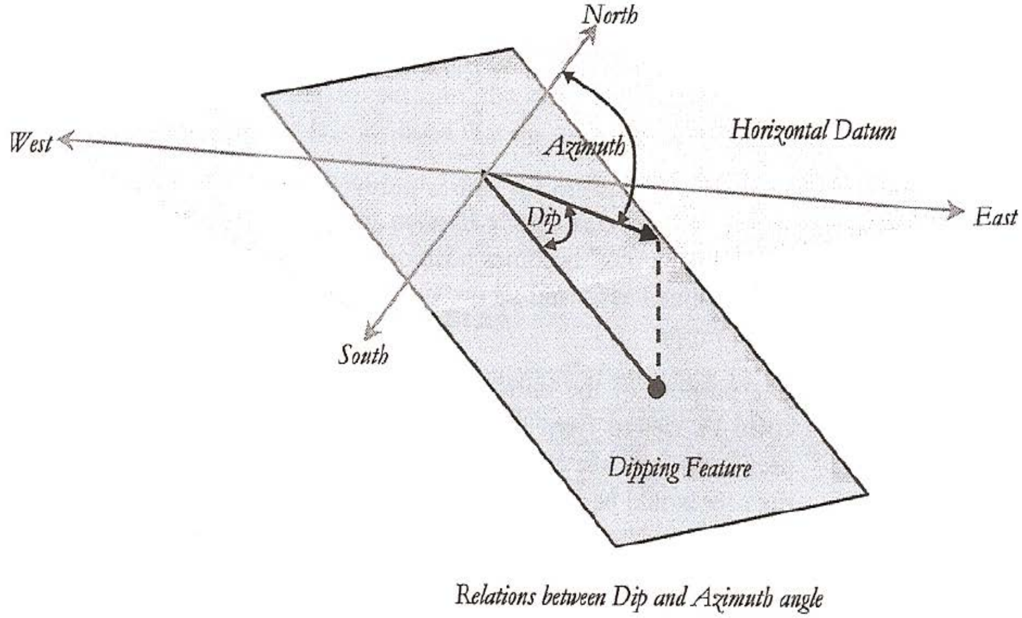


Figure 1 Explanation of azimuth and dip for fractures

Fracture Summary

B2

Depth ft	Elev. ft	Azimuth deg	Dip deg	Aperture mm
40.9	554.9	126	42	5
42.0	553.8	111	48	15
43.9	551.9	126	34	6
45.4	550.4	166	31	12
46.3	***549.6***	***150***	***7***	***263***
49.5	**546.3**	**144**	**47**	**36**
50.7	**545.1**	**153**	**28**	**27**
53.5	542.3	168	57	8
54.3	541.5	175	46	16
58.1	537.7	180	54	8
58.2	537.6	171	51	10
58.8	537.0	181	57	10
60.7	535.1	167	19	7
63.7	532.1	152	47	1
64.1	531.8	160	43	7
64.5	531.3	164	52	6
66.0	529.8	169	26	8
66.3	**529.5**	**172**	**34**	**25**
70.7	525.1	148	52	4
73.5	***522.3***	***355***	***10***	***27***
73.6	***522.2***	***145***	***20***	***55***
80.8	***515.0***	***346***	***7***	***30***
80.8	***515.0***	***137***	***22***	***33***
82.4	***513.4***	***10***	***5***	***49***
84.0	511.8	165	12	8
84.7	511.1	149	45	5
85.1	510.7	142	51	4
85.4	510.4	142	43	5
86.1	***509.8***	***206***	***8***	***110***
95.4	**500.4**	**151**	**24**	**57**
99.0	496.8	152	48	5
99.2	496.6	156	37	6

Fracture Summary

B3

Depth ft	Elev. ft	Azimuth deg	Dip deg	Aperture mm
59.8	**549.3**	**152**	**10**	**5**
59.9	**549.2**	**147**	**9**	**6**
64.2	***544.9***	***191***	***24***	***87***
65.6	**543.5**	**157**	**5**	**70**
73.0	***536.2***	***168***	***25***	***93***
73.7	**535.4**	**174**	**41**	**15**
74.4	534.8	233	2	14
77.6	**531.5**	**150**	**10**	**15**
81.7	527.5	186	6	1
81.8	527.4	176	3	4
84.5	524.7	198	23	5

Fracture Summary

B4

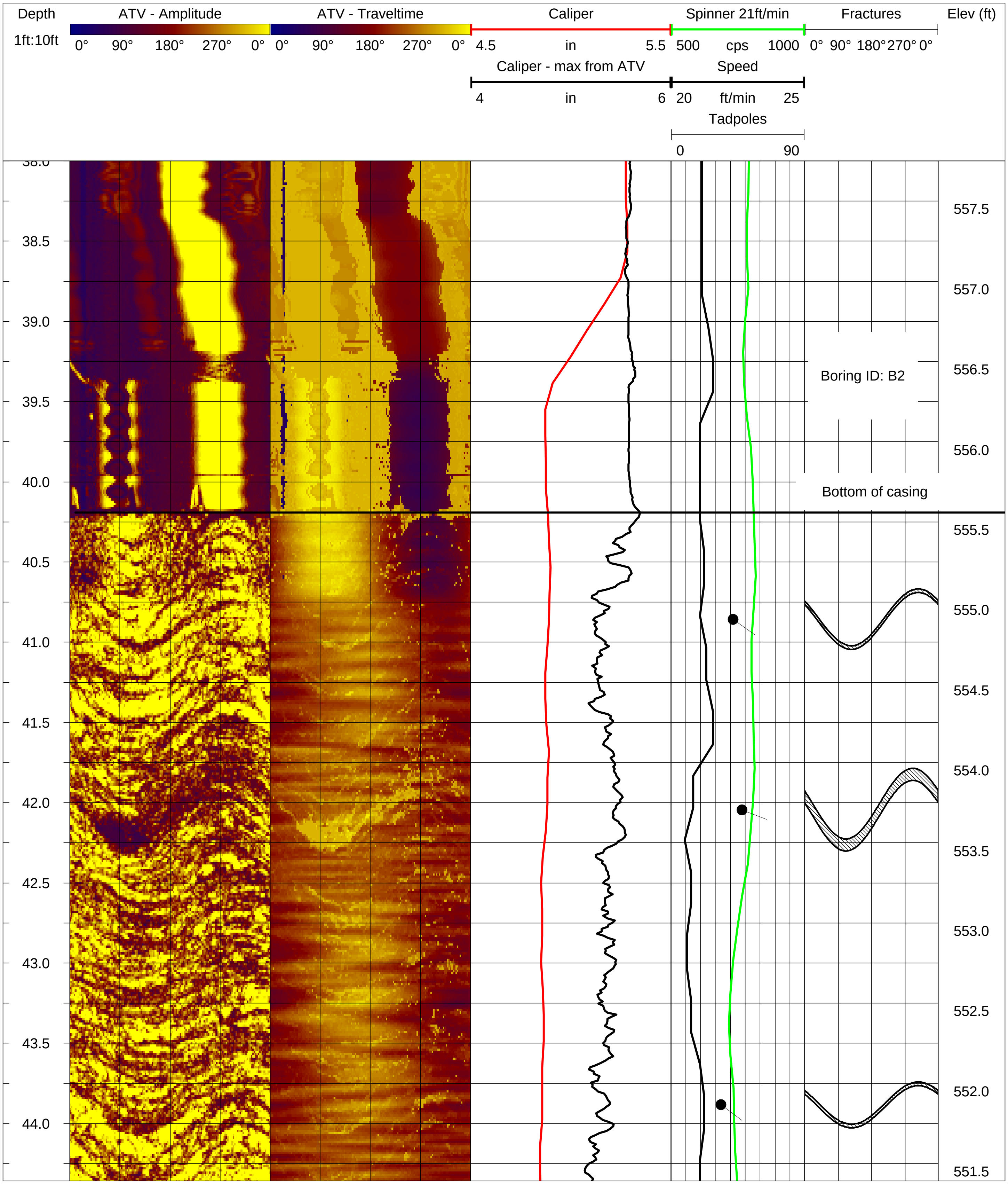
Depth ft	Elev. ft	Azimuth deg	Dip deg	Aperture mm
59.6	***548.8***	***N/A***	***N/A***	***97***
61.7	***546.7***	***N/A***	***N/A***	***55***

B9

Depth ft	Elev. ft	Azimuth deg	Dip deg	Aperture mm
75.9	***529.6***	***N/A***	***N/A***	***198***

Dominating fractures are highlighted and shown in bold and italics text. Medium size fractures are shown in bold.

APPENDIX 1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Caliper - max from ATV
4 in 6
Spinner 21ft/min
500 cps 1000
Speed
20 ft/min 25
Tadpoles
0 90
Fractures
0° 90° 180° 270° 0°
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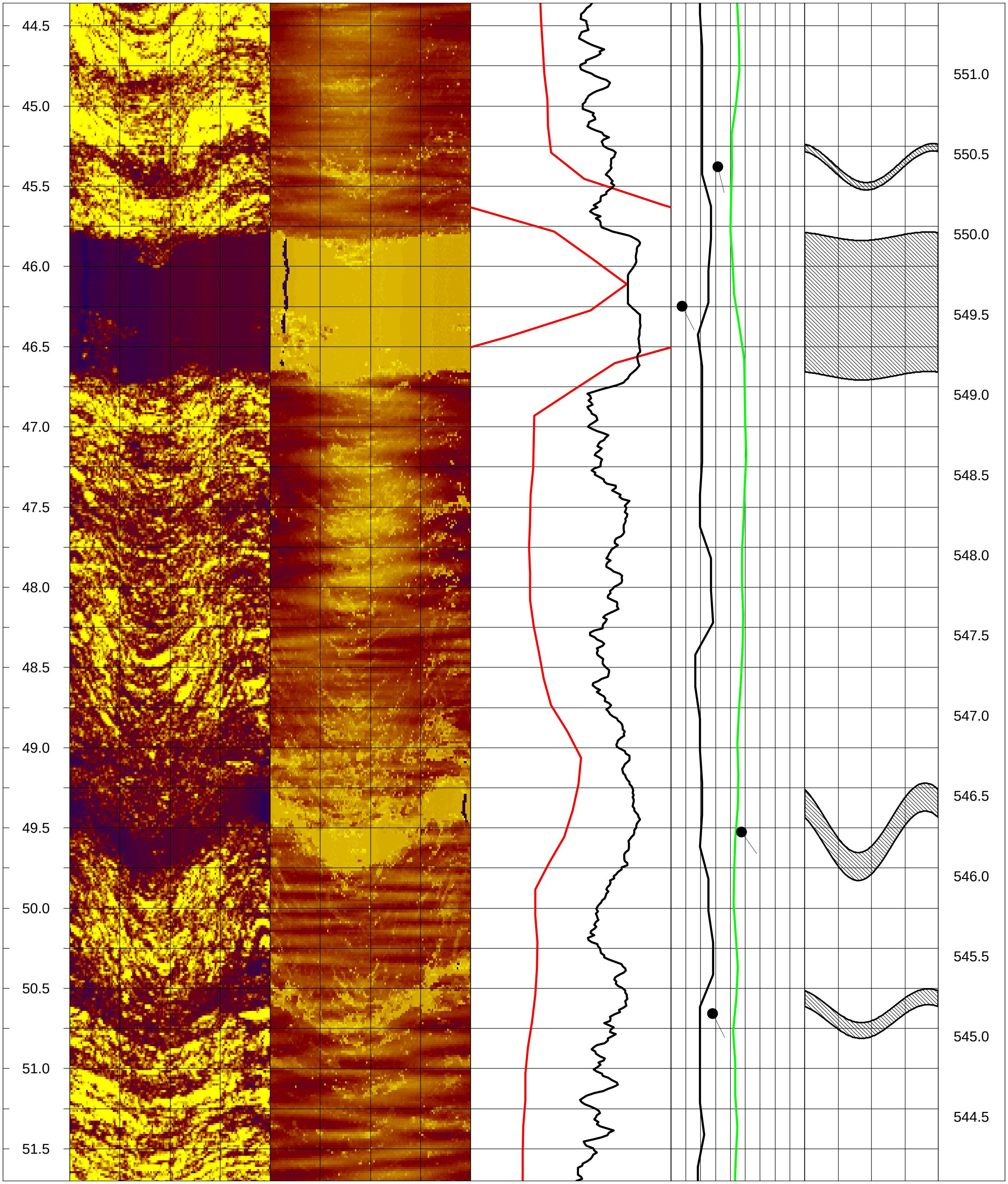
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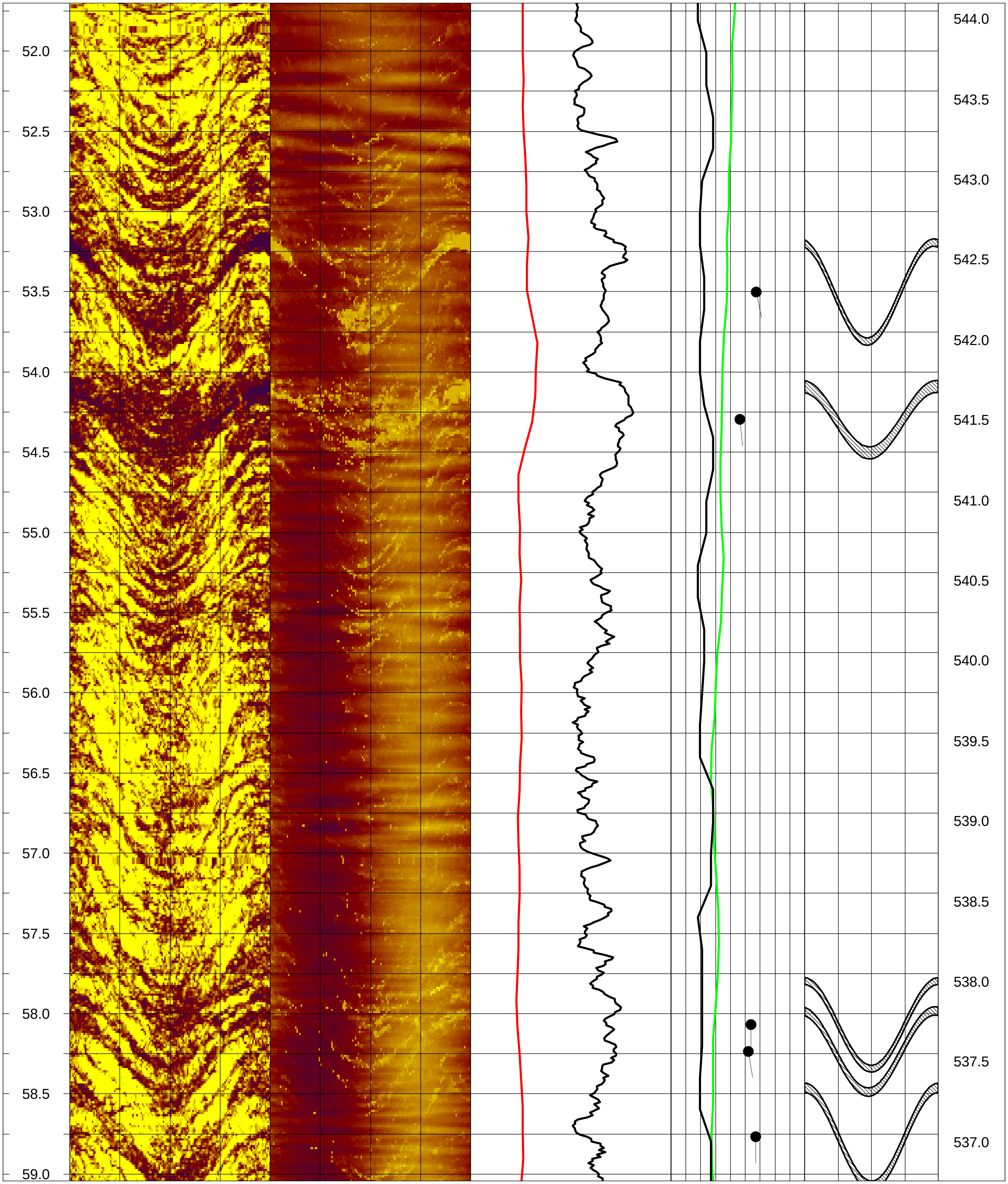

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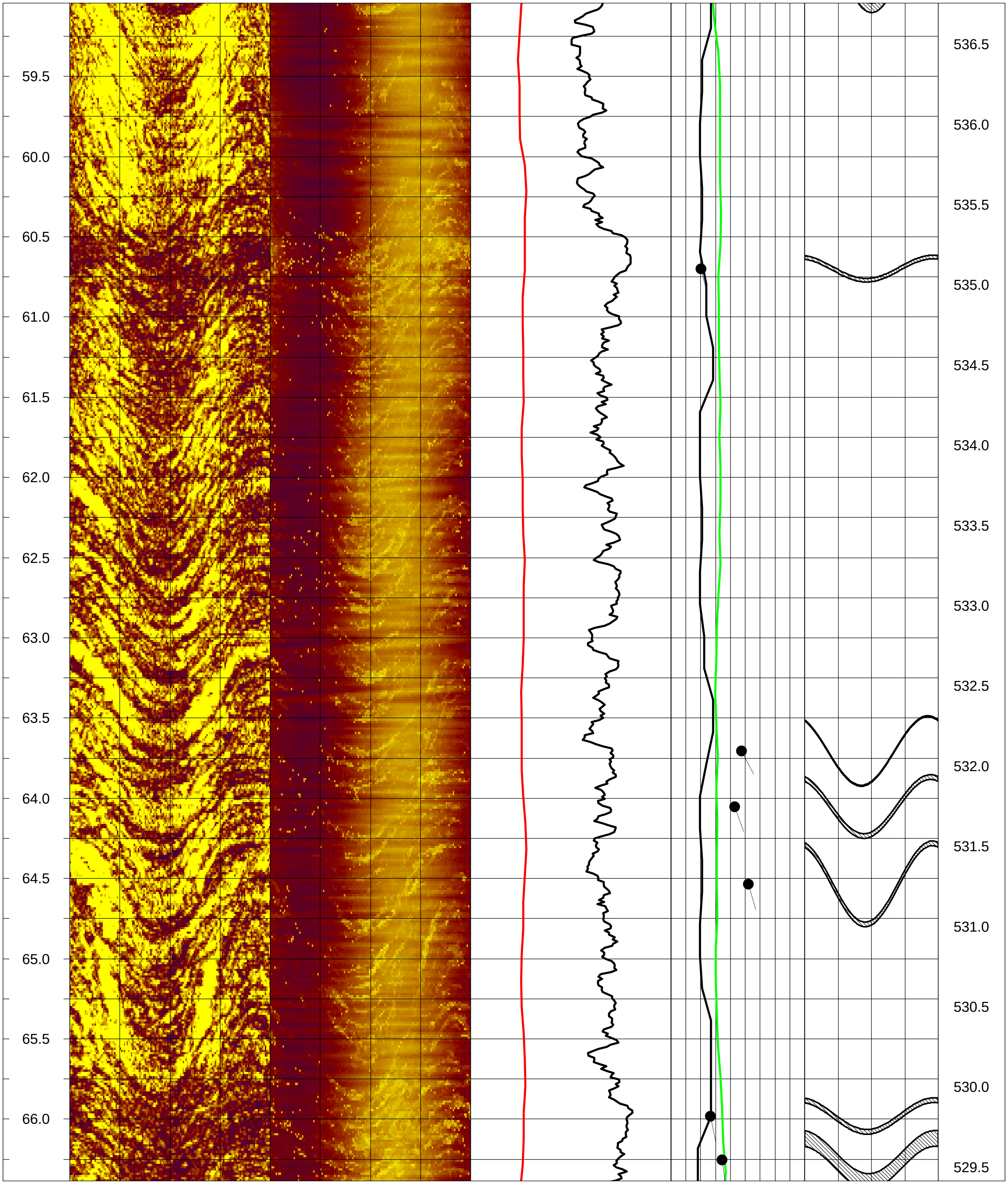
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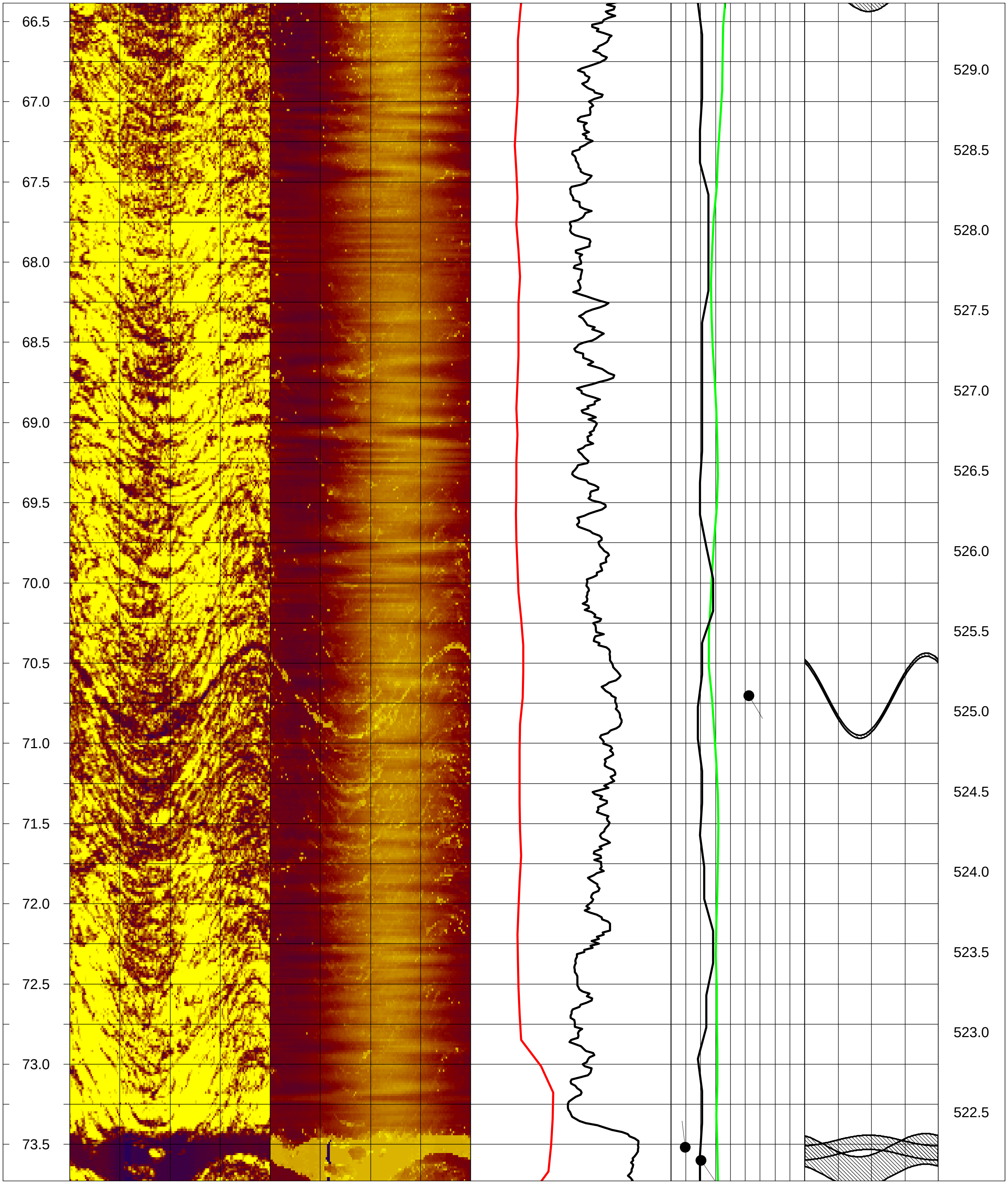

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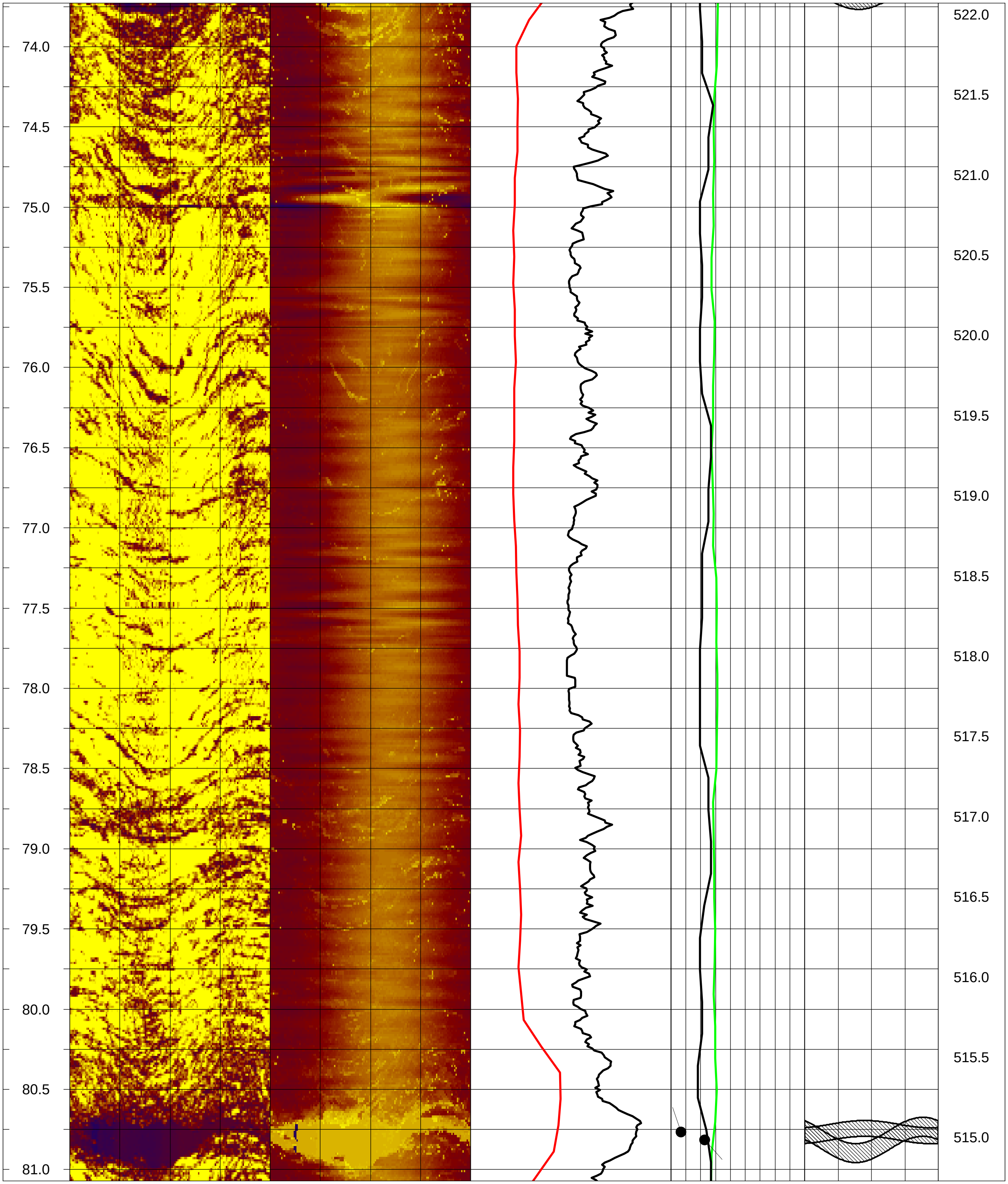
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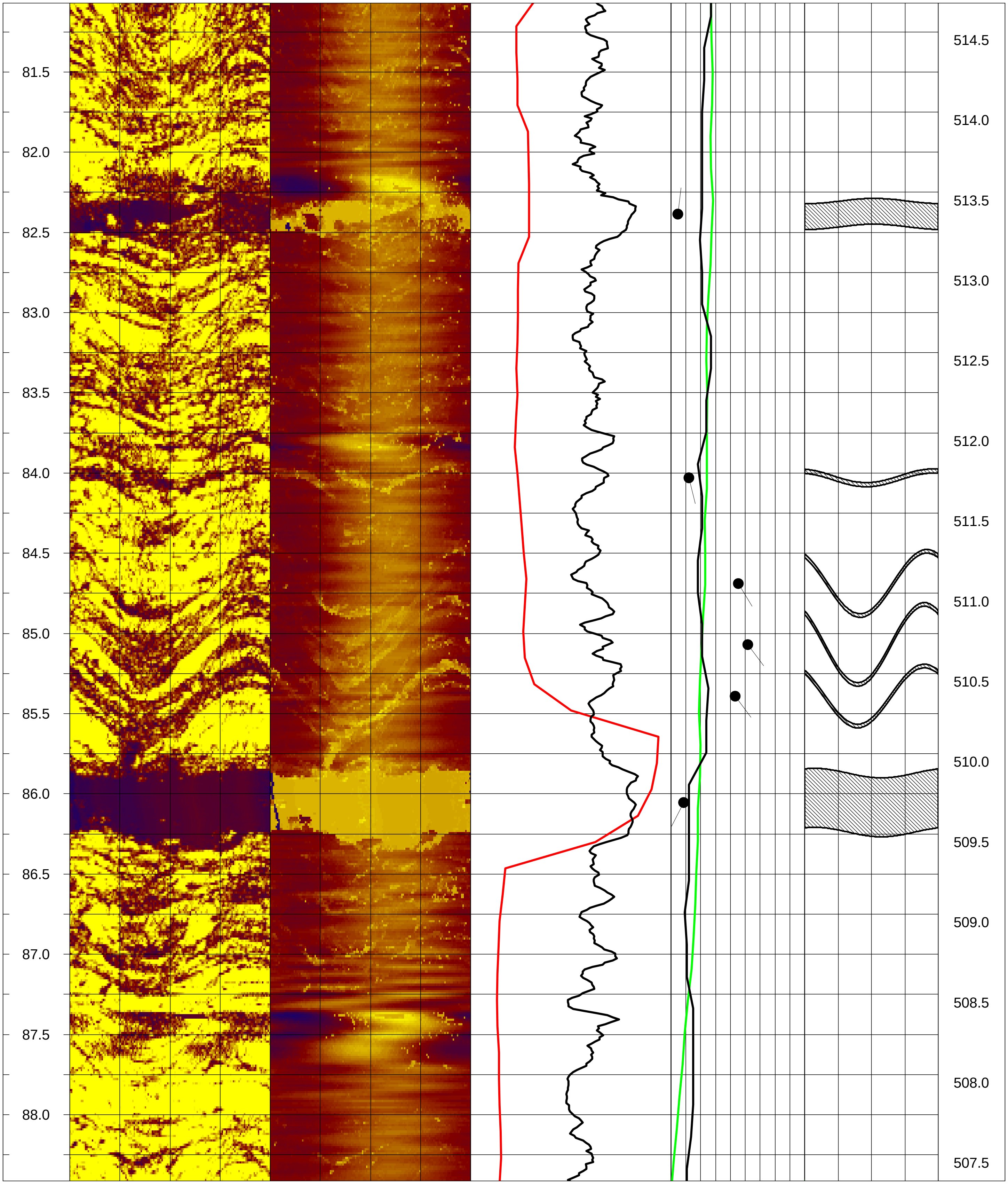
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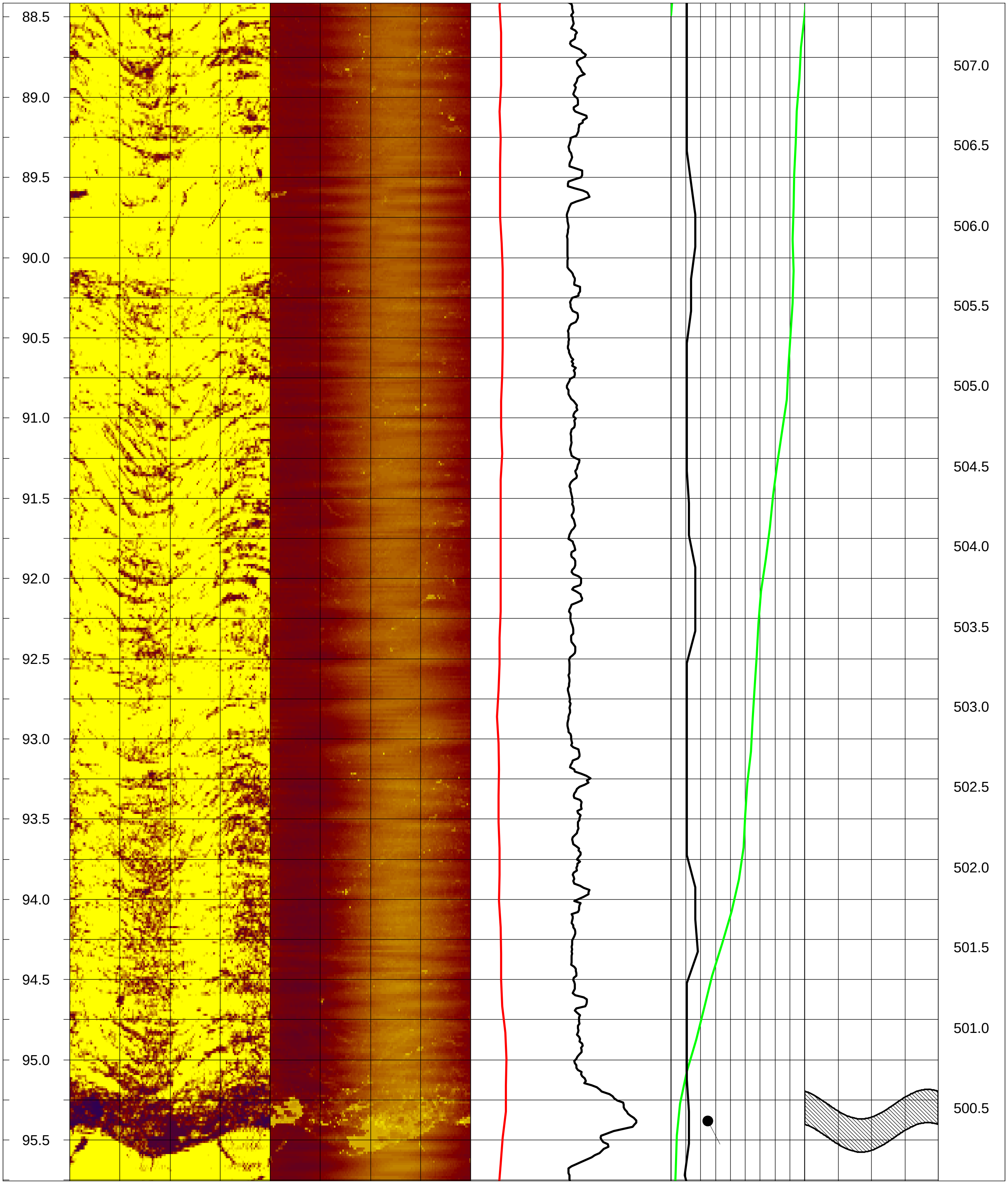
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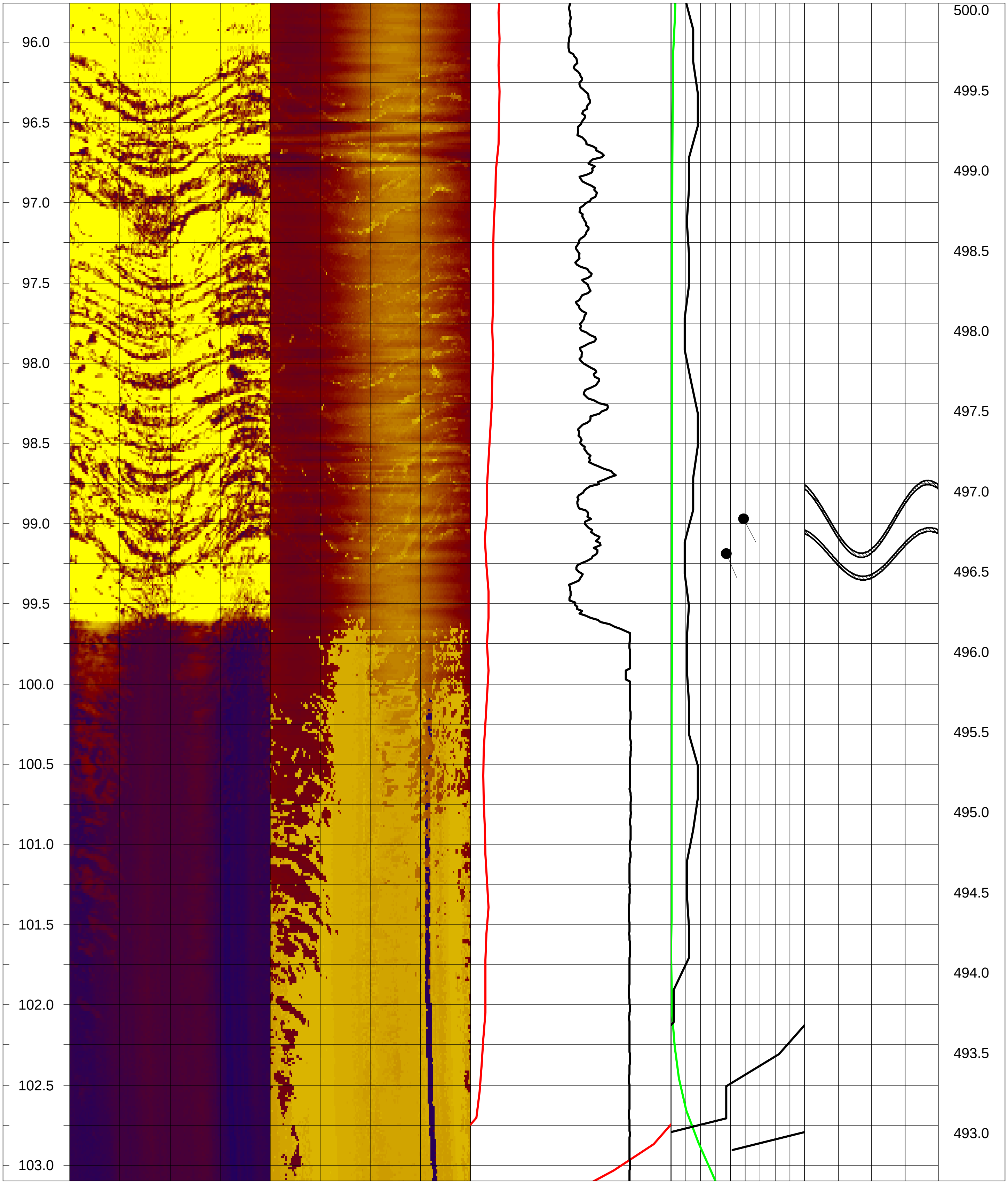
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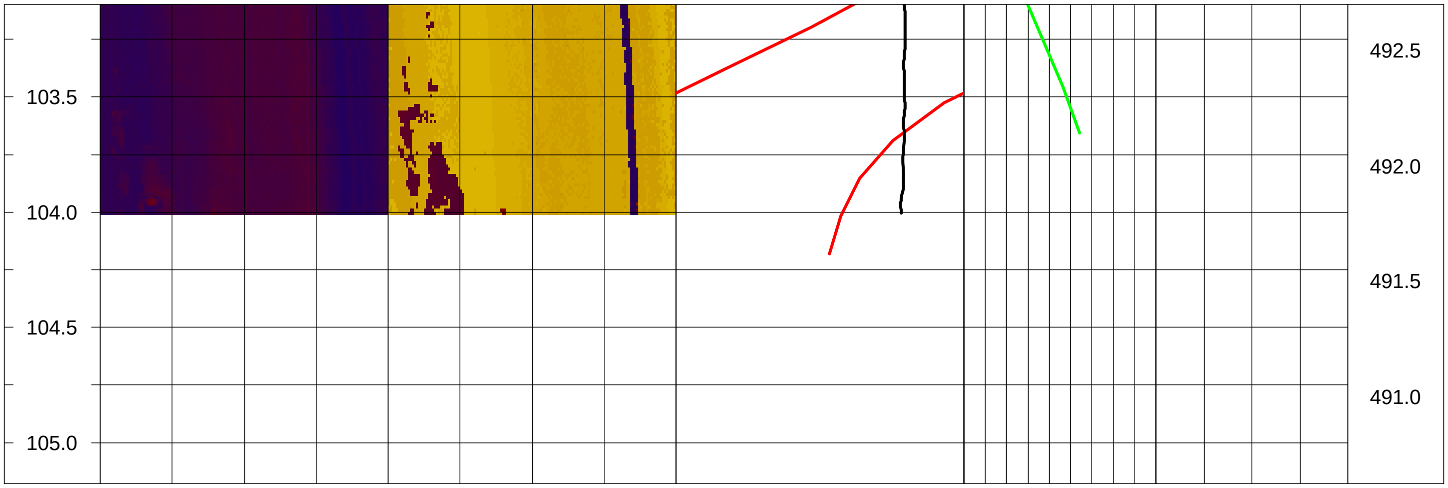

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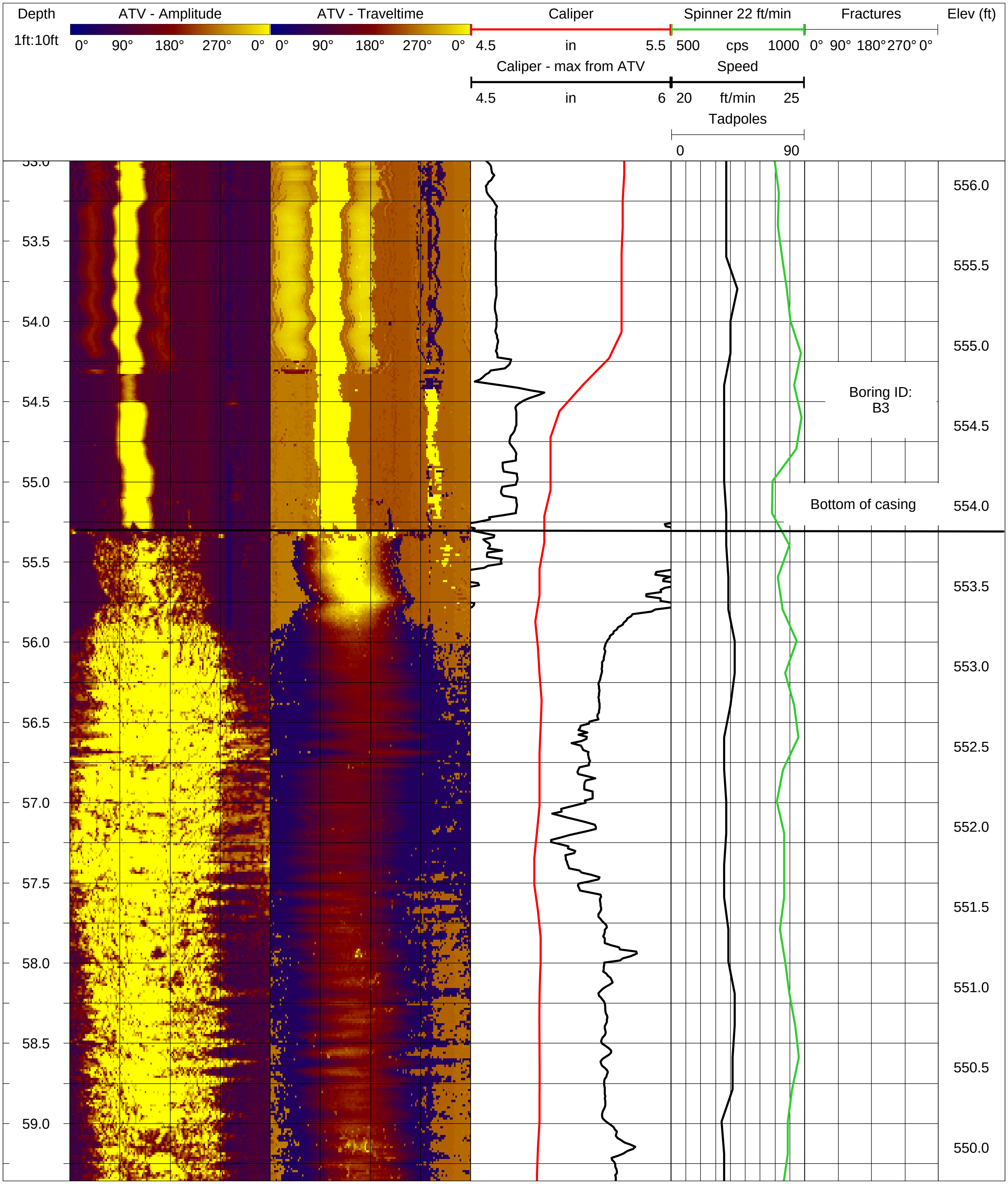
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Speed
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Tadpoles
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Fractures
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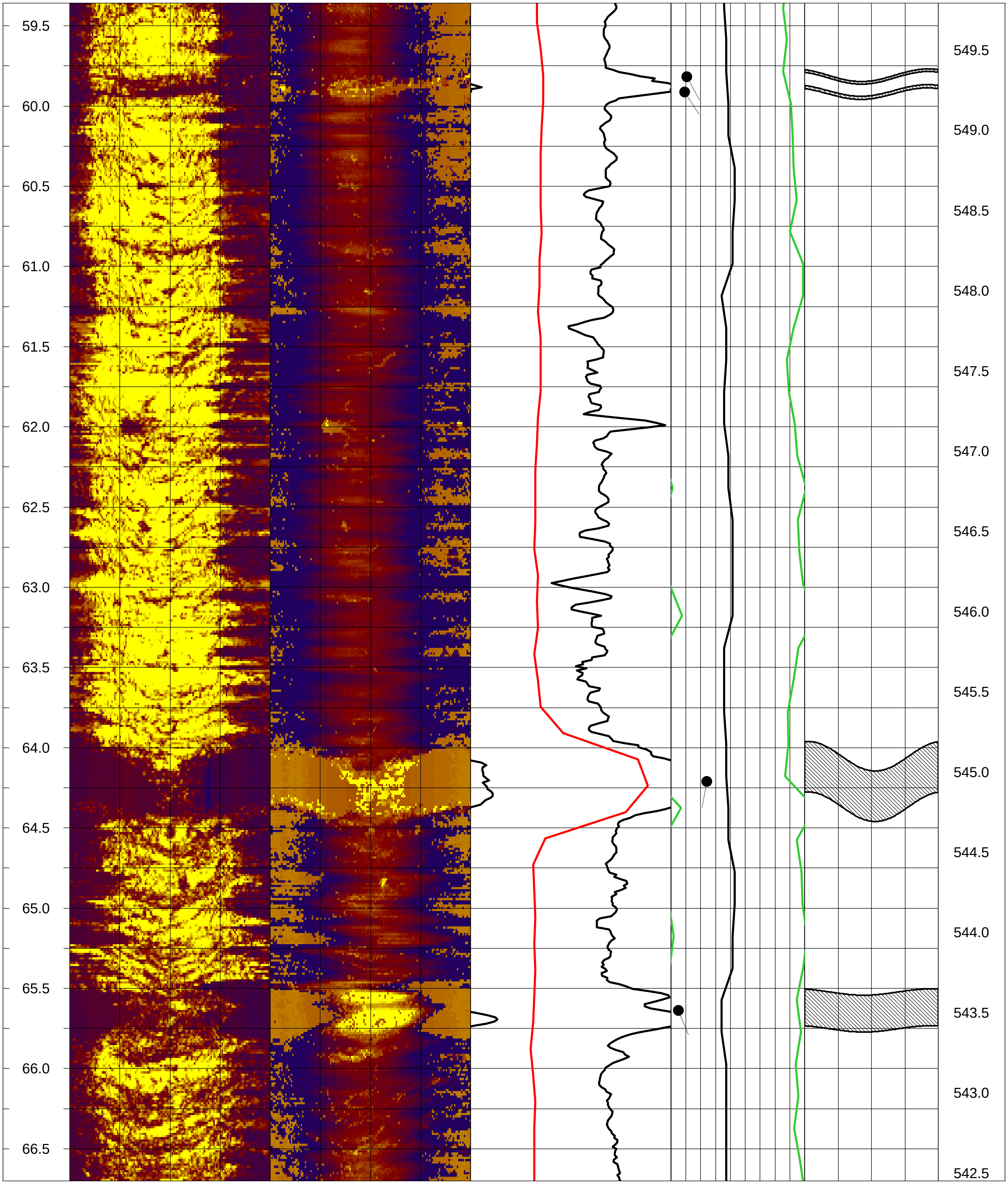
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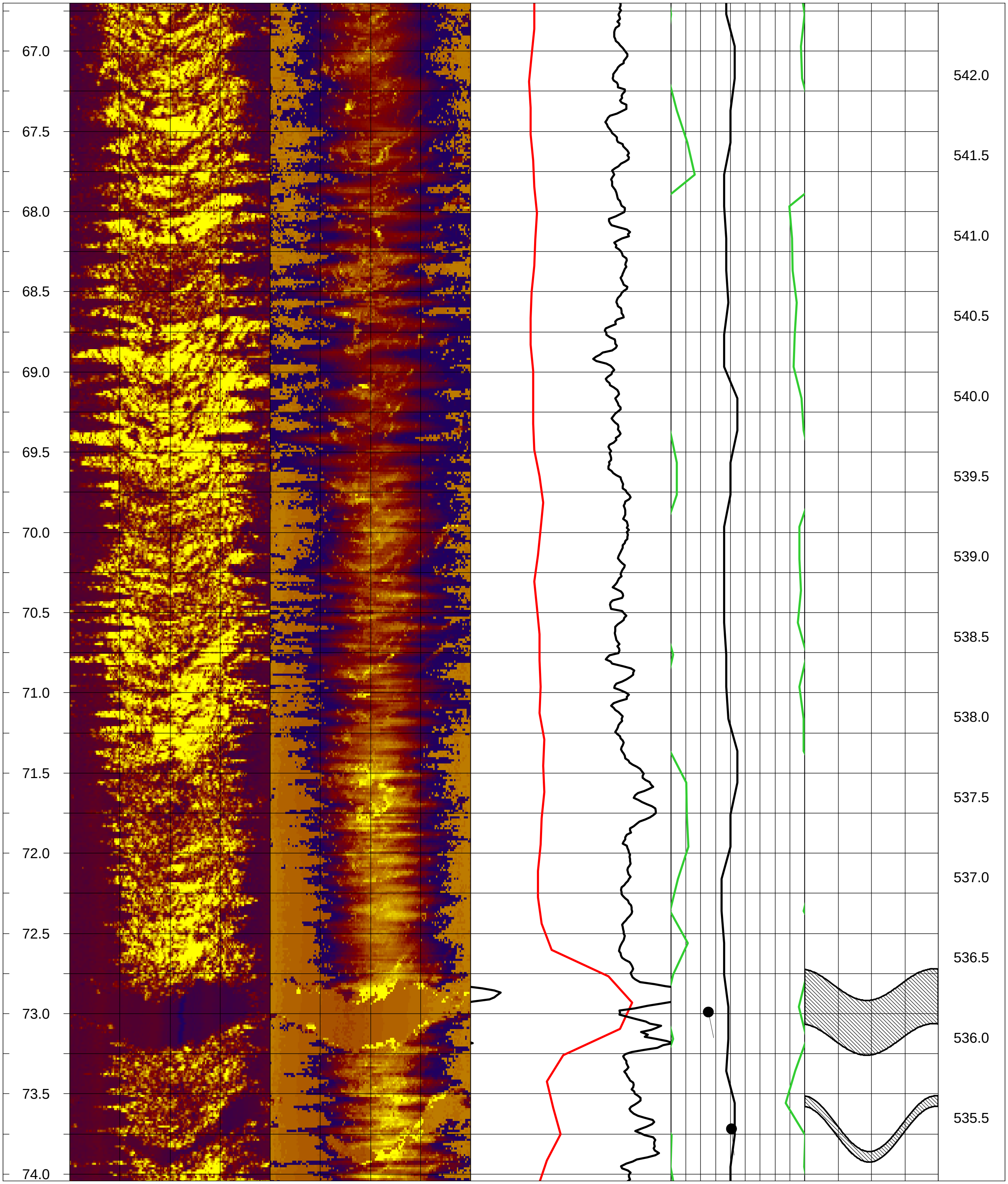
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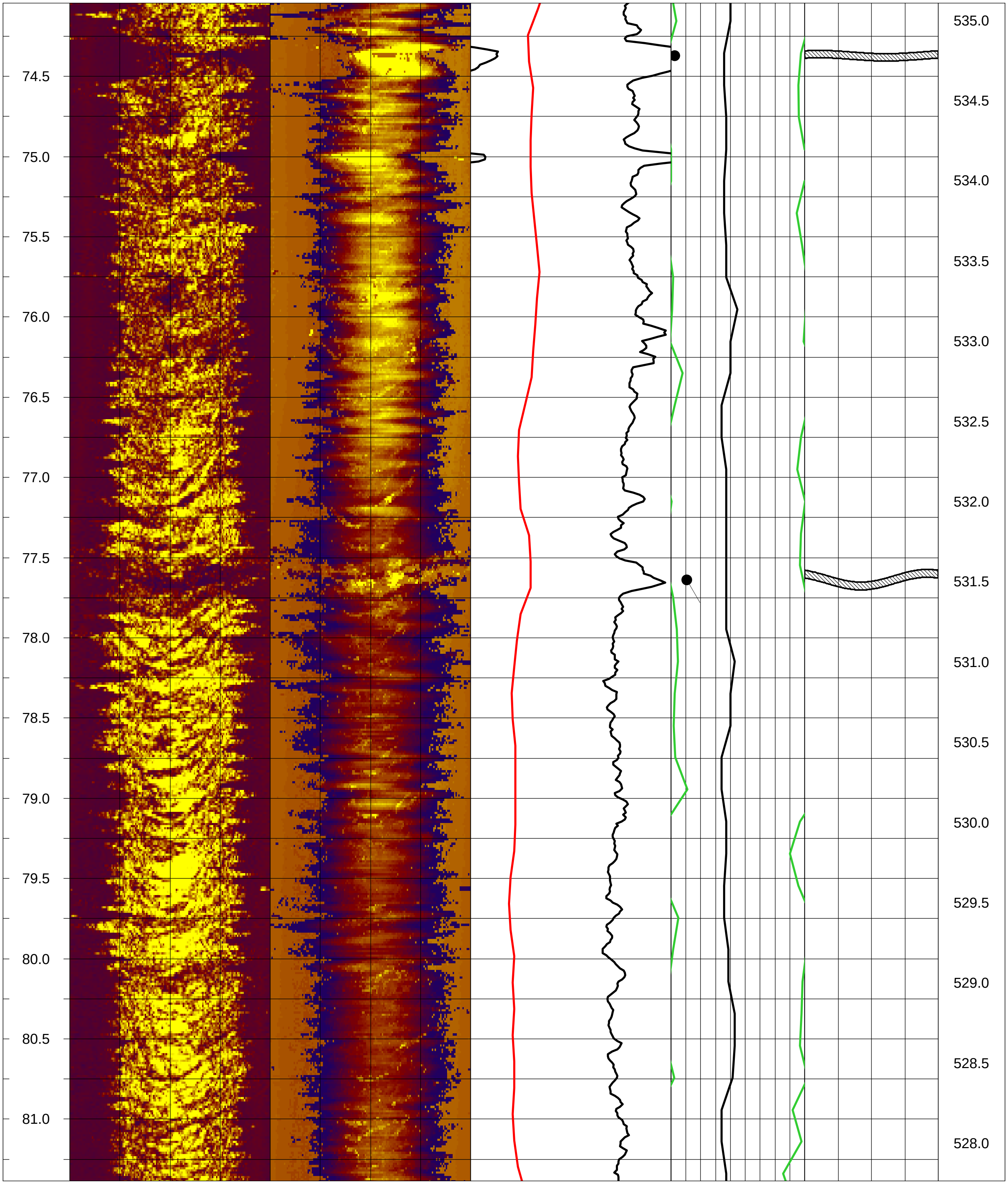
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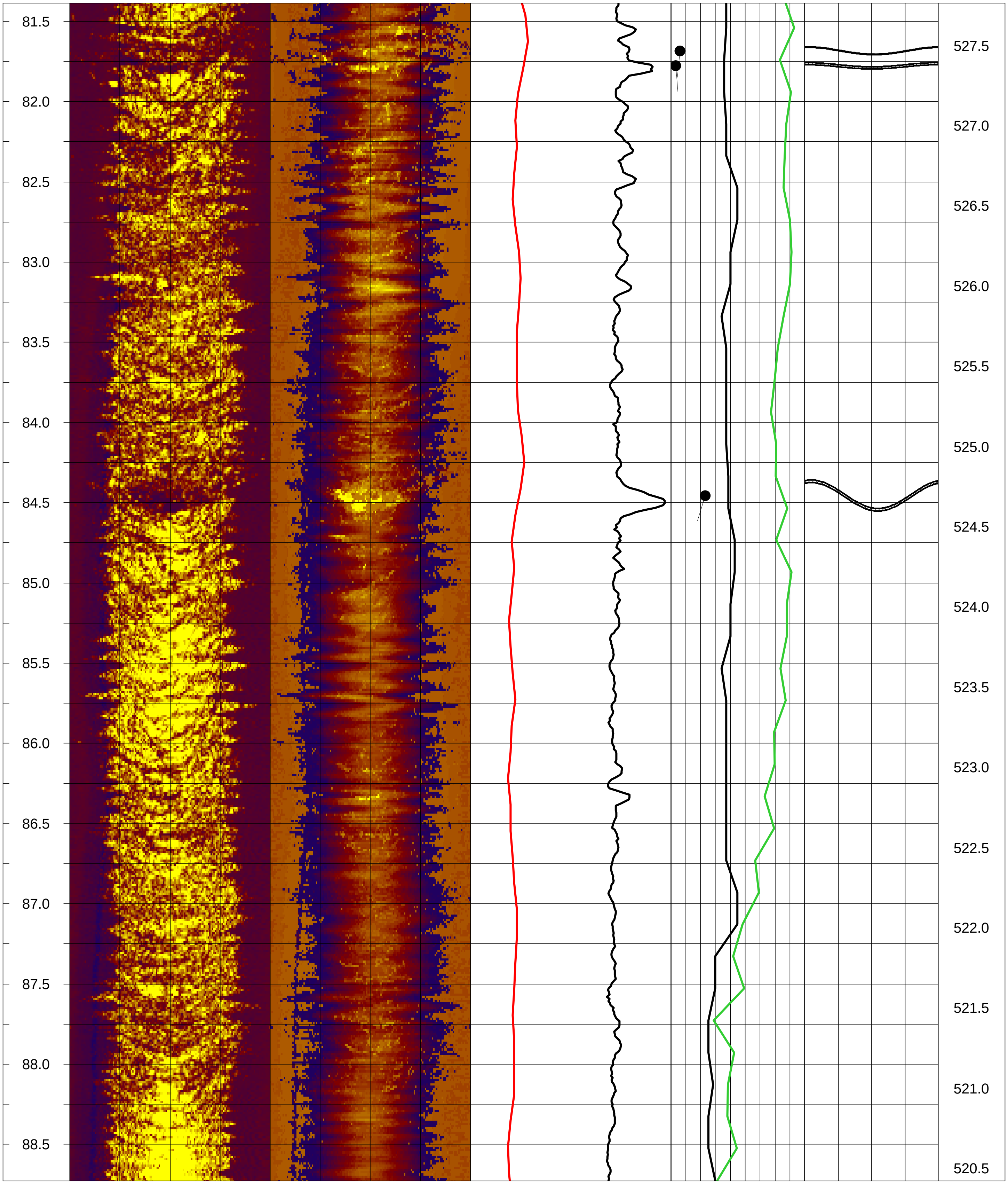
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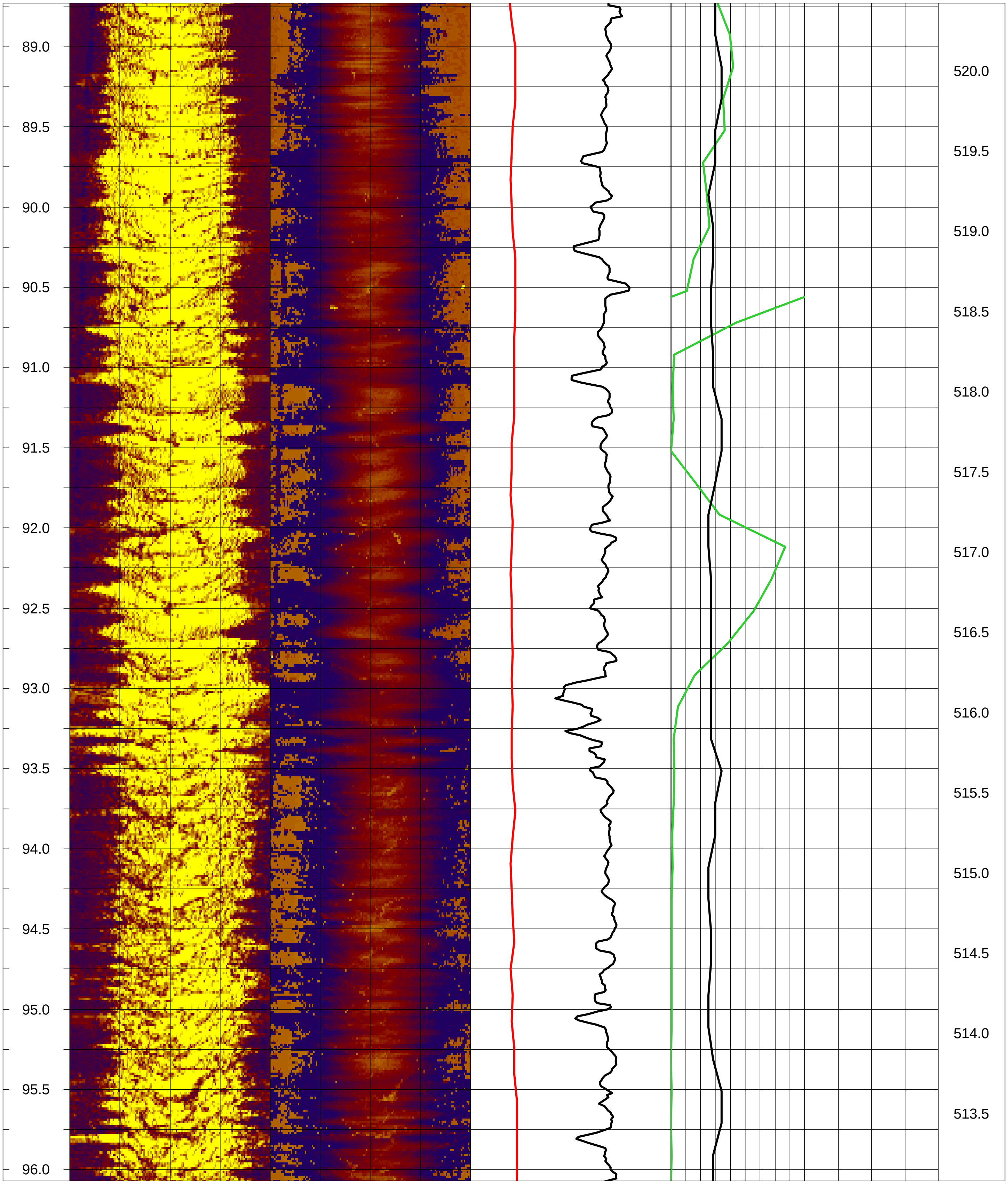
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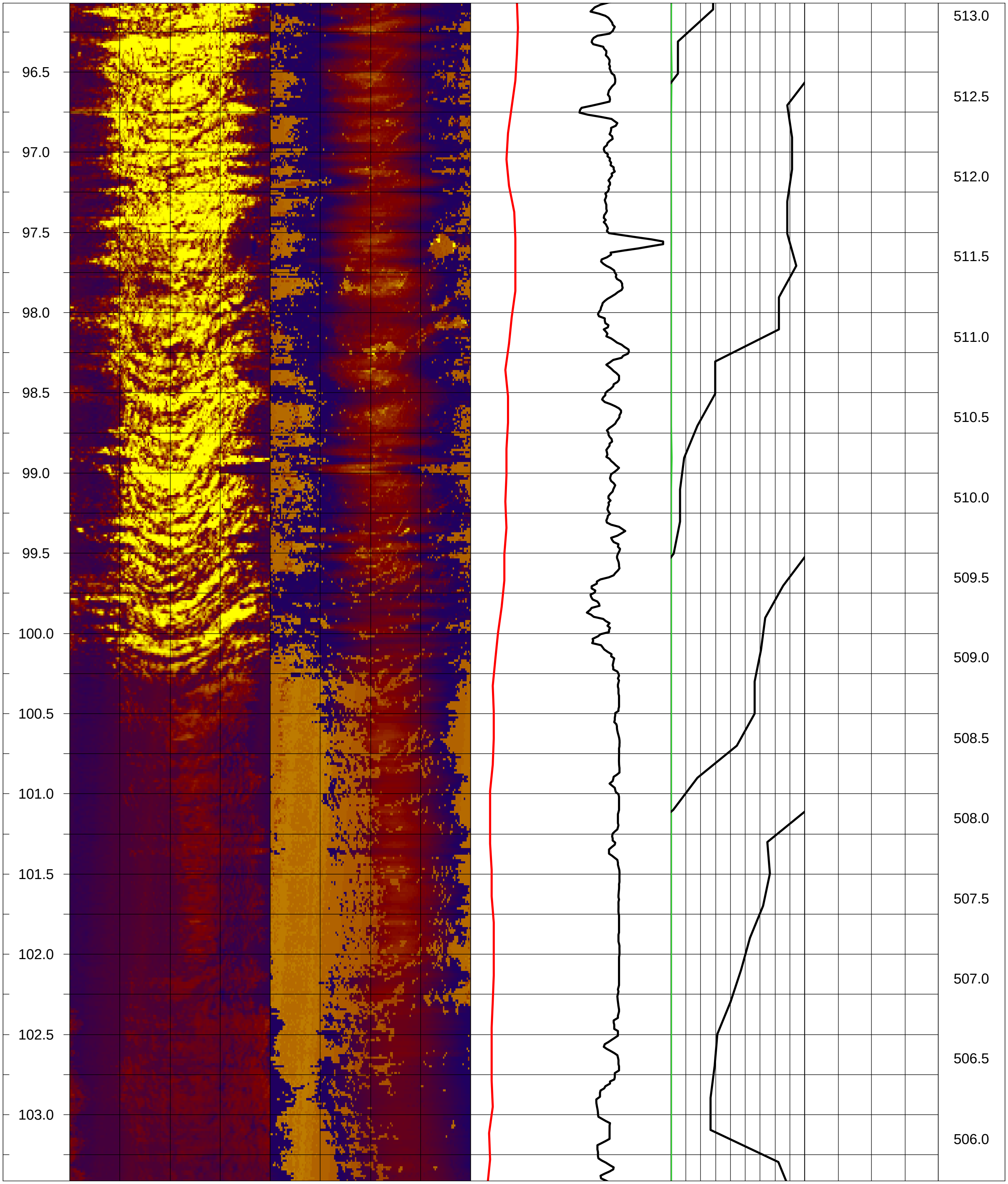
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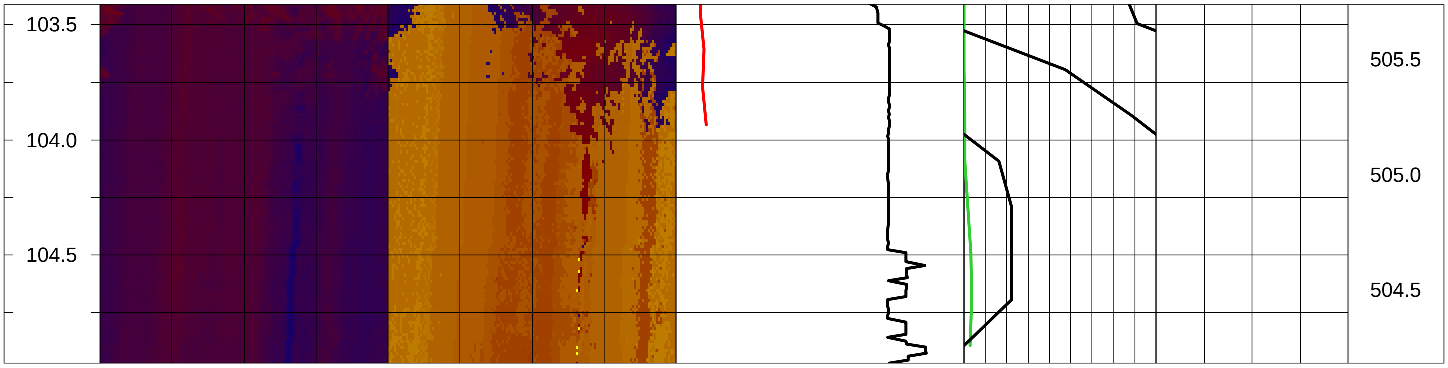
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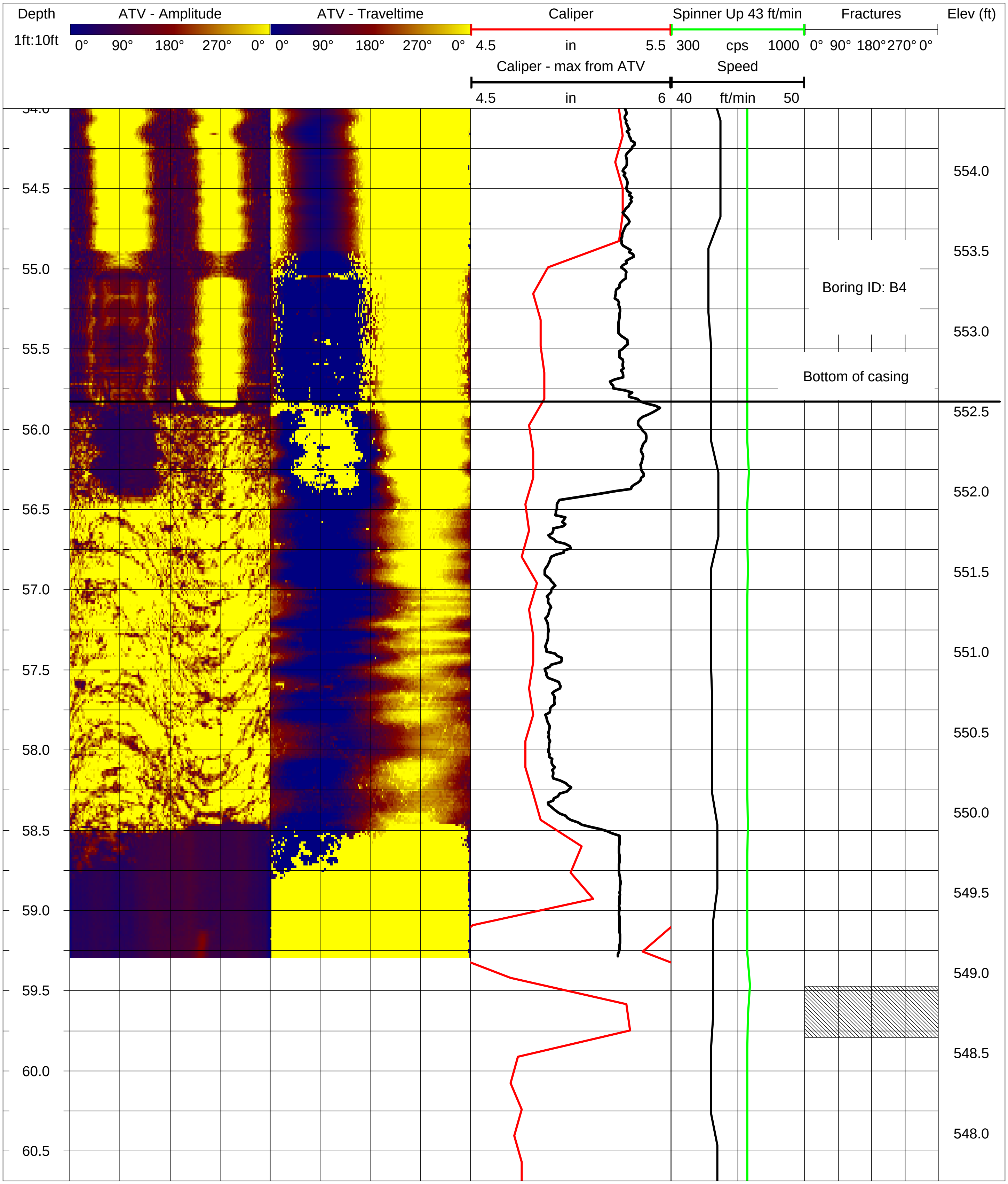
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Caliper - max from ATV
4.5 in 6
Spinner Up 43 ft/min
300 cps 1000
Speed
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Fractures
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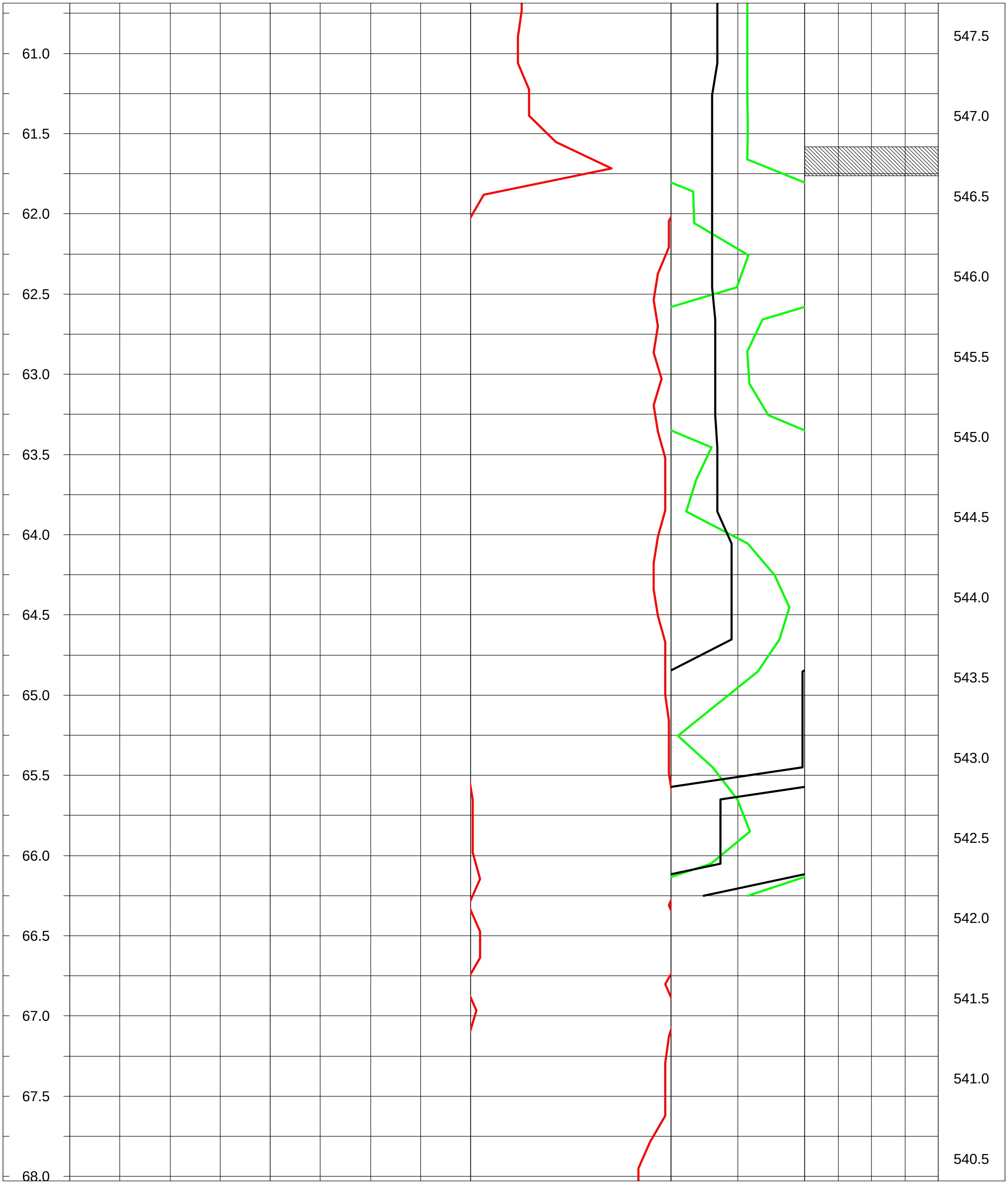
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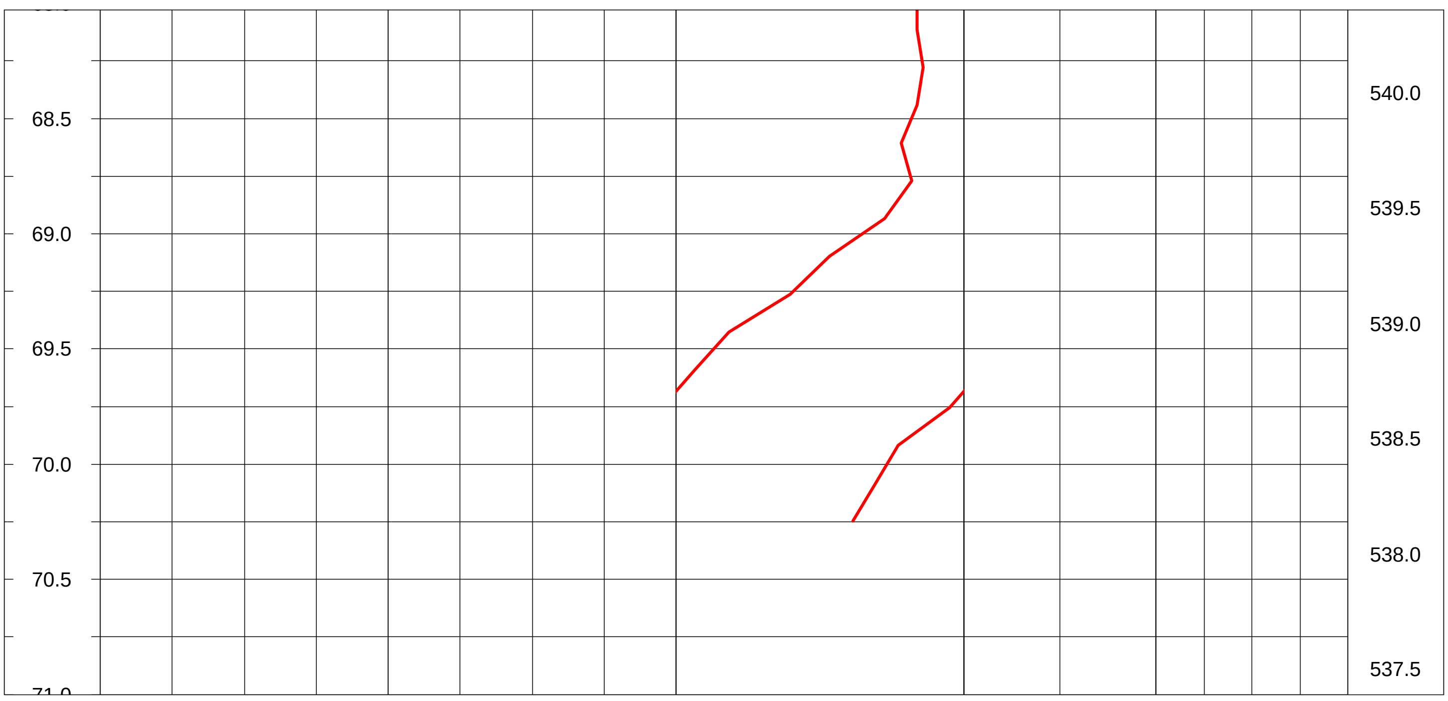
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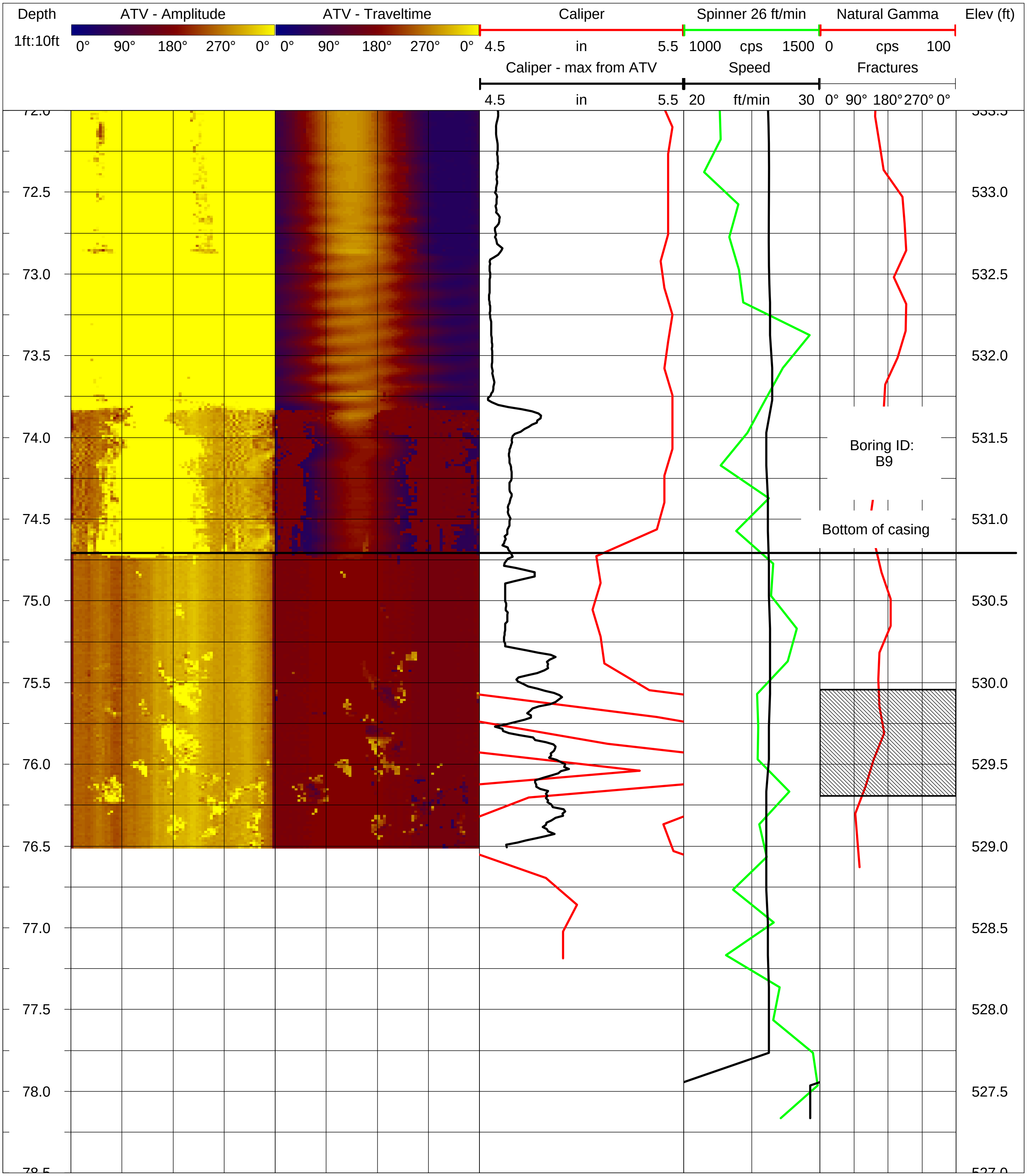
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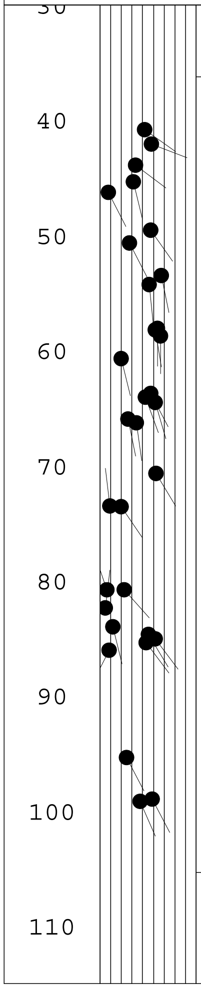
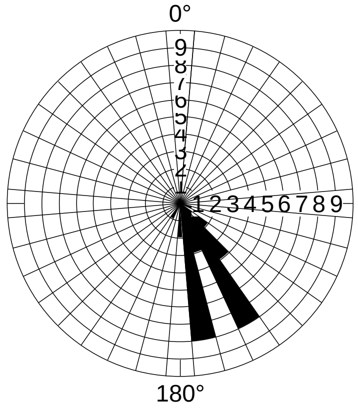
Caliper
4.5 in 5.5
Caliper - max from ATV
4.5 in 5.5
Spinner 26 ft/min
1000 cps 1500
Speed
20 ft/min 30
Natural Gamma
0 cps 100
Fractures
0° 90° 180° 270° 0°
Elev (ft)
72.5
73.0
73.5
74.0
74.5
75.0
75.5
76.0
76.5
77.0
77.5
78.0
533.0
532.5
532.0
531.5
531.0
530.5
530.0
529.5
529.0
528.5
528.0
527.5
Boring ID:
B9
Bottom of casing

APPENDIX 2

Depth	Fractures	Rose Diagram - Dip Direction	Rose Diagram - Dip
1ft:200ft	0 90	Azimuth - Absolute (Count)	Dip Count - Absolute (Count)

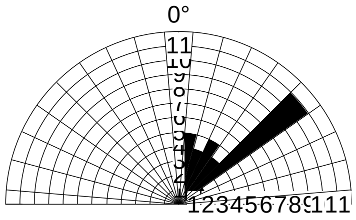


Azimuth - Absolute (Count)
Depth: 36.25 [ft] to 105.31 [ft]



Components:	Azimuth
Counts:	32.00
Mean (3D):	155.13
Min:	6.61
Max:	353.39

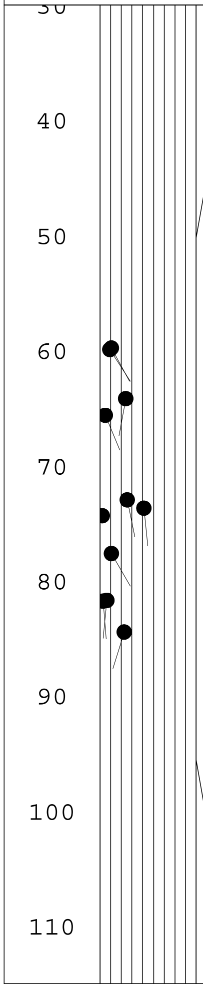
Dip Count - Absolute (Count)
Depth: 36.32 [ft] to 105.18 [ft]



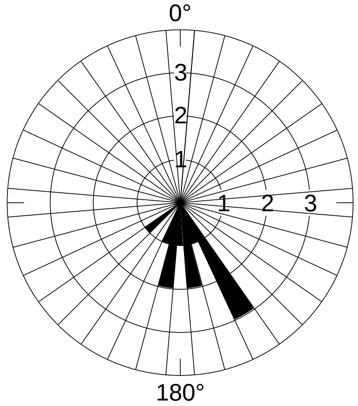
Counts:	32.00
Mean (3D):	33.23
Min:	4.74
Max:	57.31

Boring ID:
B2

Depth	Fractures	Rose Diagram - Dip Direction	Rose Diagram - Dip
1ft:200ft	0 90	Azimuth - Absolute (Count)	Dip Count - Absolute (Count)

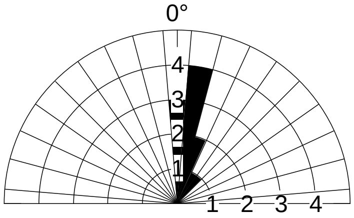


Azimuth - Absolute (Count)
Depth: 50.21 [ft] to 95.55 [ft]



Components:	Azimuth
Counts:	11.00
Mean (3D):	175.04
Min:	146.67
Max:	233.45

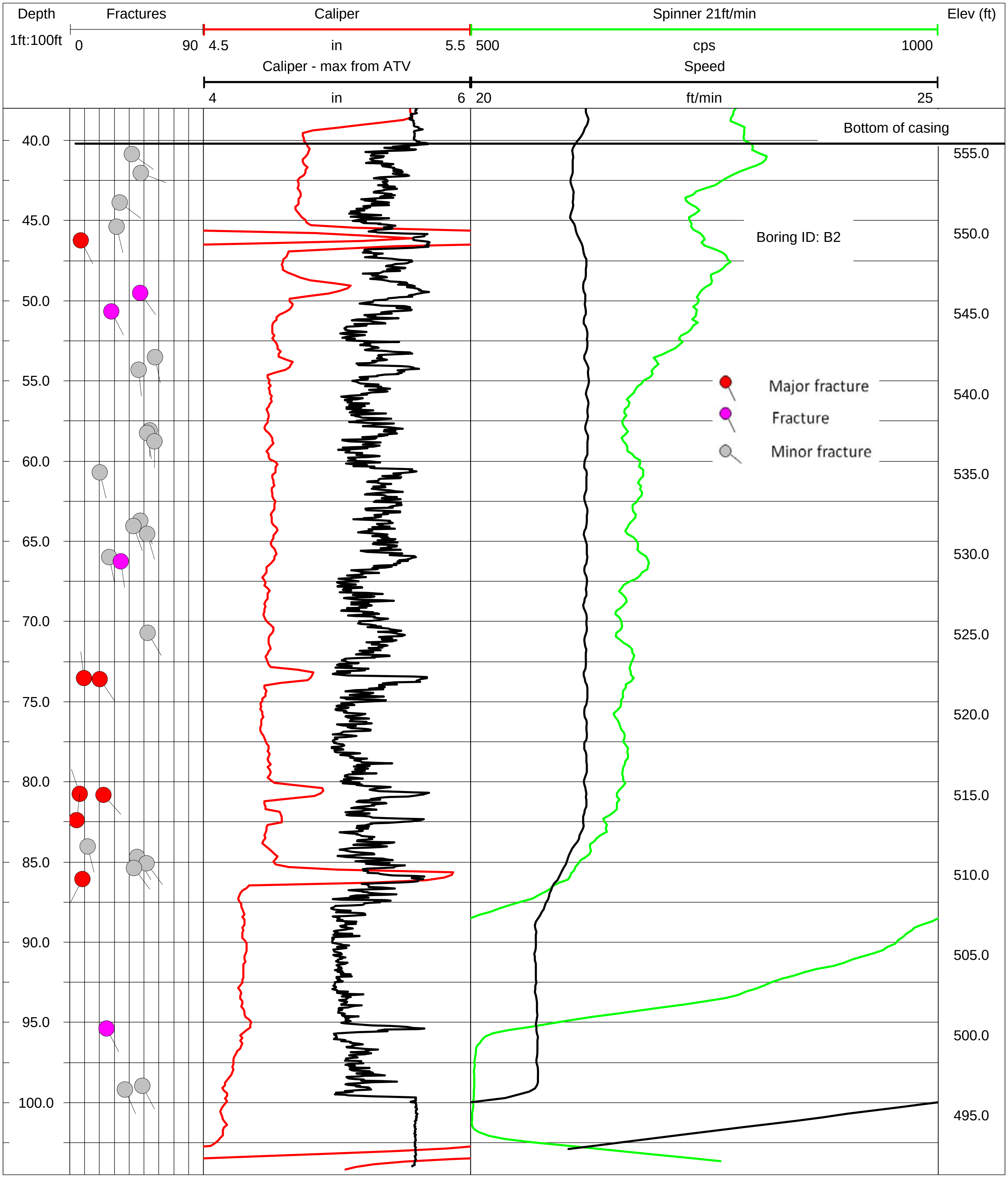
Dip Count - Absolute (Count)
Depth: 49.62 [ft] to 96.40 [ft]

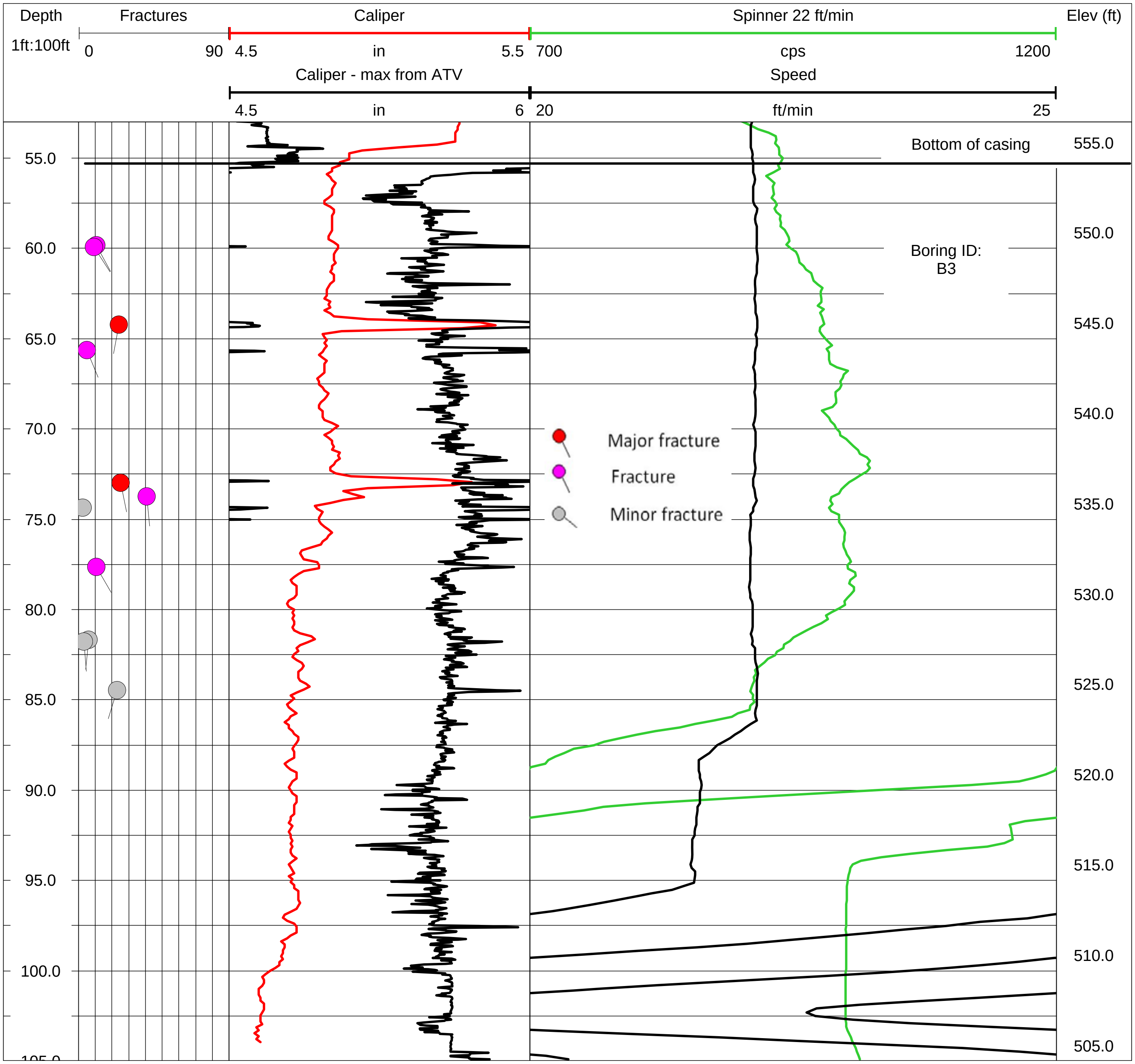


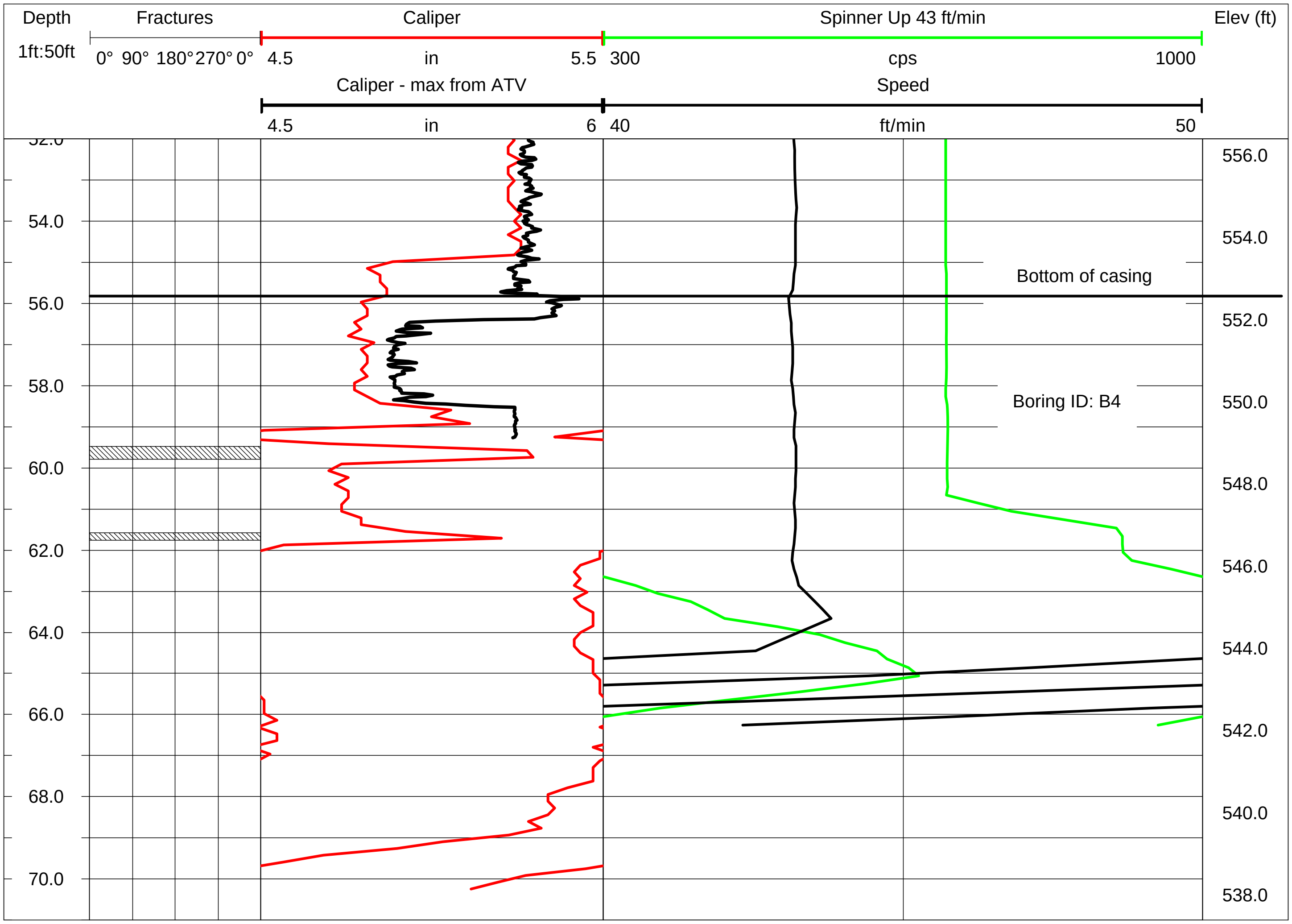
Counts:	11.00
Mean (3D):	13.52
Min:	2.41
Max:	40.82

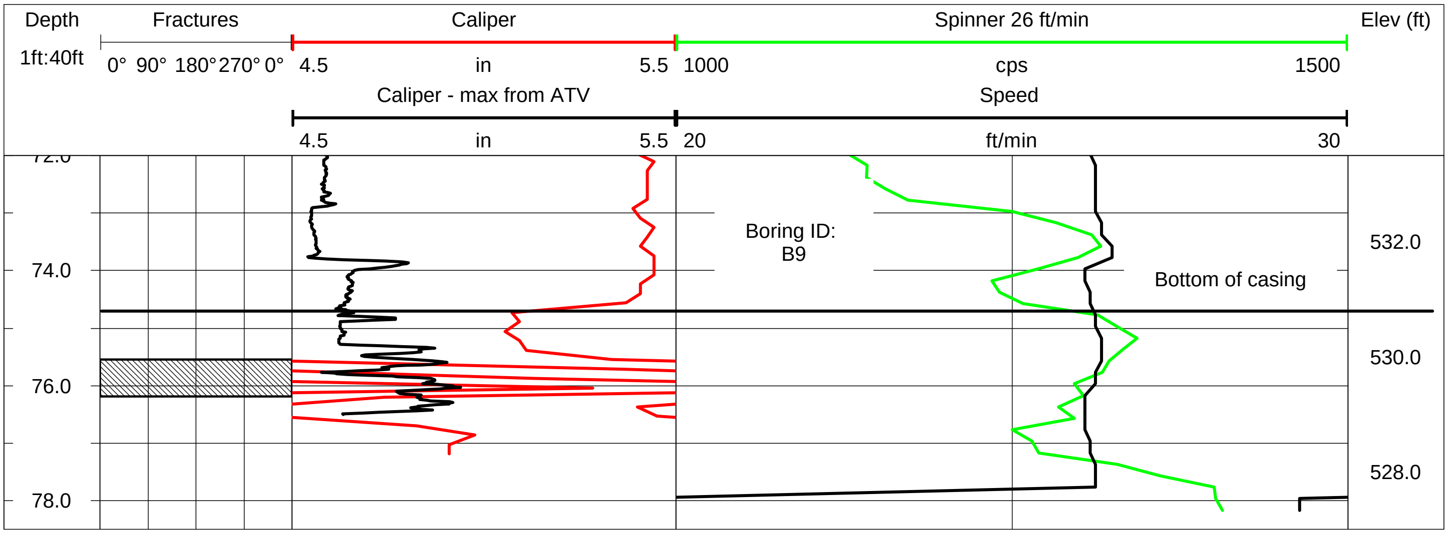
Boring ID:
B3

APPENDIX 3

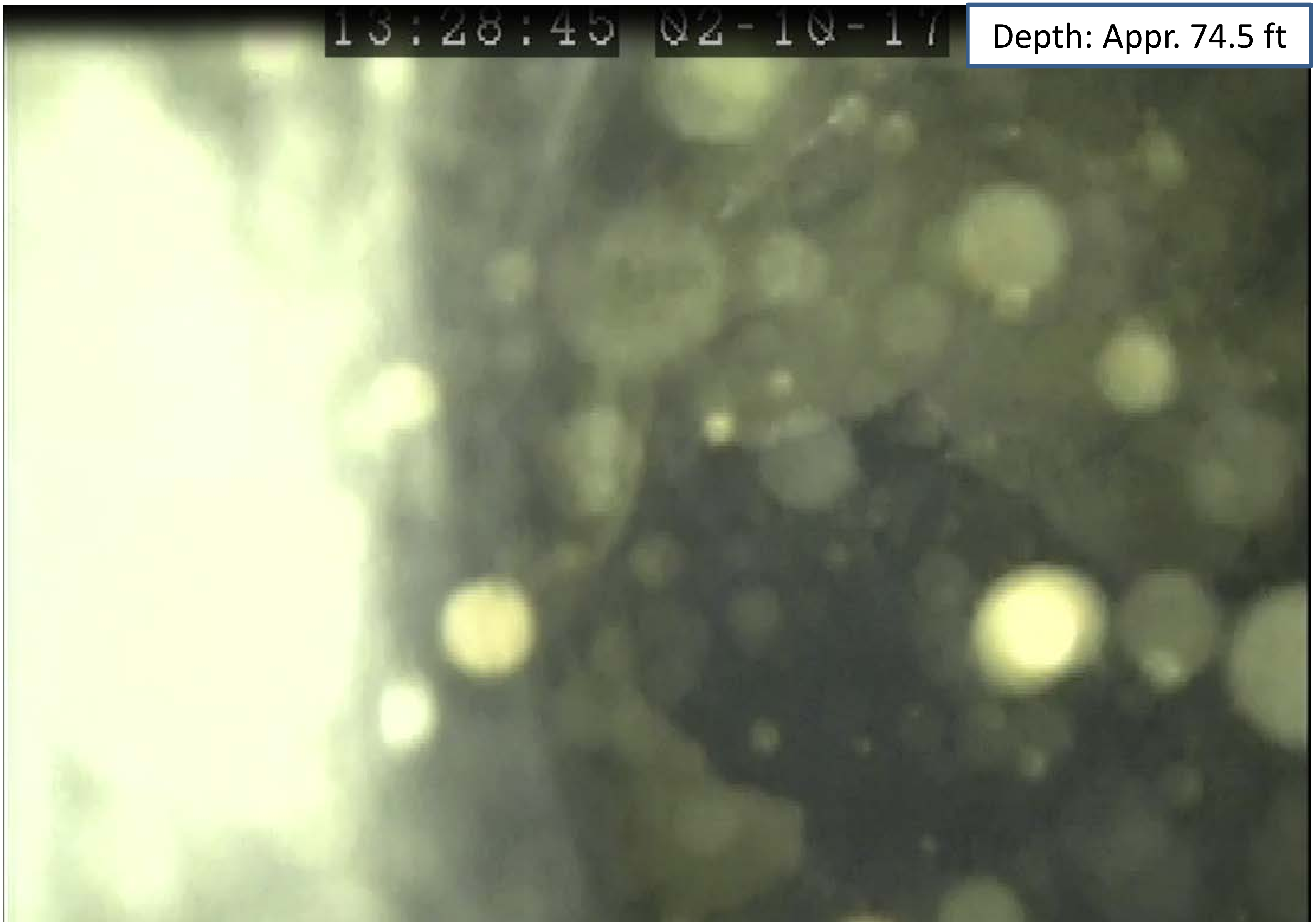

Depth
1ft:100ft
Fractures
0
90
Caliper
4.5
in
5.5
Caliper - max from ATV
4
in
6
Spinner 21ft/min
500
cps
1000
Speed
20
ft/min
25
Elev (ft)
Bottom of casing
Boring ID: B2
Major fracture
Fracture
Minor fracture
40.0
45.0
50.0
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
555.0
550.0
545.0
540.0
535.0
530.0
525.0
520.0
515.0
510.0
505.0
500.0
495.0


Depth
1ft:100ft
Fractures
0
90
Caliper
4.5
in
5.5
Caliper - max from ATV
4.5
in
6
Spinner 22 ft/min
700
cps
1200
Speed
20
ft/min
25
Elev (ft)
55.0
60.0
65.0
70.0
75.0
80.0
85.0
90.0
95.0
100.0
Bottom of casing
Boring ID:
B3
Major fracture
Fracture
Minor fracture
555.0
550.0
545.0
540.0
535.0
530.0
525.0
520.0
515.0
510.0
505.0


Depth
1ft:50ft
Fractures
0° 90° 180° 270° 0°
Caliper
4.5
in
5.5
Caliper - max from ATV
4.5
in
6
Spinner Up 43 ft/min
300
cps
1000
Speed
40
ft/min
50
Elev (ft)
54.0
56.0
58.0
60.0
62.0
64.0
66.0
68.0
70.0
556.0
554.0
552.0
550.0
548.0
546.0
544.0
542.0
540.0
538.0
Bottom of casing
Boring ID: B4


Depth
1ft:40ft
Fractures
0° 90° 180° 270° 0°
Caliper
4.5 in 5.5
Caliper - max from ATV
4.5 in 5.5
Spinner 26 ft/min
1000 cps 1500
Speed
20 ft/min 30
Elev (ft)
72.0
74.0
76.0
78.0
532.0
530.0
528.0
Boring ID:
B9
Bottom of casing

APPENDIX 4

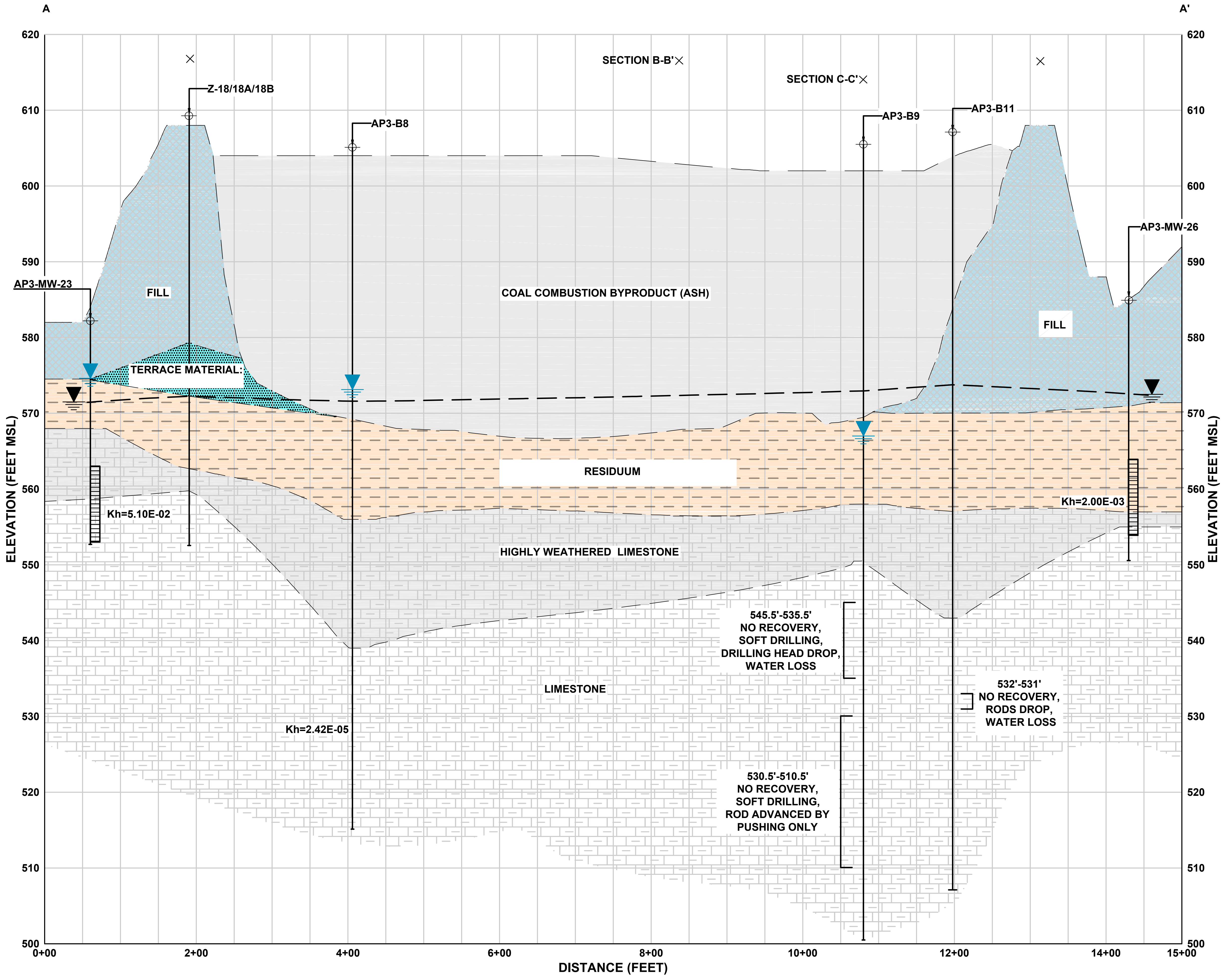


Depth: Appr. 74.5 ft

Depth: Appr. 75.0 ft

APPENDIX D

Cross Sections Depicting
Pre-Closure Conditions
(*Submitted with 2018 HAR)*



1

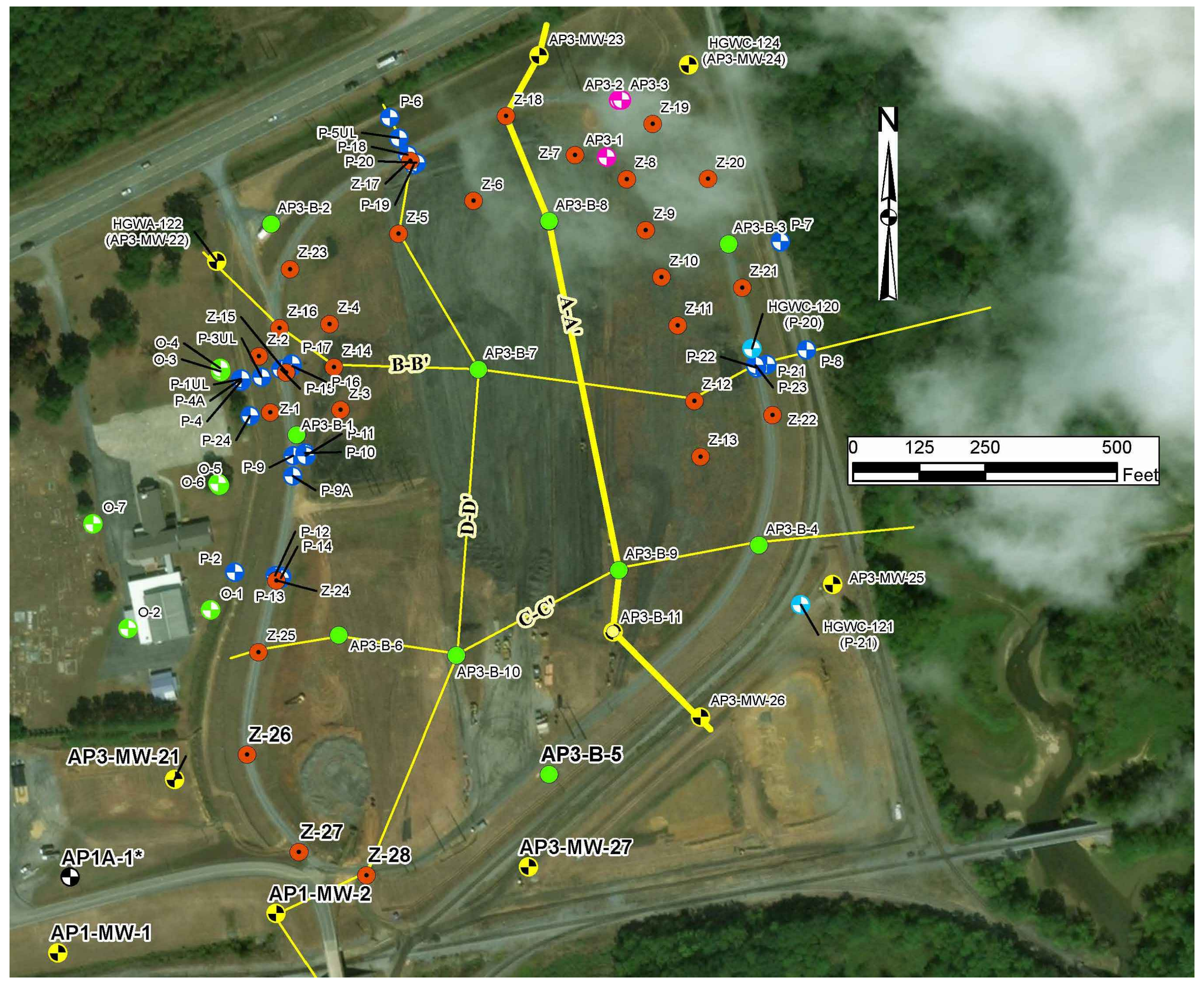
SECTION A-A'

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X

KEY MAP



LEGEND

SOIL BORING (DASHED WHERE PROJECTED)

GROUND WATER LEVEL (9 FEBRUARY 2017)

GROUND WATER LEVEL (INTERPRETED WATER TABLE BASED ON 1 JUNE 2015)

SCREEN INTERVAL

SOIL LAYER DESCRIPTIONS

COAL COMBUSTION BYPRODUCT (ASH)

FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)

TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)

RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)

HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)

LIMESTONE

NOTES:

1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE INTERPRETED BASED ON AVAILABLE INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
3. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS Z1 THROUGH Z28 AND P1 THROUGH P24 (1976 & 1977), AP3-1, AP3-2, AND AP3-3 (2010), MONITORING WELLS AROUND ASH PONDS AP1 AND AP3 (2014), P20 AND P21 (2016) WERE PROVIDED BY SOUTHERN COMPANY SERVICES. SOIL BORINGS/PIEZOMETERS AP3-B1 THROUGH AP3-B11 WERE INSTALLED BY GEOSYNTEC CONSULTANTS IN FEBRUARY 2017.
4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC.
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES184451 PROVIDED BY SOUTHERN COMPANY SERVICES.

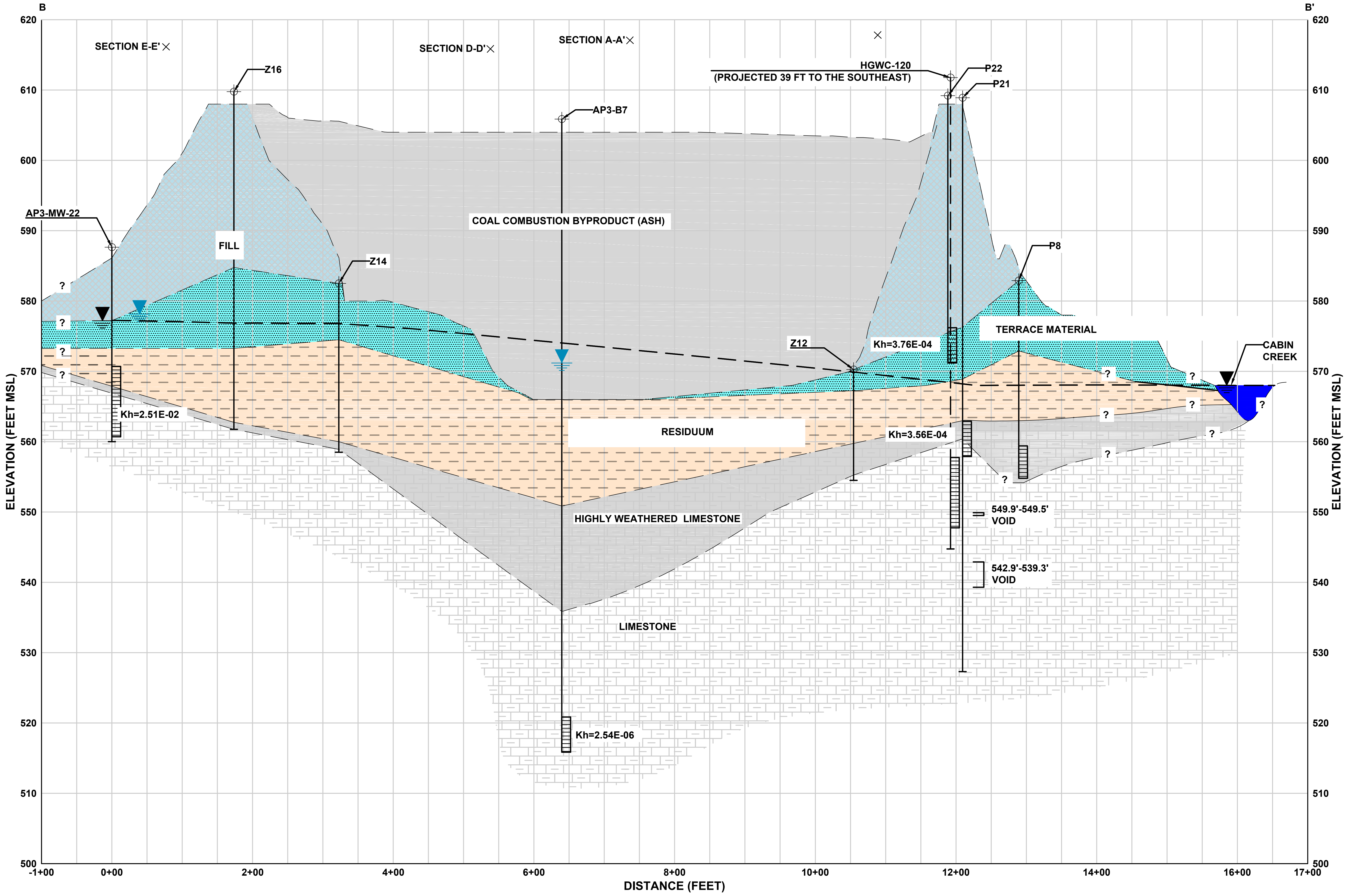
L:\CADD\G\GEORGIA POWER\PLANT HAMMOND GR6242\CROSS SECTION\GR6556.001_XSECA-A'

Geologic Sections A-A'
Georgia Power Company
Plant Hammond AP-3
Floyd County, Rome, Georgia

Geosyntec
consultants

Kennesaw, GA
November 2018

FIGURE
2-3A



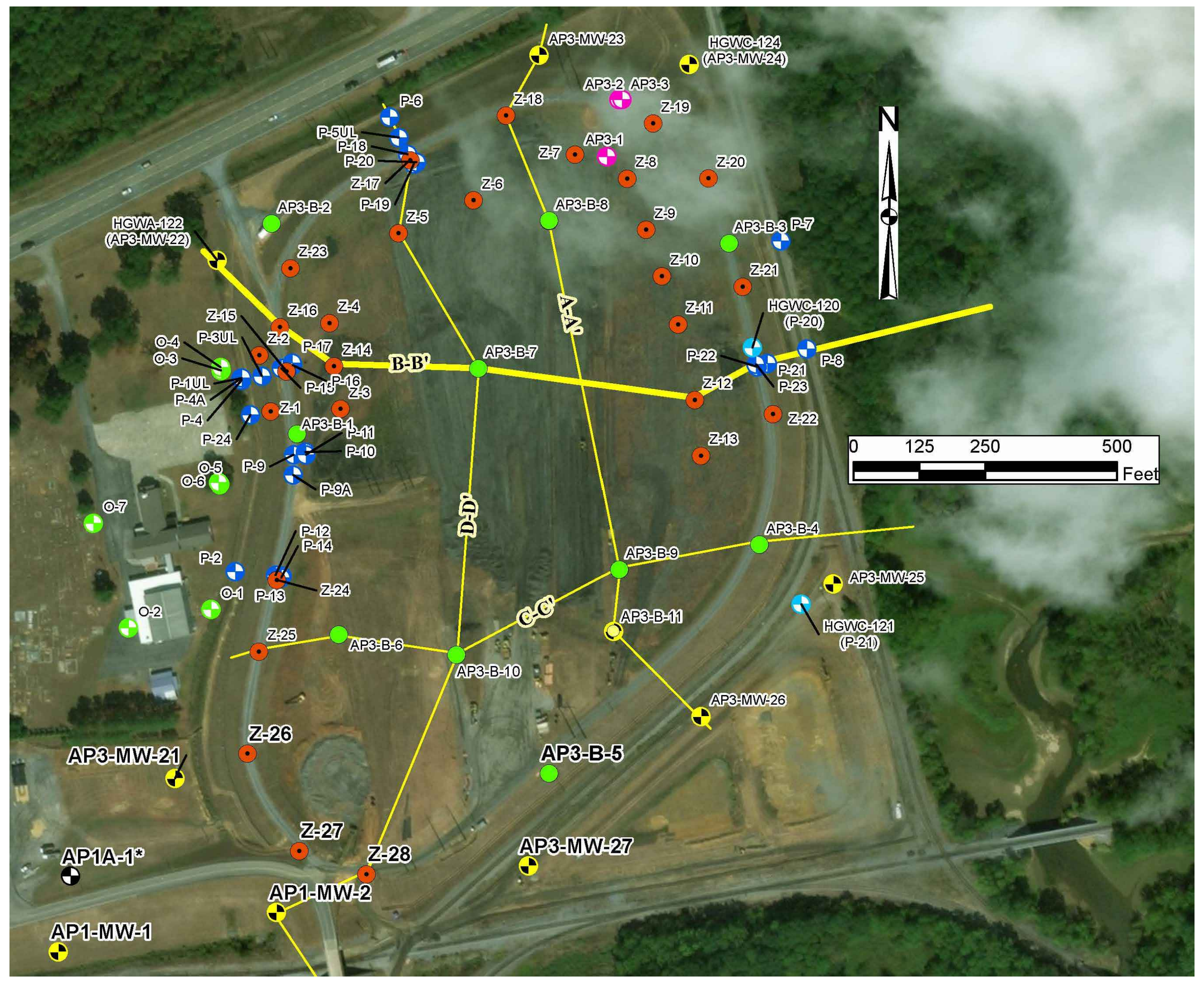
1 SECTION B-B'

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X

KEY MAP



LEGEND

- SOIL BORING (DASHED WHERE PROJECTED)
- GROUND WATER LEVEL (9 FEBRUARY 2017)
- GROUND WATER LEVEL (INTERPRETED WATER TABLE BASED ON POTENTIOMETRIC SURFACE MAP - 1 JUNE 2015)
- SCREEN INTERVAL

SOIL LAYER DESCRIPTIONS

- COAL COMBUSTION BYPRODUCT (ASH)
- FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)
- TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)
- RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)
- HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)
- LIMESTONE

NOTES:

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3. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS Z1 THROUGH Z28 AND P1 THROUGH P24 (1976 & 1977), AP3-1, AP3-2, AND AP3-3 (2010), MONITORING WELLS AROUND ASH PONDS AP1 AND AP3 (2014), P20 AND P21 (2016) WERE PROVIDED BY SOUTHERN COMPANY SERVICES. SOIL BORINGS/PIEZOMETERS AP3-B1 THROUGH AP3-B11 WERE INSTALLED BY GEOSYNTEC CONSULTANTS IN FEBRUARY 2017.
4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC. Kh AND Kv VALUES PRESENTED FOR LITHOLOGIC UNITS ARE GEOMETRIC MEAN OF THE NUMBER OF MEASUREMENTS PROVIDED IN PARENTHESIS.
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.

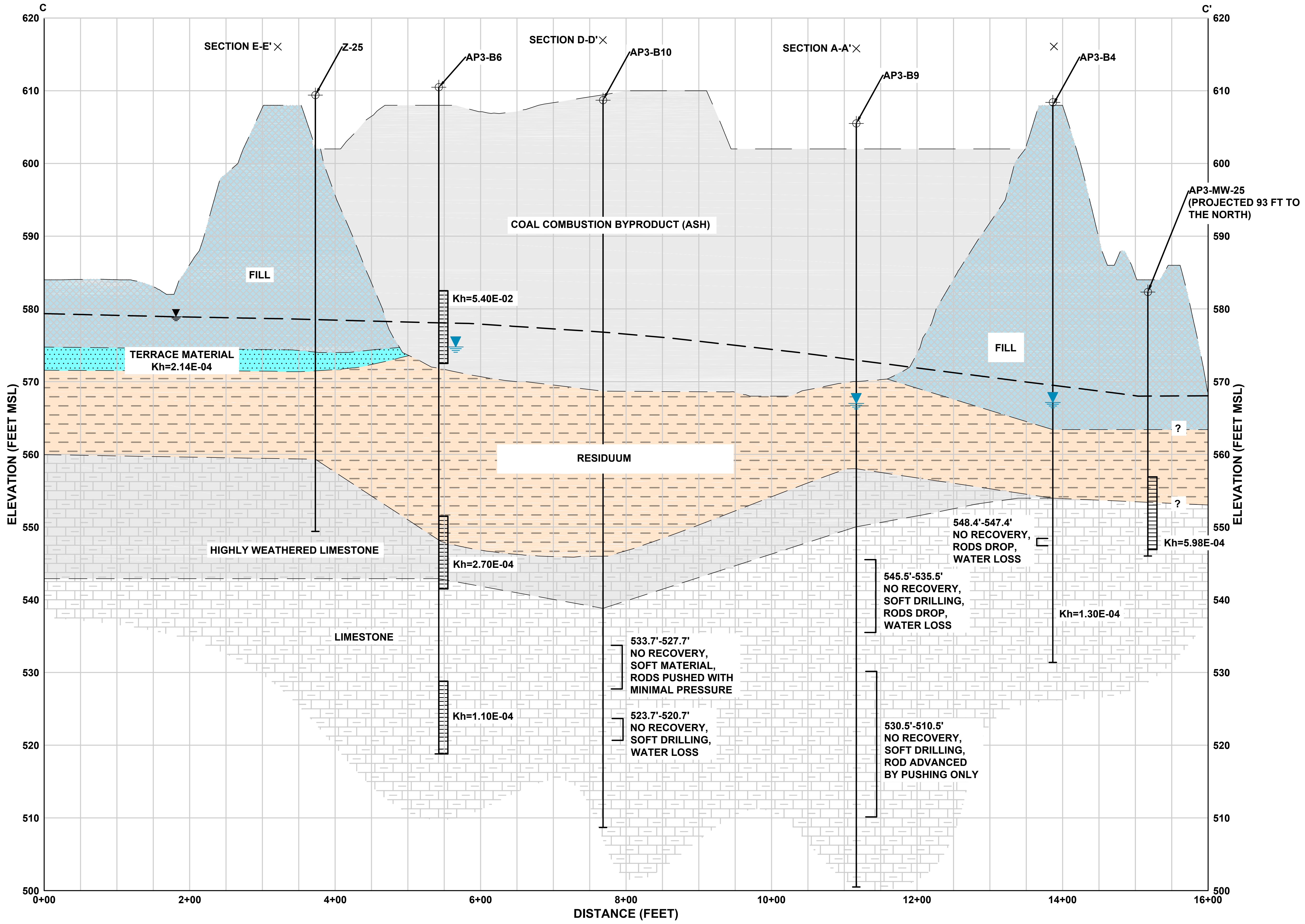
Geologic Section B-B'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

Geosyntec consultants

Kennesaw, GA
May 2017

FIGURE
2-3B

L:\CADD\G\GEORGIA POWER\PLANT HAMMOND GR6242\CROSS SECTION\GR6556.001_XSECB-B'



1

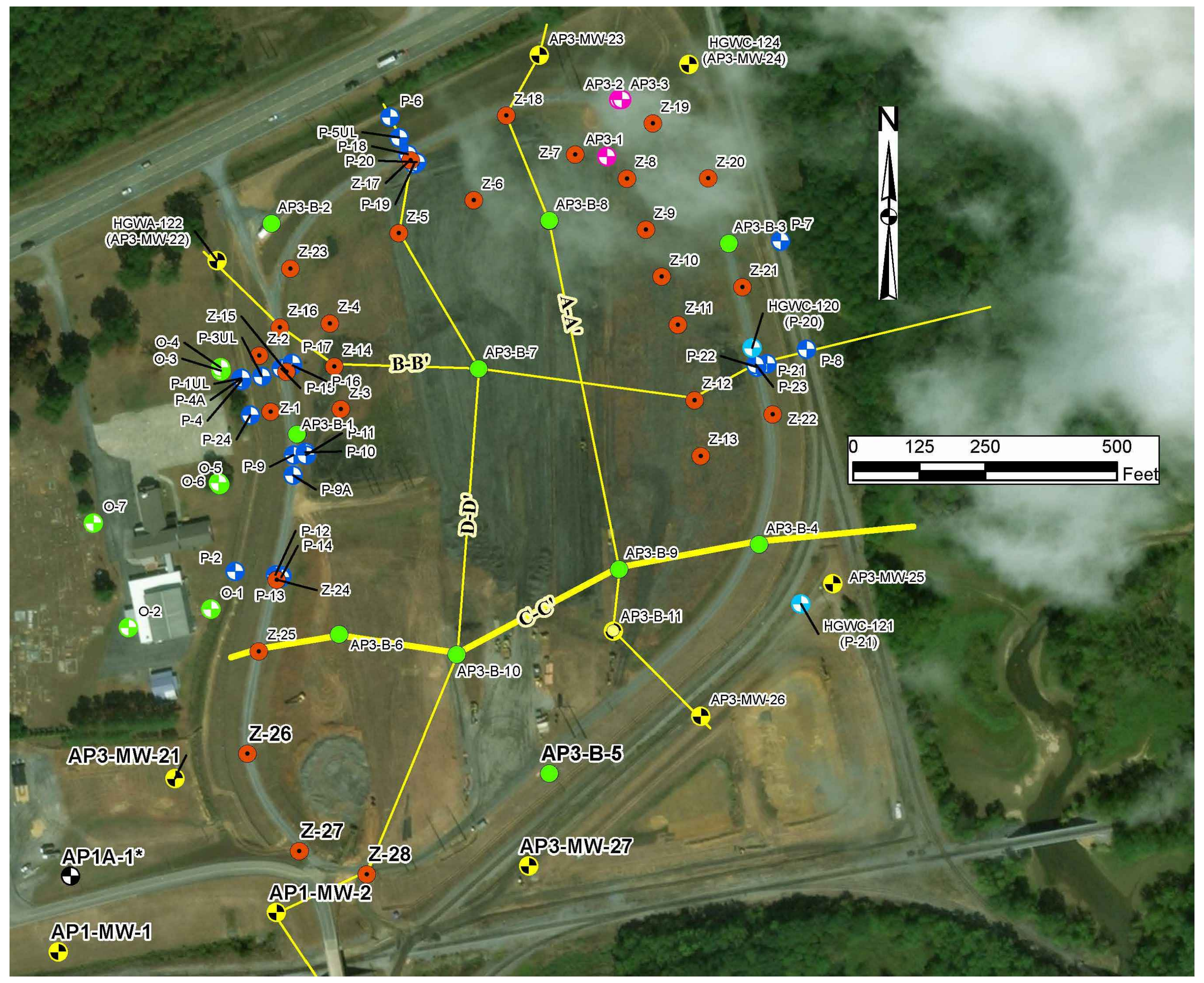
SECTION C-C'

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X

KEY MAP



LEGEND

⊥	SOIL BORING (DASHED WHERE PROJECTED)
▼	GROUND WATER LEVEL (9 FEBRUARY 2017)
- - ▼ - -	GROUND WATER LEVEL (INTERPRETED WATER TABLE BASED ON 1 JUNE 2015)
▤	SCREEN INTERVAL

SOIL LAYER DESCRIPTIONS

▨	COAL COMBUSTION BYPRODUCT (ASH)
▨	FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)
▨	TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)
▨	RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)
▨	HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)
▨	LIMESTONE

NOTES:

1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE INTERPRETED BASED ON AVAILABLE INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE.
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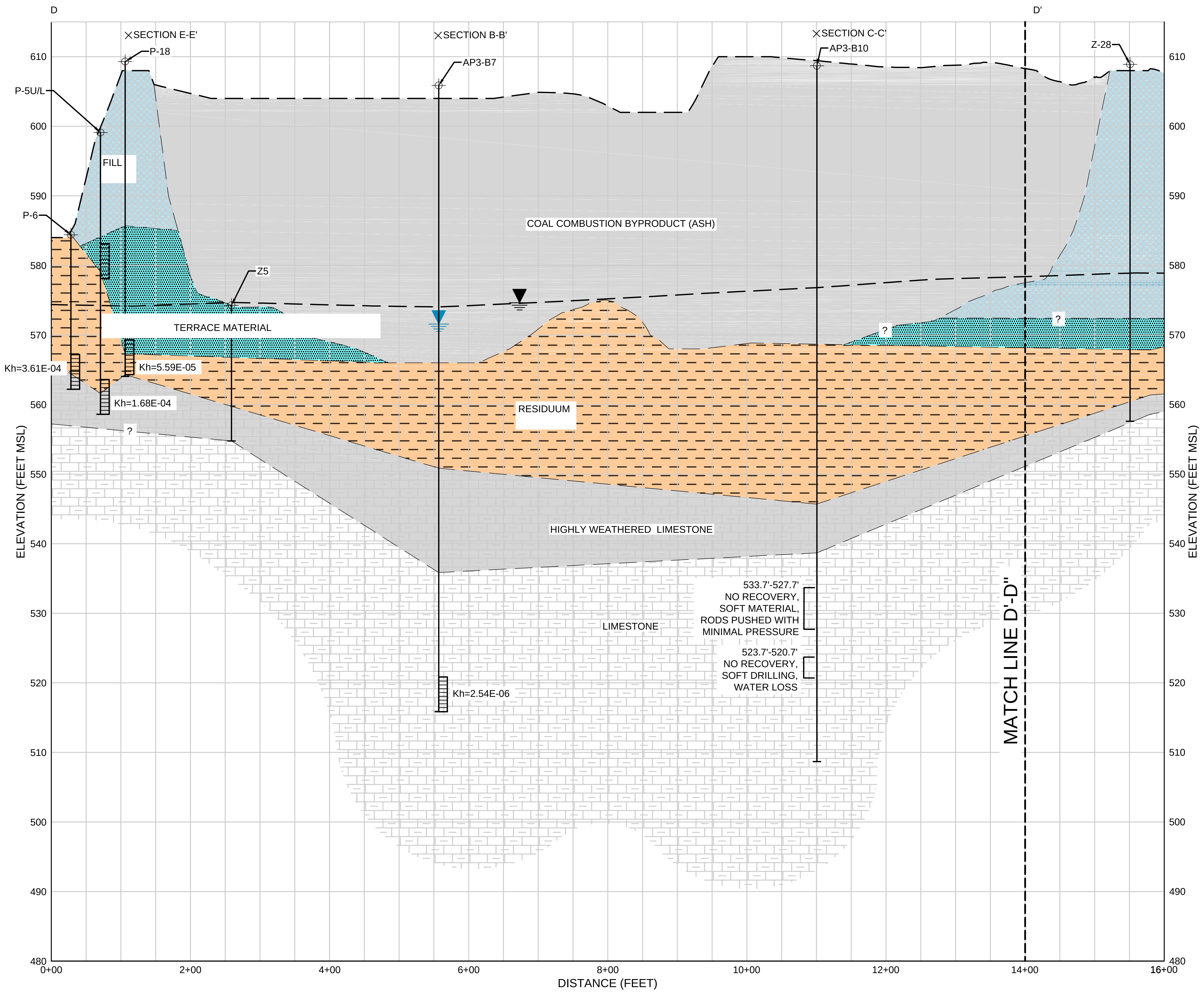
4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC.
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES184451 PROVIDED BY SOUTHERN COMPANY SERVICES.

Geologic Sections C-C'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

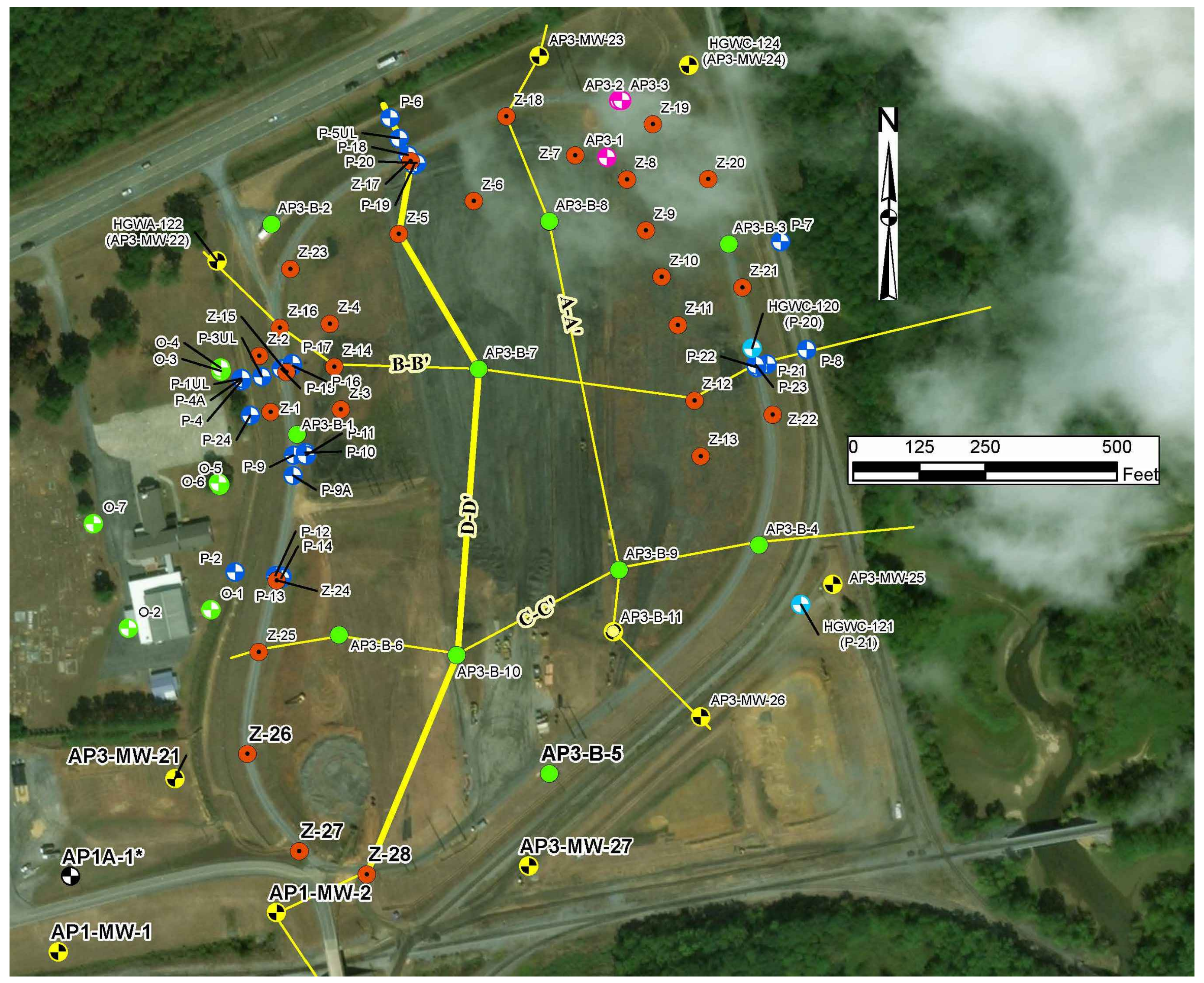
Geosyntec consultants
Kennesaw, GA
March 2017

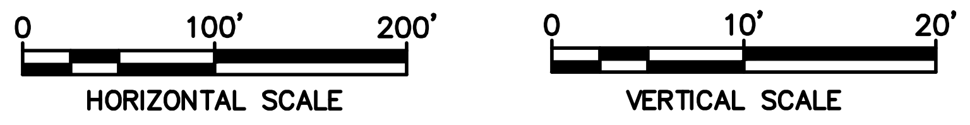
FIGURE
2-3C

L:\CADD\G\GEORGIA POWER\PLANT HAMMOND GR6242\CROSS SECTION\GR6556.001_XSECC-C'



KEY MAP





1 SECTION D-D'

VERTICAL EXAGGERATION: 10X

LEGEND

⊥	SOIL BORING (DASHED WHERE PROJECTED)
▼	GROUND WATER LEVEL (9 FEBRUARY 2017)
▼	GROUND WATER LEVEL (INTERPRETED WATER TABLE BASED ON POTENTIOMETRIC SURFACE MAP - 1 JUNE 2015)
▥	SCREEN INTERVAL

SOIL LAYER DESCRIPTIONS

▨	COAL COMBUSTION BYPRODUCT (ASH)
▨	FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)
▨	TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)
▨	RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)
▨	HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)
▨	LIMESTONE

NOTES:

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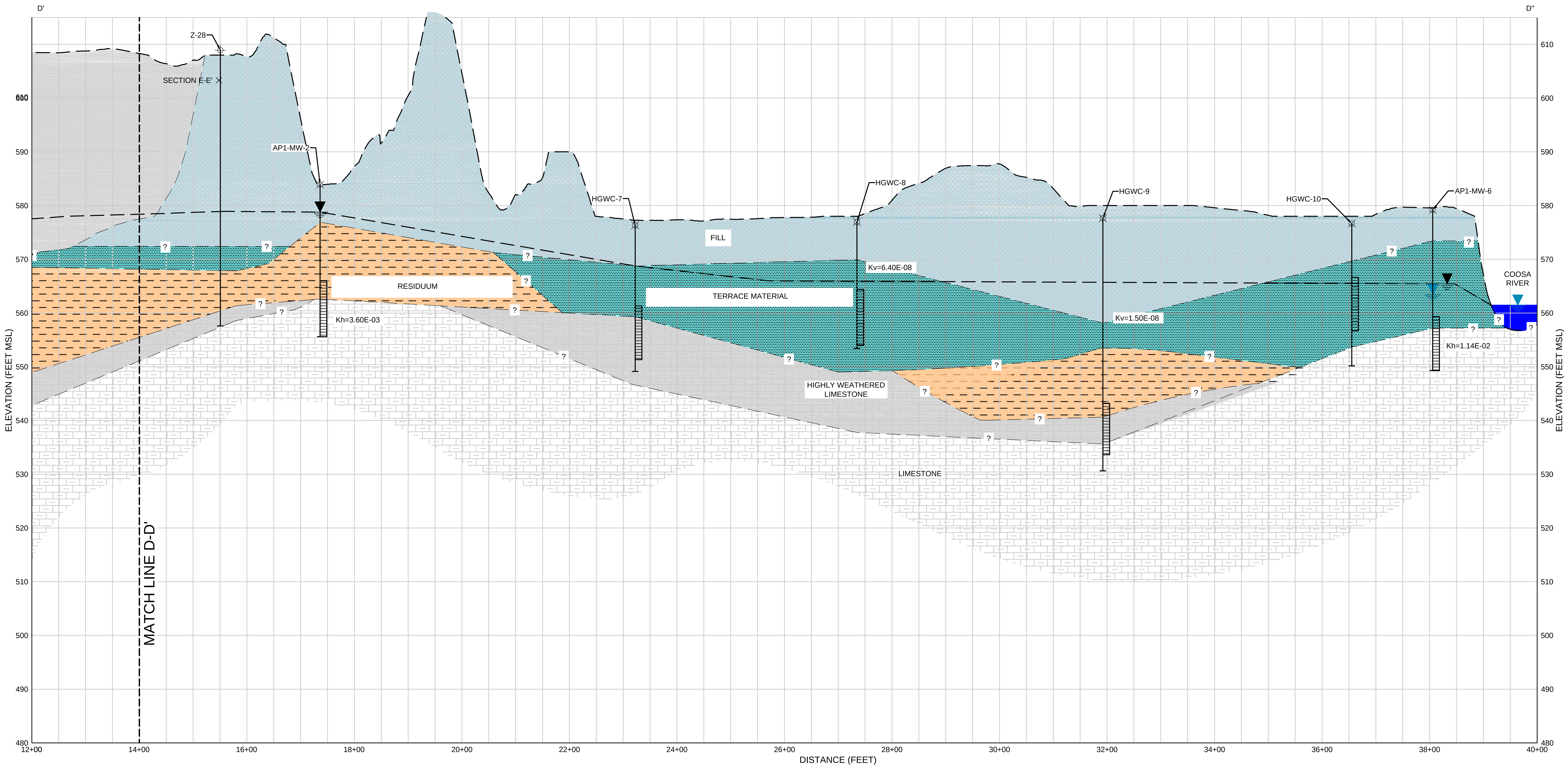
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.

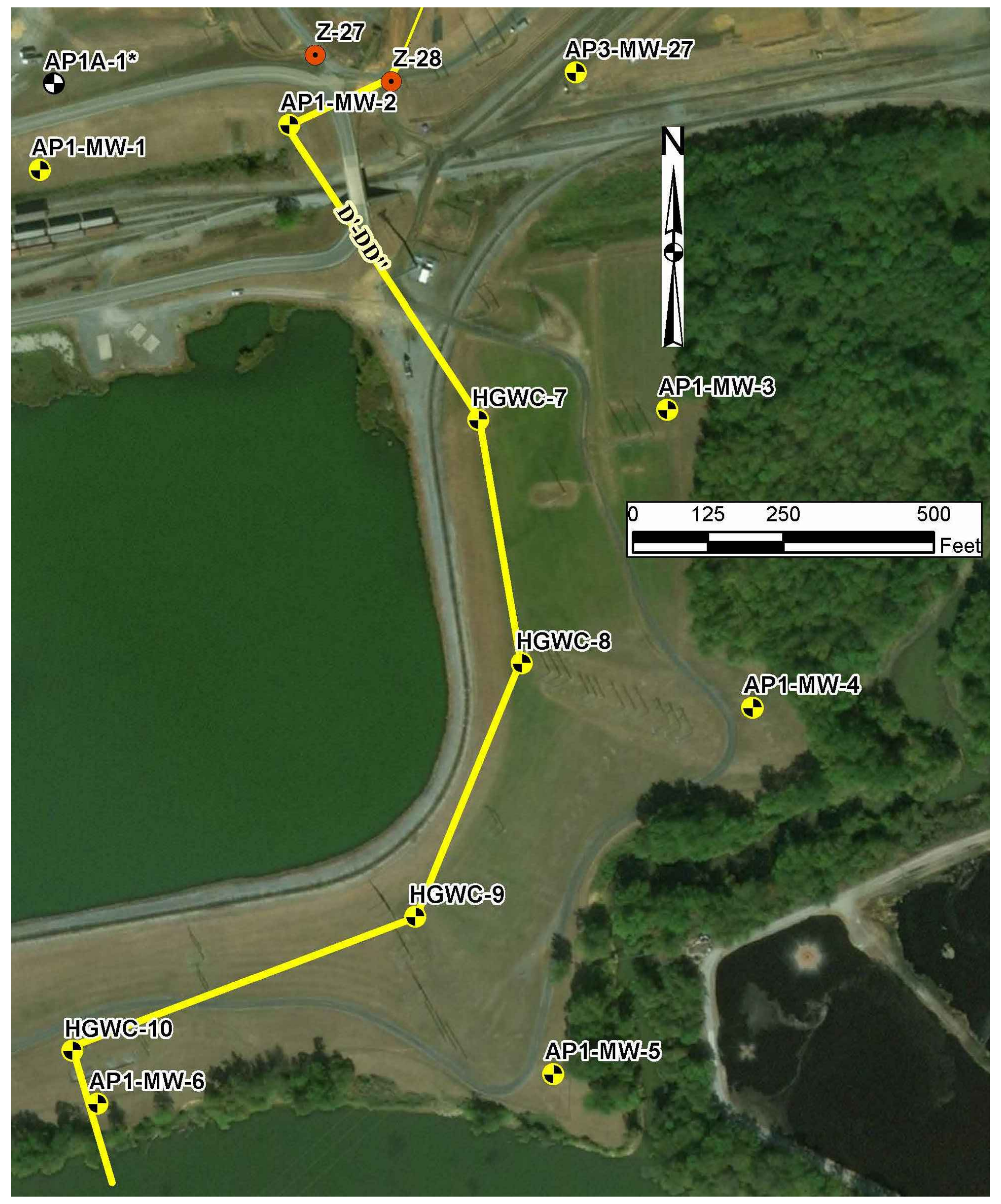
Geologic Section D-D'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

Geosyntec consultants
Kennesaw, GA
May 2017

FIGURE
2-3D



KEY MAP



1

SECTION D'-D''

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X

LEGEND

⊥	SOIL BORING (DASHED WHERE PROJECTED)
▼	GROUND WATER LEVEL (9 FEBRUARY 2017)
– ▼ –	GROUND WATER LEVEL (INTERPRETED WATER TABLE BASED ON POTENTIOMETRIC SURFACE MAP - 1 JUNE 2015)
▯	SCREEN INTERVAL

SOIL LAYER DESCRIPTIONS

▨	COAL COMBUSTION BYPRODUCT (ASH)
▨	FILL (LEAN CLAY OR GRAVELLY LEAN CLAY WITH SAND)
▨	TERRACE MATERIAL (CLAYEY SAND, SANDY CLAY, GRAVELLY SILTY CLAY)
▨	RESIDUUM (LEAN CLAY, LEAN CLAY WITH GRAVEL, FAT CLAY OR SANDY FAT CLAY)
▨	HIGHLY WEATHERED LIMESTONE (CLAYEY GRAVEL, SANDY LEAN CLAY WITH GRAVEL)
▨	LIMESTONE

NOTES:

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5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.

Geologic Section D'-D''
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

Geosyntec
consultants

Kennesaw, GA
May 2017

FIGURE
2-3D'

APPENDIX E

Hydraulic Conductivity Testing Results

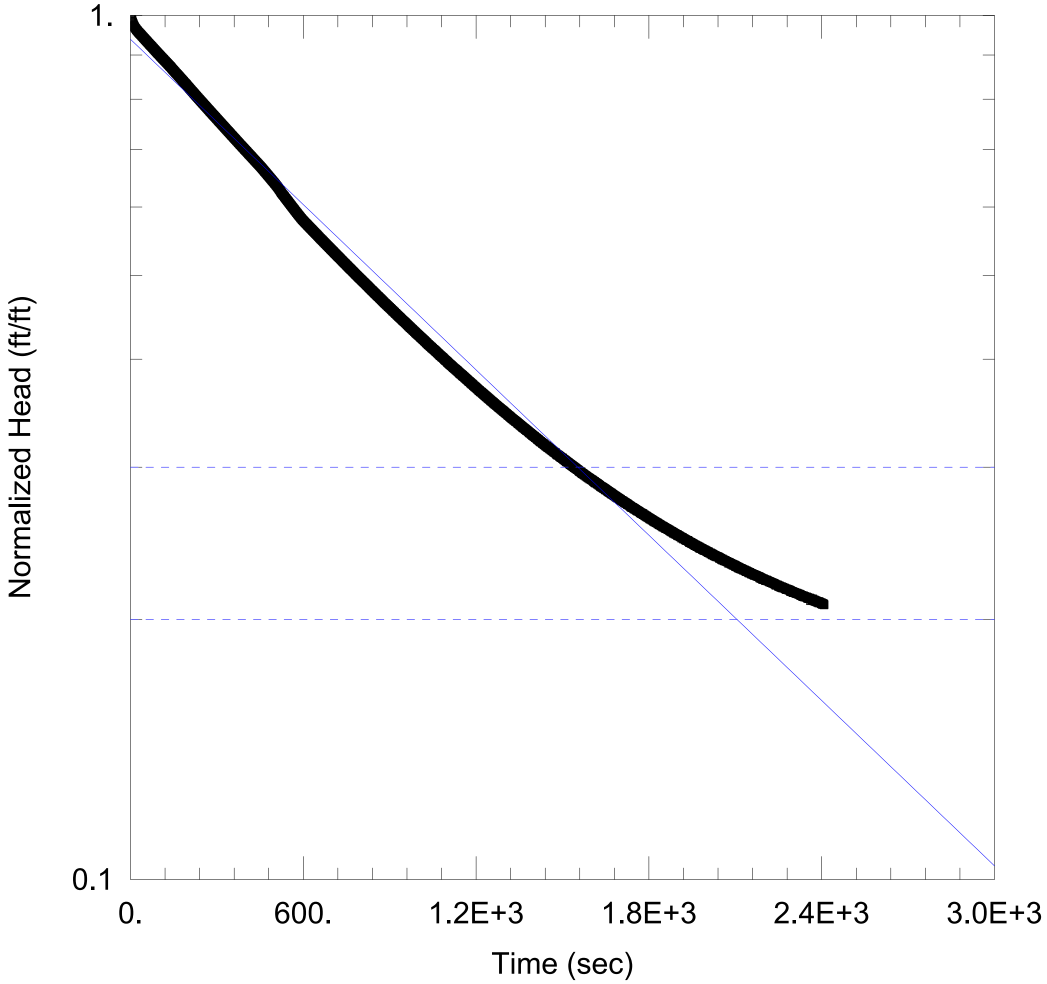
Summary Table of Slug Tests Performed at Plant Hammond AP-3 as Part of Geosyntec (2017) Field Investigation

Well Information										AQTESOLV Input Parameters													Hydraulic Conductivity (K) Estimates				
Well ID	**Packer Test***	**Slug Test****	**Stickup length [ft]**	**Depth to Sensor [ft bgs]**	**Static DTW [ft btoc]**	**DTW after Pumping [ft btoc]**	**Top Screen Depth [ft bgs]**	**Bottom Screen Depth [ft bgs]**	**Total Depth [ft bgs]**	**Ho [ft]**	**H [ft]**	**b [ft]**	**Kv/Kh**	**d [ft]**	**L [ft]**	**T [ft]**	**r(c) [ft]**	**r(eq) [ft]**	**r(p) [ft]**	**r(w) [ft]**	**r(sk) [ft]**	**Bouwer-Rice K [ft/day]**	**Bouwer-Rice K [cm/sec]**	**KGS K [ft/day]**	**KGS K [cm/sec]**	**GEOMEAN**
AP3-B1	NA		4	79	30.45	51.01	76.0	81.0	82.0	20.56	55.55	55.55	0.1	49.55	5.0	0.00	0.25	0	0.25	0.25	0.25	**1.6**	5.7E-04	**1.9**	6.8E-04	6.2E-04
AP3-B2	Deep		4	101	27.30	60.64	99.0	104.0	105.0	33.344	81.7	81.70	0.1	75.70	5.0	0.00	0.25	0	0.25	0.25	0.25	**0.7**	2.3E-04	**1.4**	4.9E-04	3.4E-04
AP3-B2	Shallow		4	47	28.90	30.86	45.0	50.0	105.0	0.586	80.1	80.10	0.1	20.10	5.0	0.00	0.25	0	0.25	0.25	0.25	**Insufficient Data for Analysis**				
AP3-B3	Deep		4	101	48.10	94.94	98.5	103.5	106.0	46.838	61.9	61.90	0.1	54.40	5.0	0.00	0.25	0	0.25	0.25	0.25	**Insufficient Data for Analysis**				
AP3-B3	Shallow		4	59	48.65	50.62	60.0	65.0	106.0	1.969	61.35	61.35	0.1	15.35	5.0	0.00	0.25	0	0.25	0.25	0.25	**7.8**	2.8E-03	**8.7**	3.1E-03	2.9E-03
AP3-B4	NA		4	55	45.40	45.67	53.5	58.5	60.5	0.265	19.1	19.10	0.1	12.10	5.0	0.00	0.25	0	0.25	0.25	0.25	**2.6**	9.2E-04	**4.2**	1.5E-03	1.2E-03
AP3-B5	NA		4	66	38.85	42.45	64.0	69.0	71.0	3.601	36.15	36.15	0.1	29.15	5.0	0.00	0.25	0	0.25	0.25	0.25	**2.0**	7.0E-04	**2.9**	1.0E-03	8.5E-04
AP3-B6S		Shallow	3.56	-	37.15	37.52	25.0	35.0	35.0	0.371	1.41	1.41	0.1	0.00	10.0	0.00	0.083	0	0	0.083	0.25	**102.2**	4.1E-02	**52.4**	1.8E-02	2.8E-02
AP3-B6I		Intermediate	0	-	35.78	38.81	59.0	69.0	69.0	3.025	33.22	33.22	0.1	23.22	10.0	0.00	0.083	0	0	0.083	0.25	**0.3**	9.7E-05	**0.3**	1.1E-04	1.0E-04
AP3-B6D		Deep	0	-	34.89	35.89	79.0	89.0	89.0	0.728	54.11	54.11	0.1	44.11	10.0	0.00	0.083	0	0	0.083	0.25	**0.2**	6.2E-05	**0.1**	4.0E-05	5.0E-05
AP3-B7	NA		0	86	34.30	88.99	85.0	90.0	90.0	54.693	55.7	55.70	0.1	50.70	5.0	0.00	0.25	0	0.25	0.25	0.25	**Insufficient Data for Analysis**				
AP3-B8	NA		2	84	31.17	77.70	83.0	88.0	89.0	46.53	59.83	59.83	0.1	53.83	5.0	0.00	0.25	0	0.25	0.25	0.25	**1.5**	5.2E-04	**1.4**	4.9E-04	5.0E-04

Ho	Observed initial displacement (change in water level from static)
H	Static water column height
b	Saturated thickness of aquifer
Kv/Kh	Ratio of vertical to horizontal hydraulic conductivity
d	Depth to top of well screen - this is the length from the water level (or top confining unit) to the top of the screen.
L	Length of well screen
T	Transducer Depth - Note: only used by the Butler-Zahn (2004) & McElwee-Zenner solution. If using Bower-Rice or other solution methods, set to zero
r(c)	Inside radius of well casing
r(eq)	Radius of downhole equipment
r(p)	Inside radius of packer
r(w)	Radius of well open or perforated interval
r(sk)	Outside radius of well skin distrubed zone enveloping filter pack
*****	Packer testing was conducted in a 6" diameter open hole
******	Slug testing was conducted in 2" PVC casing installedi n a 6" borehole.
^	Dagan Method for partially submerged screen

Note:

1. For b assume that bottom of well is bottom of aquifer if bottom of aquifer is not known
2. Dagan method applied to AP3-B6S where water level is within screen interval



RISING HEAD

Data Set: N:\...\B-01_Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:37:00

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-01
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 55.55 ft
Anisotropy Ratio (Kz/Kr): 0.1

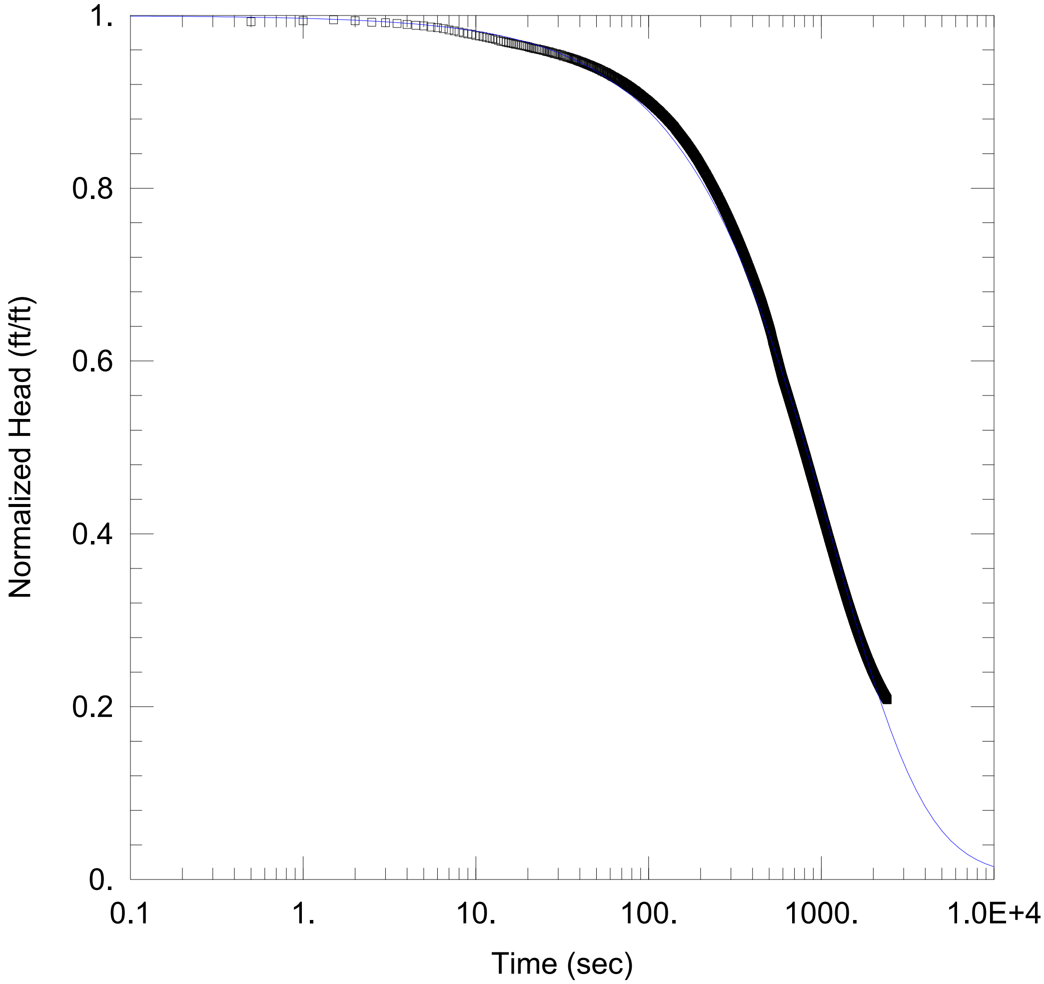
WELL DATA (B-01)

Initial Displacement: 20.57 ft
Static Water Column Height: 55.55 ft
Total Well Penetration Depth: 54.55 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.00057 cm/sec
y0 = 19.3 ft



RISING HEAD

Data Set: N:\...\B-01_KGS_rev1.aqt
Date: 06/28/17 Time: 09:37:35

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-01
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 55.55 ft

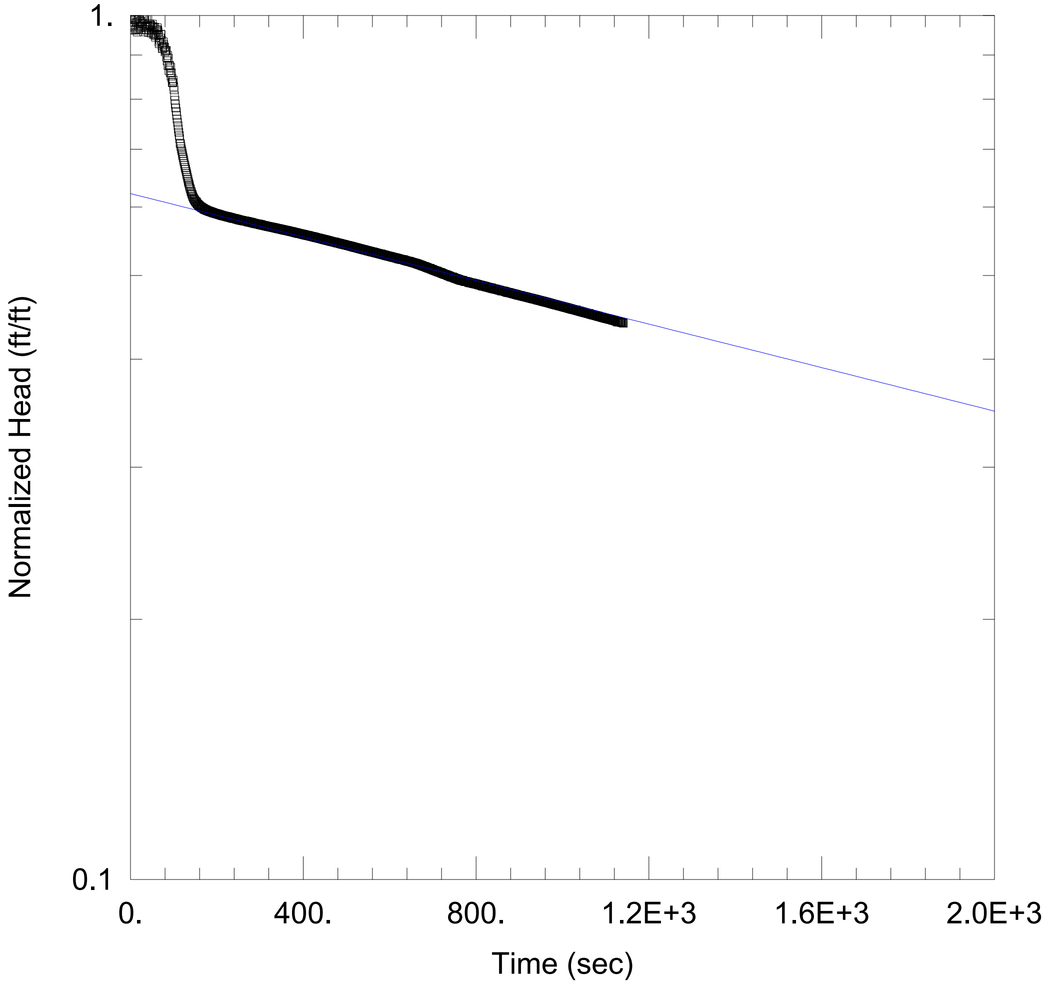
WELL DATA (B-01)

Initial Displacement: 20.57 ft
Static Water Column Height: 55.55 ft
Total Well Penetration Depth: 54.55 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0006815 cm/sec
Ss = 7.257E-5 ft^{-1}
Kz/Kr = 0.001



RISING HEAD

Data Set: N:\...\B-02_deep Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:38:40

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-02 deep
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 81.7 ft
Anisotropy Ratio (Kz/Kr): 0.1

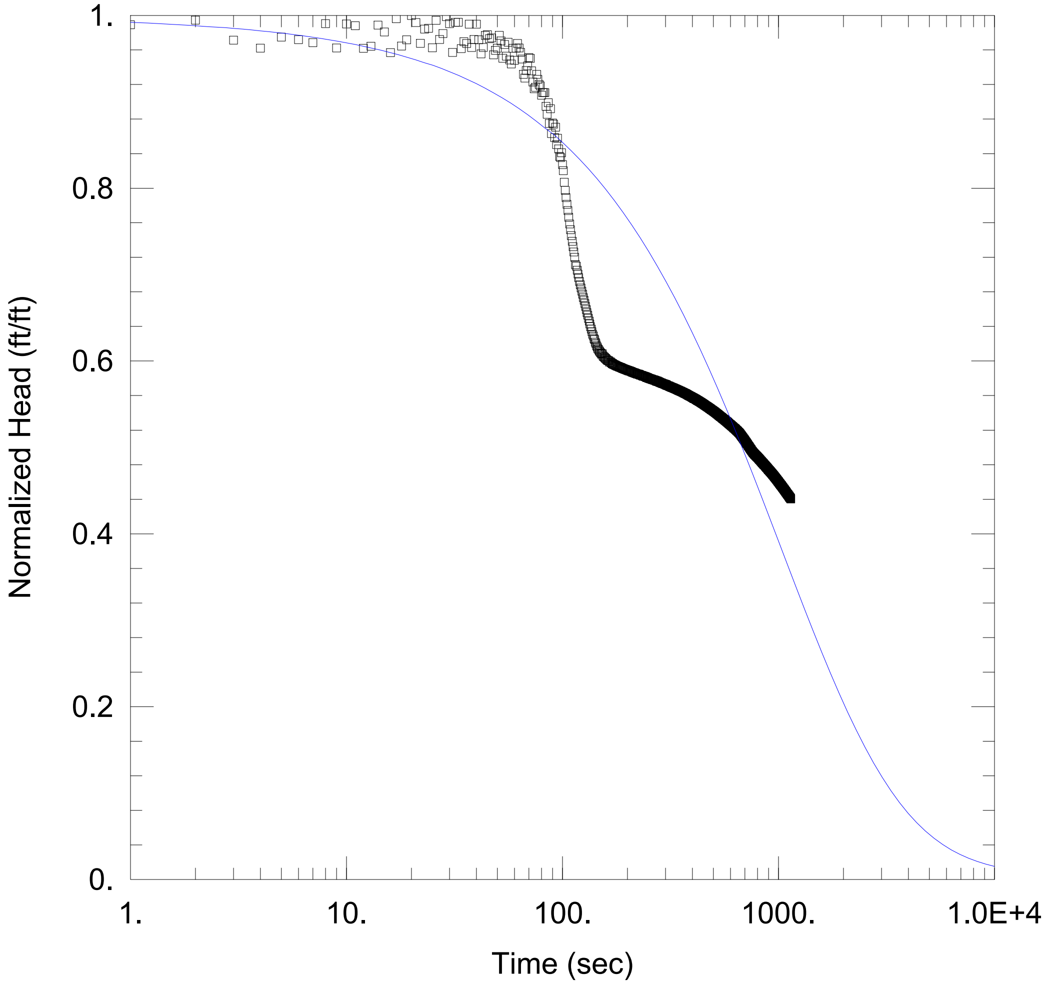
WELL DATA (AP3-B-02 deep)

Initial Displacement: 32.57 ft
Static Water Column Height: 81.7 ft
Total Well Penetration Depth: 80.7 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0002341 cm/sec
y0 = 20.26 ft



RISING HEAD

Data Set: N:\...\B-02_deep KGS_rev1.aqt
Date: 06/28/17 Time: 09:39:37

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-02 deep
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 81.7 ft

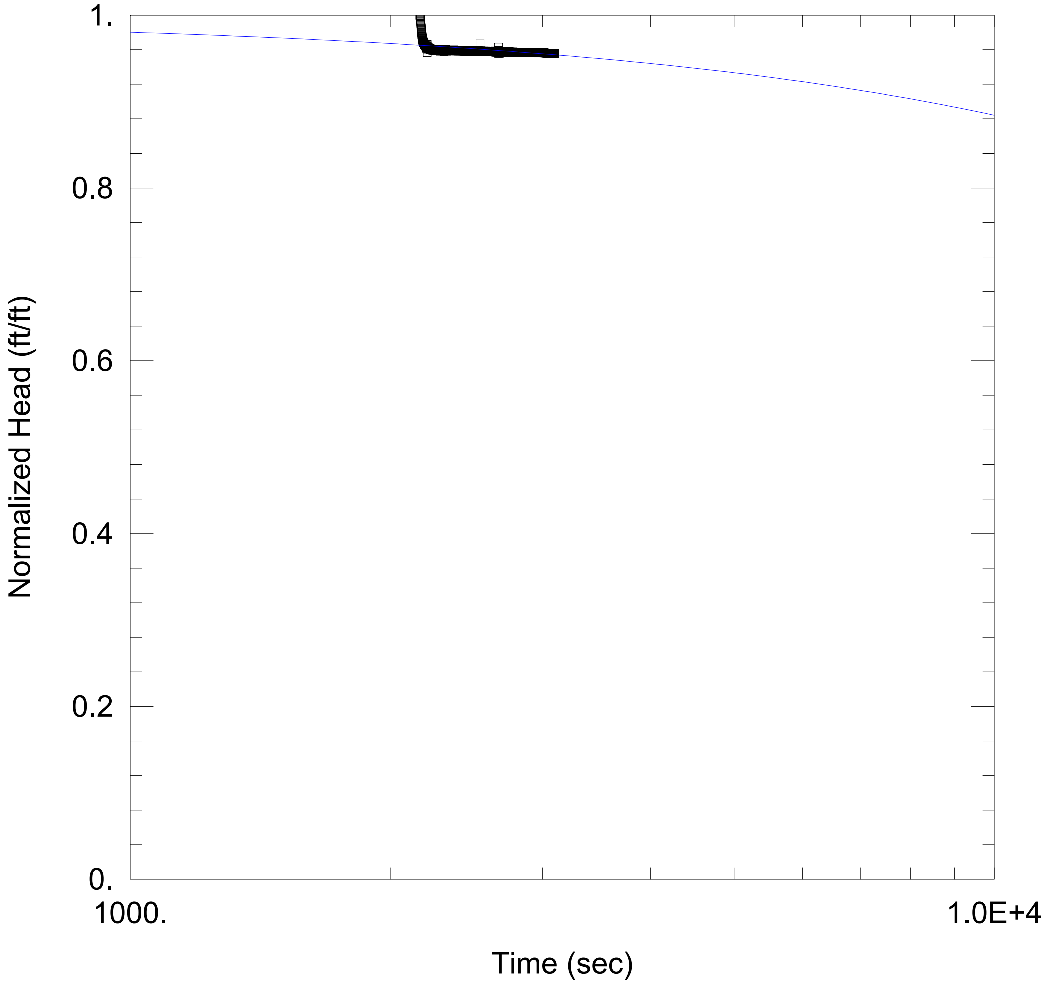
WELL DATA (AP3-B-02 deep)

Initial Displacement: 32.57 ft
Static Water Column Height: 81.7 ft
Total Well Penetration Depth: 80.7 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0004933 cm/sec
Ss = 0.001224 ft^{-1}
Kz/Kr = 0.1



WELL TEST ANALYSIS

Data Set: N:\...\B-03 deep_KGS_rev1.aqt
Date: 06/28/17 Time: 09:41:53

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-03 deep
Test Date: 2/09/2017

AQUIFER DATA

Saturated Thickness: 61.9 ft

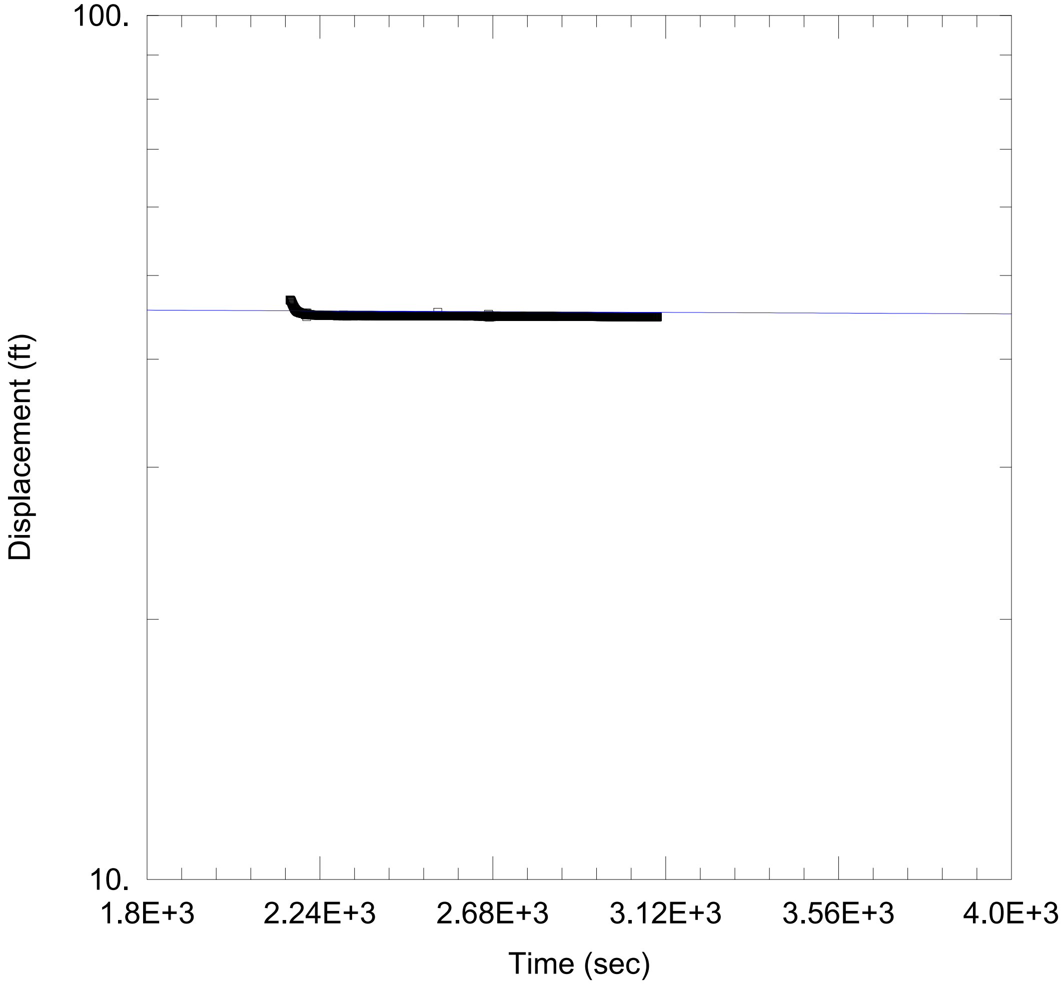
WELL DATA (AP3-B03 deep)

Initial Displacement: 46.84 ft
Static Water Column Height: 61.9 ft
Total Well Penetration Depth: 55.4 ft
Screen Length: 1. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.982E-5 cm/sec
Ss = 0.001616 ft^{-1}
Kz/Kr = 0.1



WELL TEST ANALYSIS

Data Set: N:\...\B-03_deep Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:42:25

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-03 deep
Test Date: 2/09/2017

AQUIFER DATA

Saturated Thickness: 61.9 ft
Anisotropy Ratio (Kz/Kr): 0.1

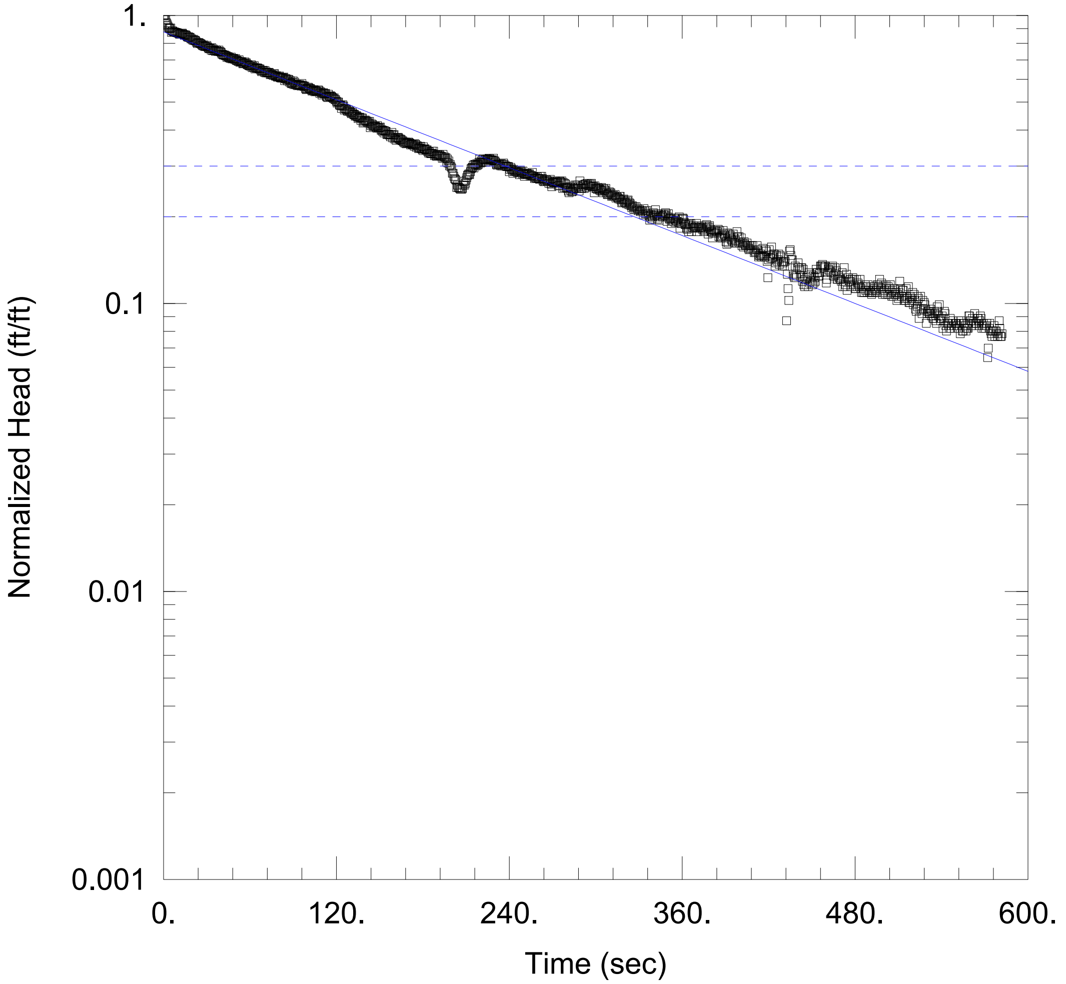
WELL DATA (AP3-B03 deep)

Initial Displacement: 46.84 ft
Static Water Column Height: 61.9 ft
Total Well Penetration Depth: 55.4 ft
Screen Length: 1. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.75E-6 cm/sec
y0 = 45.97 ft



WELL TEST ANALYSIS

Data Set: N:\...\B-03_shallow Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:46:09

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-03 shallow
Test Date: 2/09/2017

AQUIFER DATA

Saturated Thickness: 61.35 ft
Anisotropy Ratio (Kz/Kr): 0.1

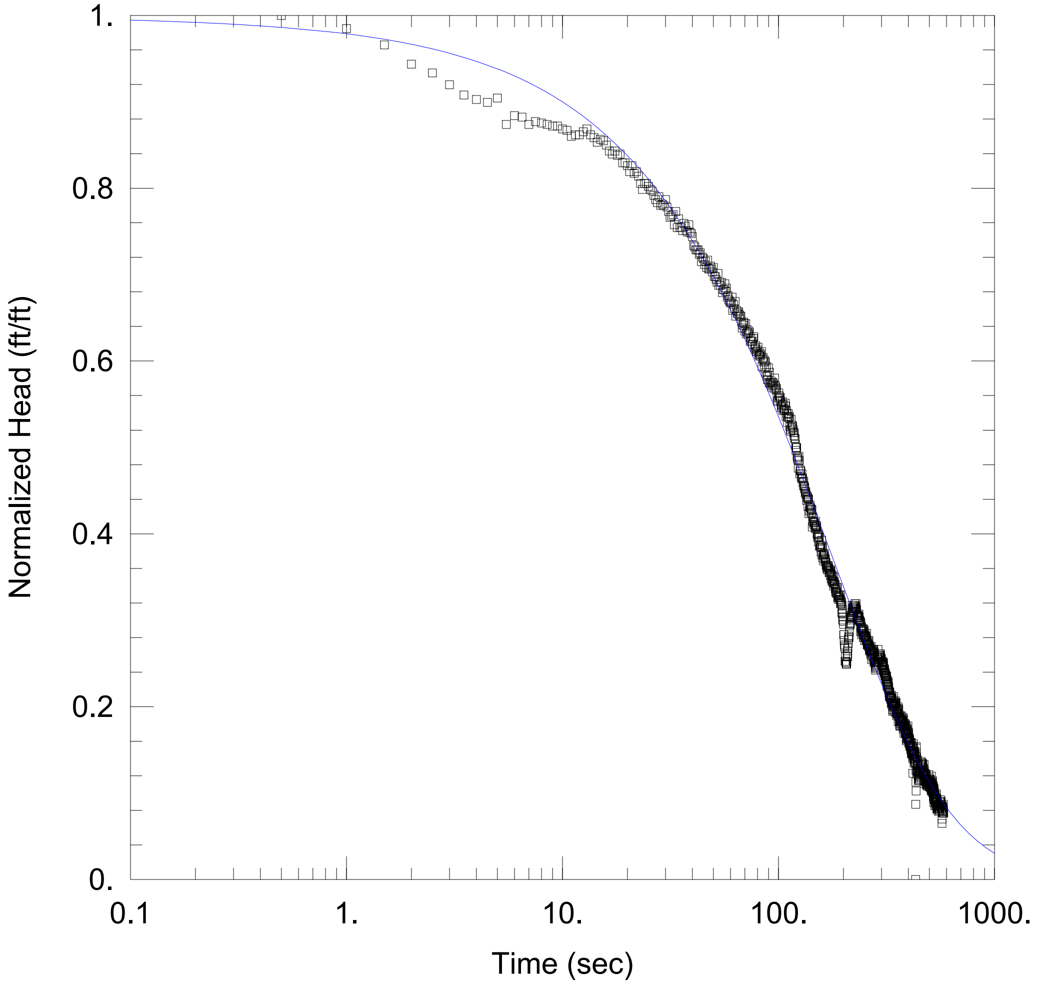
WELL DATA (B03-shallow)

Initial Displacement: 0.586 ft
Static Water Column Height: 61.35 ft
Total Well Penetration Depth: 20.35 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.002819 cm/sec
y0 = 0.5137 ft



WELL TEST ANALYSIS

Data Set: N:\...\B-03_shallow KGS_rev1.aqt

Date: 06/28/17 Time: 09:46:44

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-03 shallow
Test Date: 2/09/2017

AQUIFER DATA

Saturated Thickness: 61.35 ft

WELL DATA (B03-shallow)

Initial Displacement: 0.586 ft
Total Well Penetration Depth: 20.35 ft
Casing Radius: 0.25 ft

Static Water Column Height: 61.35 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

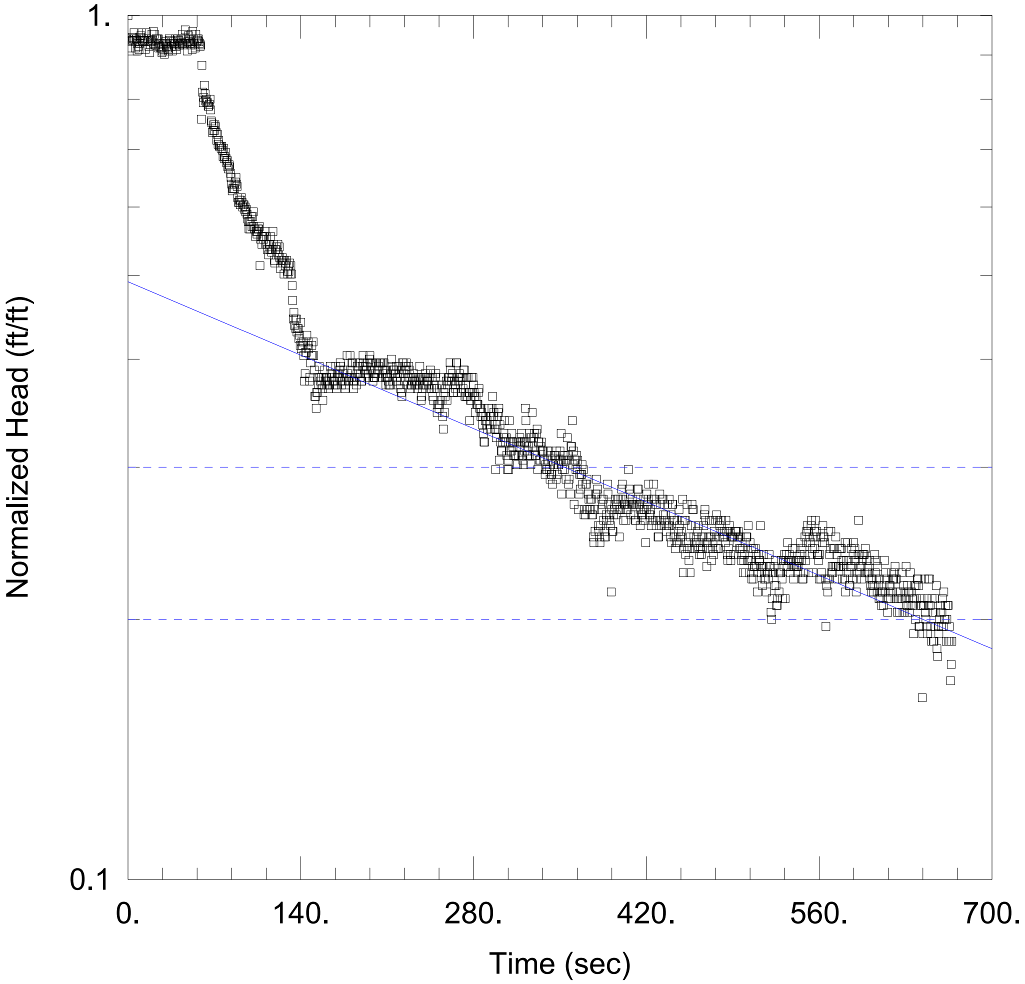
SOLUTION

Aquifer Model: Unconfined

Solution Method: KGS Model

Kr = 0.00307 cm/sec
Kz/Kr = 0.1

Ss = 0.000945 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\B-04_Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:47:36

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-04
Test Date: 2/09/2017

AQUIFER DATA

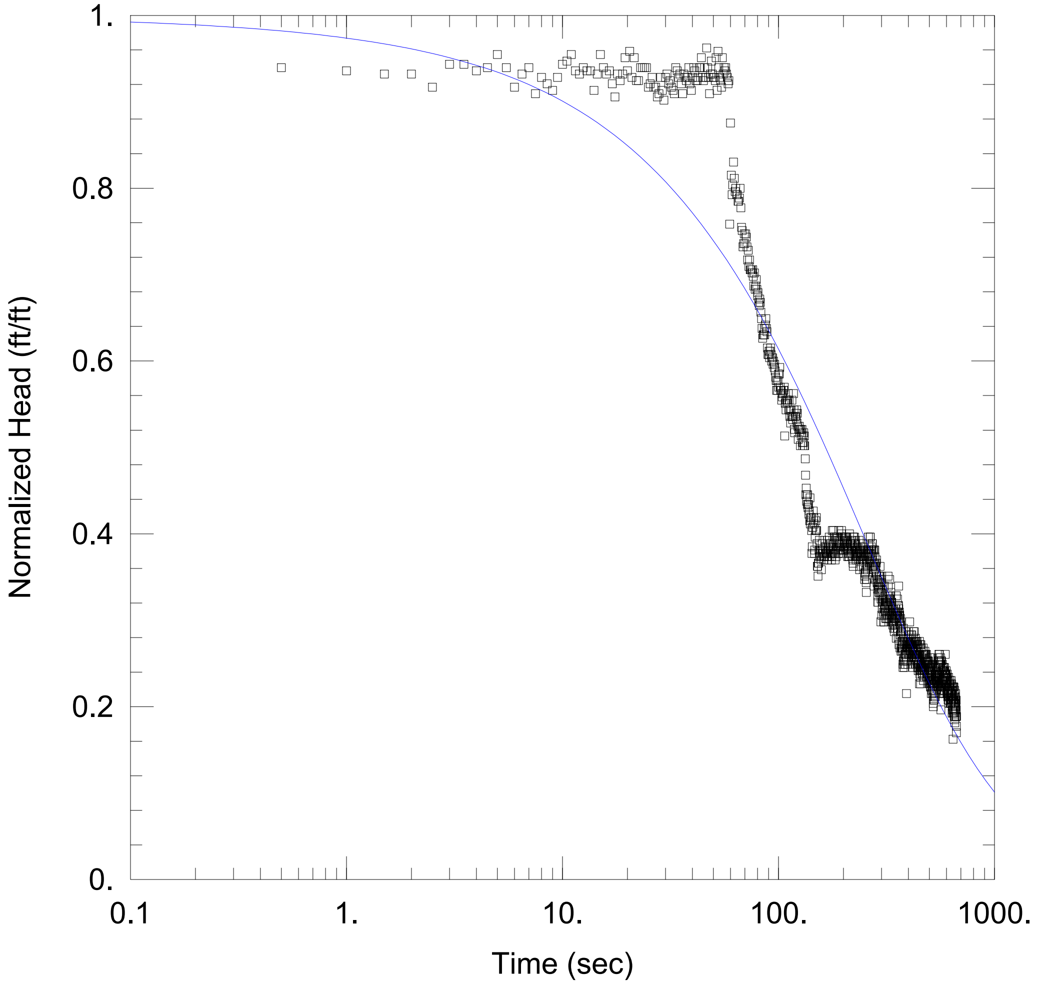
Saturated Thickness: 19.1 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (AP3-B04)

Initial Displacement: 0.265 ft
Static Water Column Height: 19.1 ft
Total Well Penetration Depth: 17.1 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0009247 cm/sec
y0 = 0.1303 ft



WELL TEST ANALYSIS

Data Set: N:\...\B-04_KGS_rev1.aqt
Date: 06/28/17 Time: 09:48:19

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-04
Test Date: 2/09/2017

AQUIFER DATA

Saturated Thickness: 19.1 ft

WELL DATA (AP3-B04)

Initial Displacement: 0.265 ft
Total Well Penetration Depth: 17.1 ft
Casing Radius: 0.25 ft

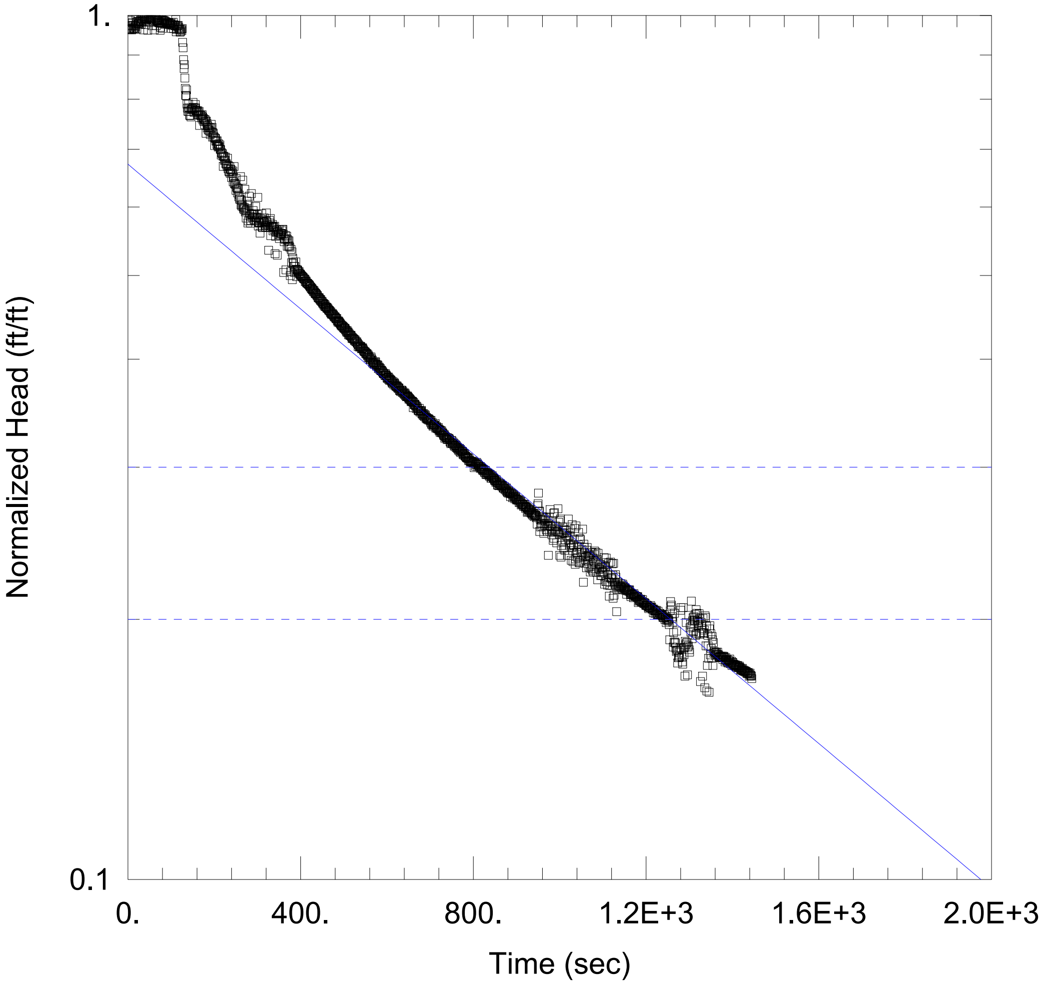
Static Water Column Height: 19.1 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.001478 cm/sec
Kz/Kr = 0.1

Ss = 0.005236 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\B-05_Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:48:59

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-05
Test Date: 2/08/2017

AQUIFER DATA

Saturated Thickness: 36.15 ft
Anisotropy Ratio (Kz/Kr): 0.1

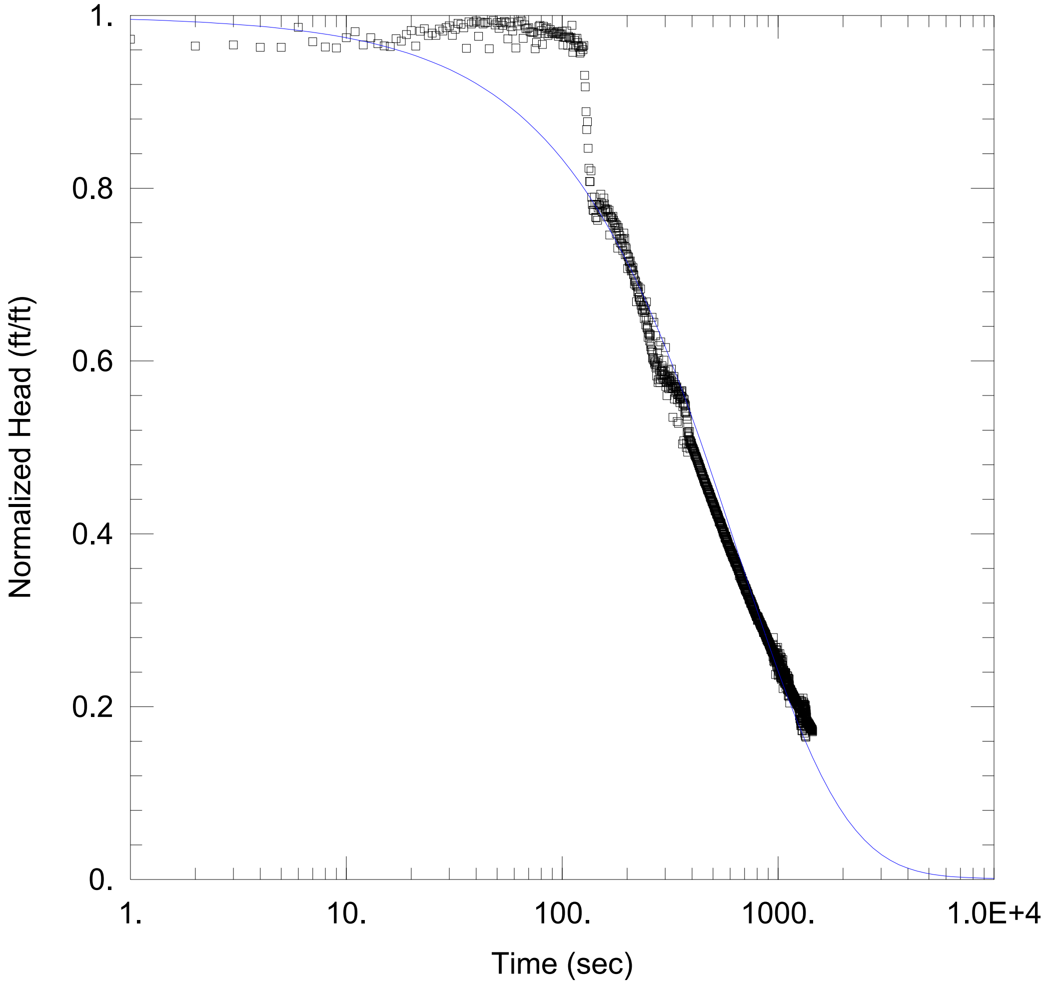
WELL DATA (AP3-B-05)

Initial Displacement: 3.601 ft
Total Well Penetration Depth: 34.15 ft
Casing Radius: 0.25 ft
Static Water Column Height: 36.15 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0006951 cm/sec
y0 = 2.422 ft



WELL TEST ANALYSIS

Data Set: N:\...\B-05_KGS_rev1.aqt

Date: 06/28/17 Time: 09:49:36

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-05
Test Date: 2/08/2017

AQUIFER DATA

Saturated Thickness: 36.15 ft

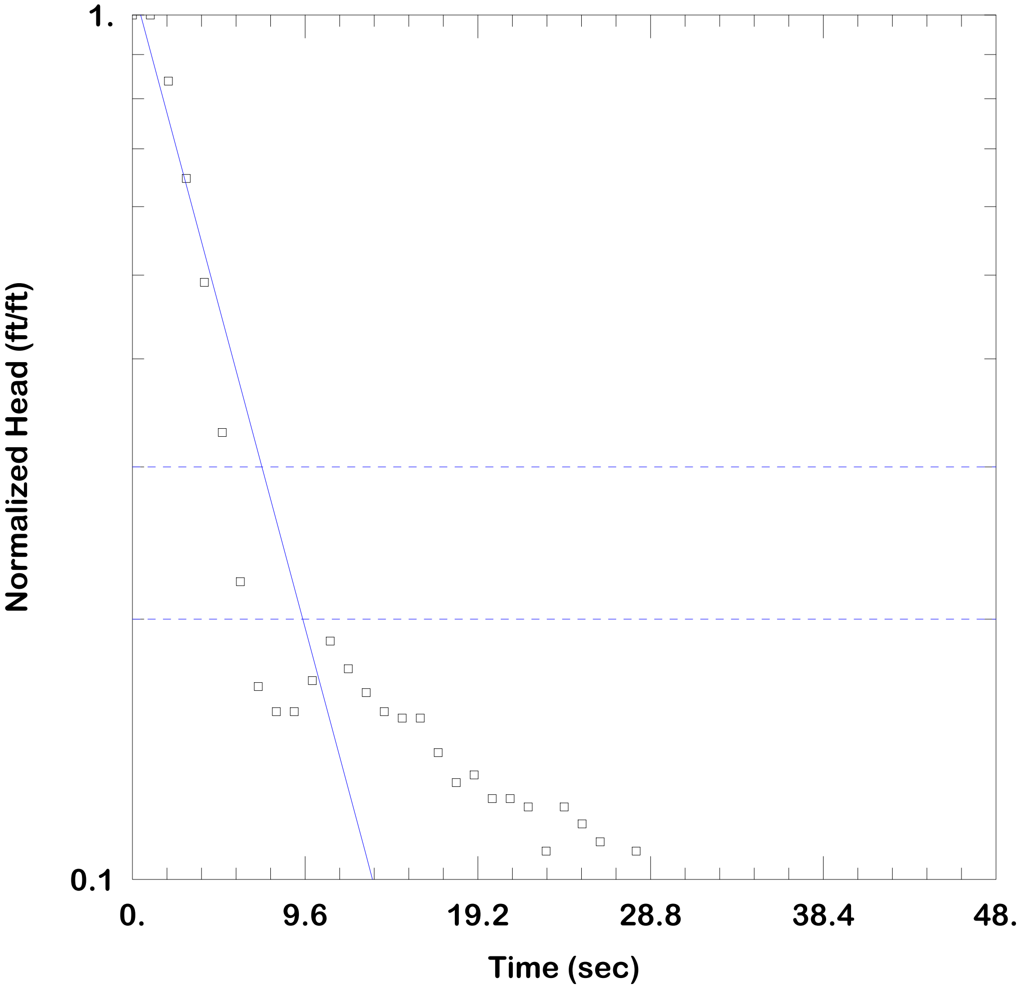
WELL DATA (AP3-B-05)

Initial Displacement: 3.601 ft
Static Water Column Height: 36.15 ft
Total Well Penetration Depth: 34.15 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.001029 cm/sec
Ss = 7.634E-5 ft^{-1}
Kz/Kr = 0.1



WELL TEST ANALYSIS

Data Set: N:\...\B06A_Bouwer Rice_rev1.aqt
Date: 06/28/17 Time: 09:54:14

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-06A
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 1.41 ft Anisotropy Ratio (Kz/Kr): 0.1

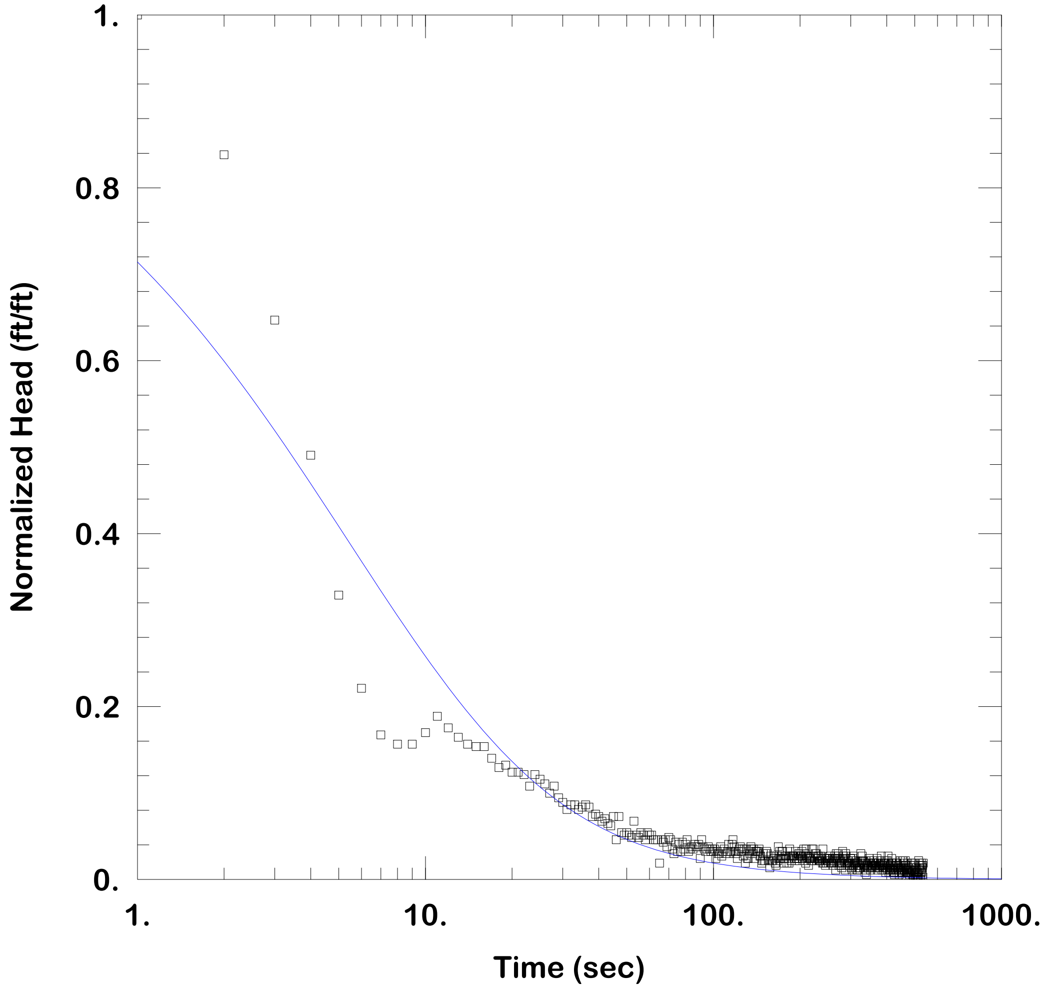
WELL DATA (AP3-B6A)

Initial Displacement: 0.371 ft Static Water Column Height: 1.41 ft
Total Well Penetration Depth: 10. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.04134 cm/sec y0 = 0.4026 ft



WELL TEST ANALYSIS

Data Set: N:\...\B06A_KGS_rev1.aqt
Date: 06/28/17 Time: 09:56:24

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-06A
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 1.41 ft

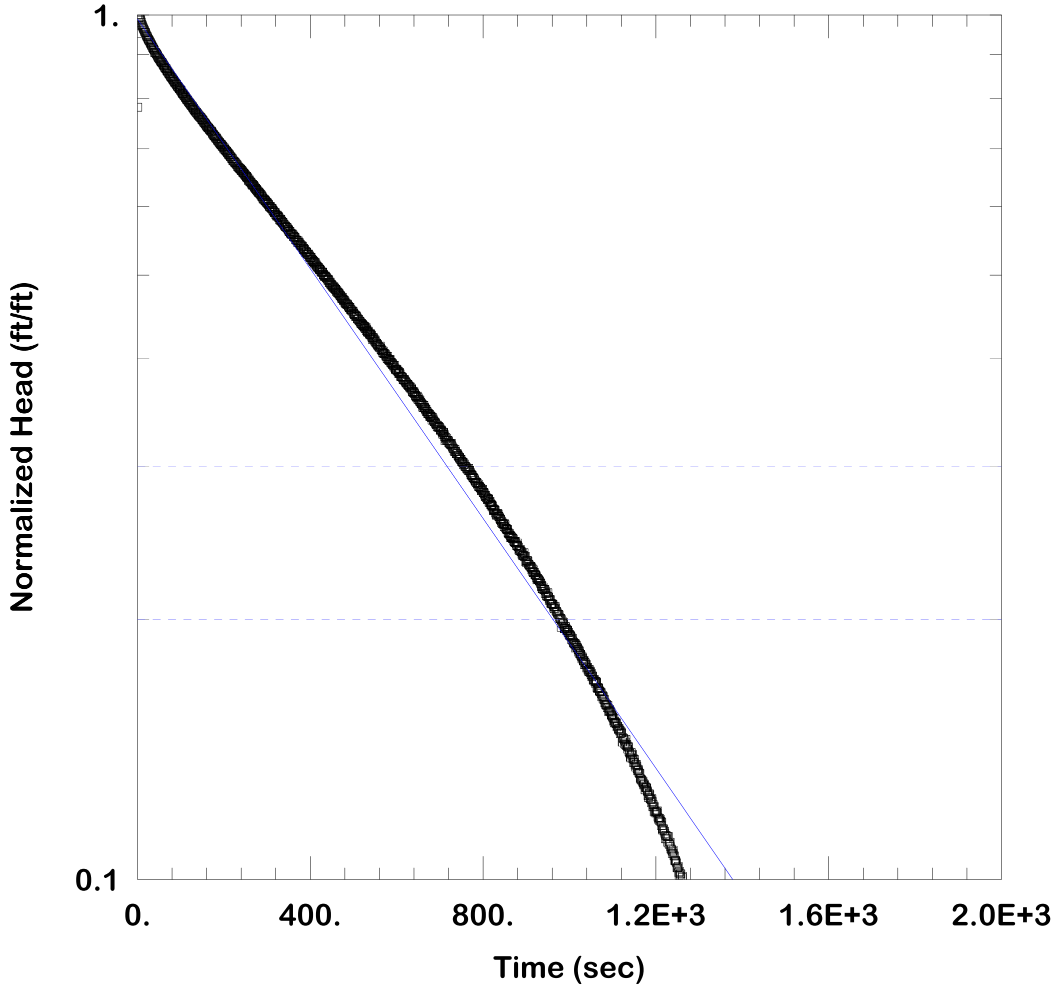
WELL DATA (AP3-B6A)

Initial Displacement: 0.371 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.083 ft
Static Water Column Height: 1.41 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.01849 cm/sec
Ss = 0.07092 ft^{-1}
Kz/Kr = 0.1



WELL TEST ANALYSIS

Data Set: N:\...\B06B Bower Rice_rev1.aqt

Date: 06/28/17 Time: 09:57:06

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-06B
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 33.22 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (AP3-B6B)

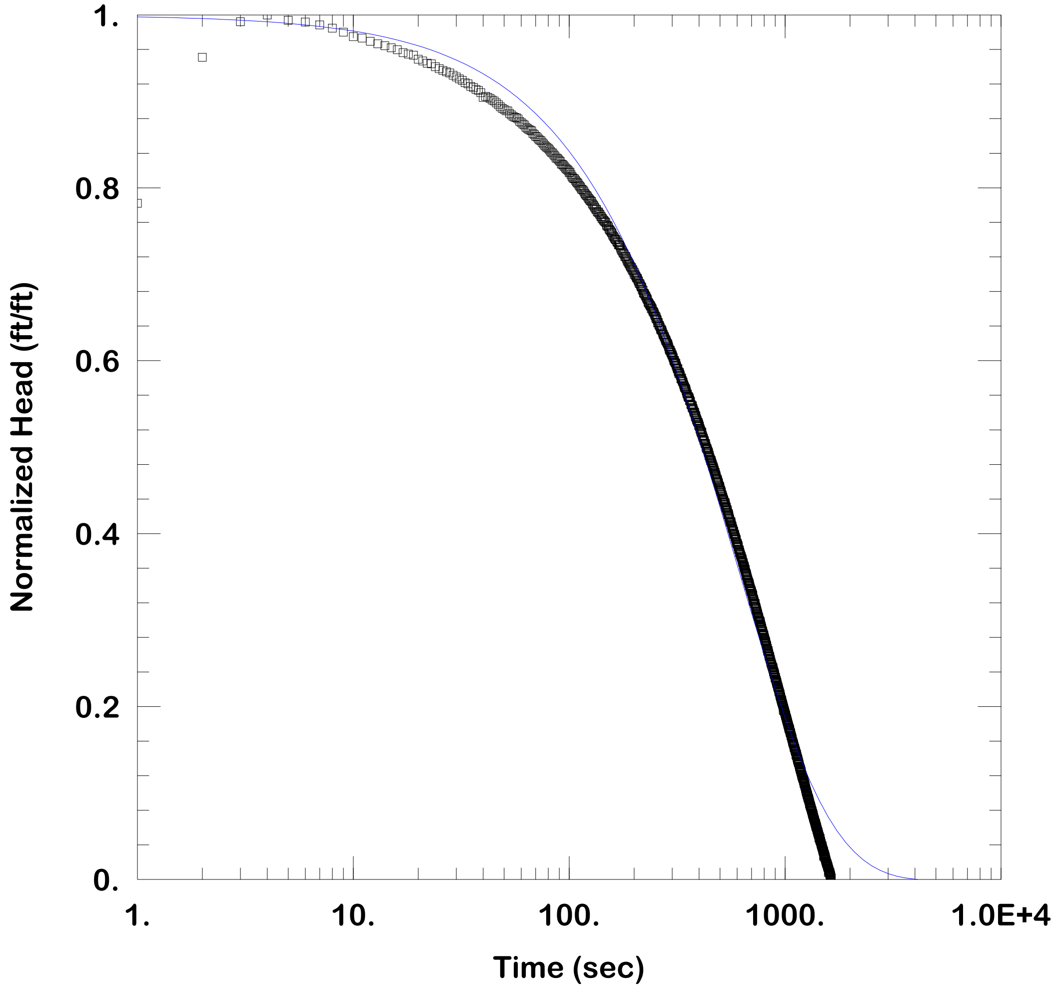
Initial Displacement: 3.025 ft
Total Well Penetration Depth: 33.22 ft
Casing Radius: 0.083 ft

Static Water Column Height: 33.22 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 9.748E-5 cm/sec y0 = 2.993 ft



WELL TEST ANALYSIS

Data Set: N:\...\B06B KGS_rev1.aqt
Date: 06/28/17 Time: 09:57:51

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-06B
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 33.22 ft

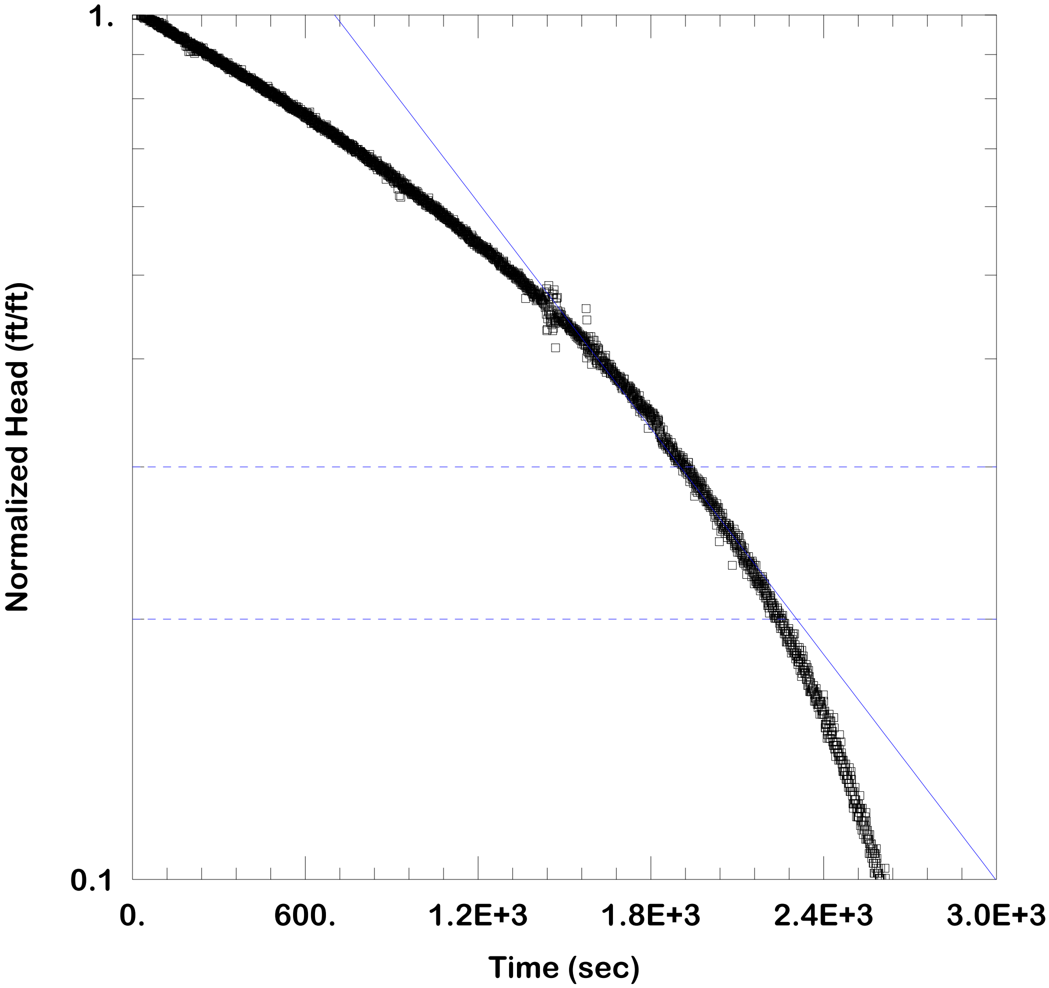
WELL DATA (AP3-B6B)

Initial Displacement: 3.025 ft
Static Water Column Height: 33.22 ft
Total Well Penetration Depth: 33.22 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.000108 cm/sec
Ss = 3.911E-8 ft^{-1}
Kz/Kr = 0.1



WELL TEST ANALYSIS

Data Set: N:\...\B06C Bower Rice_rev1.aqt
Date: 06/28/17 Time: 09:58:40

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-06C
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 54.11 ft
Anisotropy Ratio (Kz/Kr): 0.1

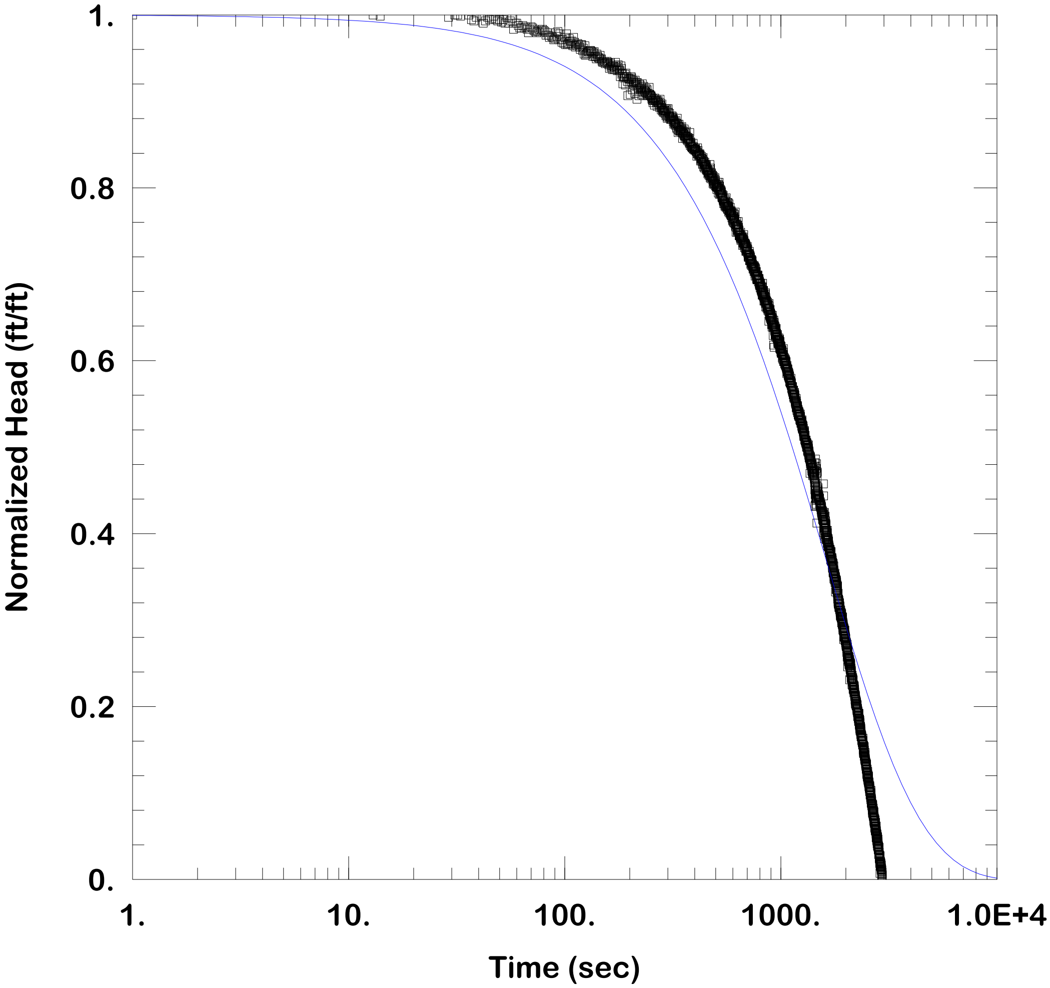
WELL DATA (AP3-B6C)

Initial Displacement: 0.728 ft
Static Water Column Height: 54.11 ft
Total Well Penetration Depth: 54.11 ft
Screen Length: 10. ft
Casing Radius: 0.083 ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.222E-5 cm/sec
y0 = 1.472 ft



WELL TEST ANALYSIS

Data Set: N:\...\B06C KGS_rev1.aqt

Date: 06/28/17 Time: 09:59:21

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-06C
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 54.11 ft

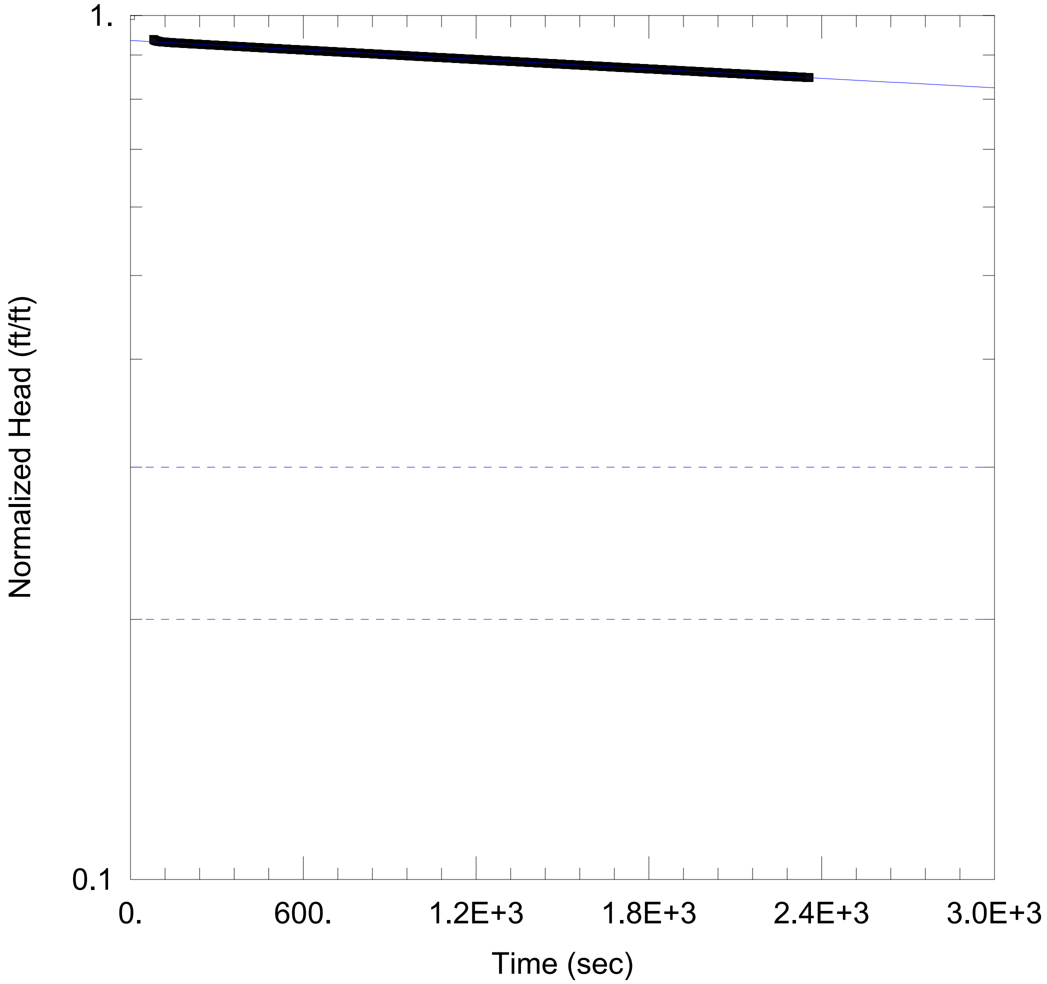
WELL DATA (AP3-B6C)

Initial Displacement: 0.728 ft
Total Well Penetration Depth: 54.11 ft
Casing Radius: 0.083 ft
Static Water Column Height: 54.11 ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 3.988E-5 cm/sec
Ss = 1.848E-12 ft^{-1}
Kz/Kr = 0.1



WELL TEST ANALYSIS

Data Set: N:\...\B-07_Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:50:18

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-07
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 55.7 ft
Anisotropy Ratio (Kz/Kr): 0.1

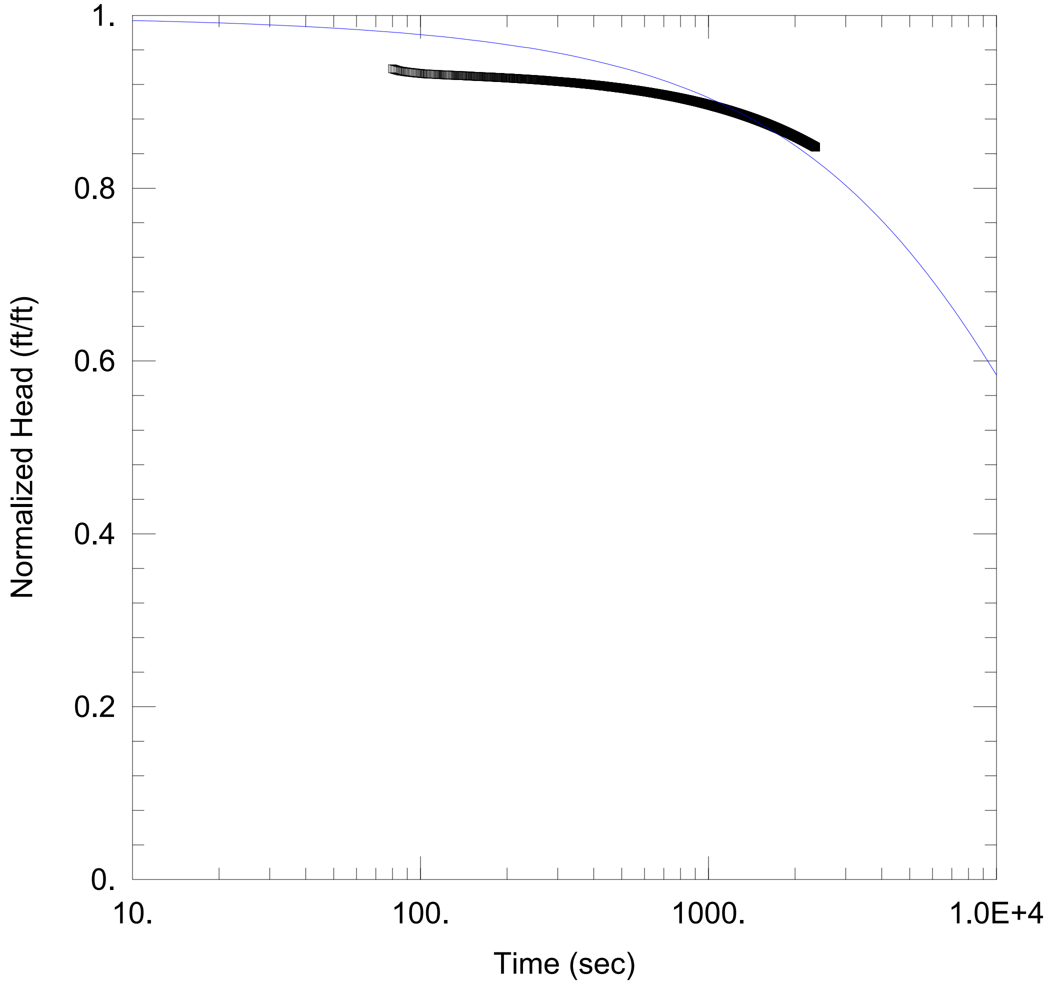
WELL DATA (AP3-B07)

Initial Displacement: 54.69 ft
Static Water Column Height: 55.7 ft
Total Well Penetration Depth: 55.7 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.694E-5 cm/sec
y0 = 51.15 ft



WELL TEST ANALYSIS

Data Set: N:\...\B-07_KGS_rev1.aqt
Date: 06/28/17 Time: 09:50:49

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-07
Test Date: 2/10/2017

AQUIFER DATA

Saturated Thickness: 55.7 ft

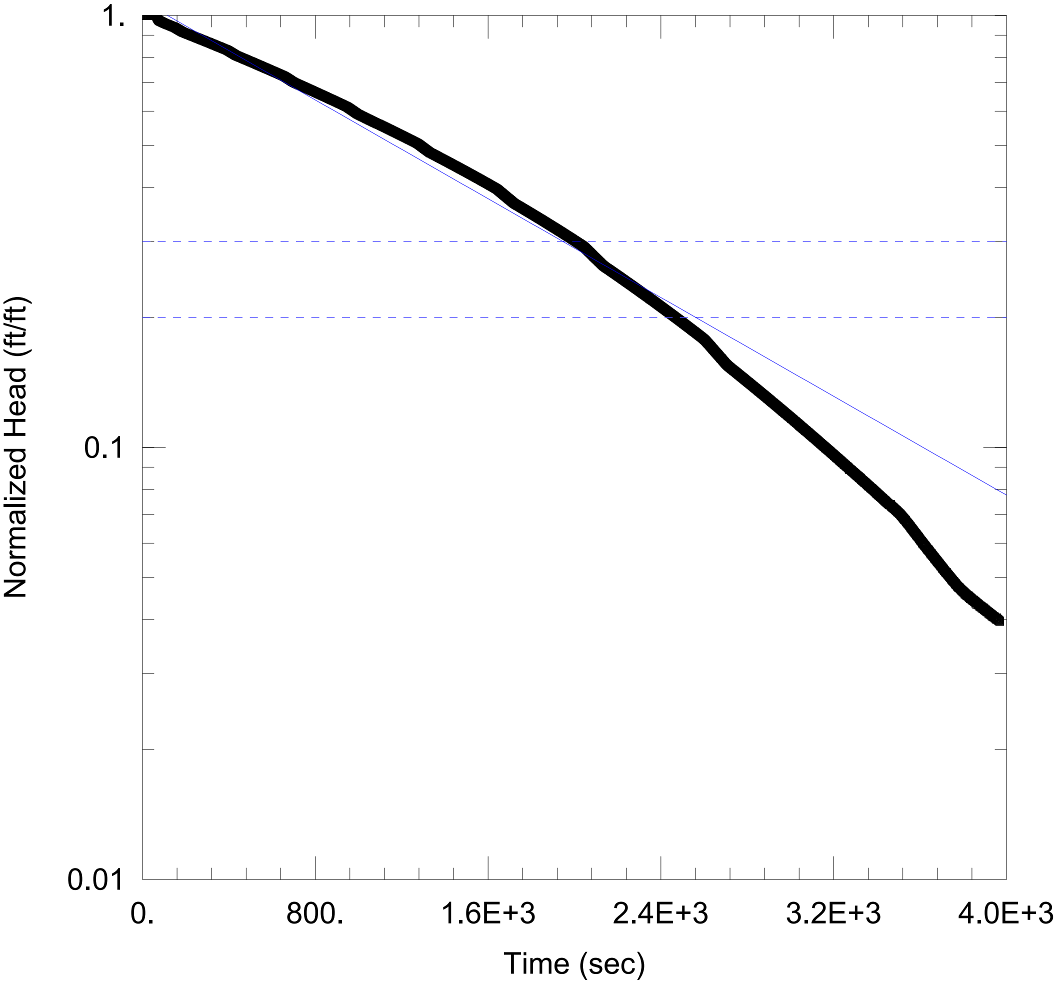
WELL DATA (AP3-B07)

Initial Displacement: 54.69 ft
Total Well Penetration Depth: 55.7 ft
Casing Radius: 0.25 ft
Static Water Column Height: 55.7 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.302E-5 cm/sec
Kz/Kr = 0.1
Ss = 0.001795 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\B-08_Bouwer rice_rev1.aqt
Date: 06/28/17 Time: 09:52:01

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-08
Test Date: 2/11/2017

AQUIFER DATA

Saturated Thickness: 59.83 ft
Anisotropy Ratio (Kz/Kr): 0.1

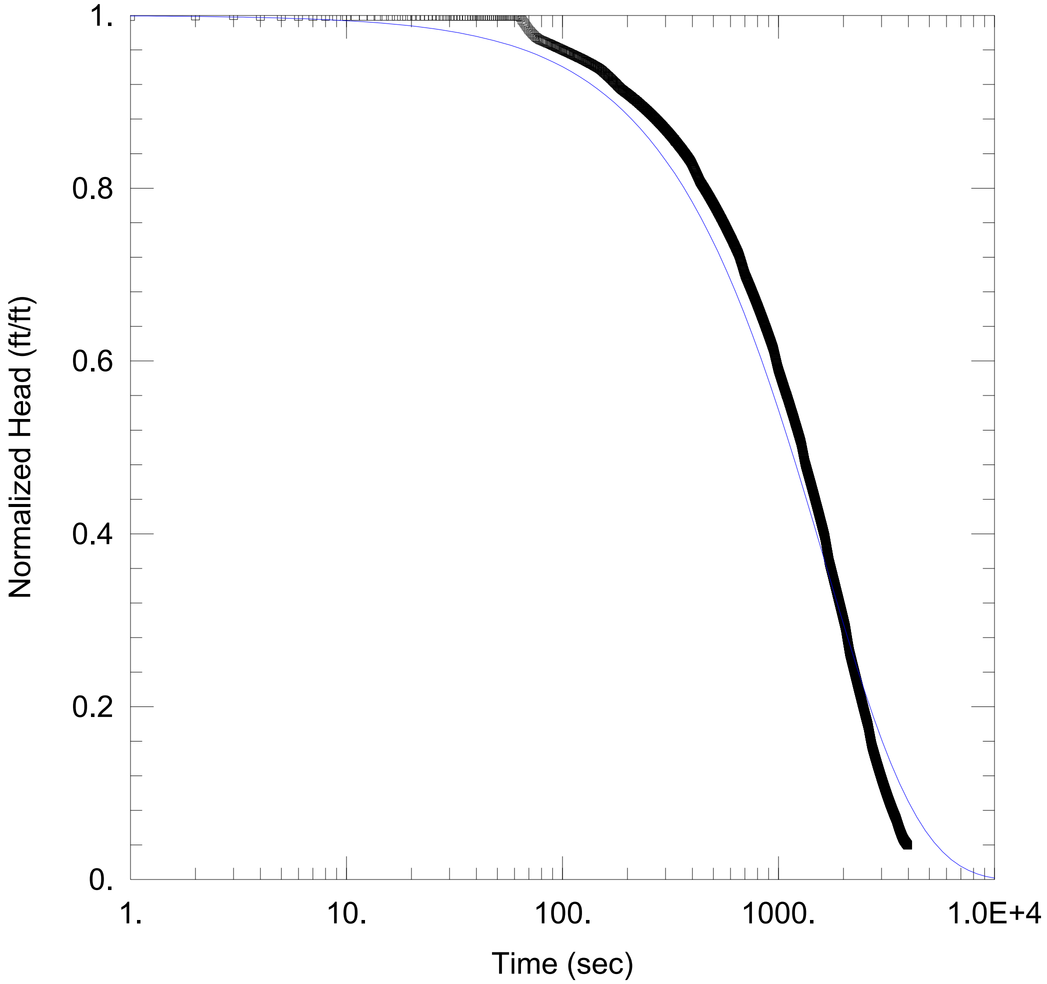
WELL DATA (AP3-B-08)

Initial Displacement: 46.57 ft
Total Well Penetration Depth: 58.83 ft
Casing Radius: 0.25 ft
Static Water Column Height: 59.83 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.000515 cm/sec
y0 = 50.25 ft



WELL TEST ANALYSIS

Data Set: N:\...\B-08_KGS_rev1.aqt
Date: 06/28/17 Time: 09:52:30

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Southern Company
Project: GR6242
Location: Plant Hammond
Test Well: B-08
Test Date: 2/11/2017

AQUIFER DATA

Saturated Thickness: 59.83 ft

WELL DATA (AP3-B-08)

Initial Displacement: 46.57 ft
Static Water Column Height: 59.83 ft
Total Well Penetration Depth: 58.83 ft
Screen Length: 5. ft
Casing Radius: 0.25 ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0004872 cm/sec
Ss = 1.671E-12 ft^{-1}
Kz/Kr = 0.1

TABLE 1

FIELD PERMEABILITY MEASUREMENTS

Piez. No.	Permeability (Ft/Min)	Material Tested
P-1u	2.0 x 10^{-5}	Fill
P-3u	1.2 x 10^{-5}	Fill
P-11	1.0 x 10^{-5}	Fill
P-14	2.6 x 10^{-6}	Fill
P-17	1.0 x 10^{-5}	Fill
P-19	1.6 x 10^{-5}	Fill
P-20	2.3 x 10^{-6}	Fill
P-23	1.5 x 10^{-6}	Fill
P-1L	2.0 x 10^{-4}	Residuum on rock
P-3L	2.4 x 10^{-5}	Residuum on rock
P-4	*	Residuum on rock
P-5L	3.3 x 10^{-4}	Residuum on rock
P-6	7.1 x 10^{-4}	Residuum on rock
P-15	8.3 x 10^{-4}	Residuum on rock
P-18	1.1 x 10^{-4}	Residuum on rock
Z-16	1.2 x 10^{-6}	Residuum on rock
Z-21	2.7 x 10^{-4}	Residuum on rock
P-10	5.1 x 10^{-4}	Terrace
P-13	1.0 x 10^{-4}	Terrace
P-16	8.4 x 10^{-5}	Terrace (+ some residuum
P-22	7.4 x 10^{-4}	Terrace
P-4A	4.2 x 10^{-3}	Rock (+ some residuum)
P-9	1.0 x 10^{-4}	Rock (+ some residuum)
P-12	**	Rock (+ some residuum)
P-21	7^{+} x 10^{-4}	Rock (+ some residuum)

* Permeability in P-4 was too high to measure with available equipment.

** There was no response in P-12, apparently due to clogging the piezometer with grout during the sealing process.

Source: Investigation of Water Loss, LETCO, October 1977.

APPENDIX F

Groundwater Model Calculation Package

Prepared for

Southern Company
241 Ralph McGill Blvd NE
Atlanta, Georgia 30308

GROUNDWATER MODEL CALCULATION PACKAGE PLANT HAMMOND AP-3

GEORGIA POWER COMPANY
Floyd County, Georgia

Submitted by

engineers | scientists | innovators

1255 Roberts Boulevard, Suite 200
Kennesaw, Georgia 30144

Project Number: GR6242
November 2019

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3D	three dimensional
AP	ash pond
cm/s	centimeters per second
EVS	Environmental Visualization System
ft	feet
ft^2/d/ft	square feet per day per foot
Geosyntec	Geosyntec Consultants
GPC	Georgia Power Company
HAR	Hydrogeologic Assessment Report
NAVD88	North American Vertical Datum of 1988
NRMSE	normalized root mean square error
PEST	Parameter Estimation Software
REV	Representative Elementary Volume
SCS	Southern Company Services
USGS	United States Geologic Survey

1.0 INTRODUCTION

This *Groundwater Model Calculation Package* (Report) was prepared to document the construction and calibration of the finalized three-dimensional (3D), steady-state, groundwater numerical flow model used to evaluate the groundwater flow conditions in the vicinity of Ash Pond 3 (AP-3 or Site) at the Georgia Power Company (GPC) owned and operated Plant Hammond (the Plant) near Rome, GA. This Report documents the findings and conclusions of the calibrated groundwater flow model, which was used to simulate existing condition and capping of AP-3 with dewatering of AP-1 and evaluate the impacts of pond closure on the groundwater flow system at the Plant. The Report has been prepared by Geosyntec Consultants, Inc. (Geosyntec) on behalf of Southern Company Services (SCS).

1.1 Model Objectives

The objectives of the numerical groundwater flow modeling were three-fold:

- Construct a steady-state groundwater model of the Site that is calibrated to representative groundwater conditions recorded in the field;

- Simulate groundwater conditions within AP-3 under the current closure scenario using the calibrated model;

- Using the simulated results to evaluate the post-closure groundwater conditions.

2.0 MODEL CONSTRUCTION

2.1 Model Design

Based on the geologic information described in Section 3.0 of the *Hydrogeologic Assessment Report (Revision 01) – Ash Pond 3 (AP-3)* (HAR Rev. 01), the numerical groundwater flow model is conceptualized as being a single aquifer system, composed of five geologic layers (i.e. fill, terrace alluvium material, residuum, highly weathered rock, and unweathered limestone). The geological layers were further vertically discretized to better evaluate flow in the model domain **(Table 1)**. Generally, the geological layers, in addition to ash, were assigned to the numerical model layers as follows:

- Fill: Layer 1 and 2
- Ash: Layer 1 and 2
- Terrace Alluvium Material: Layer 3
- Residuum: Layer 4
- Highly weathered Rock: Layer 5
- Highly Fractured Rock (i.e. top 5 feet of Limestone): Layer 6
- Unweathered Limestone: Layers 7-9

Based on information provided in boring logs and a microgravity survey, the hydraulic properties of the geologic materials within the terrace alluvium material, highly weathered rock, and highly fractured rock were altered to more appropriately represent the materials (e.g., gravel or fractures that may indicate a greater than average hydraulic conductivity value than suggested by the geometric mean of measured values) found in these zones. These zones are shown in **Figures 1** through **9** and the justification for each zonation is provided in **Table 1**.

The bottoms of AP-1 and AP-3 were determined using historical as-built drawings published to GPC's webpage. Data from these sources were imported into the 3D visualization software Environmental Visualization System (EVS) and used to create the bottom of ash for AP-1 and AP-3.

The modular, 3D, finite difference groundwater flow model (MODFLOW), created by the United States Geological Survey (USGS), was used as the modeling program to simulate groundwater flow. Specifically, a Newton formulation of MODFLOW, MODFLOW-NWT (Niswonger, et al., 2011) was utilized because of its capabilities in solving non-linear equations associated with unconfined aquifers and non-linear boundary conditions, conditions relevant to the Site. The constant head package and the drain package (Niswonger, 2011) were used to simulate rivers/creeks and ephemeral steams, respectively. The recharge package (Niswonger, et al., 2011) was used to simulate recharge. Parameter estimation software (PEST) is a model independent parameter estimation program (Watermark Numerical Computing, 1994) that was used during the calibration process to assist in estimating model parameters such as hydraulic conductivity.

For the purposes of the MODFLOW groundwater flow model, the aquifer is assumed to act as an equivalent porous medium. However, a portion of the model domain is comprised of fractured rock. One rationale for this assumption is based on observed historical water levels and associated potentiometric surface maps that indicate a relatively smooth potentiometric surface without angular or sharp changes in the groundwater table.

Geophysical borehole logs were reviewed to evaluate the average open fracture spacing (**Table 3**). The evaluation indicated that in the borings where geophysics data were available that the average open fracture spacing varied from 0.25 to 0.65 fractures per foot with an average of 0.45 fractures per foot. These fracture spacings were used to calculate a representative elementary volume (REV). A REV is the smallest volume over which a measurement can be made that will yield a value representative of a whole. Since MODFLOW assumes groundwater flow in a porous medium (not fractures), it is necessary to understand the scale of the fractured rock system where groundwater flow is the same as in a porous medium. Generally, a REV of equivalent porous media flow occurs at scales of 30 to 50 times grain size diameter on a side. This same concept has been applied to fractured rock systems and for this Site would indicate that a REV for the portion of the limestone evaluated would range from a cube with sides measuring 7.5 feet to a cube with sides measuring 32.5 feet.

2.2 Model Grid and Layering

The model domain consists of 344 rows, 344 columns, and 9 vertical layers. The model cell size varies from approximately 10 ft by 10 ft Near AP-3 and telescopes outward toward the model boundary.

Model layers represent the 5 geologic units described in the HAR Rev. 01 and **Table 1** herein. Ground surface elevations were based on a combination of actual ground surface topography from publicly-available regional LIDAR data and a Site topo map provided by SCS. Lithology and layer elevations were based on subsurface lithologic/geologic boring log descriptions from Site-specific field investigation data, and historical maps of AP-3 construction. Data from these sources were imported using EVS and interpolated to create surfaces for the top and bottom of each model layer. The top of layer 1 is land surface and the elevations are based on LIDAR elevation data provided by the USGS (USGS, 2017) and a Site topo map[1]. Elevations for the bottoms of layer 1 through 9 were based on geological boring log data from the Site. The bottom of layer 9 (bottom of bedrock) was assumed to be at an elevation of 375 ft North American Vertical Datum of 1988 (NAVD88), which varies between 160 to 190 feet below the bottom of the highly fractured rock zone. **Figure 10b** though **Figure 15** show examples of EVS model layering along the cross section lines presented on **Figure 10a.**

In general, a minimum model layer thickness of 0.1 ft was applied to areas where interpolation of artificial pinch-outs were created due to a lack of geological data control points, or where physical pinch-outs of geologic units were observed (e.g. terrace alluvium material directly beneath AP-3). This minimum thickness was enforced because MODFLOW-NWT does not allow for a zero layer thickness in the model grid. For areas where a unit pinches out, cells with a minimum thickness of 0.1 ft were assigned hydraulic conductivity zones to match the geologic unit in the layer below. For example, the terrace alluvium material pinches out underneath AP-3, resulting in small layer thicknesses in model layer 3 beneath AP-3. Those cells were therefore assigned a hydraulic conductivity equal to that of the residuum in model layer 3.

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[1] The topographic contours and details shown inside of the Dike limits were obtained from the stamped as-built final cover survey conducted by Martin Survey and Associates, Inc. of Holly Springs, GA for Salla Construction Company, LLC of Birmingham, AL, Dated 25 October 2012, as provided by Southern Company Services in the CAD file titled "PH-Final 12-4-12."

2.3 Model Boundaries

A conceptual level map of the boundary conditions is shown in **Figure 16** and the boundary conditions assigned to the model are shown in **Figure 16a**. The Coosa River was modeled by assigning a constant head boundary condition elevation of 561.45 ft NAVD88 to Layers 1-5. It should be noted that based on surface water elevation data collected by the USGS from 1 October 2007 until 20 May 2017 at a staff gauge located approximately eight miles east of Plant Hammond, the Coosa River stage has historically varied by 21.7 feet[2]. The depth of the Coosa River is not known adjacent to the Plant and was assumed to be approximately 17 feet deep and extend to the top of the highly-fractured limestone.

Cabin Creek is shown on the USGS topo (USGS, 1967) in **Figure 16** to be continually present and was also modeled as a constant head boundary condition. However, observations made during Site visits indicated that Cabin Creek is shallow. Furthermore, the elevation of Cabin Creek changes from approximately 570 ft to 561.45 ft NAVD88. Therefore, the constant head boundary condition that represents Cabin Creek is assigned to the uppermost active layer. For example, in one portion of the model the boundary condition would be assigned to layer 1. However, as Cabin Creek cuts down through the terrain, it reaches a point where it influences layer 2 and layer 1 is now dry. In these instances, the constant head boundary condition would be assigned to layer 2 instead of layer 1.

The USGS topo map indicates an ephemeral stream along the western portion of the model. Due to the ephemeral nature of the unnamed stream, it was assigned as a drain boundary condition. The drain elevations were derived from the Site-specific topo data and USGS topo and ranged from 590.6 ft NAVD88 near the northern edge of the model to the southern terminus of the Coosa River with a 9 February 2017 measured elevation of 561.45 ft NAVD88. The drain conductance was a calibrated value and set at 10 square feet per day per foot (ft^2/d/ft). Like Cabin Creek, this unnamed stream is shallow, and therefore the drain boundary condition was only assigned to the uppermost active layer.

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[2] https://nwis.waterdata.usgs.gov/usa/nwis/uv/?cb_00065=on&format=rdb&site_no=02397000&period=&begin_date=2007-10-01&end_date=2017-05-21

The USGS topo map in **Figure 16** shows that a topographic ridge is located north and west of the Site. It was assumed that this ridge functions as a no flow boundary condition as surface water runoff appears to collect in streams or water bodies on either site of the ridge.

AP-1 and AP-2 were both modeled as constant head boundary conditions. Ash was present in layers 1 and 2 in AP-1. Therefor the 9 February 2017 measured constant head boundary condition (585.09 ft NAVD88) was applied to both layers 1 and 2 in AP-1. Less information is available regarding AP-2 therefore the 9 February 2017 measured constant head boundary condition of 596.43 ft NAVD88 was applied only to the uppermost active cell. Similarly, little information is known regarding the industrial wastewater ponds to the east of Cabin Creek, which are not owned by GPC. Therefore, the surface water elevation derived from LIDAR data (588 ft NAVD88) was assigned to the uppermost active cell in these locations.

2.3.1 Model Recharge

The USGS performed a recharge study for the Coosa River basin (USGS, 1996). The study evaluated average recharge for the 4,040 square mile drainage basin that is represented by streamflow measurements made at a point on the Coosa River approximately 8 miles east of the Site. The recharge study estimated that the average recharge rate for the entire basin was 13.2 inches per year, but may be as low as 3.2 inches per year during droughts. It should be mentioned that these estimates are averages. Actual recharge will vary locally based on topography, surface water, run-off, man-made drainage features, rainfall intensity, etc. Therefore, these two recharge estimates were used as the upper and lower bounds for estimating recharge assigned to various zones within the model domain during model calibration. As shown in **Figure 17**, four recharge zones were assigned to the Site. The area south of the railroad tracks does not receive recharge as much of the area is covered with pavement or buildings and the remainder of the area is close to the Coosa River and is therefore in a discharge area. The area north of the railroad tracks was assigned a recharge value of 6.38 inches per year. This reflects the lower amount of recharge expected in the area due to runoff from relatively steep topography and the presence of man-made stormwater ditches. The area north of Cabin Creek was assigned a recharge of 13.2 inches per year as it is the headwaters area for Cabin Creek. Additionally, AP-3 was assigned a recharge rate of 3.7 inches per year in stormwater runoff is directed to an inner perimeter stormwater collection system. This recharge rate depicts baseline conditions for when the AP-3 cover system was incomplete (i.e., February 9, 2017). It should be noted that 0.57 inches of precipitation fell on nearby Rome, GA on February 8, 2017 (wunderground.com, 2017). This is one day before Geosyntec personnel were on Site collecting static groundwater and surface water measurements that were used to calibrate the model.

2.4 Hydraulic Conductivity Zones

In general, hydraulic conductivity zonation was based on a specific geologic material, which represented a layer in the model. The range, geometric mean and model calibrated hydraulic conductivity values for each geologic material are presented in **Table 1**. If available, well-specific hydraulic conductivity values were incorporated into the model (**Table 4**). However, model calibration was not possible using a single hydraulic conductivity for each geologic material as this produced unacceptable residuals in the residuum, highly weathered rock, and highly fractured rock. Therefore, the boring logs of monitoring wells with relatively high residuals were evaluated for the presence of material within the well screen that may be hydraulically different than that of the main geologic unit. Additionally, a microgravity survey was evaluated for the presence of bedrock zones that may contain open fractures/ solution voids (low density materials) or lower hydraulic conductivity zones (high density materials). Finally, where available, the measured hydraulic conductivity in wells with relatively high residuals were evaluated for differences from the value used in the model for the geologic unit. **Figures 1 through 9** show the hydraulic conductivity zones used in layers 1 through 9. A table of hydraulic conductivity zones is shown in **Table 1**.

2.5 Model Calibration

The model was calibrated to groundwater elevation targets based on measurements at monitoring wells and surface water locations made by Geosyntec on February 9, 2017. These measurements, well screen elevations, calibrated modeled values for each well are shown on **Table 5**. Wells were assigned to model layers based on their screen elevations. The groundwater flow model was calibrated to the actual on-site groundwater conditions by setting drain conductance to 10 ft^2/d/ft and then modifying recharge and hydraulic conductivity using PEST version 13.6 (Watermark, 1994) to allow the named parameters to vary within measured ranges until the best statistical fit between measured and observed head elevations was obtained. Following the use of PEST, zones within select geologic materials were adjusted according to available data as described in Section 2.4 to obtain a satisfactory fit. The model was considered calibrated once simulated output closely approximated observed field conditions (e.g. inferred groundwater flow directions, groundwater gradients, groundwater elevations at monitoring wells observed on Site), and when calibration statistics indicated a low residual mean error and a normalized root mean square error (NRMSE) less than 10%. NRMSE is used to measure the difference between observed groundwater values and model predicted values. The smaller the difference between observed and predicted values, the smaller the NRMSE percentage. Typically, groundwater models are considered calibrated when NRMSE is less than 10%.

Simulated groundwater elevation contours of the calibrated model are shown in **Figure 18** for the highly fractured rock zone and **Figure 19** for the terrace alluvium material. These zones were selected because most of the wells near AP-3 are screened in the highly weathered zone/highly fractured zone and most of the wells near AP-1 are screened at least partially in the terrace alluvium material. Simulated contours and flow directions generally matched historical potentiometric contour and flow direction maps generated from measured groundwater elevations. The simulated and the observed groundwater elevations were compared at the 36 monitoring well targets incorporated into the model by calculating the residual (observed groundwater elevation minus simulated groundwater elevation) for each well target (**Table 5**). The minimum residual head value was -3.81 ft and the maximum residual head value was 3.20 ft, over a range in observed head values of 20.76 ft. Comparison statistics for the well targets in **Table 5** show a residual mean error (ME) of -0.15 ft and a NRMSE of 9.9%); the proximity of these statistics to zero indicates a good match between observed and simulated heads and that the model is reasonably calibrated. The computed mass water balance error for the model was also small (-2.0 E-04%). **Figure 20** plots observed versus simulated head values for the 36 targets, and shows a good match between observed and simulated heads based on proximity of the results to the 1:1 correlation line. **Figure 21** shows observed head versus model residuals and shows that there is no strong bias to the residuals. Combined with the comparison statistics and negligible mass balance error, **Figure 20** and **Figure 21** support the conclusion that the flow model is a reasonable representation of actual Site conditions. Overall, simulated head contours, flow directions, calibration statistic, and model residuals indicates that the model is reasonably calibrated.

3.0 PREDICTIVE SIMULATIONS

After calibration, the groundwater model was used to evaluate the predictive scenario for pre-closure conditions (i.e., calibration run) and final closure design at steady state.

3.1 Scenario 1: Baseline Condition (Base Case, Pre-Closure)

This scenario is the calibrated model representing the conditions present at the Site before completion of the cover system, i.e. the "existing condition" at the time of model construction (i.e., February 9, 2017). **Figure 22** shows the baseline groundwater elevation contours generated from the model simulation.

3.2 Scenario 2: Install Cover at AP-3; AP-1 at Baseline Pool Level (Post-Closure)

Scenario 2 represents the conditions at the Site following completion of the cover system at AP-3 but prior to the dewatering and closure of AP-1. Under this scenario, recharge over AP-3 was reduced to zero and the constant head boundary condition at AP-1 was set at 585.09 ft to represent the pool water level measured February 9, 2017. **Figure 23** shows model predicted groundwater elevation contour map.

3.3 Scenario 3: Install Cover at AP-3 and Drain AP-1 (Post-Closure)

Scenario 3 represents the conditions at the Site following completion of the cover system at AP-3 and the anticipated closure of AP-1. Under this scenario, recharge over AP-3 was reduced to zero and the constant head boundary condition at AP-1 is removed to represent the removal of free water and closure of that unit. **Figure 24** shows model predicted groundwater elevation contour map.

Groundwater flow models are necessarily simplified mathematical representations of complex natural systems. Therefore, all groundwater models have limits to their accuracy and associated uncertainties in model predictions. The goal of this model was not to define precise predictive scenarios, but to provide relative groundwater elevation and flow information. The supporting calibration statistics and representative flow simulations provide an acceptable degree of confidence that the model is calibrated and suitable for its intended purpose.

4.0 SENSITIVITY ANALYSIS

A sensitivity analysis was performed to evaluate the effect that decreased horizontal and vertical hydraulic conductivity of the residuum would have on the calibration of the model. This parameter was chosen as the residuum is present beneath the ash in AP-3 and the hydraulic conductivity of the residuum plays a role in the feasibility of closure options. For the sensitivity analysis, the horizontal hydraulic conductivity of the residuum was reduced from 2.20 x 10^{-4} centimeters per second (cm/s) to 2.20 x 10^{-5} cm/s and the vertical hydraulic conductivity was reduced from 9.15 x 10^{-5} cm/s to 1.46 x 10^{-6} cm/s. The residuals between the calibrated head values and the sensitivity head values are shown in **Table 6**. The relatively small residuals (average residual is -0.06 ft and absolute average residual is 0.12 ft) between the simulations indicates that the model is not very sensitive to the hydraulic conductivity of the residuum. The implies that the potential for natural fluctuation of hydraulic conductivity within the residuum will not negatively impact the constructed model’s ability to accurately predict scenarios.

5.0 CONCLUSIONS

A three-dimensional steady state groundwater flow model was constructed to simulate various scenarios at the Site. Once calibrated, the model was used to simulate the groundwater flow conditions that would result from constructing a cap at AP-3 and draining AP-1 (Scenario 3). Under this scenario, the model predicts approximately a four-foot reduction in the groundwater elevation across the Site relative to the modeled pre-closure baseline conditions (Scenario 1).

6.0 REFERENCES

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TABLES

Table 1. Geologic Zones and Hydraulic Conductivity Values

Geologic Unit	Assigned Groundwater Model Layer	Data Source	Horizontal Hydraulic Conductivity, K_h (cm/s)				Vertical Hydraulic Conductivity, K_v (cm/s)			
			Geometric Mean	**Model**	**Range of Values**	**Number of Observations**	**Geometric Mean**	**Model**	**Range of Values**	**Number of Observations**
Residuum	**4**	Law Engineering (1977), Southern Company (2014) - K_h Golder (2016) & Geosyntec (2017) - K_v	2.01E-04	2.20E-04	6.10E-07 to 2.35E-02	13	2.91E-07	9.15E-05	1.00E-07 to 1.40E-06	6
Fill	**1, 2**	Law Engineering (1977) - K_h Golder (2016) & Geosyntec (2017) - K_v	3.33E-06	1.02E-05	7.62E-07 1.02E-05	8	4.12E-08	1.5E-07 at berm; 1.85E-06 elsewhere	1.50E-08 to 1.50E-07	4
Terrace Material	**3**	Law Engineering (1977) - K_h Golder (2016) & Geosyntec (2017) - K_v	1.21E-04	1.11E-03	4.27E-05 to 3.76E-04	4	9.47E-08	2.14E-04	6.40E-08 to 1.40E-07	2
Rock (+ some residuum)	**5, 6**	Law Engineering (1977) - K_h	3.38E-04	3.38E-03	5.08E-05 to 2.13E-03	3	-	3.38E-04	-	-
Limestone	**7, 8, 9**	Geosyntec (2017) - K_h	4.99E-04	3.53E-04	6.22E-05 to 2.82E-03	7	-	3.53E-05	-	-

Notes:
1) The samples tested for vertical hydraulic conductivity of the terrace material contained more clay than average and likely underestimate the vertical hydraulic conductivity.
2) The following additional hydraulic conductivity zones are shown on Figures 1 through 9. The hydraulic conductivities (cm/s) and rationale for changing the hydraulic conductivity are shown below:

Low Density Limestone Kh=1.76E-02 Kv=1.76E-03 Calibrated based on assumed increased fracture density from microgravity survey
High Density Limestone Kh=3.53E-05 Kv=3.53E-06 Calibrated based on assumed decreased fracture density from microgravity survey
High K Terrace Material Kh=5.00E-02 Kv=5.00E-03 Calibrated based on relatively high K values measured at AP1-MW6 and AP1-MW7, sand lense in APC1-5S, and sandy gravel in AP1-C4.
Low K residuum Kh=8.82E-0 6Kv=8.82E-07 Used lower range of K for residuum based on presence of only clay in this boring.
East of AP1 Low K Residuum Kh=3.38E-05 Kv=3.38E-06 Used lower range of K for residuum based on presence of only clay in this boring.
East of AP1 High K Residuum Kh=7.06E-03 Kv=7.06E-04 Calibrated based on presence of sandy gravel in well screen of AP1C-1
SW of AP1 Sand Kh=5.00E-02 Kv=5.00E-03 Calibrated based on sand seam in residuum at AP1C-6
SW of AP3 Highly Weathered Limestone Kh=8.42E-02 Kv= 8.42E-03 Calibrated based on partially weathered rock (shale gravel) AP3-MW21 and AP1-MW-1
SW of AP3 High K Highly Fractured Zone Kh=2.68E-02 Kv=2.68E-03 Calibrated based on partially weathered rock (shale gravel) AP3-MW21 and AP1-MW-1
water Kh=3.53E+00 Kv=3.53E+00 High K used to simulate water in Coosa River and Cabin Creek.

Table 2. Groundwater Elevations Near AP3-B-11 - February 9, 2017

Monitoring Well Name	Easting (ft)	Northing (ft)	Distance from AP3-B-11	Groundwater Elevation 2/9/17 (ft)	Reduction in Groundwater Elevation from AP3-B-11 (ft)
AP3-B-4	1942920.34	1550709.19	320	567.14	16.98
AP3-B-5	1942521.24	1550275.29	295	570.48	13.64
AP3-B-9	1942654.24	1550662.39	120	567.00	17.12
AP3-B-10	1942345.89	1550500.71	300	568.89	15.23
AP3-B-11	1942643.26	1550545.31	0	584.12	0.00

Notes:
1) Elevations are referenced to NAVD88
2) Northing and Easting reference the Georgia State Plane West (NAD83)

Table 3. Fracture Spacing Evaluation

Borehole Name	Length of Borehole Geophysics Data (ft)	Total Number of Open Fractures	Total Open Space (ft)	Fractures per Foot	Open Space per length (ft/ft)
AP3-B-2	59	32	2.85	0.54	0.048
AP3-B-3	44.5	11	1.03	0.25	0.023
AP3-B-4	3.1	2	0.50	0.65	0.161
AP3-B-9	2.75	1	0.65	0.36	0.236

Table 4. Well-Specific Measured Hydraulic Conductivity Values

Monitoring Well Name	Easting (ft)	Northing (ft)	Well Screen Midpoint Elevation (ft)	Model Layer	Measured Horizontal Hydraulic Conductivity (cm/s)		Measured Vertical Hydraulic Conductivity (cm/s)	
AP1-MW-1	1941590.75	1549936.41	563.10	6	2.68E-03	e	-	
AP1-MW-5	1942445.49	1548430.84	555.60	6	1.84E-03	e	-	
AP1-MW-6	1941686.57	1548381.22	554.30	6	1.14E-02	e	-	
AP1-MW-7	1941084.33	1548230.08	556.50	4	2.35E-02	e	-	
APA-4 (HGWA-4MW-19)	1939386.06	1549932.71	567.90	3	9.74E-04	e	-	
APA-2 (HGWA-1MW-20)	1940773.28	1550423.59	568.40	7	1.41E-03	e	-	
AP3-MW-21	1941812.40	1550265.01	565.50	5	8.42E-03	e	-	
HGWA-122 (AP3-MW-22)	1941892.64	1551247.62	565.70	6	2.50E-02	e	-	
AP3-MW-23	1942503.03	1551636.22	558.10	6	5.04E-02	e	-	
HGWC-124 (AP3-MW-24)	1942787.04	1551618.74	552.70	7	1.27E-03	e	-	
HGWC-8 (AP1C-2)	1942392.75	1549114.34	559.43	3	-		6.40E-08	e
HGWC-9 (AP1C-3)	1942215.01	1548692.82	538.62	5	-		1.50E-08	e
HGWC-11 (AP1C-5S)	1941146.65	1548477.54	560.33	4	-		6.10E-08	e
AP3-B-1	1942043.87	1550918.48	530.63	7	5.70E-04	b	1.40E-06	c
AP3-B-2	1941995.70	1551318.19	493.00	8	2.34E-04 (496.80'-491.80')	b	1.10E-07	c
AP3-B-3	1942862.68	1551280.14	507.00	7	2.82E-03 (549.15'-544.15')	b	2.90E-07	c
AP3-B-4	1942920.34	1550709.19	552.39	6	9.25E-04	b	2.10E-08	d
AP3-B-5	1942521.24	1550275.29	542.83	7	6.95E-04	b	7.60E-07	c
AP3-B-6S	1942122.65	1550542.92	581.95	1	4.13E-02	a	-	
AP3-B6I	1942123.35	1550538.41	546.48	5	9.75E-05	a	1.00E-07	c
AP3-B6D	1942124.44	1550530.98	523.76	7	6.22E-05	a	-	
AP3-B-8	1942521.40	1551323.29	519.59	7	5.15E-04	b	1.80E-07	c

Notes:
"-" = data unavailable
Source citation of hydraulic conductivity values:
a) Measured via slug test by Geosyntec, 2017
b) Measured via packer test by Geosyntec, 2017
c) Laboratory measurement of residuum vertical hydraulic conductivity by Geosyntec, 2017
d) Laboratory measurement of fill vertical hydraulic conductivity by Geosyntec, 2017
e) Provided by others

Elevations are referenced to NAVD88

Table 5. Observed and Modeled Groundwater Elevations February 9, 2017

Monitoring Well Name	Easting (ft)	Northing (ft)	Well Screen Midpoint Elevation (ft)	Model Layer	Observed Groundwater Elevation (ft)	Simulated Groundwater Elevation (ft)	Residual (ft)
AP1-MW-1	1941590.75	1549936.41	563.10	6	581.53	579.23	2.30
AP1-MW-5	1942445.49	1548430.84	555.60	6	562.79	562.23	0.56
AP1-MW-6	1941686.57	1548381.22	554.30	6	563.41	563.49	-0.08
AP1-MW-7	1941084.33	1548230.08	556.50	4	562.66	563.54	-0.88
APA-4 (HGWA-4MW-19)	1939386.06	1549932.71	567.90	3	583.42	582.87	0.55
APA-2 (HGWA-1MW-20)	1940773.28	1550423.59	568.40	7	580.12	583.39	-3.27
AP3-MW-21	1941812.40	1550265.01	565.50	5	581.45	578.25	3.20
HGWA-122 (AP3-MW-22)	1941892.64	1551247.62	565.70	6	578.57	579.14	-0.57
AP3-MW-23	1942503.03	1551636.22	558.10	6	574.61	574.37	0.24
HGWC-124 (AP3-MW-24)	1942787.04	1551618.74	552.70	7	570.50	570.83	-0.33
HGWA-1 (APA-2MW-20)	1940773.31	1550423.69	568.30	7	580.12	583.39	-3.27
HGWA-2 (APA-3S)	1939845.20	1549796.40	565.23	3	581.02	582.86	-1.84
HGWA-3 (APA-3D)	1939833.46	1549793.93	548.19	5	581.20	581.40	-0.20
HGWA-4 (APA-4MW-19)	1939386.17	1549932.76	567.90	3	583.42	582.87	0.55
HGWC-7 (AP1C-1)	1942319.97	1549520.39	556.32	5	575.77	572.93	2.84
HGWC-8 (AP1C-2)	1942392.75	1549114.34	559.43	3	577.42	574.39	3.03
HGWC-9 (AP1C-3)	1942215.01	1548692.82	538.62	5	566.10	566.85	-0.75
HGWC-10 (AP1C-4)	1941644.41	1548469.51	561.66	3	565.15	566.38	-1.23
HGWC-11 (AP1C-5S)	1941146.65	1548477.54	560.33	4	564.80	567.55	-2.75
HGWC-12 (AP1C-5D)	1941152.08	1548475.82	550.33	6	564.80	568.61	-3.81
HGWC-13 (AP1C-6)	1940900.41	1548628.52	554.76	4	576.53	573.48	3.05
HGWC-120 (P20-2016)	1942907.17	1551082.00	552.76	7	566.60	567.11	-0.51
AP1A-1	1941613.87	1550080.50	571.17	3	581.59	581.51	0.08
AP3-B-1	1942043.87	1550918.48	530.63	7	577.63	575.12	2.51
AP3-B-2	1941995.70	1551318.19	493.00	8	578.20	577.11	1.09
AP3-B-3	1942862.68	1551280.14	507.00	7	564.50	568.30	-3.80
AP3-B-4	1942920.34	1550709.19	552.39	6	567.14	566.28	0.86
AP3-B-5	1942521.24	1550275.29	542.83	7	570.48	568.80	1.68
AP3-B-6S	1942122.65	1550542.92	581.95	1	574.80	577.15	-2.35
AP3-B6I	1942123.35	1550538.41	546.48	5	574.70	572.83	1.87
AP3-B6D	1942124.44	1550530.98	523.76	7	572.87	573.11	-0.24

Table 5. Observed and Modeled Groundwater Elevations February 9, 2017

Monitoring Well Name	Easting (ft)	Northing (ft)	Well Screen Midpoint Elevation (ft)	Model Layer	Observed Groundwater Elevation (ft)	Simulated Groundwater Elevation (ft)	Residual (ft)
AP3-B-7	1942387.32	1551042.74	518.36	7	571.56	571.48	0.08
AP3-B-8	1942521.40	1551323.29	519.59	7	573.14	572.01	1.13
AP3-B-9	1942654.24	1550662.39	538.00	7	567.00	568.55	-1.55
AP3-B-10	1942345.89	1550500.71	552.69	4	568.89	572.44	-3.55
*AP3-B-11**	*1942643.26*	*1550545.31*	*539.62*	*6*	*584.12*	*568.90*	*15.22*

Min Residual	-3.81
Max Residual	3.20
Range	20.76
Mean Error	-0.15
NRMSE	9.9%

Notes:
*AP3-B-11 was not included in the statistical evaluations. The measured groundwater elevation in this well is approximately 15 feet higher than it's nearest neighbors

1) Elevations are referenced to NAVD88. Northing and Easting reference the Georgia State Plane West (NAD83)

Table 6. Sensitivity Evaluation

Monitoring Well Name	Calibrated Head (ft)	Sensitivity Analysis Head (ft)	Residual
AP1-MW-1	579.25	579.35	-0.10
AP1-MW-5	562.26	562.23	0.04
AP1-MW-6	563.58	563.51	0.06
AP1-MW-7	564.08	563.70	0.39
HGWA-4 (APA-4MW-19)	582.95	583.15	-0.20
APA-2 (HGWA-1MW-20)	583.43	583.58	-0.16
AP3-MW-21	578.26	578.40	-0.13
HGWA-122 (AP3-MW-22)	579.15	579.36	-0.20
AP3-MW-23	574.38	574.53	-0.15
HGWC-124 (AP3-MW-24)	570.83	570.90	-0.07
HGWA-1 (APA-2MW-20)	583.43	583.58	-0.16
HGWA-2 (APA-3S)	582.93	583.10	-0.17
HGWA-3 (APA-3D)	581.47	581.60	-0.13
HGWA-4 (APA-4MW-19)	582.95	583.15	-0.20
HGWC-7 (AP1C-1)	572.94	573.07	-0.13
HGWC-8 (AP1C-2)	574.40	574.45	-0.06
HGWC-9 (AP1C-3)	566.90	566.89	0.02
HGWC-10 (AP1C-4)	566.68	566.37	0.31
HGWC-11 (AP1C-5S)	567.75	567.60	0.15
HGWC-12 (AP1C-5D)	568.73	568.62	0.10
HGWC-13 (AP1C-6)	573.55	573.53	0.03
HGWC-120 (P20-2016)	567.11	567.12	0.00
AP1A-1	581.53	581.64	-0.11
AP3-B-1	575.14	575.29	-0.16
AP3-B-2	577.13	577.29	-0.16
AP3-B-3	568.30	568.30	0.00
AP3-B-4	566.28	566.30	-0.02
AP3-B-5	568.81	568.90	-0.09
AP3-B-6S	577.17	577.61	-0.45
AP3-B6I	572.84	572.94	-0.10
AP3-B6D	573.12	573.23	-0.11
AP3-B-7	571.49	571.53	-0.04
AP3-B-8	572.02	572.09	-0.08
AP3-B-9	568.55	568.59	-0.04
AP3-B-10	572.45	572.38	0.06
AP3-B-11	568.91	568.95	-0.05
		Average	-0.06
		Abs. Average	0.12

FIGURES

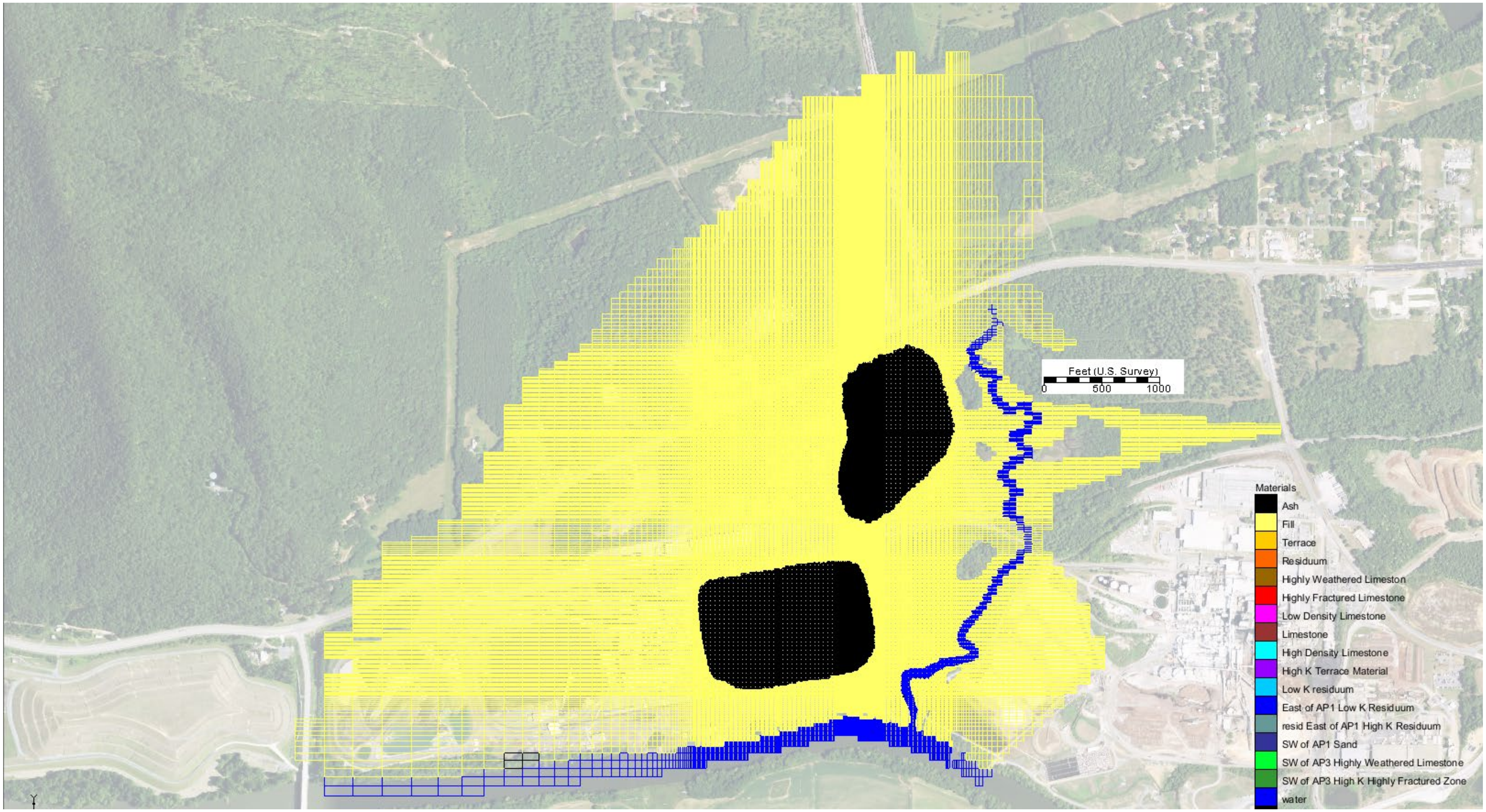


Figure 1: Layer 1 Hydraulic Conductivity Zones

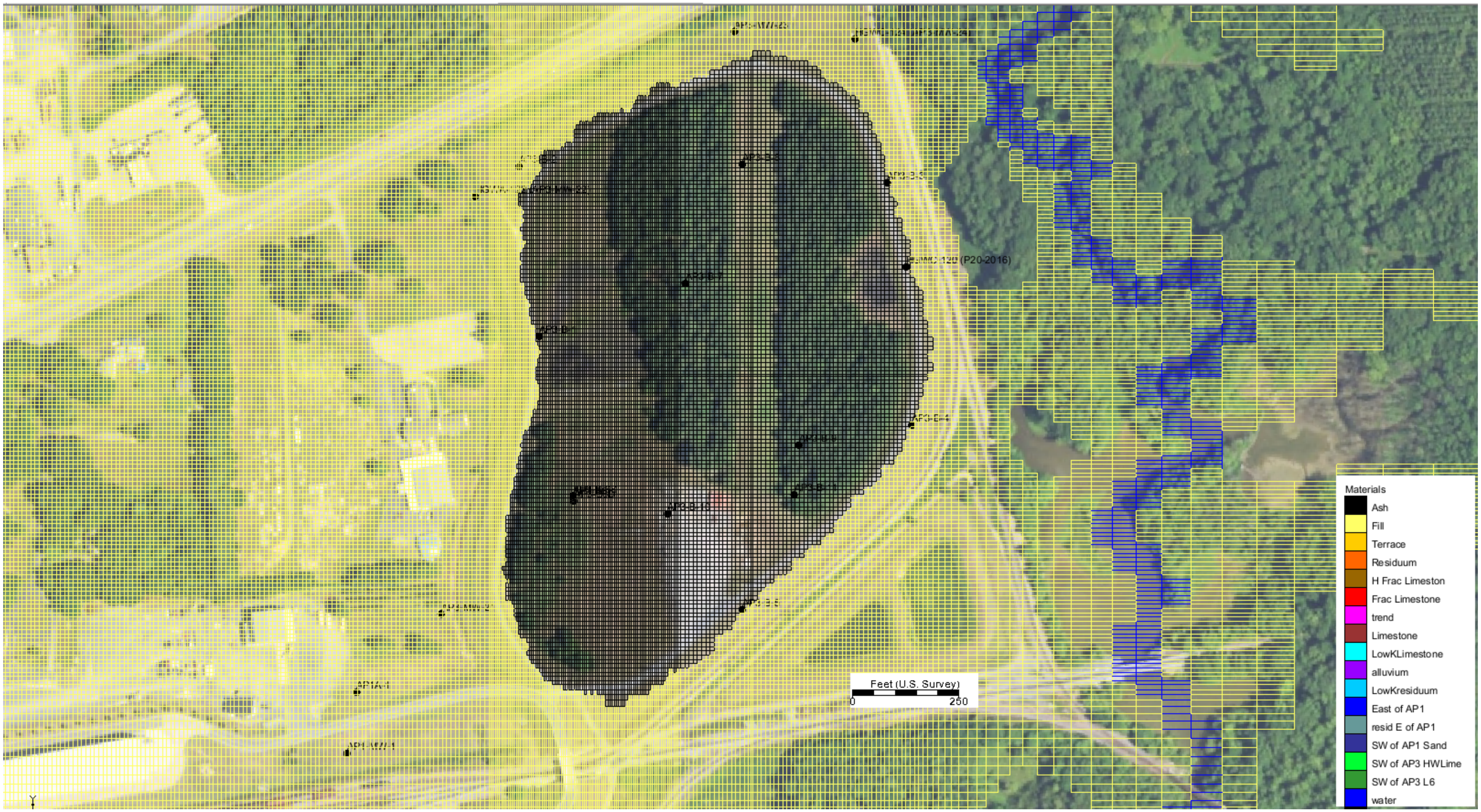


Figure 1a: Layer 1 Hydraulic Conductivity Zones Near AP-3

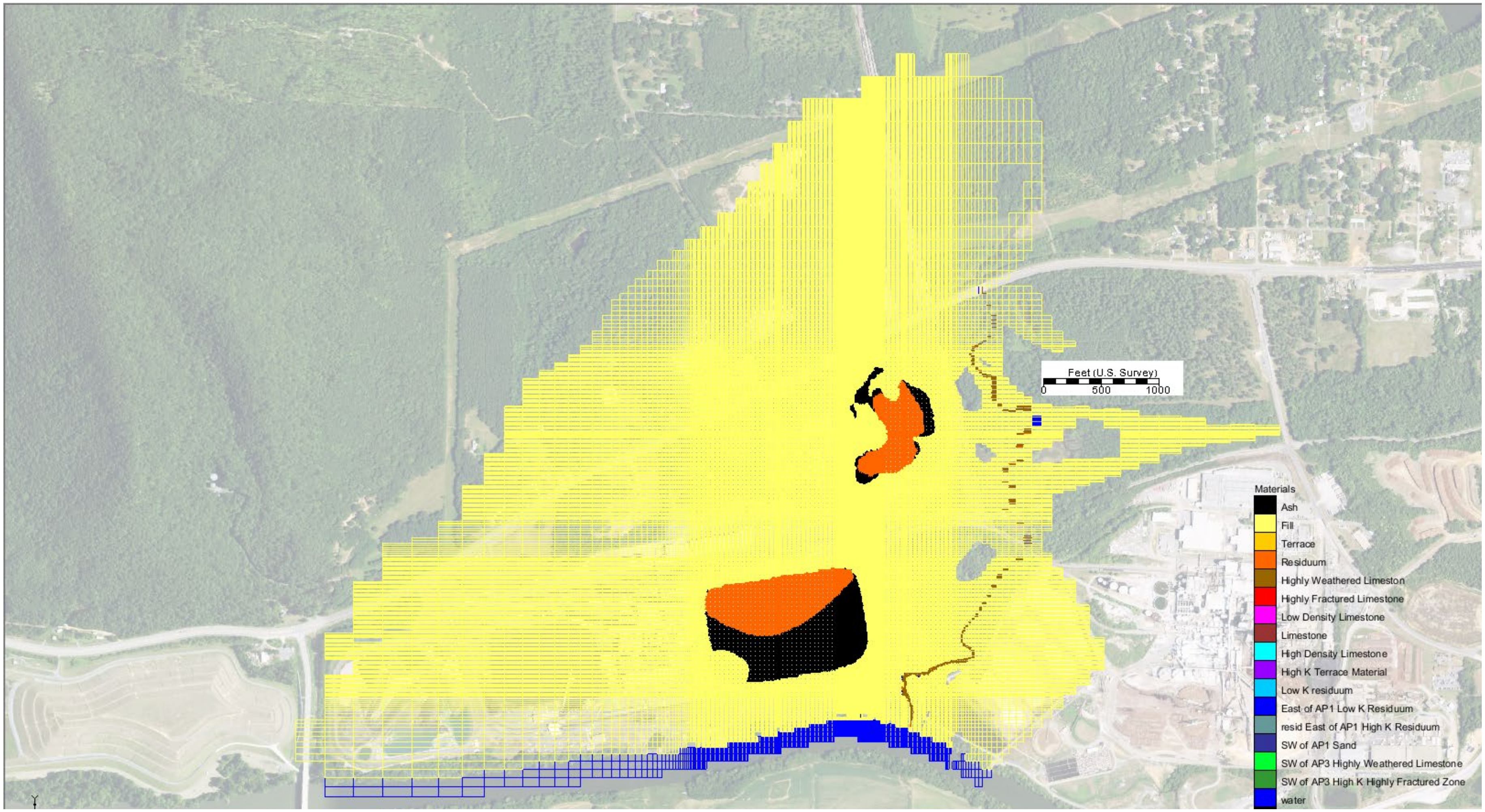


Figure 2: Layer 2 Hydraulic Conductivity Zones

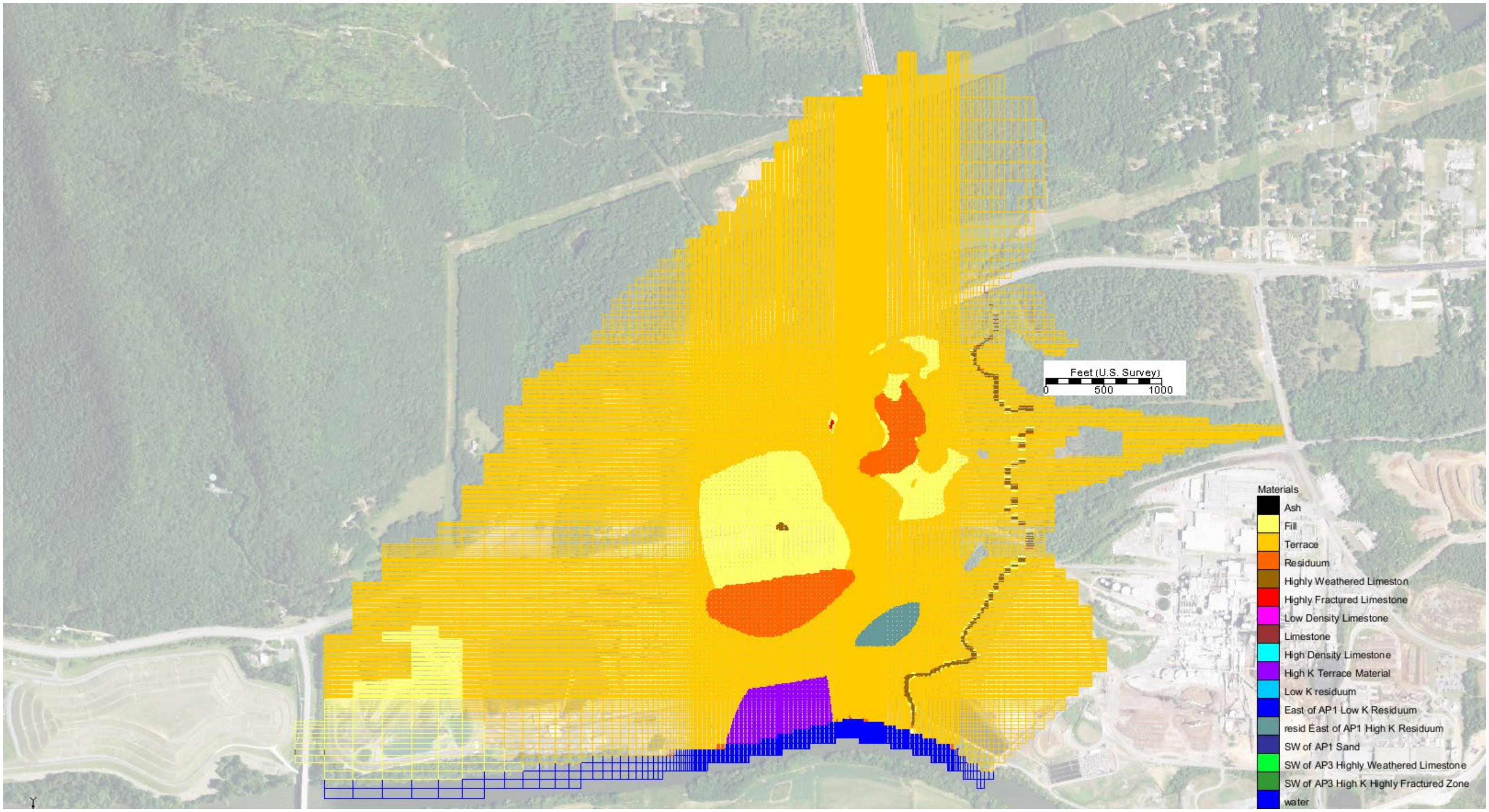


Figure 3: Layer 3 Hydraulic Conductivity Zones

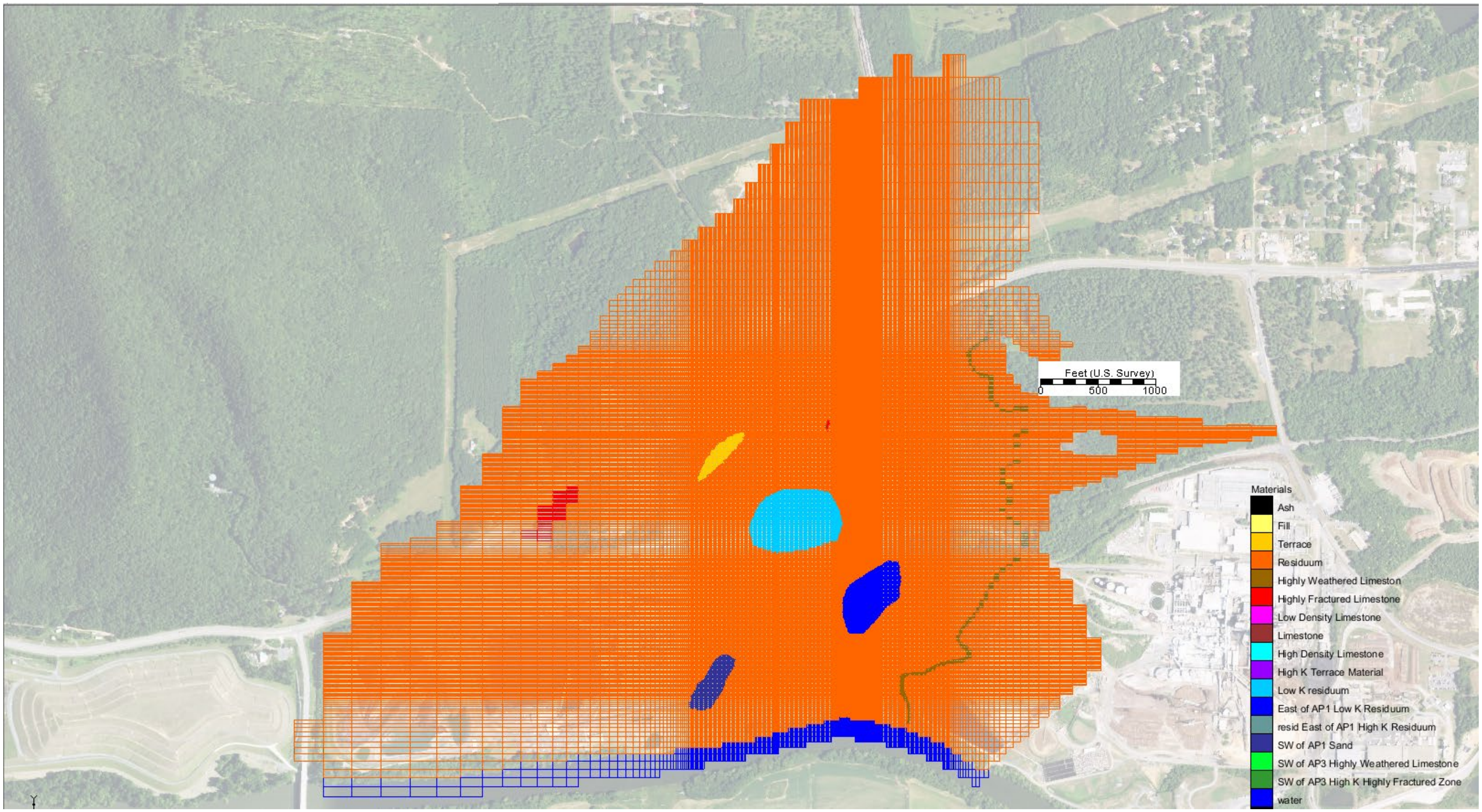


Figure 4: Layer 4 Hydraulic Conductivity Zones

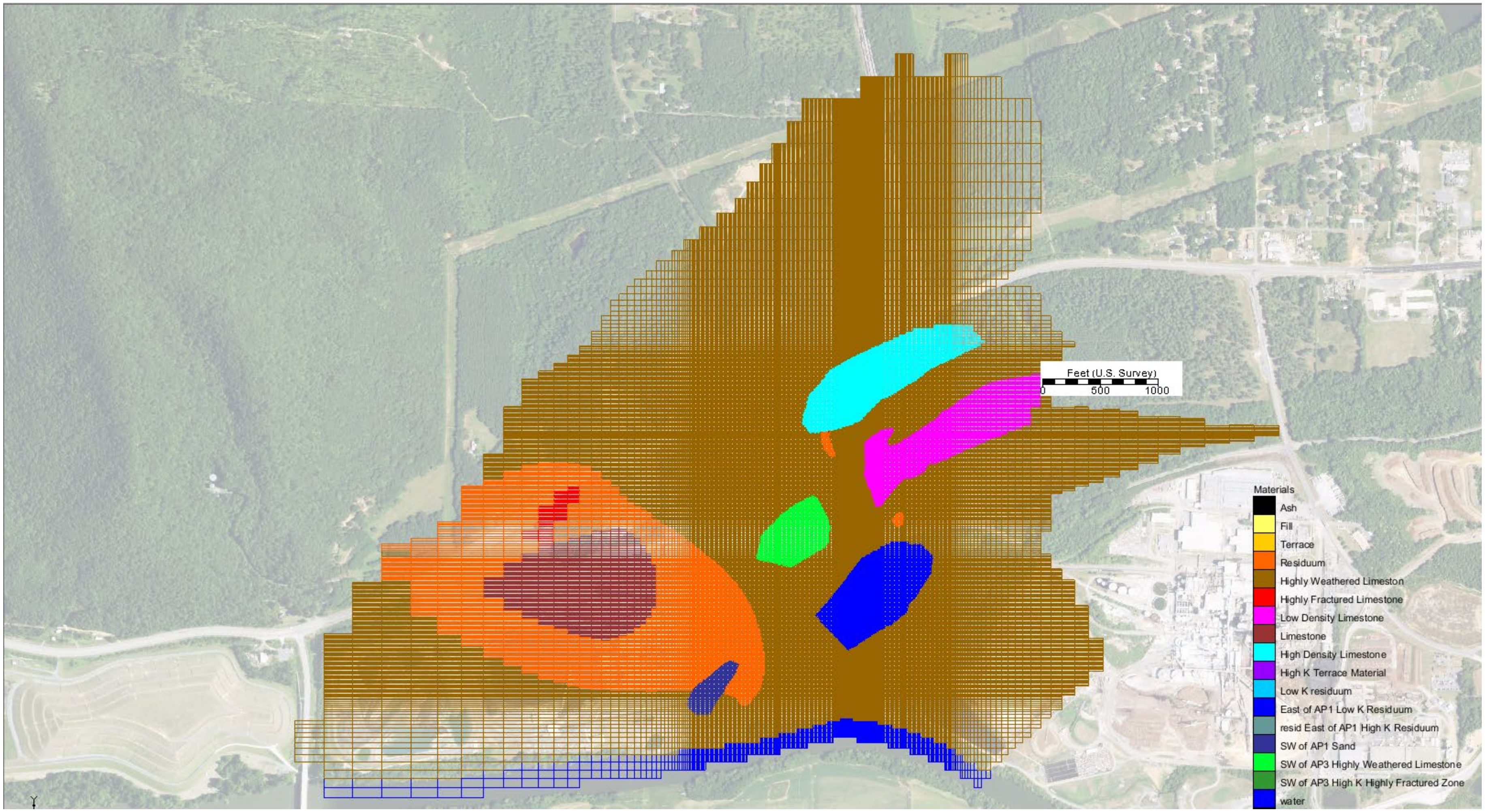


Figure 5: Layer 5 Hydraulic Conductivity Zones

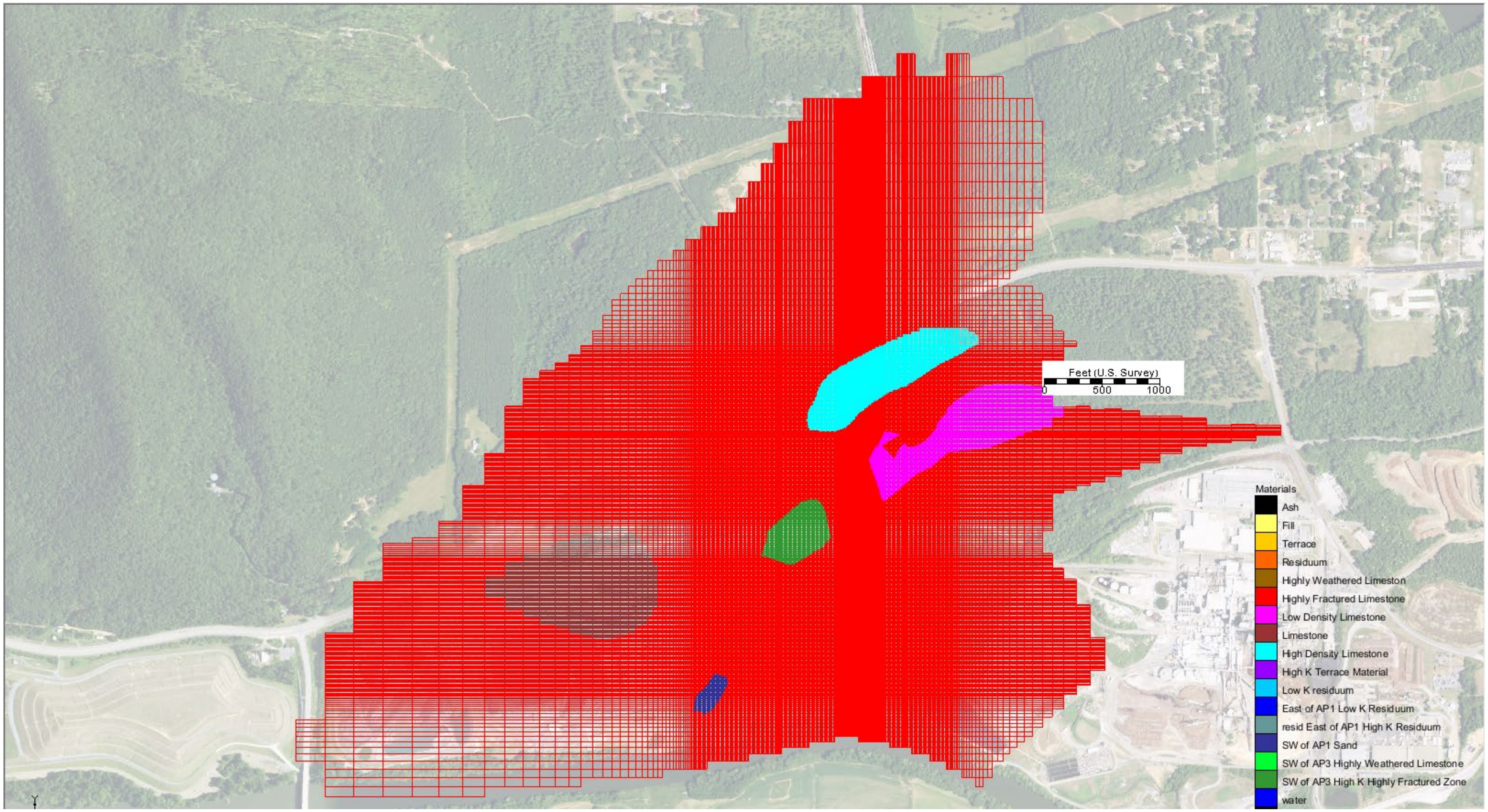


Figure 6: Layer 6 Hydraulic Conductivity Zones

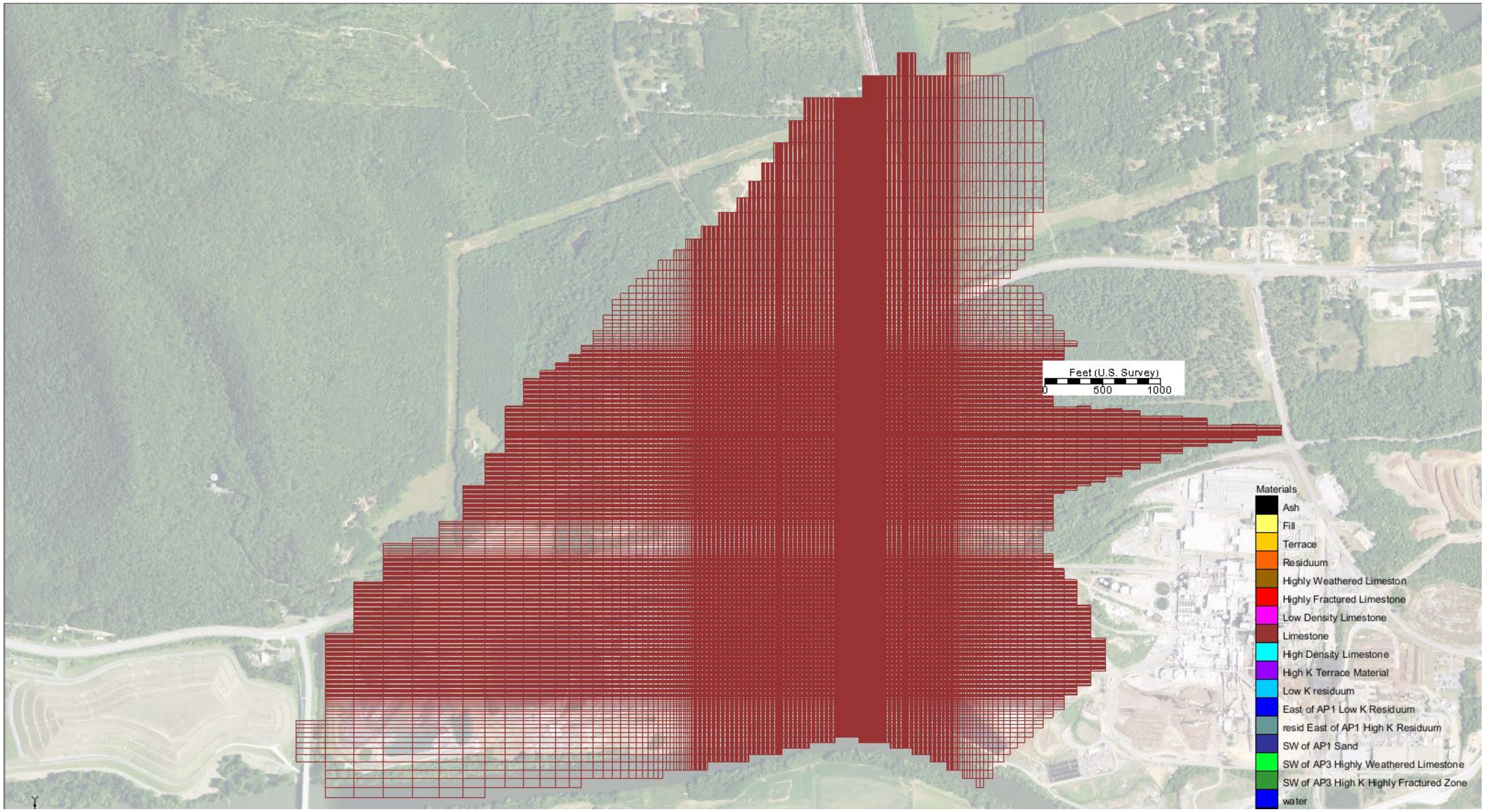


Figure 7: Layer 7 Hydraulic Conductivity Zones

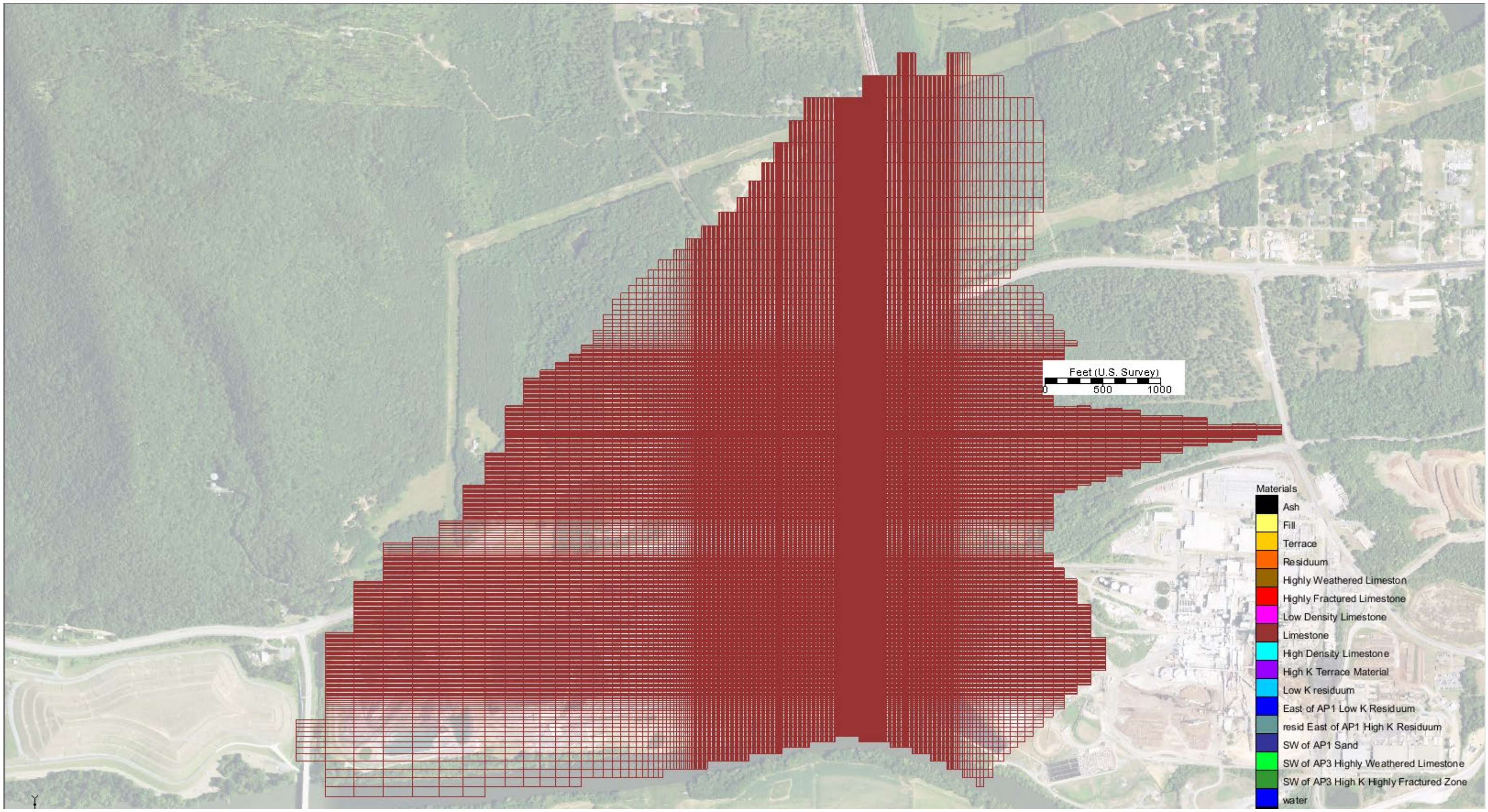


Figure 8: Layer 8 Hydraulic Conductivity Zones

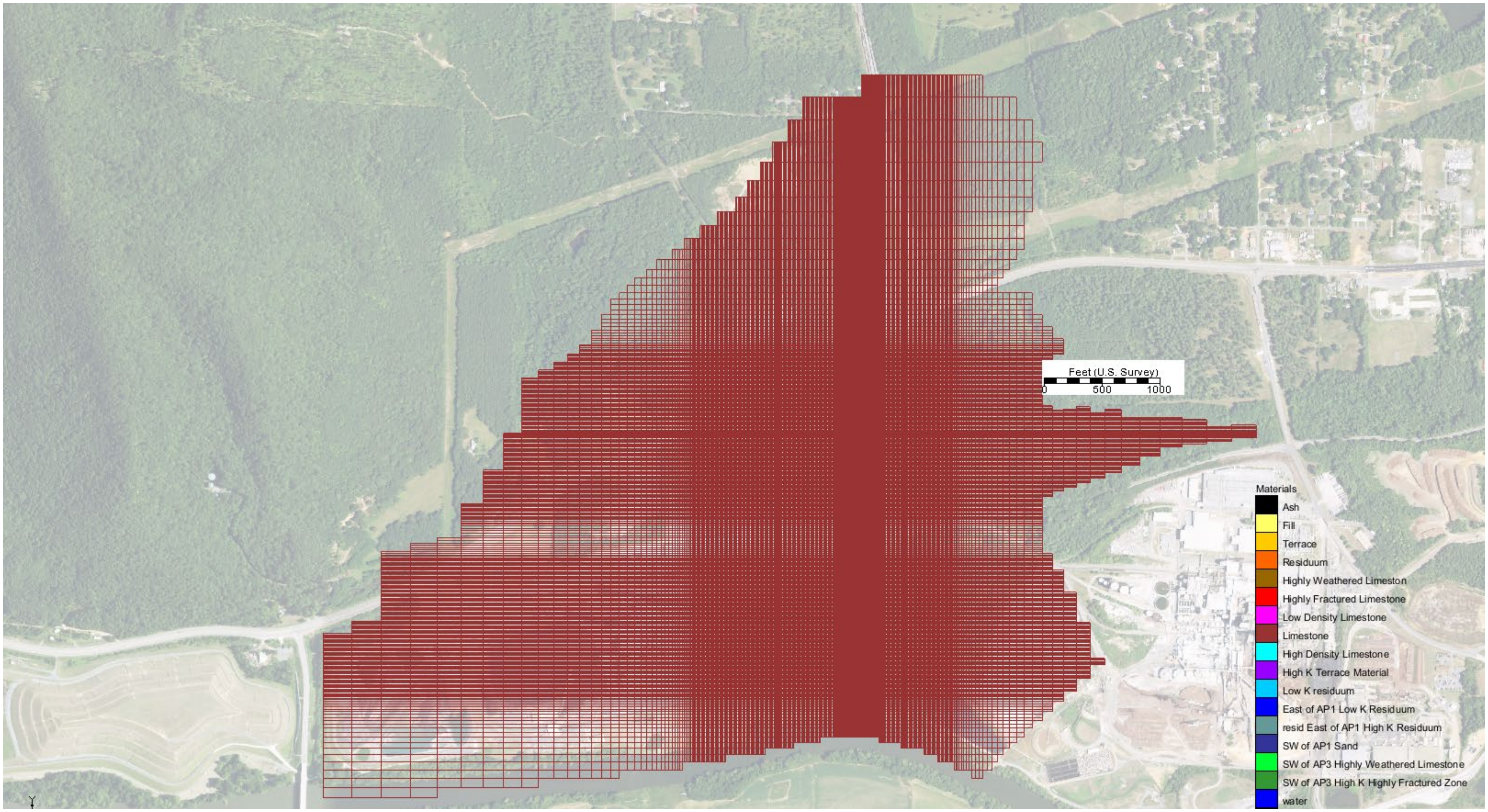


Figure 9: Layer 9 Hydraulic Conductivity Zones

●	Boring (Installed 2017)
●	Boring (Installed 2015)
●	Boring (Installed 1976-1977)
●	Well/Piezometer (Installed 2016)
●	Monitoring Well (Installed 2015)
●	Well/Piezometer (Installed 2014)
●	Piezometer (Installed 2010)
●	Piezometer (Installed 1976-1977)
●	Observation Well (Installed 1976-1977)
—	Ground Surface Elevation (5 ft interval)
– –	Georgia Power Property Boundary

Notes:
1. Aerial Photograph approximate date - February 2017
Source: Google Earth.
2. Topographic Contour Source: City of Rome and Floyd County, Georgia and a site topographic map provided by Southern Company Services.
3. AP3-1, AP3-2, AP3-3, AP1-MW-2, AP1-MW-3, AP1-MW-4, AP3-MW-25 through AP3-MW-27, and HGWC-121 were abandoned.

N

0 580
Feet

Plan View of Geologic Sections in EVS (A-A', B-B', C-C', D-D', D'-D'', E-E', and F-F')

Georgia Power Company
Plant Hammond AP3
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA

July 2017

Figure
10a

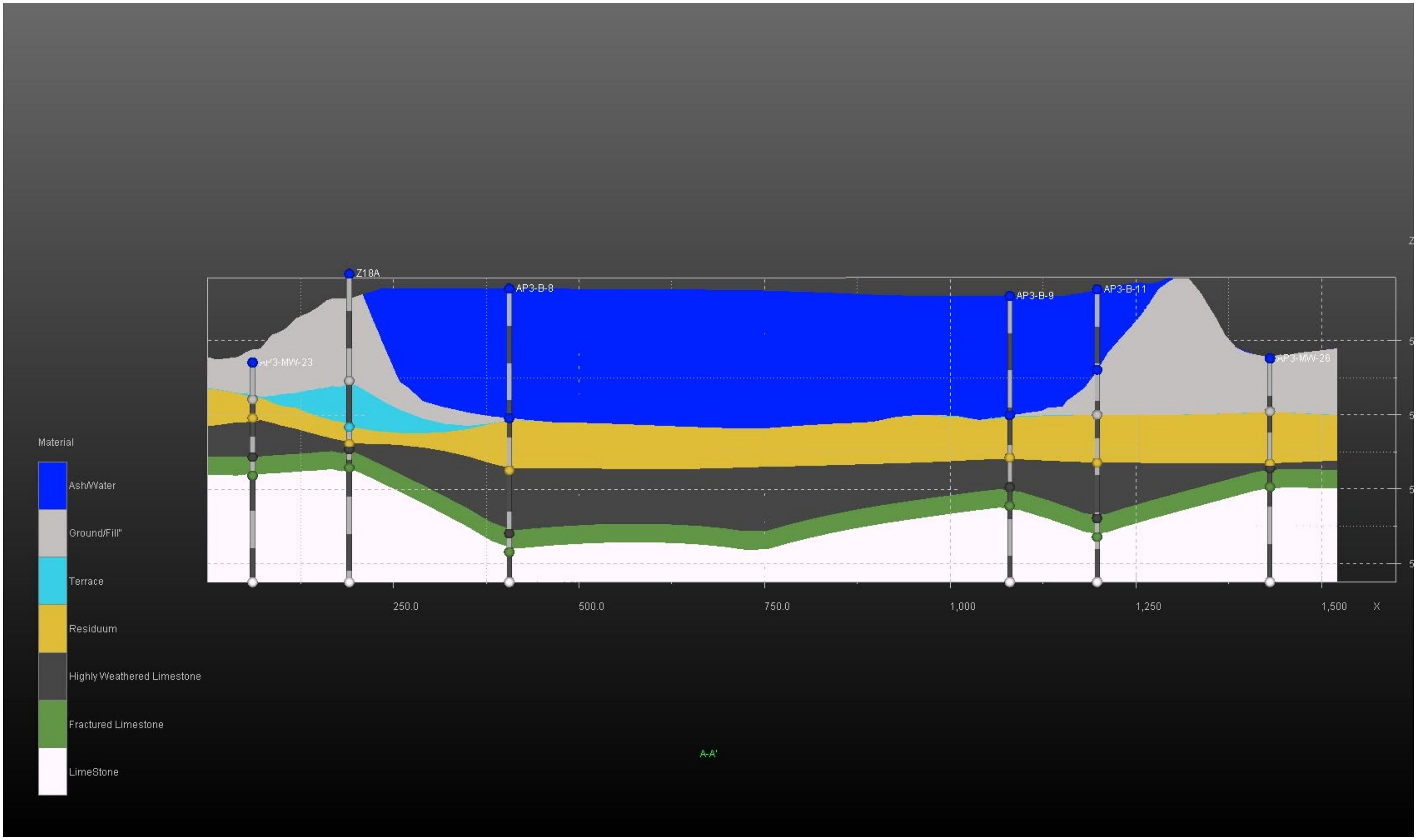


Figure 10b: EVS Cross-Section A-A’

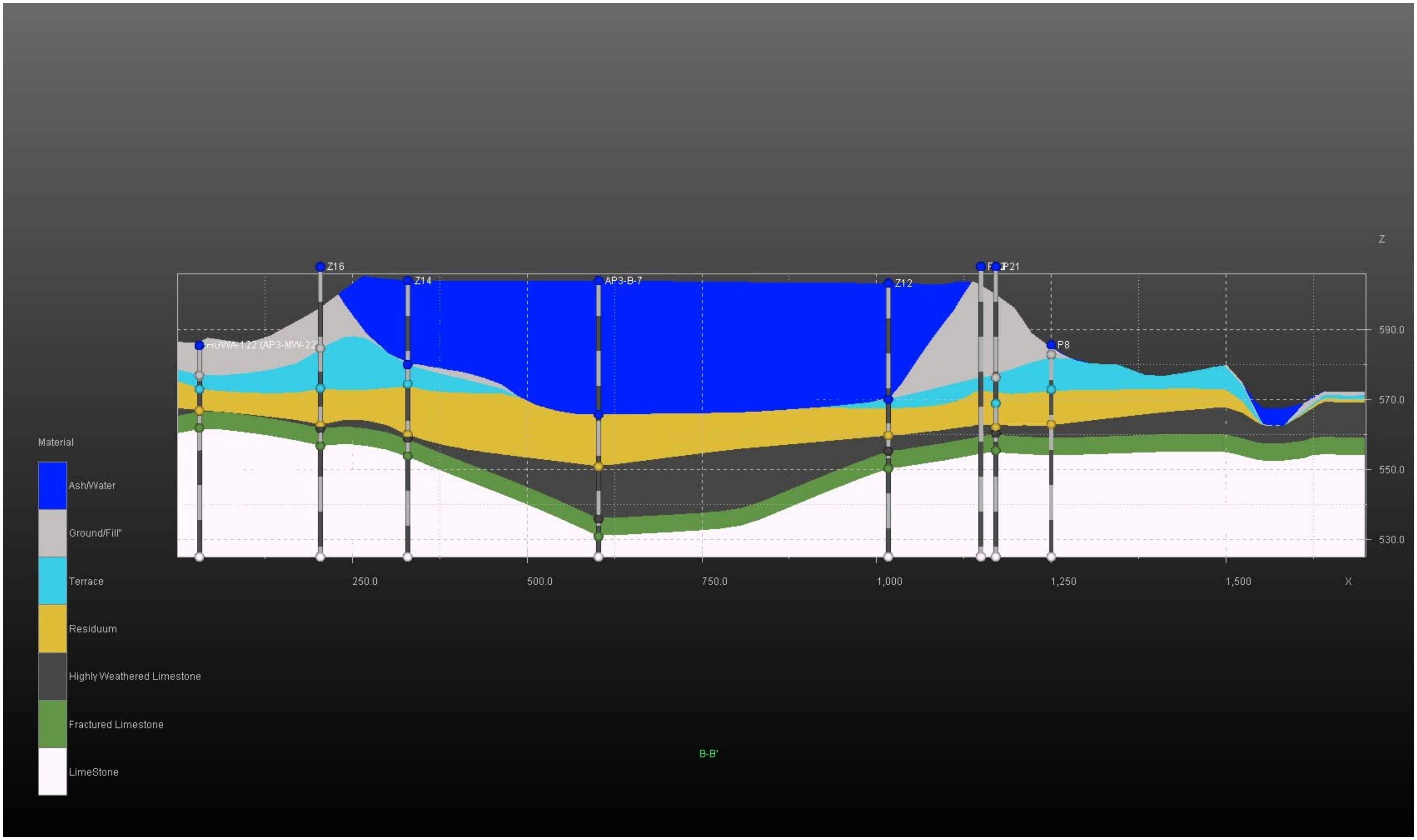


Figure 11: EVS Cross-Section B-B’

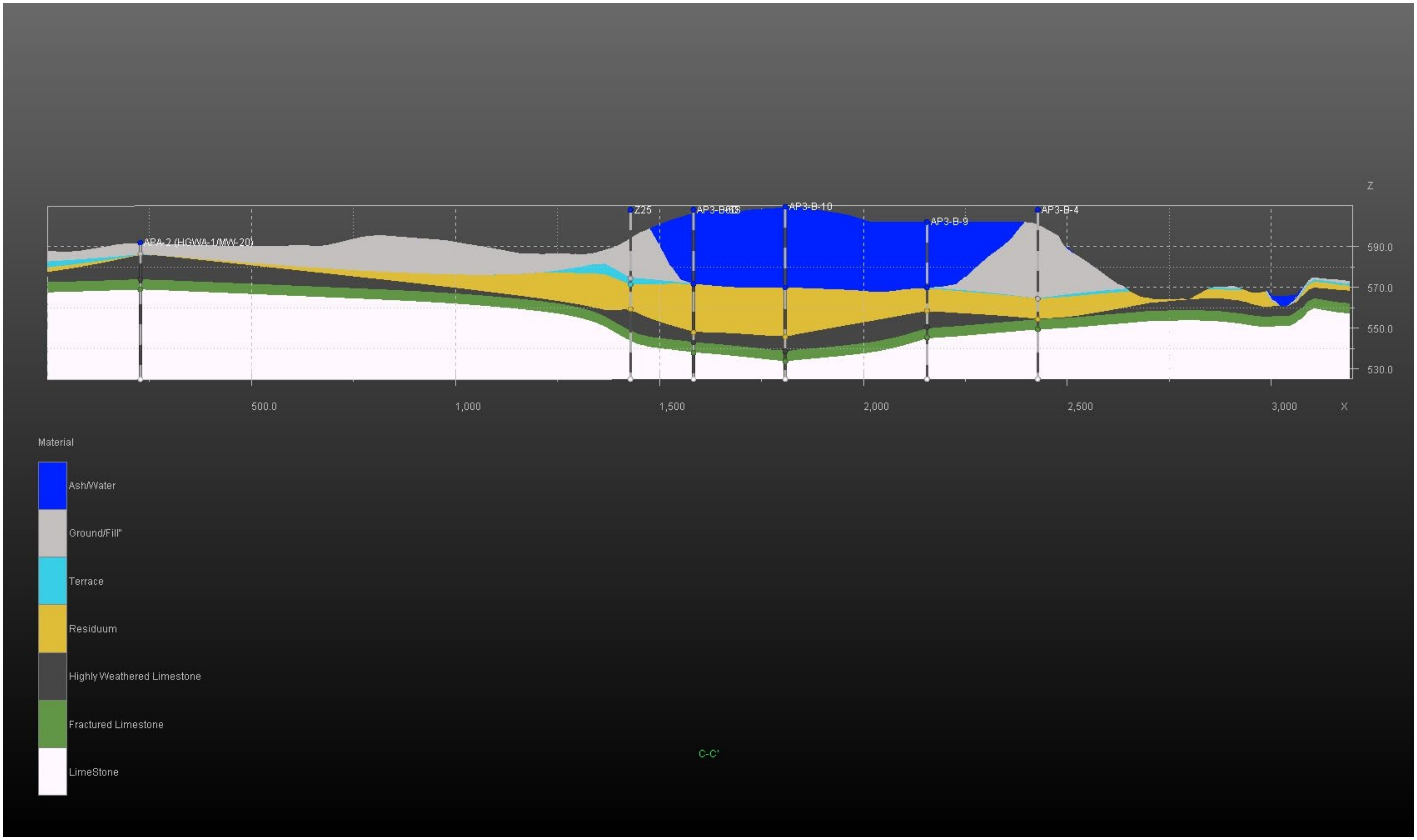


Figure 12: EVS Cross-Section C-C’

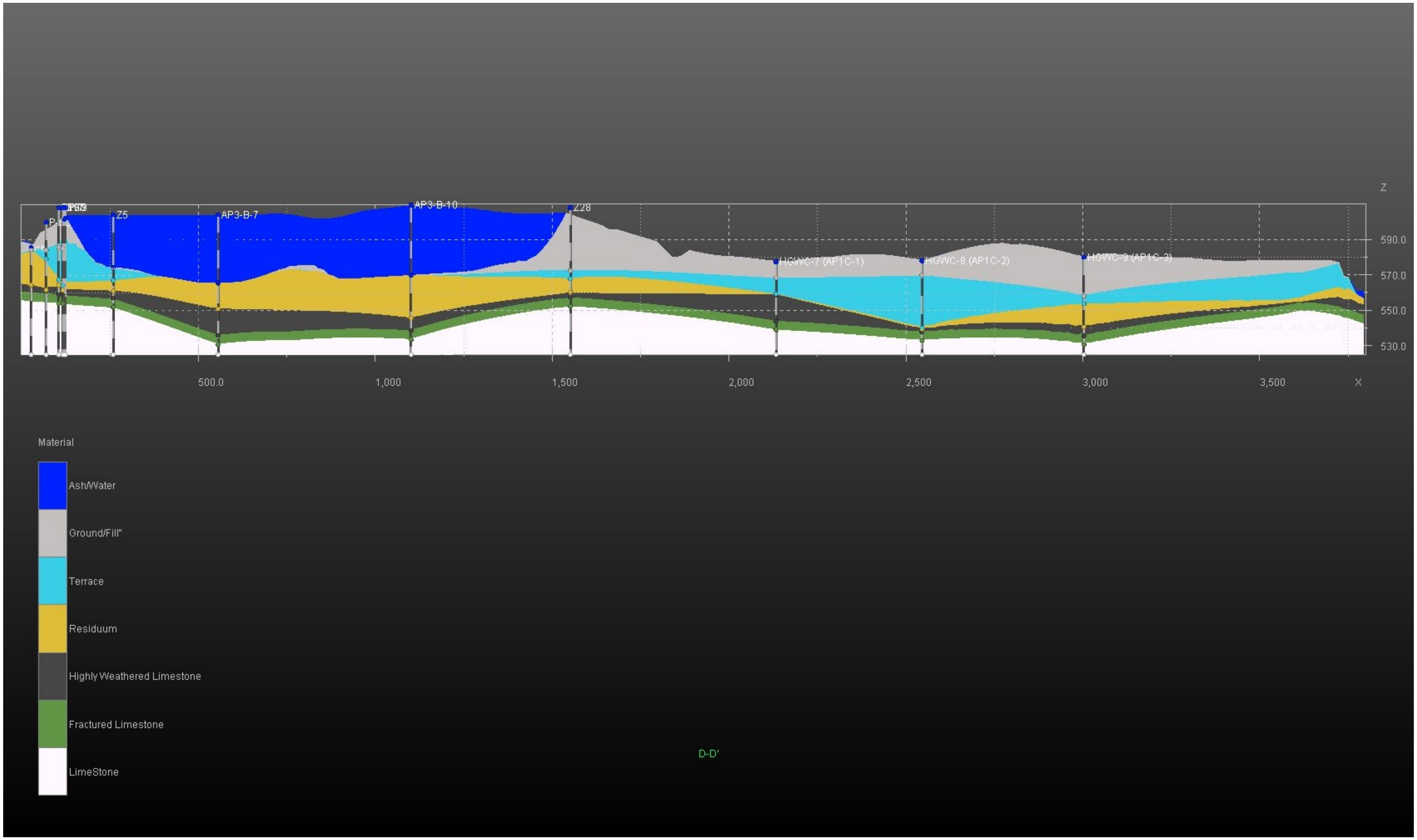


Figure 13: EVS Cross-Section D-D’

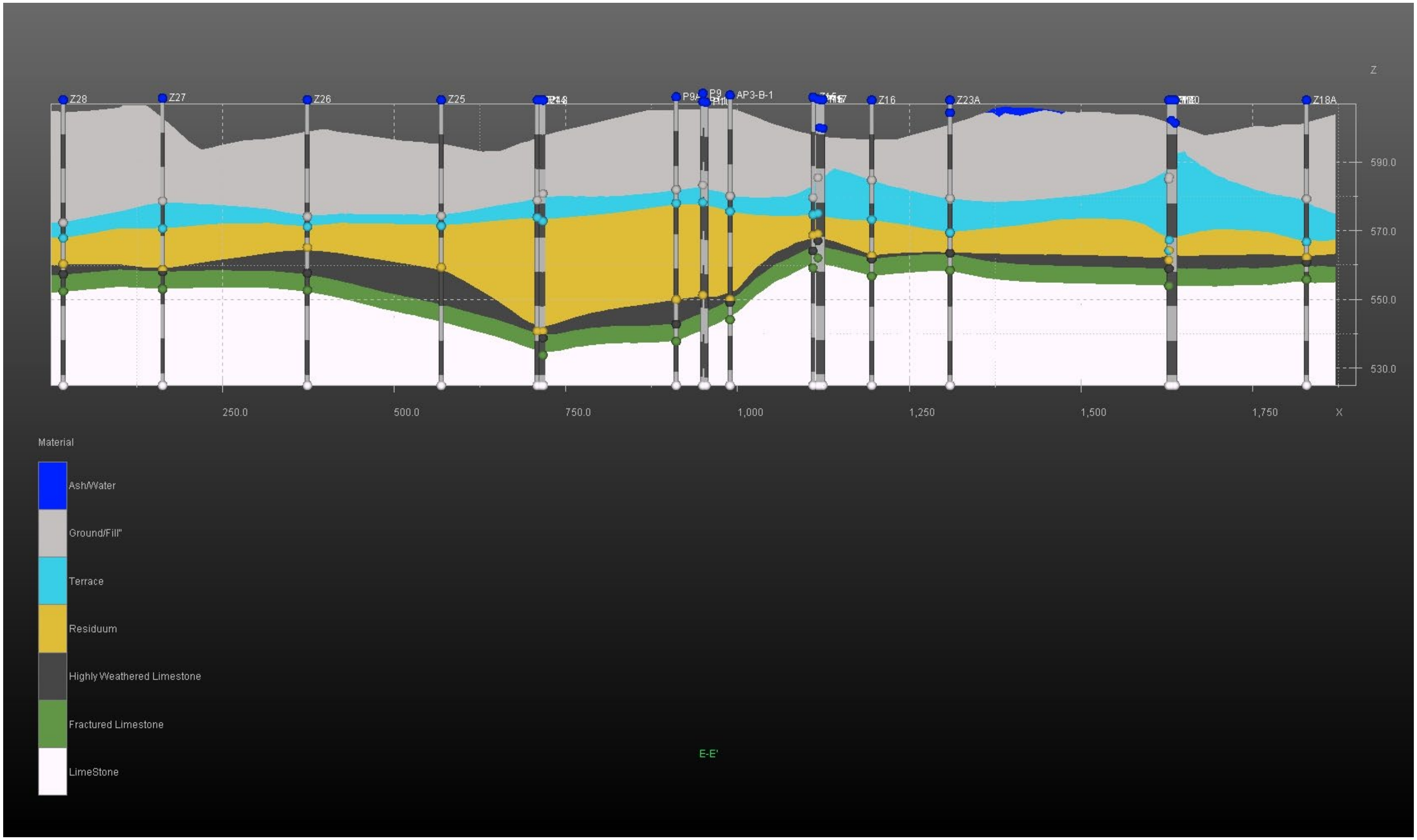


Figure 14: EVS Cross-Section E-E’

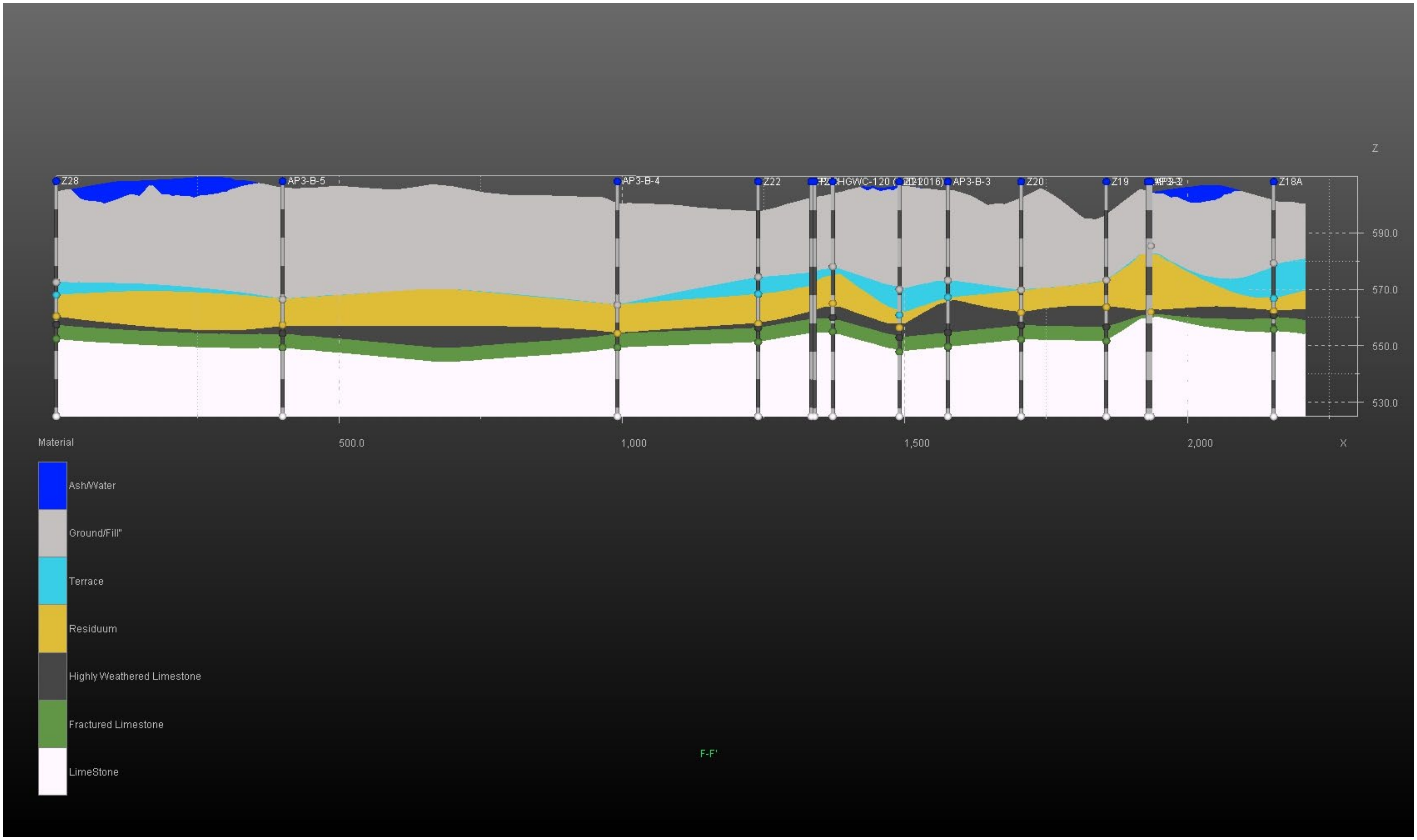


Figure 15: EVS Cross-Section F-F'

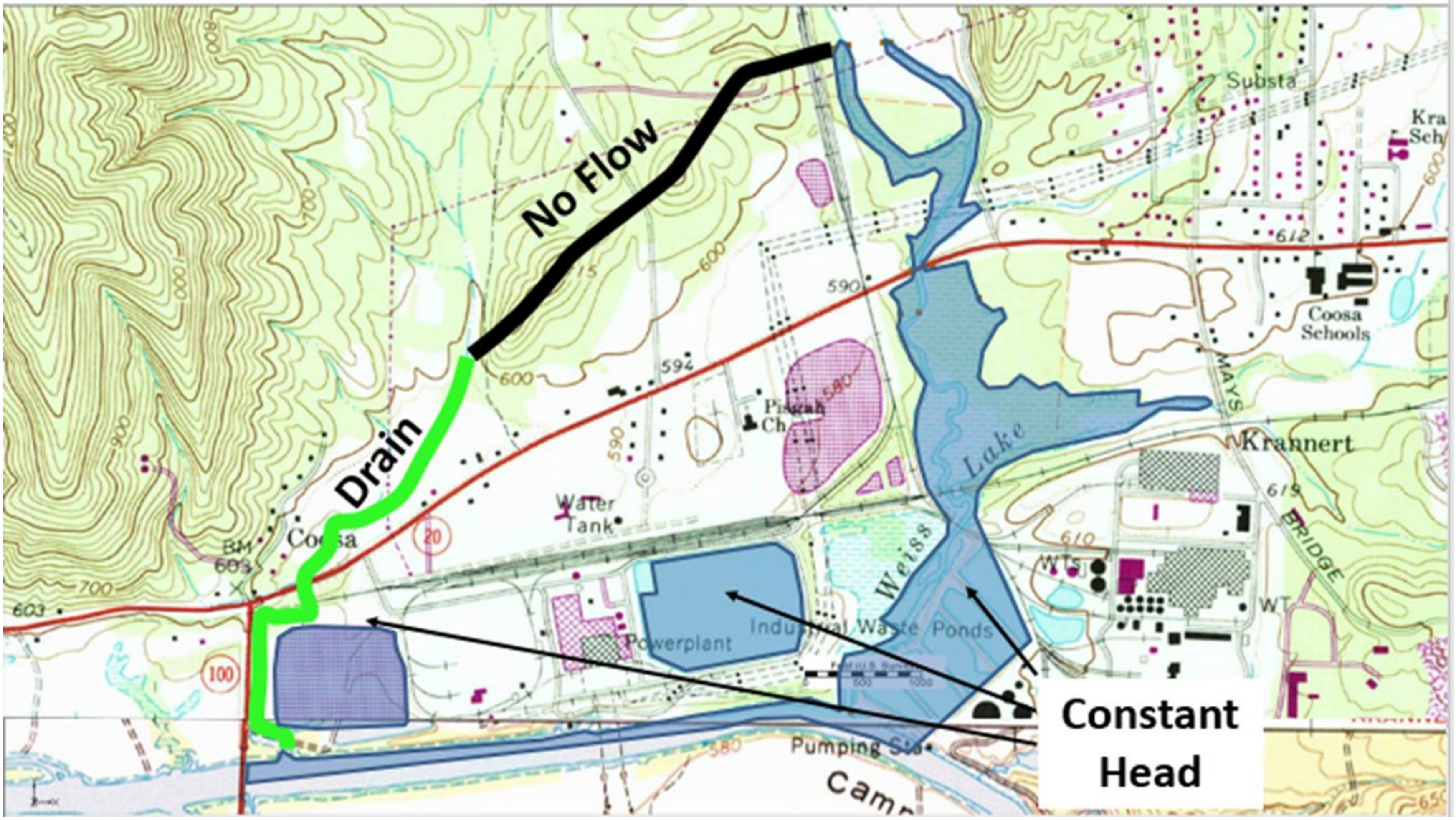


Figure 16: Conceptual Model Boundary Conditions

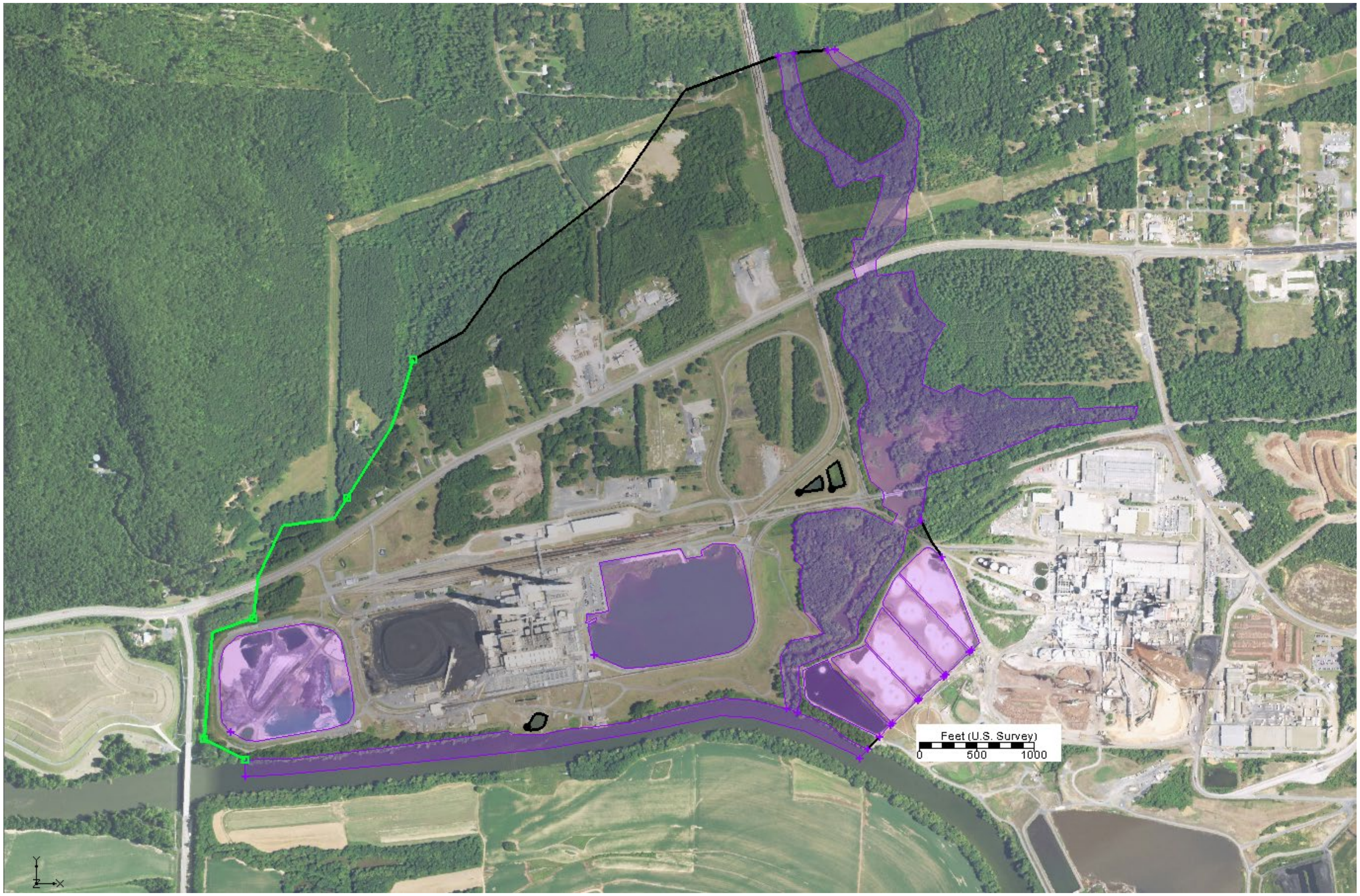


Figure 16a: Model Boundary Conditions

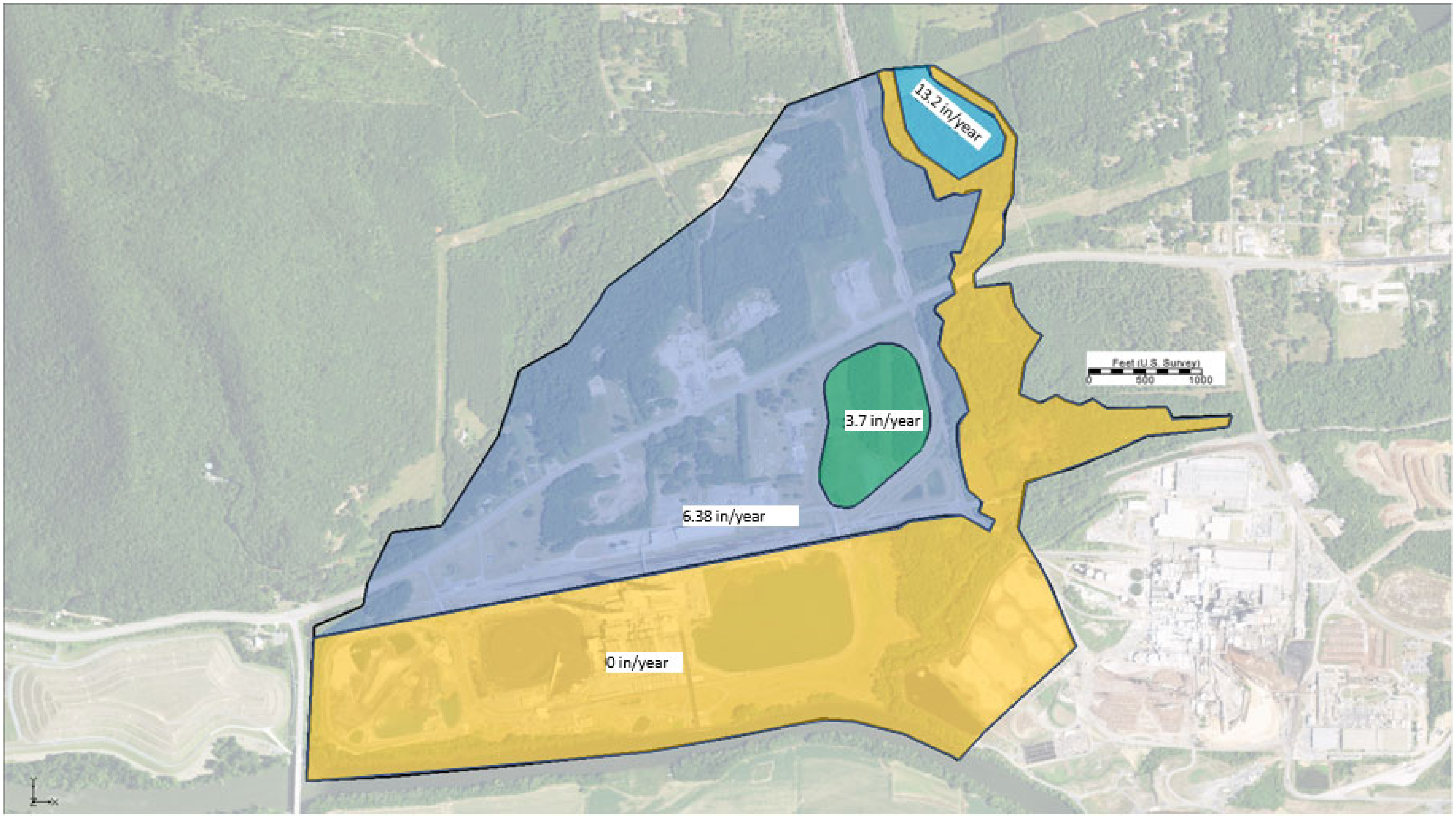


Figure 17: Model Recharge Zones

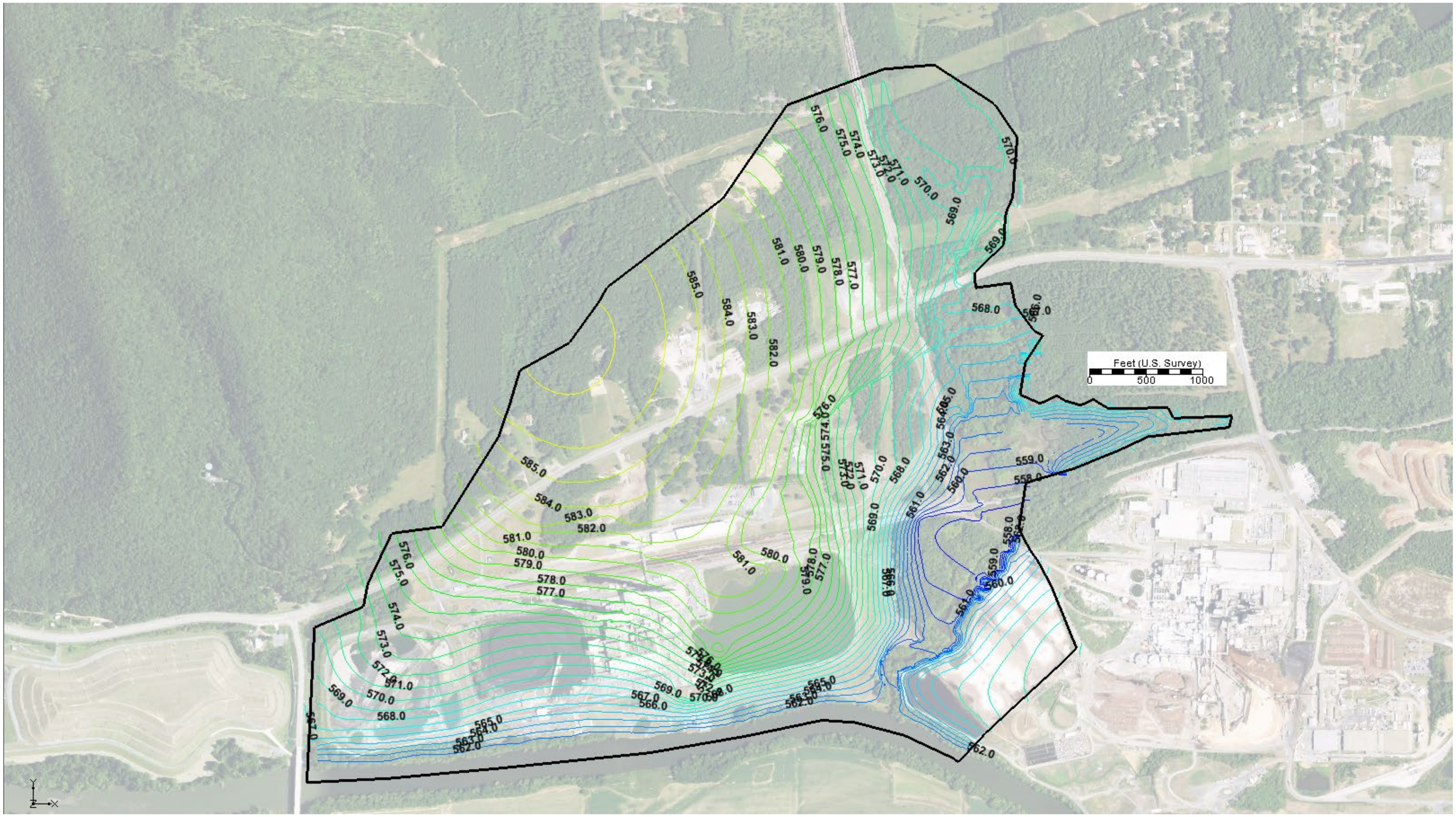


Figure 18: Modeled Groundwater Elevations for the Highly Fractured Limestone

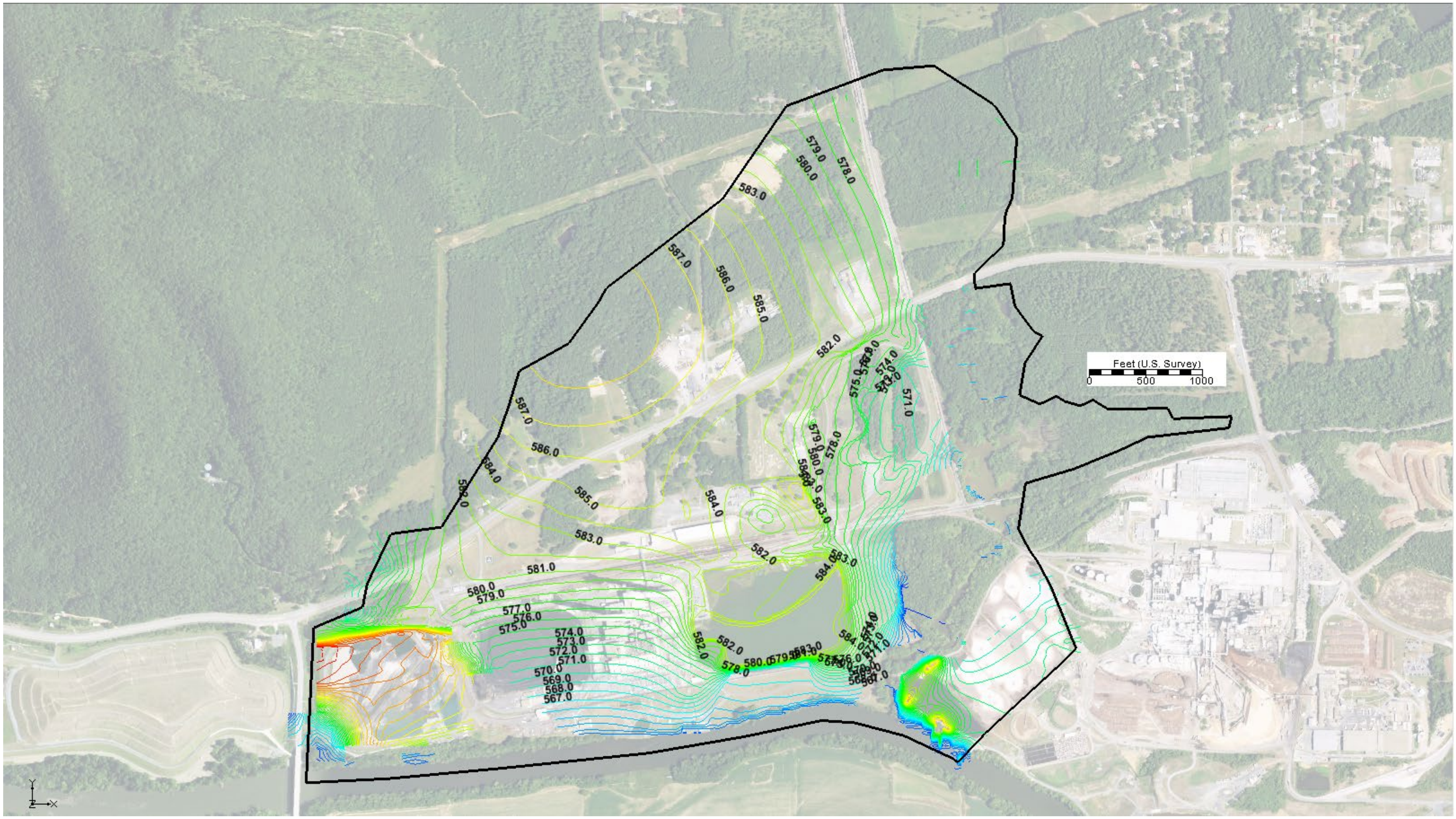


Figure 19: Modeled Groundwater Elevations for the Terrace Alluvium Material

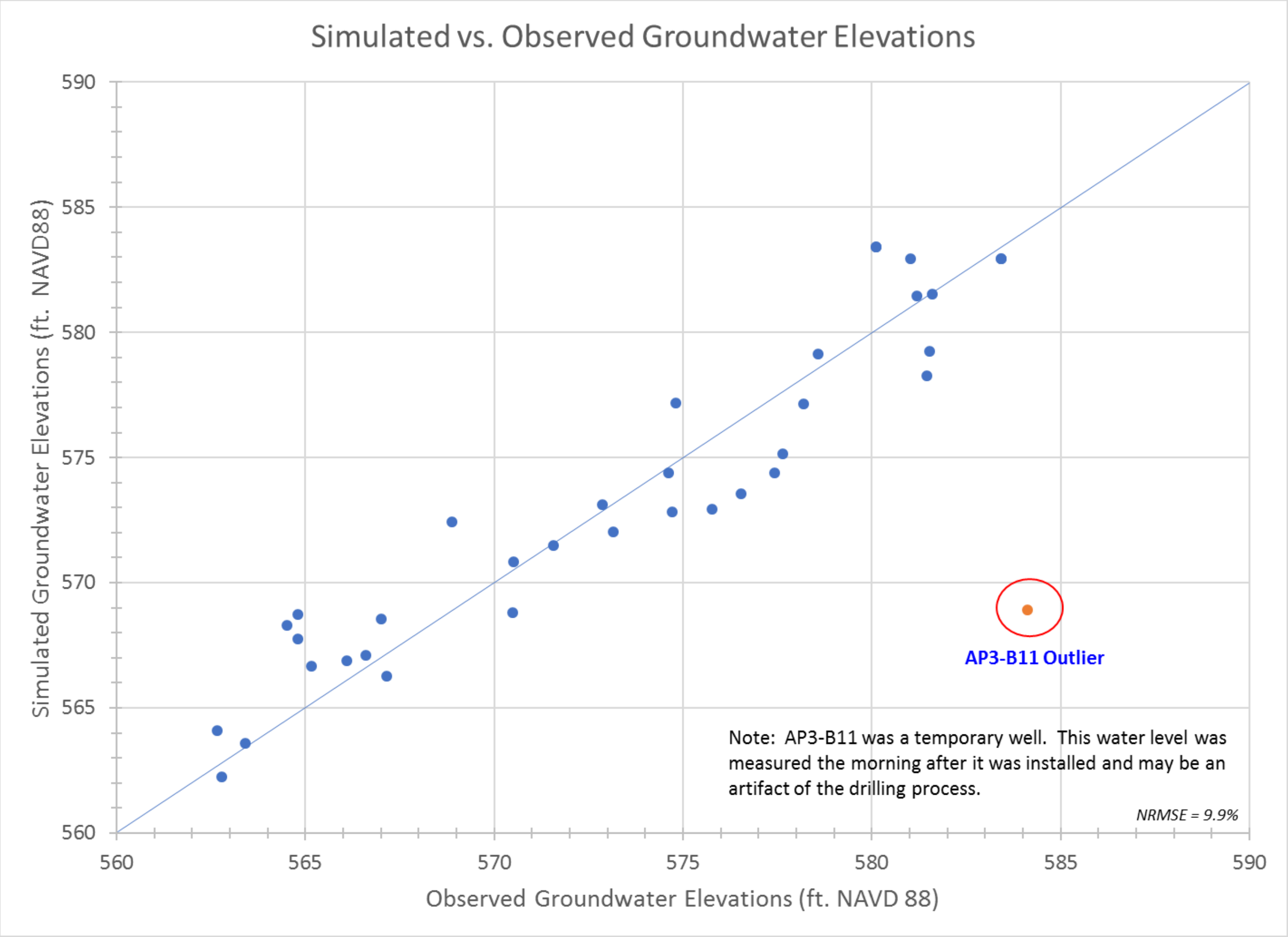
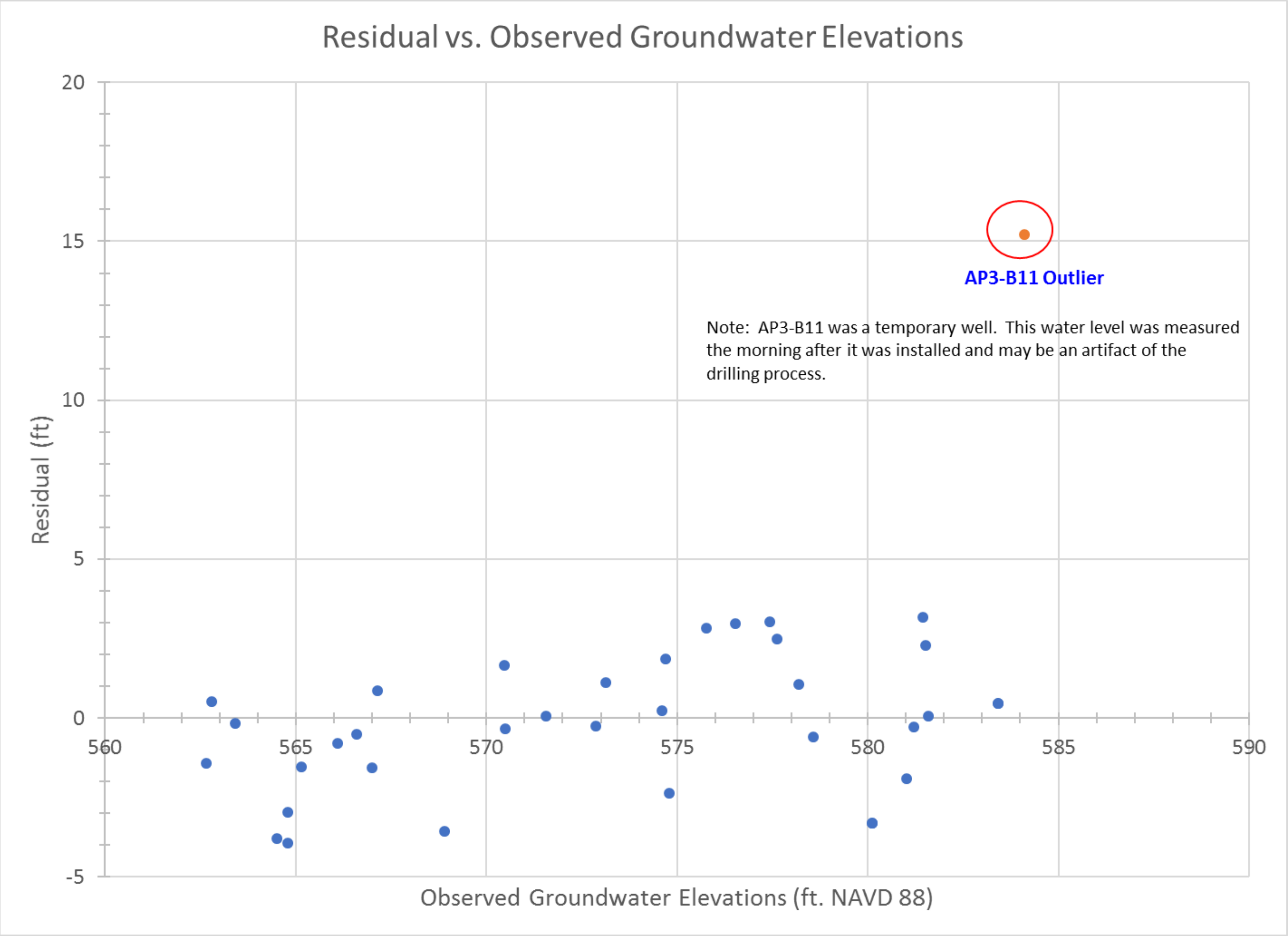


Figure 20: Simulated vs. Observed Groundwater Elevations



Note: AP3-B11 was a temporary well. This water level was measured the morning after it was installed and may be an artifact of the drilling process.

Figure 21: Residual vs. Observed Groundwater Elevations

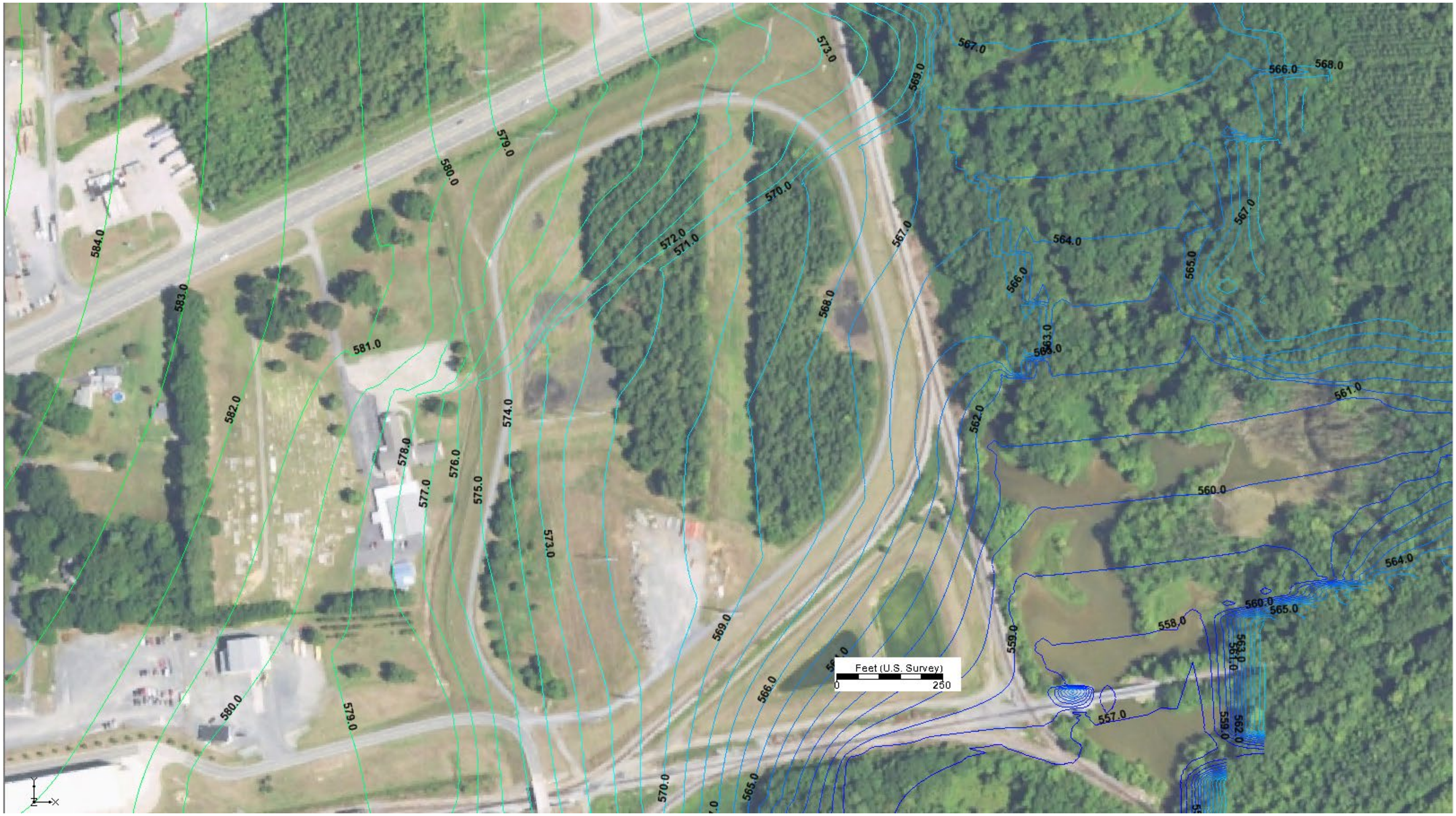


Figure 22: Scenario 1 – Model Predicted Groundwater Elevation Contour

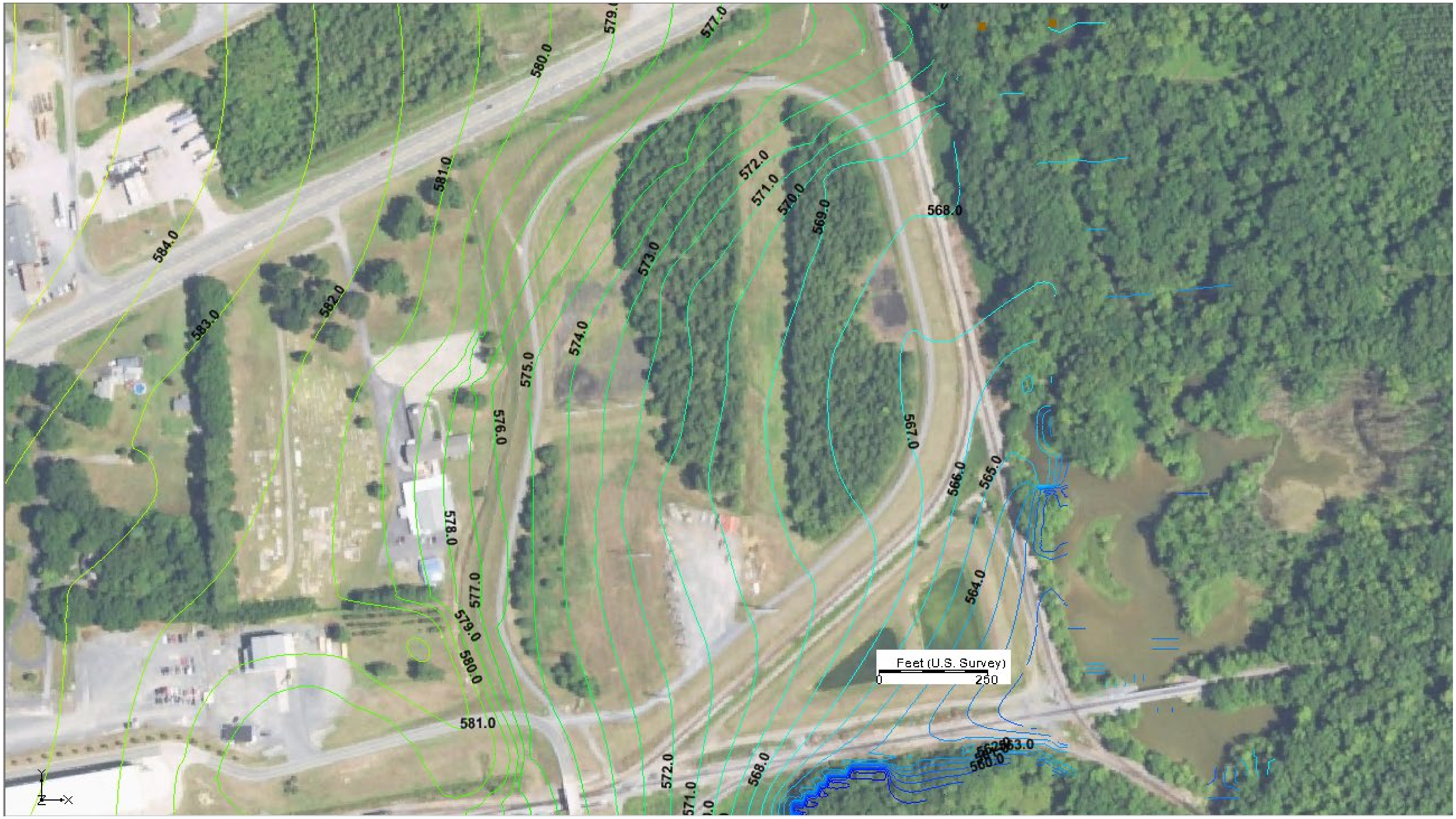


Figure 23: Scenario 2 – Model Predicted Groundwater Elevation Contour

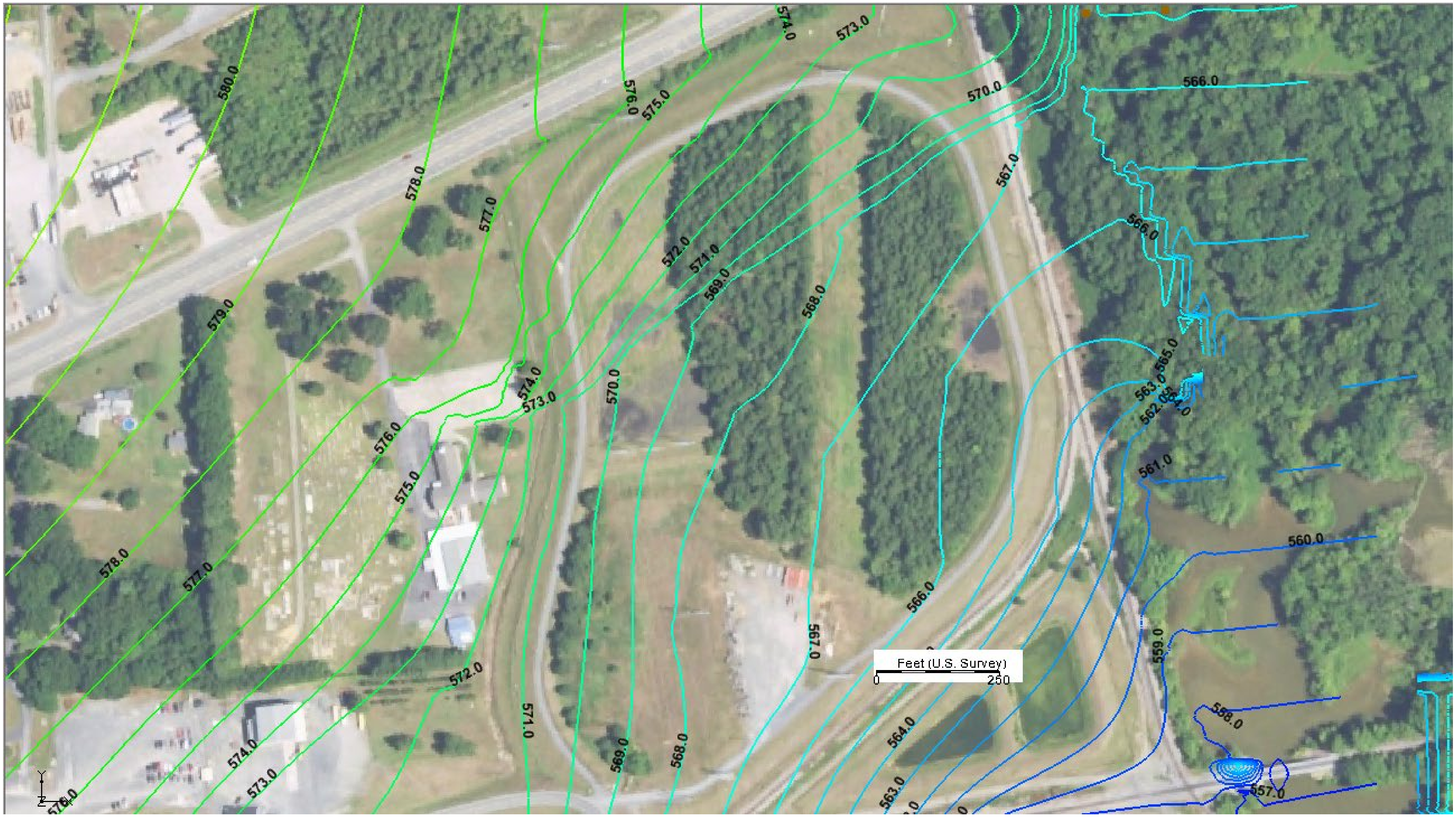


Figure 24: Scenario 3 – Model Predicted Groundwater Elevation Contour

APPENDIX G

Boring Logs for AP-3 Monitoring Well Network

Log updated with revised survey certified 5/19/2020.

BORING HGWA-1

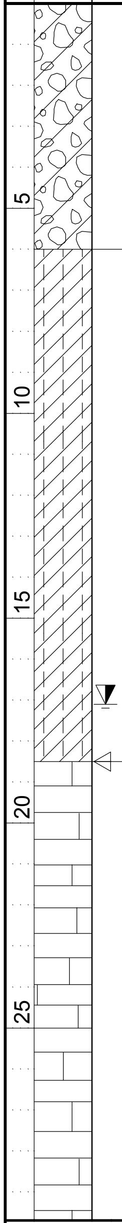
LOG OF TEST BORING

PAGE 1 OF 1
ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 12/3/2014 **COMPLETED** 12/3/2014 **SURF. ELEV.** 592.32 **COORDINATES:** N:1550423.32 E:1940770.00
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 29.7 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 17.1 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.



STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
Clayey Gravel (GC)					
- brown and light brown, dry, dense		SS -1	3.5-5.0	7-13-18 (**31**)	
	586.32				
Silty Clay (CL)					
- pale gray-brown, dry, very stiff, with red and yellow-brown mottling		SS -2	8.5-10.0	7-10-12 (**22**)	
- brown, dry, stiff, with gray mottling		SS -3	13.5-15.0	6-6-6 (**12**)	
	573.82)				
SHALEY LIMESTONE					Auger refusal at 18.5 ft.
- gray and dark gray, not to highly weathered, shale seams less than 1/2 inch, shear/fracture zone fabric, near vertical bedding, water staining		RC -1	18.7-25.2	**95** (23)	
		RC -2	25.2-29.7	**98** (9)	
	562.62				

Bottom of borehole at 29.7 feet.

Easting and Northing in NAD 1983.
Elevations in NAVD 1988.

Log updated with revised survey certified 5/19/2020.

WELL: HGWA-1

RECORD OF WELL CONSTRUCTION

PAGE 1 OF 1

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers

LOCATION Plant Hammond

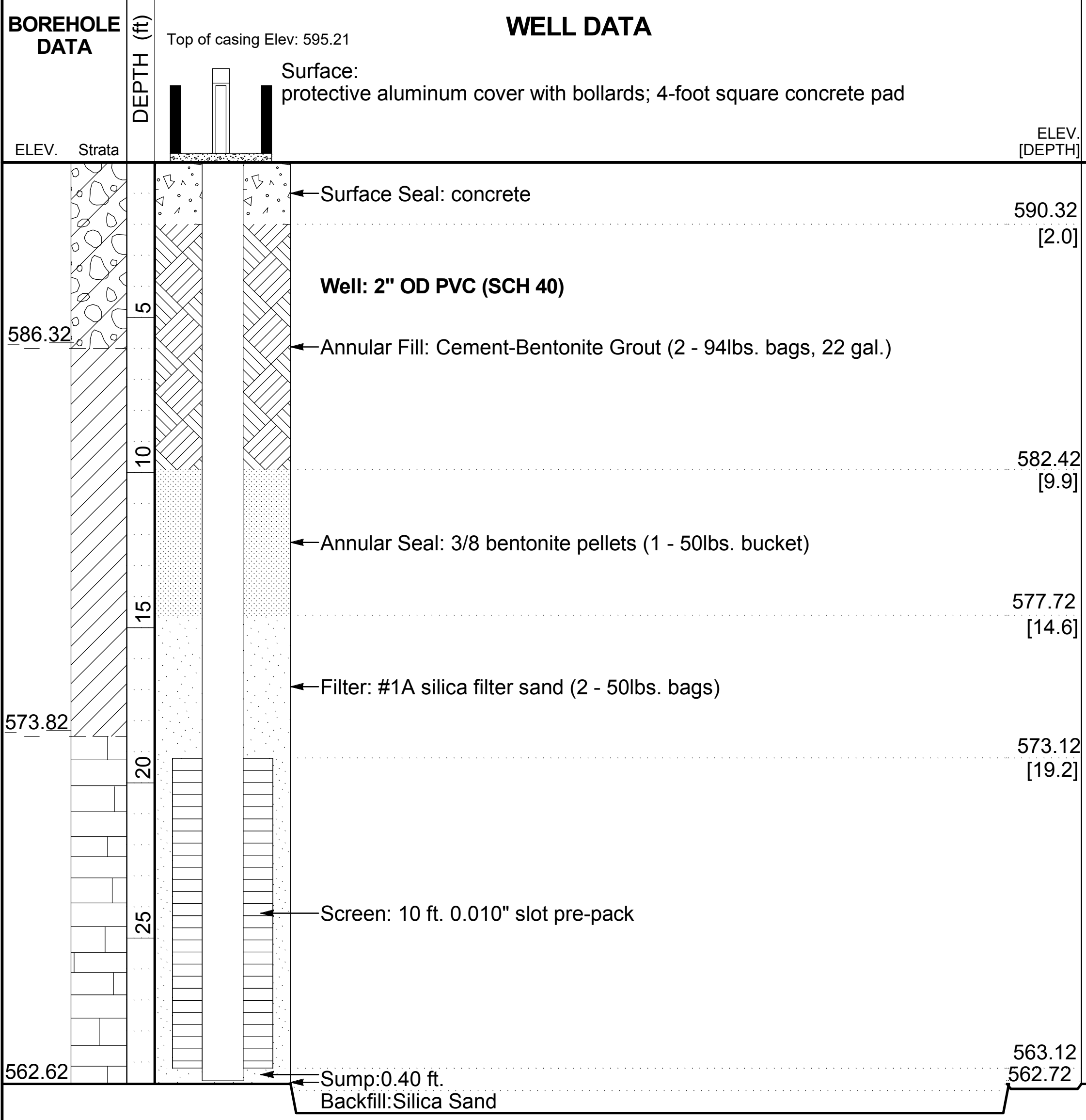
DATE STARTED 12/3/2014 **COMPLETED** 12/3/2014 **SURF. ELEV.** 592.32 **COORDINATES:** N:1550423.32 E:1940770.00

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

DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 29.7 ft. **GROUND WATER DEPTH: DURING** **COMP.** **DELAYED** 17.1 ft. after 24 hrs.

NOTES Well installed. Refer to well data sheet.



COMMENTS

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

Log updated with revised survey certified 5/19/2020.

RECORD OF BOREHOLE HGWA-2

SHEET 1 of 1

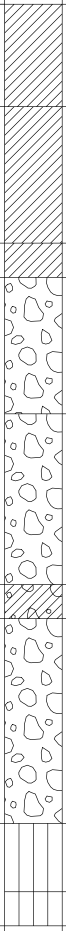
PROJECT: SCS Hammond
PROJECT NUMBER: 1545812
DRILLED DEPTH: 27.00 ft
LOCATION: Rome, GA

DRILL RIG: Pro Sonic 150
DATE STARTED: 12/2/15
DATE COMPLETED: 12/2/15

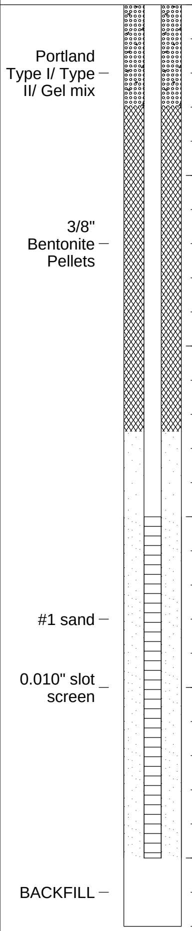
NORTHING: 1,549,796.87
EASTING: 1,939,845.15
GS ELEVATION: 585.29 ft
TOC ELEVATION: 587.92 ft

DEPTH W.L.:8.19
DATE W.L.:12/2/15
TIME W.L.:11:10

DEPTH (ft)	ELEVATION (ft)
0	585
5	580
10	575
15	570
20	565
25	560
30	555
35	550
40	545
45	

SOIL PROFILE				SAMPLES		
DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC
0.00 - 3.00 CLAY; light brown/grey silty clay, trace organic material, soft	CL		582.29			
3.00 - 7.00 SILTY CLAY; grey/orange/light brown silty clay, mottled, stiff to very stiff, some black streaking from 3'-4', moist	CL		3.00 578.29			
7.00 - 8.00 CLAY; light brown/orange/grey sandy, gravelly clay, mottled, moist	CL		7.00 577.29			
8.00 - 12.00 SANDY GRAVEL; orange/light brown sandy gravel, coarse grained, sub-angular gravel,	GP		8.00 573.29			
12.00 - 17.00 light brown/orange sandy gravel, coarse grain, loosely compacted, moist			12.00 568.29			
17.00 - 18.00 GRAVELLY CLAY; orange/light brown gravelly clay, sub-angular gravel, moist	CLG		17.00 567.29 (567.23)			
18.00 - 24.00 SANDY GRAVEL; orange/light brown sandy gravel, coarse grained, trace clay lenses, wet	GP		18.00 561.29			
24.00 - 26.00 SILT; orange/light brown layered silt, soft, wet	ML		24.00 559.29			
26.00 - 27.00 grey silt with trace limestone shale and clay, foliated, soft, wet			26.00 558.29			
Boring completed at 27.00 ft						

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES



WELL CONSTRUCTION DETAILS

WELL CASING
Interval: -3'-15'
Material: Schedule 40 PVC
Diameter: 6"
Joint Type: Screw/Flush

SURFACE CASING
Interval: N/A
Material: N/A
Diameter: N/A

WELL SCREEN
Interval: 15'-25'
Material: Schedule 40 PVC
Diameter: 2'
Slot Size: 0.010"
End Cap: Schedule 40 PVC

FILTER PACK
Interval: 12.5'-25'
Type: #1 sand/ Prepack Filter

FILTER PACK SEAL
Interval: 3'-12.5'
Type: 3/8" Bentonite Pellets

ANNULUS SEAL
Interval: 0'-3'
Type: Portland Type I/Type II/Gel Mix

WELL COMPLETION
Pad: 4'x4'x4"
Protective Casing: Anodized Aluminum

DRILLING METHODS
Soil Drill: 6-inch diameter Sonic
Rock Drill: 6-inch diameter Sonic

LOG SCALE: 1 in = 5.5 ft
DRILLING COMPANY: Cascade
DRILLER: Tom Ardito

Easting and Northing in NAD 1983.
Elevations in NAVD 1988.

GA INSPECTOR: James Mullooly
CHECKED BY: Rachel P. Kirkman, P.G.
DATE: 2/24/16

Golder Associates

Log updated with revised survey certified 5/19/2020.

RECORD OF BOREHOLE HGWA-3

SHEET 1 of 1

PROJECT: SCS Hammond
PROJECT NUMBER: 1545812
DRILLED DEPTH: 42.00 ft
LOCATION: Rome, GA

DRILL RIG: Pro Sonic 150
DATE STARTED: 12/1/15
DATE COMPLETED: 12/2/15

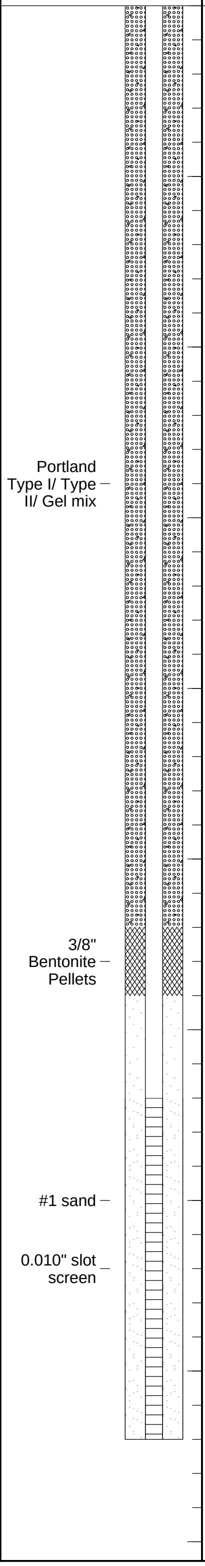
NORTHING: 1,549,794.41
EASTING: 1,939,833.39
GS ELEVATION: 585.23 ff
TOC ELEVATION: 587.74 ft

DEPTH W.L.:2.68
DATE W.L.:12/2/15
TIME W.L.:07:30

DEPTH (ft)	ELEVATION (ft)
0	585
5	580
10	575
15	570
20	565
25	560
30	555
35	550
40	545
45	

SOIL PROFILE				SAMPLES		
DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLE NO.	TYPE	REC
0.00 - 5.00 SANDY CLAY; grey/brown/orange mottled sandy clay, fine grained, medium density, stiff, moist	CLS		580.23			
5.00 - 13.00 CLAYEY GRAVEL; orange/brown clayey gravel with some sand, poorly sorted and angular pieces, gravel becomes more rounded at 9 feet, medium density compaction	GC		5.00 572.23			
13.00 - 14.00 wet around 13.5 feet	GC		13.00 571.23 (571.19)			
14.00 - 17.00 SANDY GRAVEL; brown/grey poorly sorted, well rounded sandy gravel, wet	GP		14.00 568.23			
17.00 - 25.00 orange/brown sandy gravel, well rounded, poorly sorted, wet			17.00 560.23			
25.00 - 26.00 some larger rock fragments and coarse grained sand			25.00 559.23			
26.00 - 31.00 CLAY; brown/grey sandy gravel, changes to grey weathered limestone and clay, medium density, firm, moist	CL		26.00 554.23			
31.00 - 37.00 PARTIALLY WEATHERED ROCK; partially weathered limestone and trace clay, angular rock fragments, clay is mottled light and dark grey, wet	PWR		31.00 548.23			
37.00 - 42.00 partially weathered dark grey shaly limestone, poorly sorted and angular, some gravel, bottom 3 inches are solid limestone, wet (saturated)			37.00 543.23			
Boring completed at 42.00 ft						

MONITORING WELL/ PIEZOMETER DIAGRAM and NOTES



WELL CONSTRUCTION DETAILS

WELL CASING
Interval:
Material: Schedule 40 PVC
Diameter: 6"
Joint Type: Screw/Flush

SURFACE CASING
Interval: N/A
Material: N/A
Diameter: N/A

WELL SCREEN
Interval: 32'-42'
Material: Schedule 40 PVC
Diameter: 2'
Slot Size: 0.010"
End Cap: Schedule 40 PVC

FILTER PACK
Interval: 29'-42'
Type: #1 sand/ Prepack Filter

FILTER PACK SEAL
Interval: 27'-29'
Type: 3/8" Bentonite Pellets

ANNULUS SEAL
Interval: 0'-27'
Type: Portland Type I/Type II/Gel Mix

WELL COMPLETION
Pad: 4'x4'x4"
Protective Casing: Anodized Aluminum

DRILLING METHODS
Soil Drill: 6-inch diameter Sonic
Rock Drill: 6-inch diameter Sonic

LOG SCALE: 1 in = 5.5 ft
DRILLING COMPANY: Cascade
DRILLER: Tom Ardito

Easting and Northing in NAD 1983.
Elevations in NAVD 1988.

GA INSPECTOR: James Mullooly
CHECKED BY: Rachel P. Kirkman, P.G.
DATE: 2/24/16

Golder Associates

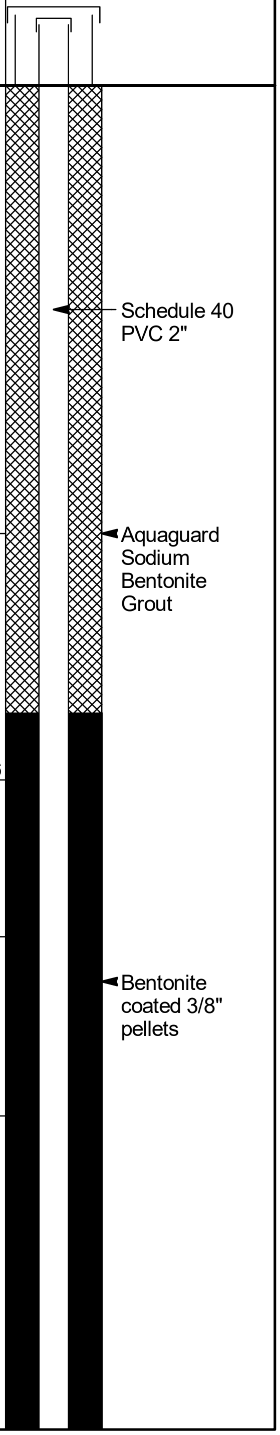
Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

HGWA-43D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 8/26/20 **COMPLETED** 8/26/20
NORTHING 1550422.85 ft **EASTING** 1940753.80 ft
DRILLER Cascade Drilling
GROUND ELEVATION 592.08 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 595.08 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terrasonic 1051181
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Hydro Excavation (0 ft to 10 ft) NO SAMPLE
5	590 585			
10	582.1		▨	CLAY, Yellowish red and light gray mottling, medium plasticity, trace coarse sand, hard, moist.
15	580 576.6		▨	CLAY, Reddish yellow with light gray mottling, laminated brown, with organic material, trace limestone gravel, hard, moist. 17 ft: Trace of limestone gravel.
	575 573.1		▤	HIGHLY WEATHERED ROCK, Light brown, recovered as angular gravelly clay with trace limestone cobbles, non plastic to low plasticity, soft, wet.
20	570 569.1		▦	LIMESTONE, Grayish blue to white, some white calcite healed fractures, 1 in clay filled fractures, mostly pulverized by drilling, powder reacts with HCl, hard, dry. 27 ft: Wet.
25	565 562.1			

CONSTRUCTION DIAGRAM



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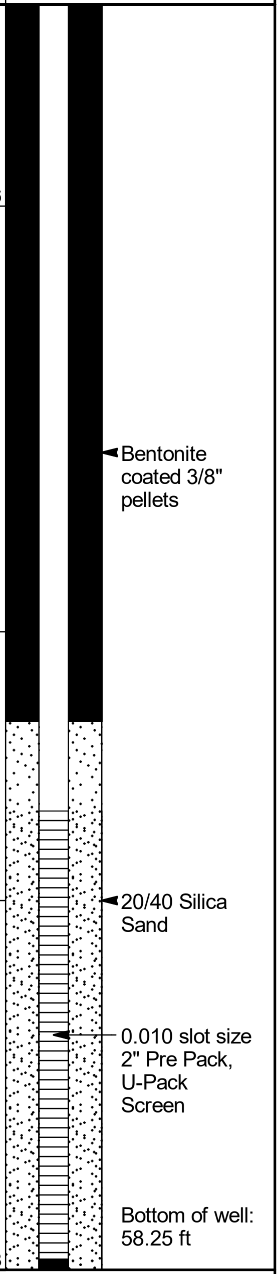
Geosyntec consultants
engineers | scientists | innovators

Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation
PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
30	560	30 ft to 50 ft: No voids reported.		30 ft to 34.5 ft: No recovery.
35 40	557.6 555 550		▦	LIMESTONE, Grayish blue to white, hard, dry, some white calcite healed fractures, 1 in clay filled fractures, 38 ft to 39 ft pulverized by drilling, powder reacts with HCl, wet. 40 ft: Up to 1 in thick calcite healed fractures.
45	548.1 545			44 ft to 50 ft: No recovery.
50 55	542.1 540 535 533.8		▦	LIMESTONE, Grayish blue to white, hard, dry, up to 1 in thick calcite healed fractures, trace 1 in clay filled fractures, mostly pulverized by drilling, powder reacts with HCl.

CONSTRUCTION DIAGRAM



Bottom of borehole at 58.3 feet.

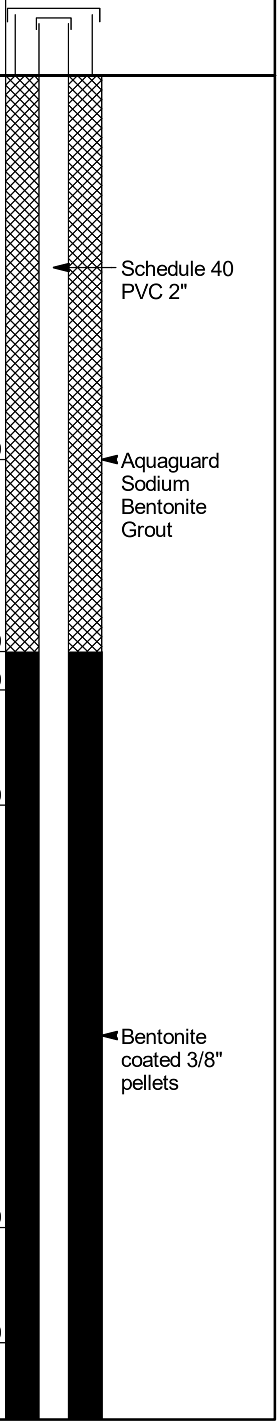
Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

HGWA-44D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 8/24/20 **COMPLETED** 8/25/20
NORTHING 1550409.13 ft **EASTING** 1940756.18 ft
DRILLER Cascade Drilling
GROUND ELEVATION 592.01 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 594.79 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terrasonic 1051181
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	
0 5	590 585			Hydro Excavation (0 ft to 10 ft) NO SAMPLE	582.0
10	580		▨	CLAY, Red with yellowish red and light gray mottling, medium plasticity, trace coarse sand, hard, moist. 12 ft: Yellowish red and light gray mottling.	577.0
15			▨	CLAY, Reddish yellow with light gray mottling, some brown organic matter, trace limestone gravel, medium to low plasticity, hard, moist.	576.0
	575		▤	HIGHLY WEATHER ROCK, Light brown, gravelley clay with some angular cobbles, gravel and cobbles are limestone, non to low plasticity, soft, wet.	573.0
20 25	570 565		▦	LIMESTONE, Dark bluish gray, reacts with HCl when powdered, partially pulverized by drilling, hard, dry to moist. 20 ft: With abundant white calcite healed fractures.	562.0
30	560	Driller reports void between 30 ft and 31 ft. No returns. 31 ft to 33 ft no recovery, but returns coming back. Driller reports 'soft' material, potentially washed away.		30 ft to 31 ft: Void. 31 ft to 33 ft: No recovery.	559.0
			▦	LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized and dry.	

CONSTRUCTION DIAGRAM



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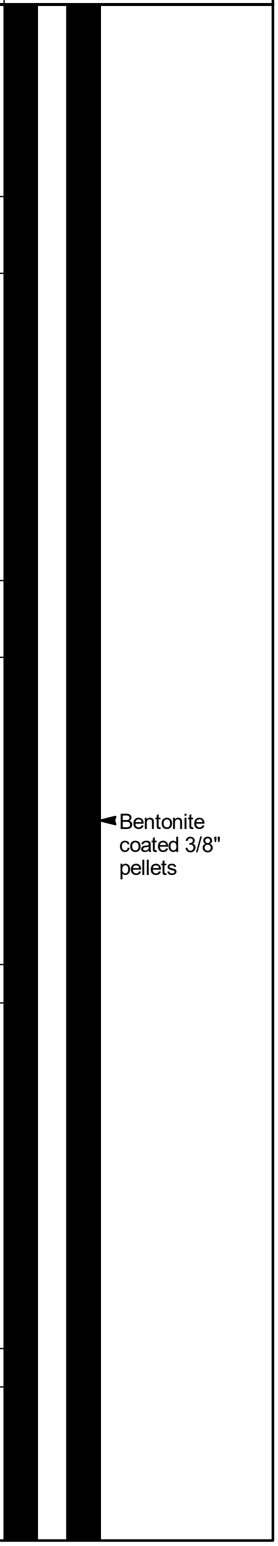
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
35	555			LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized and dry. *(continued)* 552.0	
40	550	40 ft: Driller reports no returns.		40 ft to 42 ft: No recovery. 550.0	
45	545			LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized by drilling. 542.0	
50	540			50 ft to 52 ft: No recovery. 540.0	
55	535			LIMESTONE, Dark bluish gray, wet, hard, reacts with HCl when powdered, abundant white calcite healed fractures, bottom 1 ft is pulverized by drilling. 532.0	Bentonite coated 3/8" pellets
60				60 ft to 61 ft: No recovery. 531.0	
65	530 525			LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures. 522.0	
70	520			70 ft to 71 ft: No recovery. 521.0	
				LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white hite 0.1 in to 2 in thick calcite healed fractures.	



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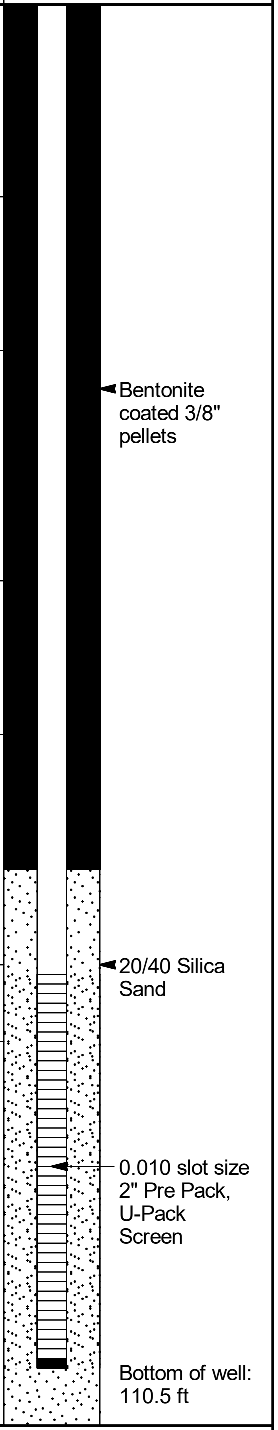
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
75	515		▦	LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white hite 0.1 in to 2 in thick calcite healed fractures. *(continued)* 512.0
80	510			80 ft to 84 ft: No recovery. 508.0
85	505		▦	LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures. 502.0
90	500			90 ft to 94 ft: No recovery. 498.0
95	495		▦	LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures. 492.0
100	490			100 ft to 102 ft: No recovery. 490.0
105 110	485		▦	LIMESTONE, Dark bluish gray, hard, wet, bottom 1 ft pulverized by drilling, reacts with HCl when powdered, abundant white 0.1 in to 2 in thick calcite healed fractures. 480.0

CONSTRUCTION DIAGRAM



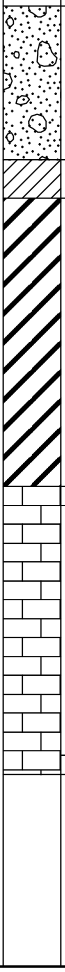
Bottom of borehole at 112.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

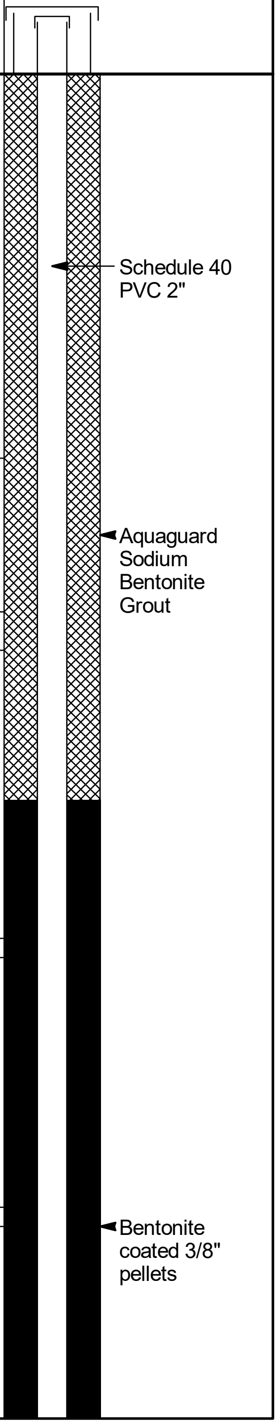
HGWA-45D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 8/19/20 **COMPLETED** 8/19/20
NORTHING 1551157.68 ft **EASTING** 1941907.54 ft
DRILLER Cascade Drilling
GROUND ELEVATION 584.08 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 586.95 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terrasonic 1051181
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski



DEPTH (ft)	ELEVATION (ft)	REMARKS	MATERIAL DESCRIPTION
0			Hydro Excavation (0 ft to 10 ft) NO SAMPLE
5	580		
10	575		574.1 GRAVELLEY SAND, Light gray, loose, trace clay, fine to coarse sand, angular gravel, moist. 12 ft: Dry.
15	570		570.1 CLAY, Light brown, mottled with light gray and yellowish red, laminar dark brown organic material throughout, firm, non plastic to low plasticity, moist.
			569.1 CLAY, Light brown, some reddish yellow, moist, soft, medium to high plasticity, with some angular, fine grained gravel increasing in concentration with depth.
20	565		20 ft: Wet.
		22.5 ft: Increased rig chatter.	561.6 LIMESTONE, Light gray to white, hard, strong reaction with HCl, dry.
25	560		561.1 LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.
30	555	30 ft to 40 ft: Very slow drilling (hard formation).	554.6 HIGHLY WEATHERED ROCK, Dark bluish gray, recovered as gravelly clay and silt, non plastic, hard, wet.
			554.1 30 ft to 37 ft: No recovery.
	550		

CONSTRUCTION DIAGRAM



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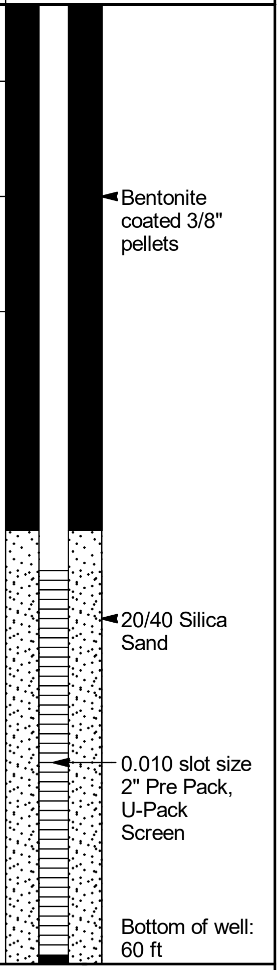
CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
35				30 ft to 37 ft: No recovery. *(continued)*
				547.1
				LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.
	545			
40				544.1
				40 ft to 43 ft: No recovery.
				541.1
				LIMESTONE, Dark bluish gray to white, abundant calcite healed fractures up to 1/2 in thick, strong reaction with HCl when powdered, hard, wet.
	540			
45				
	535			
50				
	530			
55				
	525			
60				524.1

CONSTRUCTION DIAGRAM



Bottom of borehole at 60.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

LOG OF TEST BORING

BORING HGWA-122

PAGE 1 OF 1

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/20/2014 **COMPLETED** 11/20/2014 **SURF. ELEV.** 585.04 **COORDINATES:** N:1551251.42 E:1941887.11
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 25.2 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 11.1 ft. after 100 hrs.
NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	**STRATA DESCRIPTION**	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** / **PERCENT RECOVERY** (RQD)	**COMMENTS**
		Clayey Sand (SC)					
5		- yellow-brown, dry, medium dense, medium to coarse grain, with yellow-red mottling		SS -1	3.5-5.0	3-7-5 (**12**)	
			577.04				
10		**Lean Clay (CL)** - yellow-brown, damp, stiff, no to low plasticity, with red-yellow mottling, some sand		SS -2	8.5-10.0	7-7-5 (**12**)	
		▼	572.04				
15		**Fat Clay (CH)** - brown, wet, soft, gravelly, angular gravel, weathered bedrock ▽		SS -3	13.5-15.0	2-2-1 (**3**)	
		◁	566.74				
20		**SHALEY LIMESTONE**		RC -1	18.3-20.2	**89** (21)	Auger refusal at 18.3 ft.
		- gray and dark gray, few weathered shale seams 1/8 to 1/4 inch thick, strong HCl reaction					
25		- shale seams thicker (up to 1 inch thick) and less weathered	555.84	RC -2	20.2-25.2	**96** (24)	

Bottom of borehole at 25.2 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

2012 GEOTECH ENGINEERING LOGS - ESEE2012DATABASE.GDT - 7/13/15 10:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-HAMMOND\HAMMOND ASH POND PIEZ\UPDATED HAMMOND PZ BORING L

Log updated with revised survey certified 5/19/2020.

WELL: HGWA-122

RECORD OF WELL CONSTRUCTION

PAGE 1 OF 1
ECS37736

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

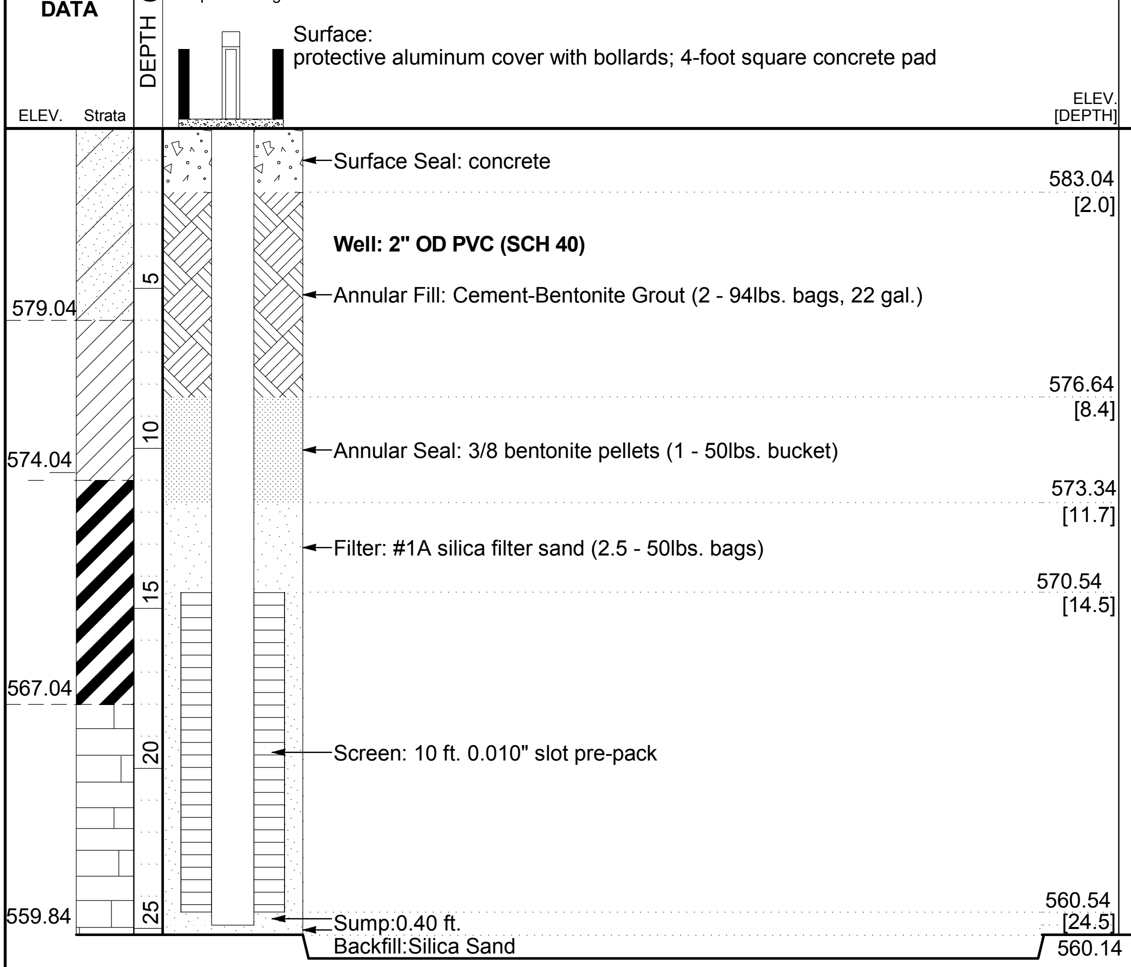
PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/20/2014 **COMPLETED** 11/20/2014 **SURF. ELEV.** 585.04 **COORDINATES:** N:1551251.42 E:1941887.11
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 25.2 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 11.1 ft. after 100 hrs.
NOTES Well installed. Refer to well data sheet.

BOREHOLE DATA | **WELL DATA** | **COMMENTS**

Top of Casing Elev: 587.90

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

BORING LOG

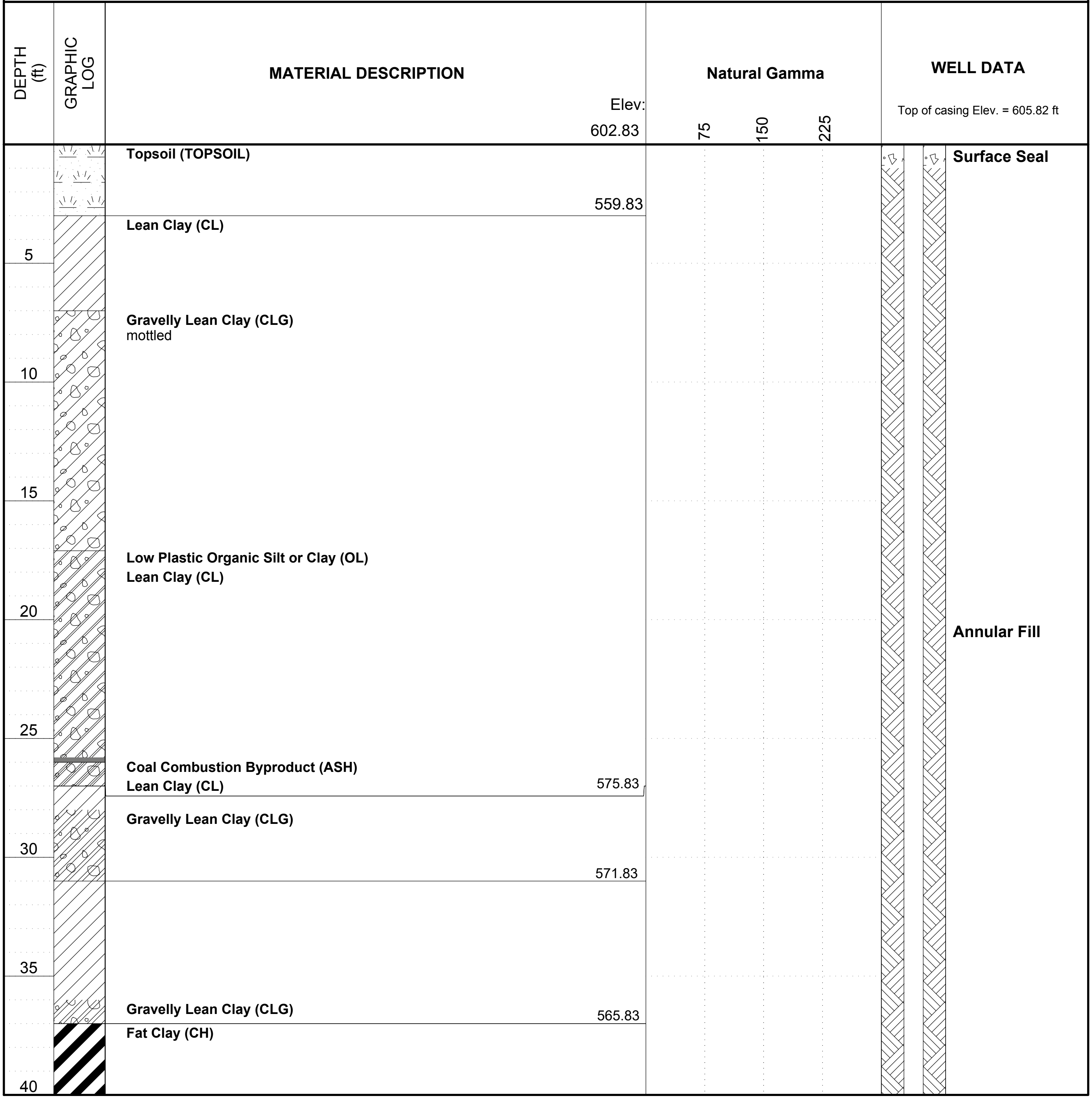
BORING HGWC-120

PAGE 1 OF 2

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Hammond
LOCATION Rome, GA

DATE STARTED 6/27/2016 **COMPLETED** 6/27/2016 **SURF. ELEV.** 602.83 **COORDINATES:** N: 1551067.24 E: 1942926.62
CONTRACTOR Cascade **EQUIPMENT** **METHOD** Rotosonic
DRILLED BY T. Ardito **LOGGED BY** W. Newton **CHECKED BY**
BORING DEPTH 67 ft. **GROUND WATER DEPTHDURING** 47 ft. **COMP.** 42.6 ft. **DELAYED** 42.6 ft.
NOTES Begin Engineering Log at 47 ft. Well installed. Refer to well data sheet.



Topsoil (TOPSOIL)	559.83
Lean Clay (CL)	
Gravelly Lean Clay (CLG) mottled	
Low Plastic Organic Silt or Clay (OL) **Lean Clay (CL)**	
Coal Combustion Byproduct (ASH) **Lean Clay (CL)**	575.83
Gravelly Lean Clay (CLG)	571.83
Gravelly Lean Clay (CLG)	565.83
Fat Clay (CH)	

(Continued Next Page)

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/4/17 08:35 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HAMMOND AP-3.GPJ

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

BORING LOG

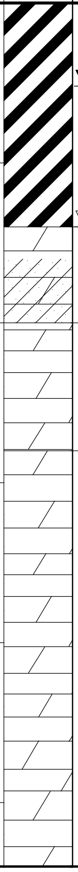
BORING HGWC-120

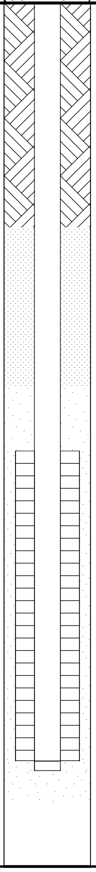
PAGE 2 OF 2

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Plant Hammond
LOCATION Rome, GA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	Elev:	Natural Gamma 75 150 225	WELL DATA Top of casing Elev. = 605.82 (CONTINUED)
45		**Fat Clay (CH)** *(Con't)*	555.83		Annular Fill
50		**DOLOSTONE** **CLS**	552.83		Annular Seal
			548.83		Filter Pack Screen top elevation: 548.83
55 60 65		**DOLOSTONE**	535.83		Screen bottom Elevation: 538.83





Bottom of borehole at 67.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 1/4/17 08:35 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\HAMMOND AP-3.GPJ

Log updated with revised survey certified 5/19/2020.

ERM
3200 Windy Hill Rd Ste 1500W
Atlanta, GA 30339
Telephone: 678-486-2700

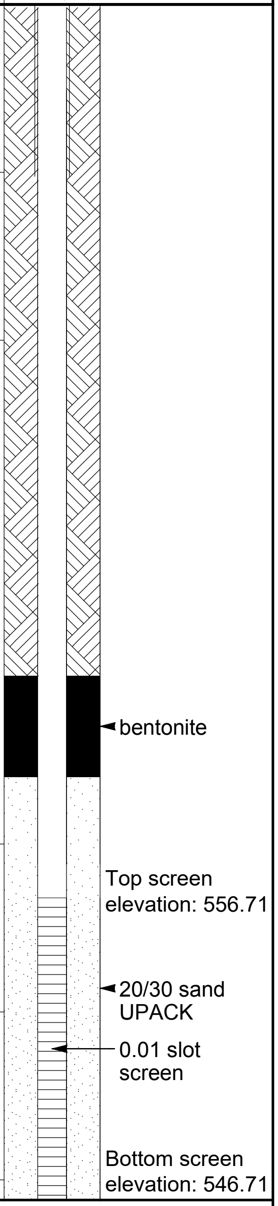
WELL NUMBER HGWC-121A

PAGE 1 OF 1

CLIENT Southern Company Services, Inc.
PROJECT NAME Plant Hammond
PROJECT NUMBER 0372394
PROJECT LOCATION Ash Disposal Site #3
DATE STARTED 7/17/17 **COMPLETED** 7/17/17
GROUND ELEVATION 582.31 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR Southern Comparny Services, Inc
COORDINATES N: 1550607.97 E: 1943030.44
DRILLING METHOD Hollow Stem Auger 2"
▽ **AT TIME OF DRILLING** 13.20 ft
LOGGED BY WV **CHECKED BY** GEJ
AT END OF DRILLING ---
NOTES
▼ **24hrs AFTER DRILLING** 11.50 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Elev:
0						582.31
	SS	70	CL-ML		(CL-ML) Silty CLAY: reddish with yellow mottling, some large angular gravel, medium stiff, low plasticity, dry	
5					5.0	577.31
	SS	63	CL		(CL) CLAY: reddish with yellow mottling, some gravel, medium dense, low plasticity, dry	
10					10.0	572.31
	SS	80	CL		(CL) CLAY: gray, some coarse sand, medium dense, moderate plasticity, moist ▼ ▽	
15						
	SS	78	CL		(CL) SAA	
20						
	SS	53	CL		(CL) SAA, wet	
25					25.0	557.31
	SS	32	CL		(CL) CLAY, gray/brown, some gravel, wet	
30					30.0	552.31
	SS	0			No recovery	
35					35.0	547.31
						546.71

WELL DIAGRAM
Top of casing elevation: 584.69
Casing Type: 2" PVC



Bottom of borehole at 35.6 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

BORING HGWC-124

LOG OF TEST BORING

PAGE 1 OF 1

ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers

LOCATION Plant Hammond

DATE STARTED 11/13/2014 **COMPLETED** 11/13/2014 **SURF. ELEV.** 579.80 **COORDINATES:** N:1551624.93 E:1942781.05

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

DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 32.5 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 14.2 ft. after 24 hrs.

NOTES Well installed. Refer to well data sheet.

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
		Fill (ML)					
5		- red-yellow, dry, very stiff, clayey, with pale brown mottling		SS -1	3.5-5.0	8-8-9 (**17**)	
			573.80				
		Silty Clay (CL)					
10		- brown-yellow and brown, dry, stiff, with black mottling		SS -2	8.5-10.0	5-3-5 (**8**)	
15	▼ ▽	- brown-yellow and brown, dry, medium stiff, with black mottling		SS -3	13.5-15.0	2-3-2 (**5**)	
			562.80				
		Clayey Gravel (GC)					
20		- brown, wet, very loose, with pale yellow-brown mottling		SS -4	18.5-20.0	2-2-2 (**4**)	
	◁		558.10				
		SHALEY LIMESTONE					Auger refusal at 21.7 ft.
25				RC -1	21.7-25.1	**94** (0)	
30		- inclined, separates at shale bedding planes, brown-red iron staining, strong to weak HCl reaction, medium grained pyrite (Dark gray and gray Formation)		RC -2	25.1-30.1	**96** (36)	
			547.30				

Bottom of borehole at 32.5 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

WELL: HGWC-124

RECORD OF WELL CONSTRUCTION

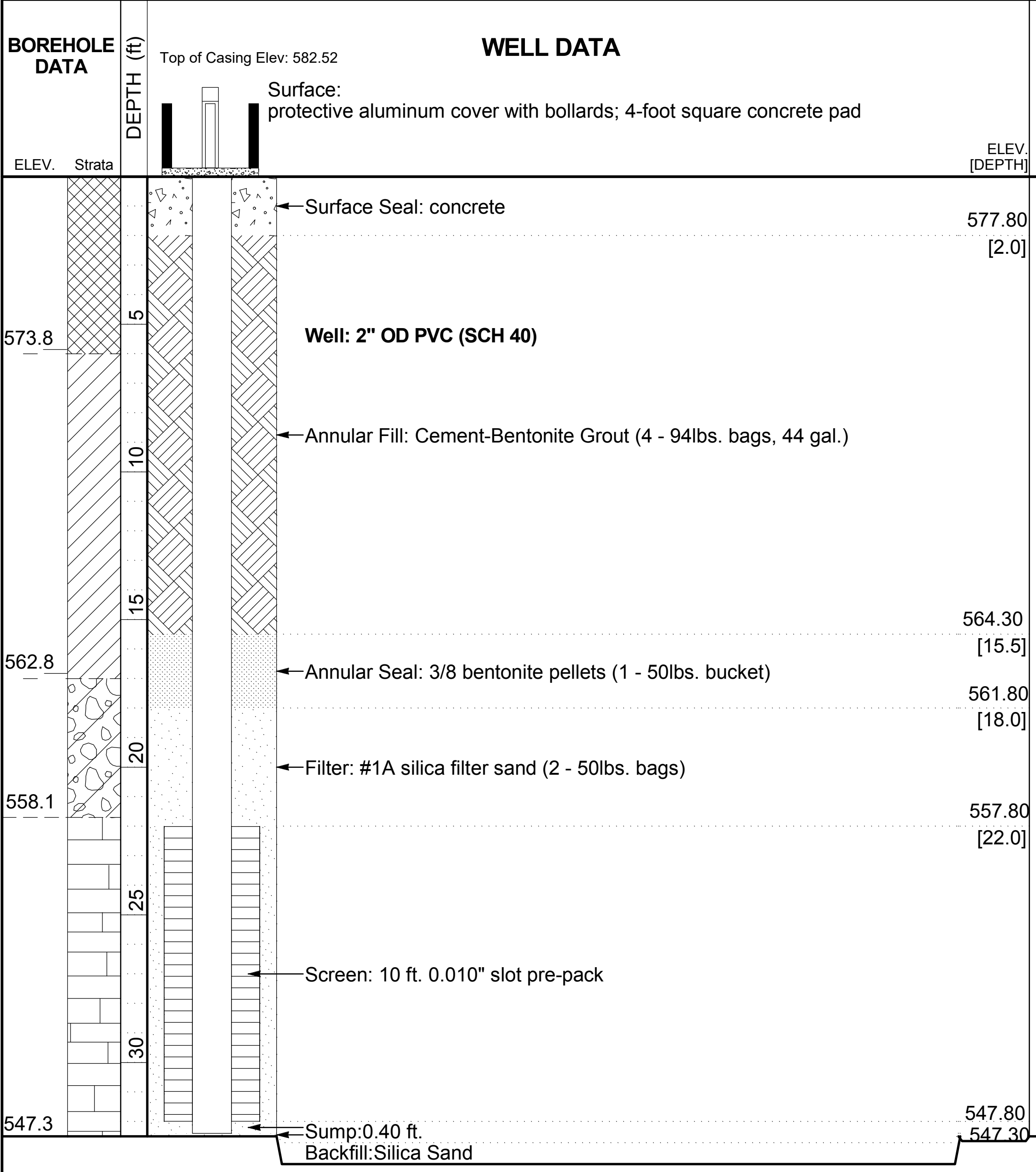
PAGE 1 OF 1
ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/13/2014 **COMPLETED** 11/13/2014 **SURF. ELEV.** 579.80 **COORDINATES:** N: 1551624.93 E: 1942781.05
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 32.5 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 14.2 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

BOREHOLE DATA | **WELL DATA** | **COMMENTS**



Easting and Northing in NAD 1983.
Elevation in NAVD 88.

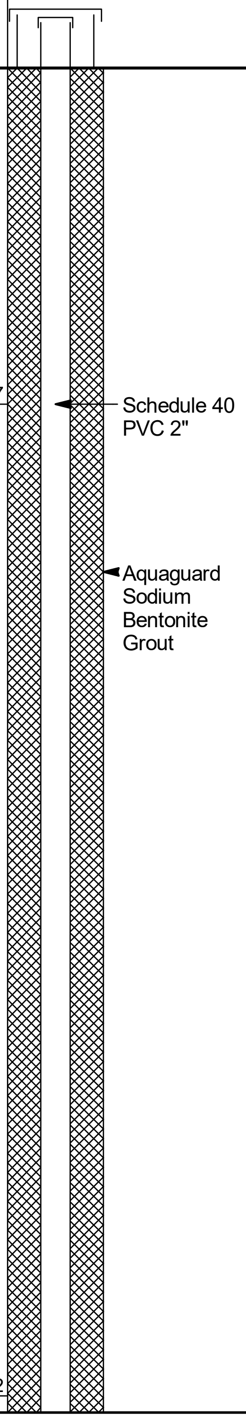
Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

HGWC-125

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 5/4/20 **COMPLETED** 5/4/20
NORTHING 1550821.41 ft **EASTING** 1942962.87 ft
DRILLER Cascade Drilling
GROUND ELEVATION 605.70 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 608.89 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terra Sonic Compact Crawler
LOGGED BY N.Tilahun **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	605			Hydro Excavation (0 ft to 10 ft) NO SAMPLE
5	600			
10	595		▨	595.7 CLAY, Light to dark brown, low to medium plasticity, trace fine to medium sand, few fine to coarse angular gravel, few silt, soft to firm, moist.
15	590		▨	
20	585		▨	20 ft: Trace black mottles.
25	580		▨	
30	575		▨	
35	570		▨	
			▨	566.2

CONSTRUCTION DIAGRAM



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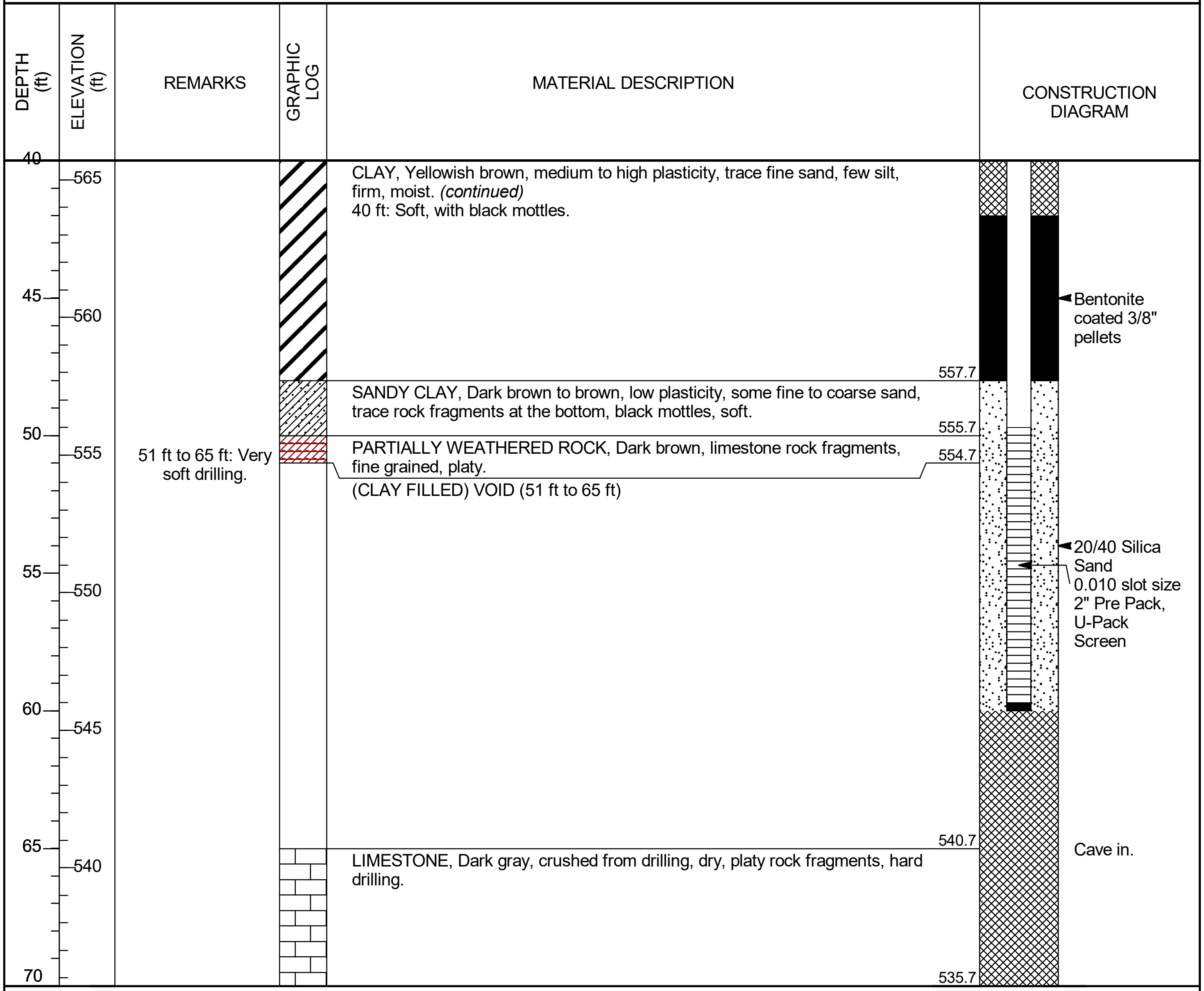
CLIENT Southern Company Services

PROJECT NAME Plant Hammond Well Installation

PROJECT NUMBER GW6581B

PROJECT LOCATION Plant Hammond



CLAY, Yellowish brown, medium to high plasticity, trace fine sand, few silt, firm, moist. *(continued)*
40 ft: Soft, with black mottles.

SANDY CLAY, Dark brown to brown, low plasticity, some fine to coarse sand, trace rock fragments at the bottom, black mottles, soft.

PARTIALLY WEATHERED ROCK, Dark brown, limestone rock fragments, fine grained, platy.

(CLAY FILLED) VOID (51 ft to 65 ft)

51 ft to 65 ft: Very soft drilling.

LIMESTONE, Dark gray, crushed from drilling, dry, platy rock fragments, hard drilling.

Bottom of borehole at 70.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

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Kennesaw, GA 20144

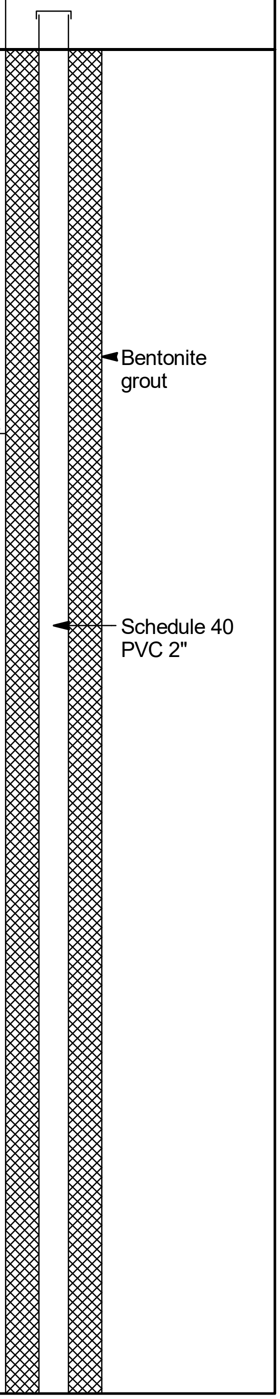
HGWC-126

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 11/25/19 **COMPLETED** 11/26/19
NORTHING 1550422.03 **EASTING** 1942689.40
DRILLER SCS Field Services
GROUND ELEVATION 608.72 **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 611.24
SAMPLING METHOD Core Barrel (4")
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Sonic TS-150
LOGGED BY B. Weinmann **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEV:
0	608.72			Hydro excavation (0-10') - No sample.	608.72
10	598.72		▨	CLAY, with SAND, Light yellow to brown, medium plasticity, fine to medium grained sand, few silt, mostly clay.	598.72
20			▨	20': With gravel.	

Depth scale: 5, 10, 15, 20, 25, 30
Elevation scale: 605, 600, 595, 590, 585, 580, 575

CONSTRUCTION DIAGRAM



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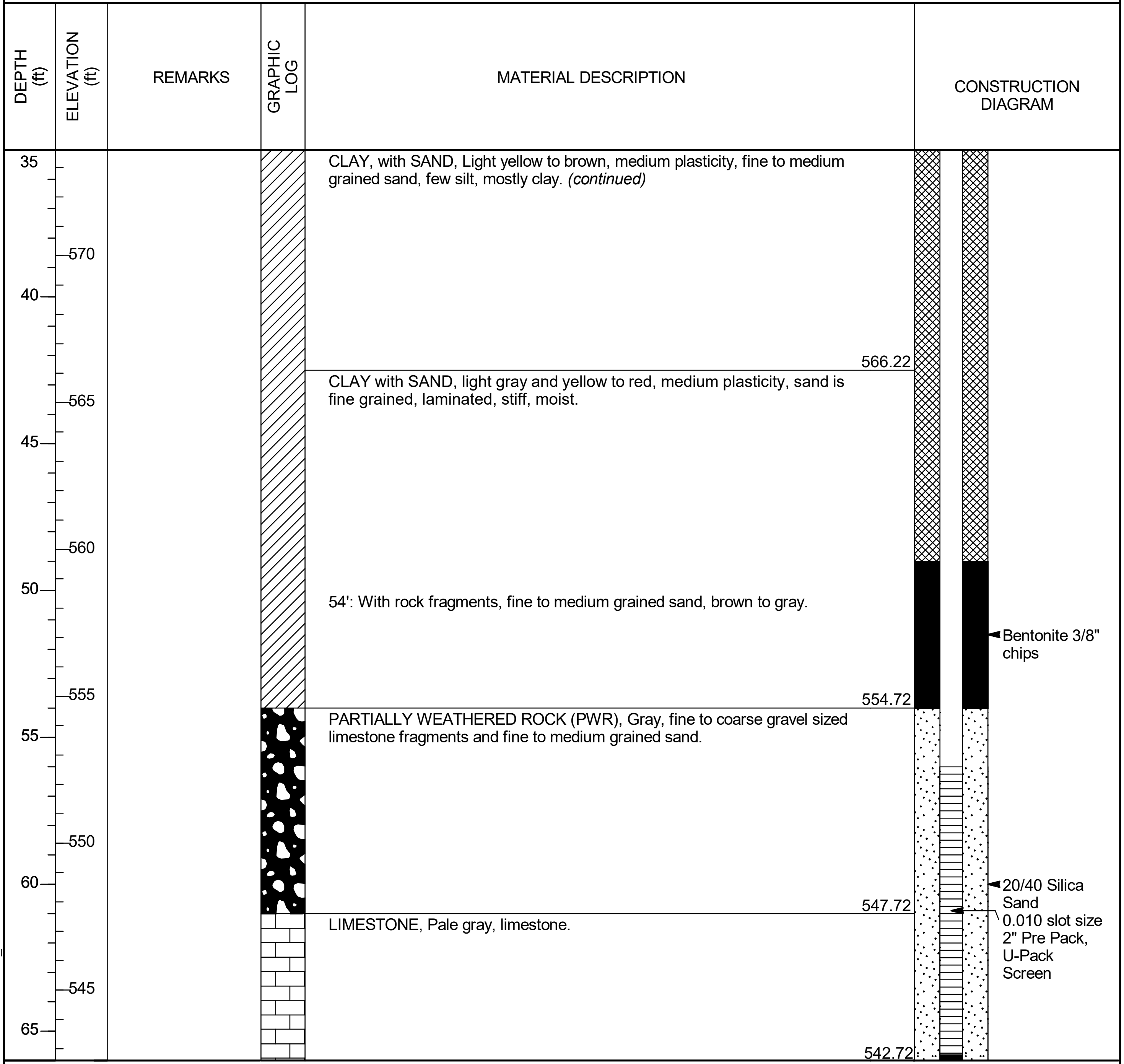
Log updated with revised survey certified 5/19/2020.

CLIENT Southern Company Services **PROJECT NAME** Plant Hammond Well Installation

PROJECT NUMBER GW6581B **PROJECT LOCATION** Plant Hammond



CLAY, with SAND, Light yellow to brown, medium plasticity, fine to medium grained sand, few silt, mostly clay. *(continued)*

CLAY with SAND, light gray and yellow to red, medium plasticity, sand is fine grained, laminated, stiff, moist.

54': With rock fragments, fine to medium grained sand, brown to gray.

PARTIALLY WEATHERED ROCK (PWR), Gray, fine to coarse gravel sized limestone fragments and fine to medium grained sand.

LIMESTONE, Pale gray, limestone.

Bottom of borehole at 66.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

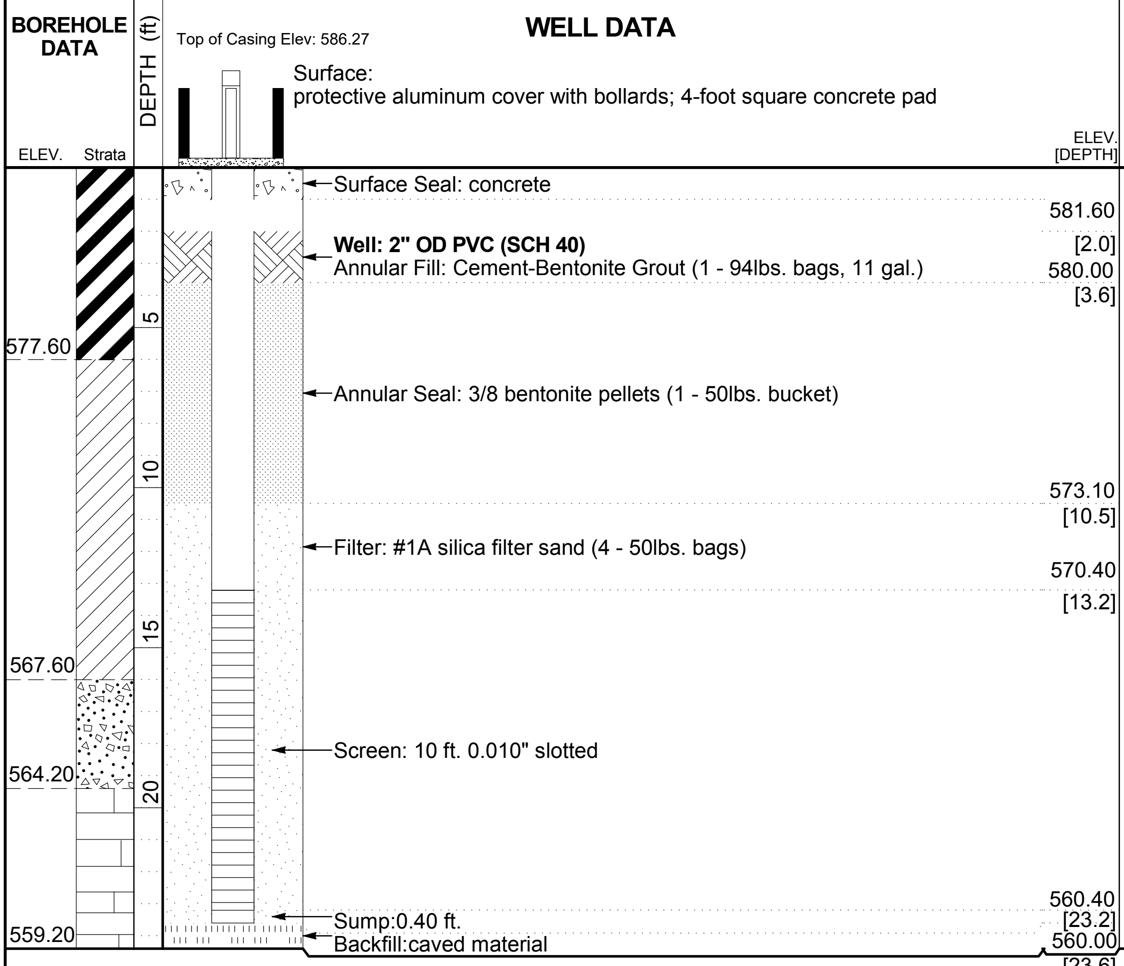
WELL: AP03-MW21
PAGE 1 OF 1
ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 12/2/2014 **COMPLETED** 12/3/2014 **SURF. ELEV.** 583.60 **COORDINATES:** N: 1550270.15 E: 1941809.76
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 24.4 ft. **GROUND WATER DEPTH: DURING** 5 ft. **COMP.** **DELAYED** 6.4 ft. after 24 hrs.
NOTES Well installed. Refer to well data sheet.

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**



Easting and Northing in NAD 1983.
Elevation in NAVD 88.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 7/8/15 13:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-HAMMOND\HAMMOND ASH POND PIEZ\UPDATED HAMMOND PZ BORIN

Log updated with revised survey certified 5/19/2020.

SOUTHERN COMPANY

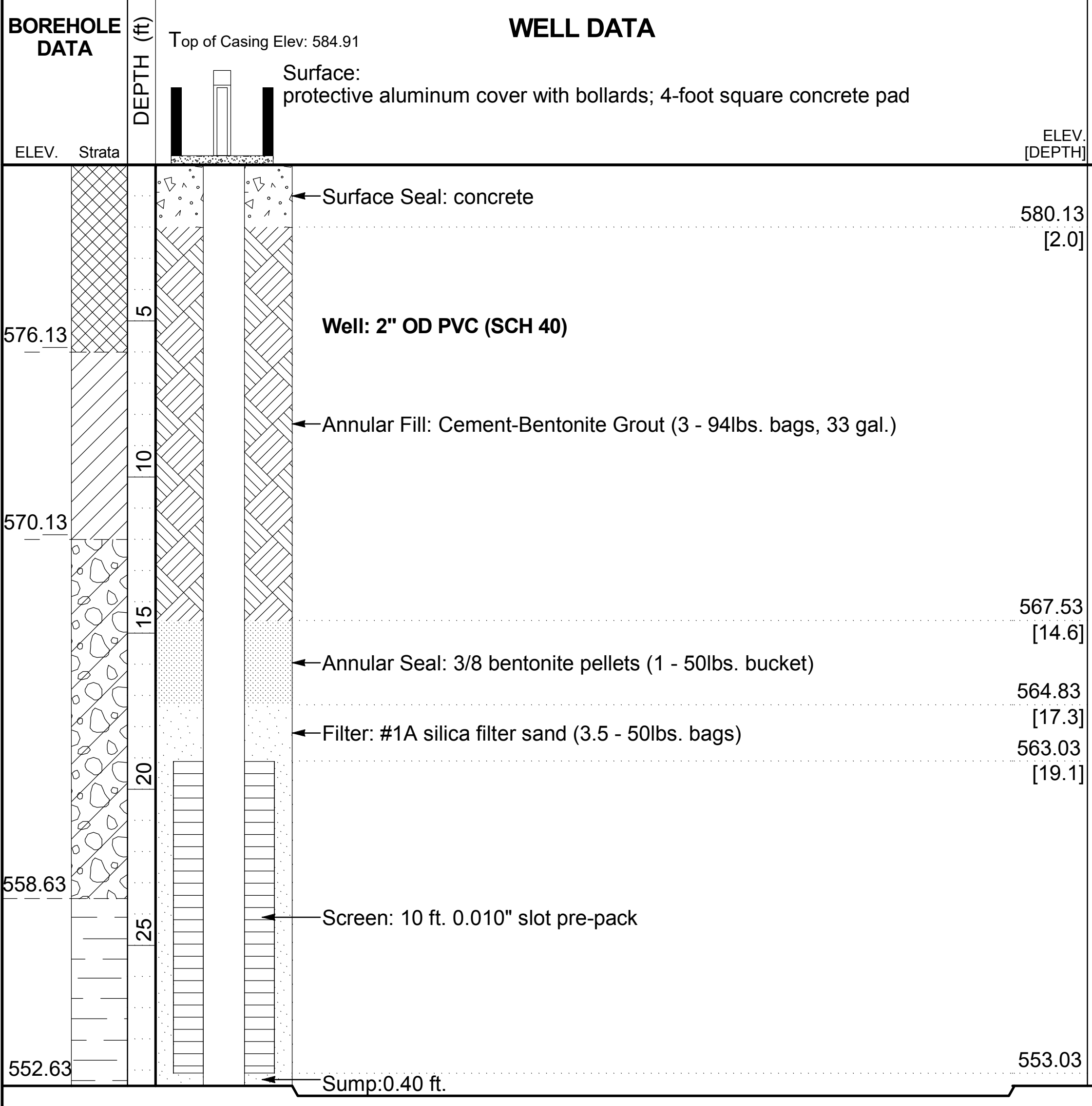
RECORD OF WELL CONSTRUCTION

WELL: AP03-MW23
PAGE 1 OF 1
ECS37736

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Ash Pond Piezometers
LOCATION Plant Hammond

DATE STARTED 11/24/2014 **COMPLETED** 11/24/2014 **SURF. ELEV.** 582.13 **COORDINATES:** N:1551641.44 E:1942496.83
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 29.5 ft. **GROUND WATER DEPTH: DURING** 15 ft. **COMP.** **DELAYED** 8.9 ft. after 72 hrs.
NOTES Well installed. Refer to well data sheet.



COMMENTS

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

Log updated with revised survey certified 5/19/2020.

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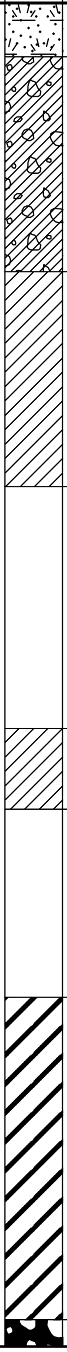
Kennesaw, GA 30144

MW-32

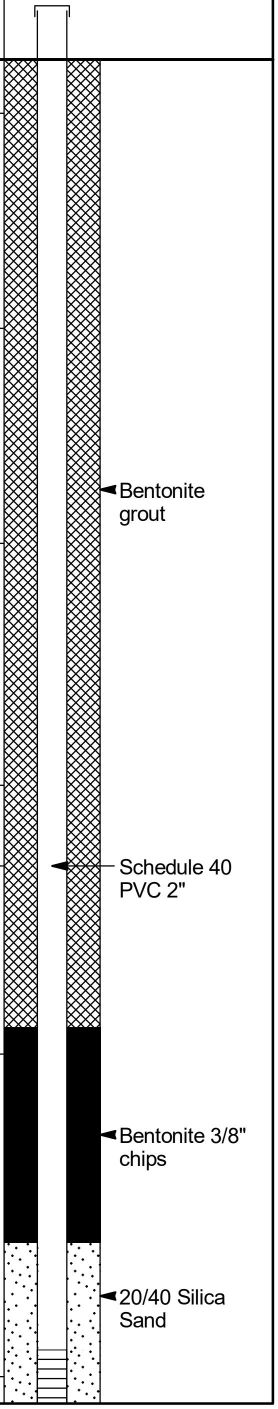
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 11/22/19 **COMPLETED** 11/26/19
NORTHING 1551092.83 ft **EASTING** 1943021.47 ft
DRILLER SCS Field Services
GROUND ELEVATION 583.10 ft **BORING DIAMETER** 8 in
DRILLING METHOD HSA + Rock Coring (NQ)
TOP OF CASING ELEVATION 585.46 ft
SAMPLING METHOD SPT
GEOPHYSICAL CONTRACTOR ---
RIG TYPE CME 550
LOGGED BY N.Tilahun **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	MATERIAL DESCRIPTION
					Top soil
	580			0-9': Hand auger.	GRAVELLY CLAY, Light brown, low plasticity, gravel is fine grained, angular, trace fien to coarse sand and silt, medium dense, moist. 3': Reddish brown to dark brown.
5	575				CLAY, Brown, medium plasticity, trace fine sand and silt, firm, moist.
10	570			9-28.3': Hollow stem auger.	9 - 13.5': No sample.
		89	2-2-2 (4)		CLAY, Brown, medium plasticity, trace angular gravel, few fine sand, firm, moist.
15	565				15 - 18.5': No sample.
		89	0-0-0 (-)	18.5-20': Weight of hammer.	CLAY, Light brown, high plasticity, very soft, laminated, wet.
20		100	0-0-0 (-)	20-21.5': Weight of hammer.	
		100	3-2-2 (4)		From 21.5': Dark brown, with weathered limestone fragments, laminated, soft, moist to wet.
	560	22	0-1-1 (2)		

GRAPHIC LOG



CONSTRUCTION DIAGRAM



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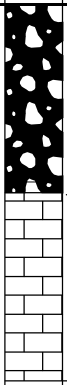
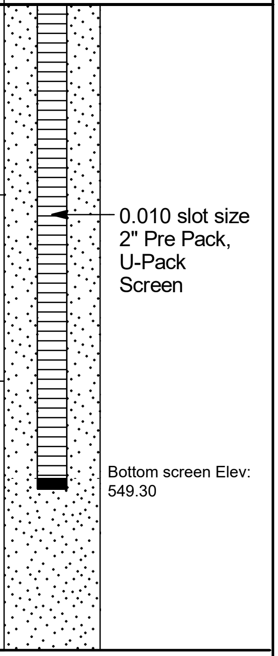
Kennesaw, GA 30144

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	MATERIAL DESCRIPTION
25		67	30-40-30 (70)		PARTIALLY WEATHERED ROCK (PWR), Gray, fine to coarse gravel sized limestone fragments, very hard, wet. *(continued)*
		17	50/3" (-)		
	555	17	50/3" (-)	From 28.3': Coring.	
					LIMESTONE, Dark gray, thinly bedded, hard, slightly weathered, with light gray to white calcite filled veins.
30					
					32 - 37': Void.
	550				
35					





Bottom of borehole at 37.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

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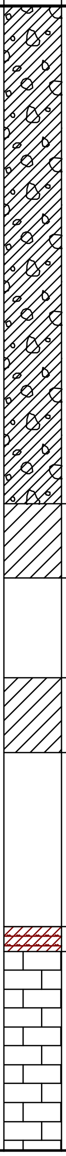
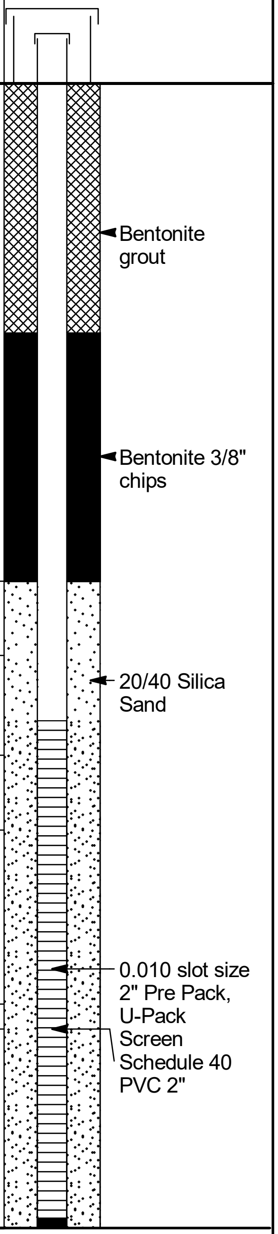
Kennesaw, GA 30144

MW-39

PAGE 1 OF 1

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 3/16/20 **COMPLETED** 3/16/20
NORTHING 1551111.45 ft **EASTING** 1943089.26 ft
DRILLER SCS Field Services
GROUND ELEVATION 577.60 ft **BORING DIAMETER** 8 in
DRILLING METHOD Hollow Stem Auger and Coring
TOP OF CASING ELEVATION 580.42 ft
SAMPLING METHOD Split Spoon
GEOPHYSICAL CONTRACTOR ---
RIG TYPE CME 550
LOGGED BY N.Tilahun **CHECKED BY** D.Yifru





DEPTH (ft)	ELEVATION (ft)	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	
0 5	575 570			0 ft to 9 ft: Hand auger. 9 ft to 18.7 ft: Hollow stem auger.		GRAVELLY CLAY, Light brown, low plasticity, gravel is fine grained, angular to subangular, trace fine to coarse sand, few silt, firm to stiff.	567.6
10		100	3-2-3 (5)			CLAY, Brown, low to medium plasticity, soft to firm, trace angular gravel, trace fine sand and silt, moist.	566.1
	565					No sample.	564.1
15		100	1-2-2 (4)			CLAY, Brown, medium plasticity, trace silt and fine to coarse sand, soft, fine angular gravel, moist.	562.6
	560					No sample.	559.1
		100	50	From 18.7 ft: Coring.		PARTIALLY WEATHERED ROCK (PWR), Dark brown to black, fine grained, laminated, trace angular gravel, very hard, wet.	558.6
20	555					LIMESTONE, Dark gray to white, thinly bedded, with calcite fillings, slightly weathered, mostly mechanical breaks.	554.6

Bottom of borehole at 23.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

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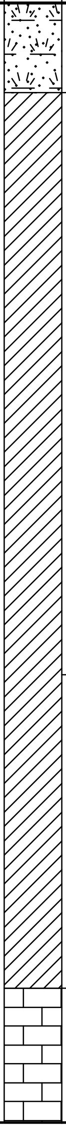
MW-41

PAGE 1 OF 1

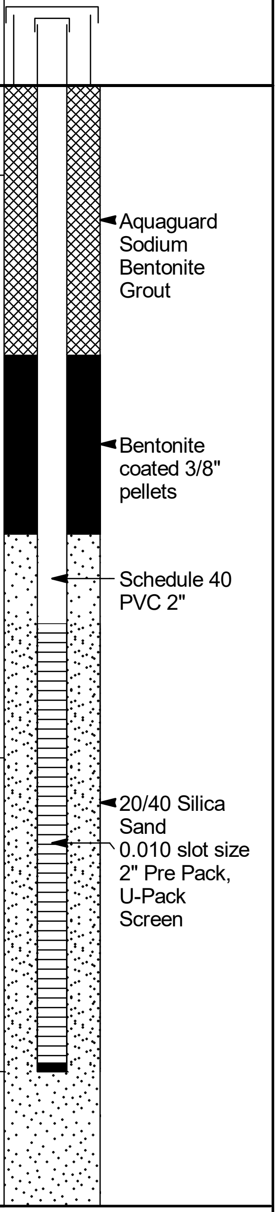
CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 5/18/20 **COMPLETED** 5/18/20
NORTHING 1551158.16 ft **EASTING** 1943196.47 ft
DRILLER Cascade Drilling
GROUND ELEVATION 574.87 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 577.25 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terra Sonic Compact Crawler
LOGGED BY N.Tilahun **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	MATERIAL DESCRIPTION	
0			TOPSOIL/ORGANIC MATTER	
		Hand auger to 2 ft, refusal.		572.9
			CLAY, Yellowish brown, low to medium plasticity, trace silt and fine sand, soft.	
5	570			
10	565			
15	560			559.9
			CLAY, Dark brown, black mottles, trace fine sand and silt, few angular gravel, laminated, soft, moist.	
20	555	20 ft to 22 ft: Driller reports very soft drilling.		
				552.9
			LIMESTONE, Dark gray, crushed from drilling, dry.	
25	550			549.9

GRAPHIC LOG



CONSTRUCTION DIAGRAM



Bottom of borehole at 25.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 88.

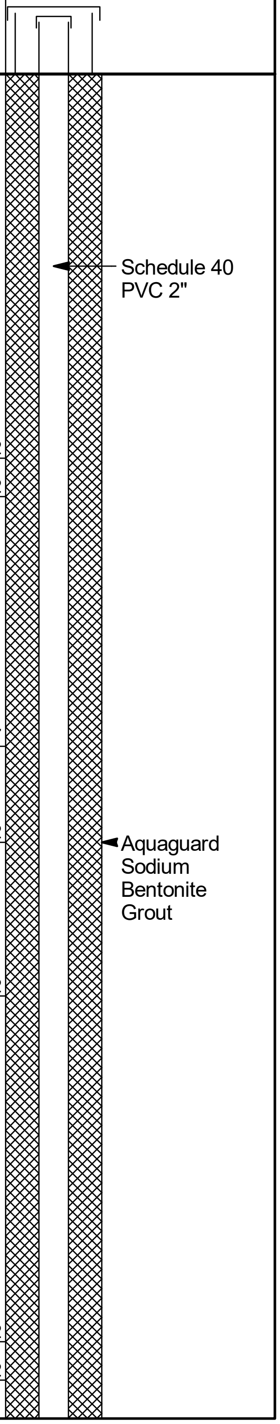
Geosyntec Consultants
1255 Roberts Boulevard
Kennesaw, GA 30144

MW-46D

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond
DATE STARTED 8/18/20 **COMPLETED** 8/18/20
NORTHING 1551056.48 ft **EASTING** 1942929.10 ft
DRILLER Cascade Drilling
GROUND ELEVATION 603.17 ft **BORING DIAMETER** 6 in
DRILLING METHOD Sonic
TOP OF CASING ELEVATION 605.72 ft
SAMPLING METHOD 4" core 6" override
GEOPHYSICAL CONTRACTOR ---
RIG TYPE Terrasonic 1051181
LOGGED BY A. Ramsey **CHECKED BY** J. Ivanowski

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0				Hydro Excavation (0 ft to 10 ft) NO SAMPLE
	600			
5				
	595			
10	593.2			SAND, Gray, loose, non plastic, fine to medium grained, some gravel from 10.5 ft to 11 ft, wet.
	592.2			CLAY, Reddish yellow, lean, low plasticity to non plastic, trace gravel to 1 in diameter, hard, moist.
				12.8 ft: Gray, lean, laminated, firm, low plasticity to non plastic, moist.
	590			
15				
	585.7			GRAVELLY CLAY, Reddish yellow, lean, firm, low plasticity, moist.
	585			
20	583.2			GRAVELLY CLAY, Very pale brown, lean, low plasticity to non plastic, hard, moist.
	580			
	579.2			CLAY, Grayish brown with some gravel, low plasticity, firm, moist.
25				
				26.5 ft: Reddish brown, trace cobbles and dusky read around medium grained sand inclusions. Increasing gravel content with depth.
	575			
30				
	570.2			GRAVELLY CLAY, Reddish yellow, some coarse sand, medium plasticity, fat, wet.
	570			
	569.2			SANDY CLAY, Reddish yellow, low plasticity, with some gravel, firm, moist.

CONSTRUCTION DIAGRAM



(Continued Next Page)

CLIENT Southern Company Services
PROJECT NAME Plant Hammond Well Installation
PROJECT NUMBER GW6581B
PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM
35	567.7		CLAY, Reddish yellow, high plasticity, very thin laminations, soft to very soft. 43 ft: Brown.	Aquaguard Sodium Bentonite Grout
	559.2		PARTIALLY WEATHERED ROCK, Brown, recovered as CLAY with gravelly limestone, medium plasticity, no HCl reaction, soft, wet.	
	556.9	50 ft to 58 ft: 1-2 ft voids about every foot, no returns reported.	LIMESTONE, Dark bluish gray, thin laminations, dolomitic, HCl reaction when powdered, very hard, some calcite healed fractures.	
50	553.2		50 to 58.5 ft: No recovery.	
	544.7		LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures. Recovered as gravel and cobbles with coarse sand.	
60	543.2		60 to 65 ft: No recovery.	Bentonite coated 3/8" pellets
65	538.2		LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures. Recovered as gravel and cobbles with coarse sand.	
70	533.2	From 73 ft: Significantly increased rig chatter indicating hard drilling. No voids reported.	70 to 77 ft: No recovery.	

(Continued Next Page)

MW-46D

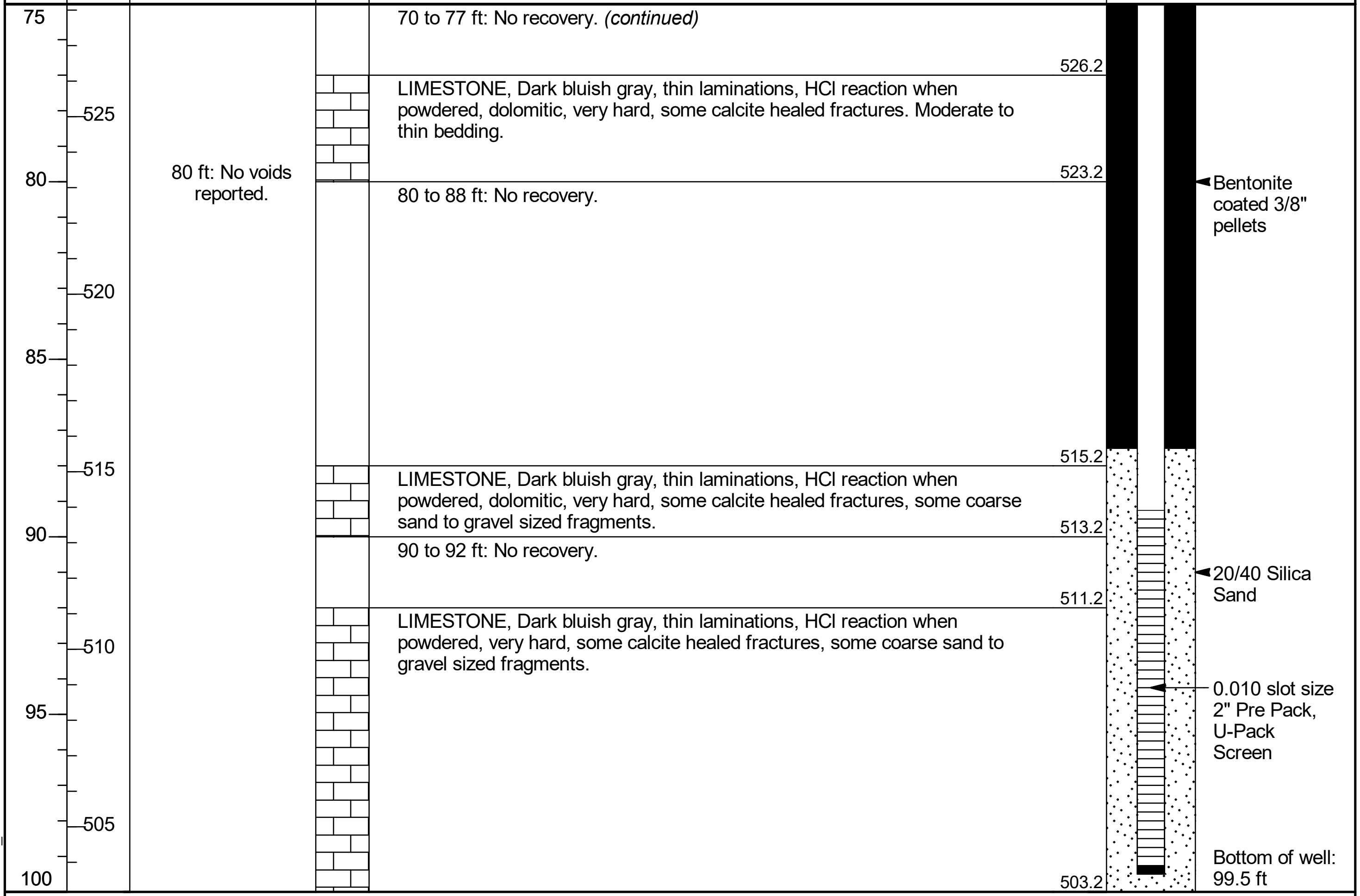
CLIENT Southern Company Services

PROJECT NAME Plant Hammond Well Installation

PROJECT NUMBER GW6581B

PROJECT LOCATION Plant Hammond

DEPTH (ft)	ELEVATION (ft)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	CONSTRUCTION DIAGRAM



REMARKS	MATERIAL DESCRIPTION	Elevation
	70 to 77 ft: No recovery. *(continued)*	526.2
	LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures. Moderate to thin bedding.	523.2
80 ft: No voids reported.	80 to 88 ft: No recovery.	515.2
	LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, dolomitic, very hard, some calcite healed fractures, some coarse sand to gravel sized fragments.	513.2
	90 to 92 ft: No recovery.	511.2
	LIMESTONE, Dark bluish gray, thin laminations, HCl reaction when powdered, very hard, some calcite healed fractures, some coarse sand to gravel sized fragments.	503.2

Bottom of borehole at 100.0 feet.

Easting and Northing in NAD 1983.
Elevation in NAVD 1988.

APPENDIX H

Certified Well Survey Data

Well ID	Casing Northing	Casing Easting	Top of Casing Elevation	Nail on Pad Northing	Nail on Pad Easting	Nail on Pad Elevation
HGWA-122	1551251.4160	1941887.1090	587.90	1551251.7520	1941888.4640	585.04
HGWC-120	1551067.2410	1942926.6150	605.82	1551066.9570	1942925.1140	602.83
HGWC-121A	1550607.9660	1943030.4370	584.69	1550606.4290	1943030.8200	582.31
HGWC-124	1551624.9330	1942781.0450	582.52	1551624.4970	1942779.7590	579.80
HGWC-125	1550821.4090	1942962.8700	608.89	1550821.3950	1942961.7570	605.70
HGWC-126	1550422.0250	1942689.3960	611.24	1550422.8480	1942688.6340	608.72
MW-21	1550270.1530	1941809.7590	586.27	1550268.6820	1941809.7320	583.60
MW-23	1551641.4430	1942496.8320	584.91	1551642.7910	1942496.2560	582.13
MW-32	1551092.8320	1943021.4650	585.46	1551094.5220	1943021.1080	583.10
MW-39	1551111.4510	1943089.2570	580.42	1551110.6190	1943087.9290	577.60
MW-41	1551158.1600	1943196.4740	577.25	1551157.3150	1943195.3930	574.87

Benchmark	Northing	Easting	Elevation
BM H-4	1549952.4470	1941611.3640	585.71

SURVEY DATA CERTIFICATION FOR SOUTHERN COMPANY TO DETERMINE NORTHING, EASTING, AND VERTICAL ELEVATION OF THE NAIL IN THE CONCRETE PAD & THE PVC WELL CASING. DATE OF FIELD SURVEY & INSPECTION: 05/11/2020-05/14/2020 FIELD SURVEY POSITIONAL TOLERANCE=0.5 FEET HORIZONTAL-NAD'83, 0.01 VERTICAL-NAVD'88 EQUIPMENT USED FOR HORIZONTAL LOCATION: TRIMBLE R10 RTK GPS & TRIMBLE S5 ROBOTIC TOTAL STATION. THE VERTICAL LOCATION OF EACH SURVEYED POINT WAS ESTABLISHED BASED UPON LEVEL RUNS WITH A DIGITAL LEVEL LOOP FROM VERTICAL CONTROL ESTABLISHED BY ON-SITE BENCHMARK BM H-4 SET BY GEL SOLUTIONS USING A TRIMBLE DINI LEVEL

GEORGIA REGISTERED LAND SURVEYOR
No. LS-3119
JIMMY R. TOOLE

5/19/2020

Well ID	Casing Northing	Casing Easting	Top of Casing Elevation	Nail on Pad Northing	Nail on Pad Easting	Nail on Pad Elevation
HGWA-1	1550423.3150	1940770.0000	595.21	1550424.4790	1940770.0550	592.32
HGWA-2	1549796.8670	1939845.1520	587.92	1549796.5130	1939845.2880	585.29
HGWA-3	1549794.4080	1939833.3900	587.74	1549794.0880	1939833.5600	585.23

Benchmark	Northing	Easting	Elevation
BM H-3	1548237.4130	1941013.5710	574.63

SURVEY DATA CERTIFICATION FOR SOUTHERN COMPANY TO DETERMINE NORTHING, EASTING, AND VERTICAL ELEVATION OF THE NAIL IN THE CONCRETE PAD & THE PVC WELL CASING. DATE OF FIELD SURVEY & INSPECTION: 05/11/2020-05/14/2020 FIELD SURVEY POSITIONAL TOLERANCE=0.5 FEET HORIZONTAL-NAD'83, 0.01 VERTICAL-NAVD'88 EQUIPMENT USED FOR HORIZONTAL LOCATION: TRIMBLE R10 RTK GPS & TRIMBLE S5 ROBOTIC TOTAL STATION. THE VERTICAL LOCATION OF EACH SURVEYED POINT WAS ESTABLISHED BASED UPON LEVEL RUNS WITH A DIGITAL LEVEL LOOP FROM VERTICAL CONTROL ESTABLISHED BY ON-SITE BENCHMARK BM H-3 SET BY GEL SOLUTIONS USING A TRIMBLE DINI LEVEL

GEORGIA REGISTERED LAND SURVEYOR
No. LS-3119
JIMMY R. TOOLE

5/19/2020

Well ID	Casing Northing	Casing Easting	Top of Casing Elevation	Nail on Pad Northing	Nail on Pad Easting	Nail on Pad Elevation
HGWA-42D	1549363.7180	1938443.8590	586.17	1549362.3140	1938444.3210	583.39
HGWA-43D	1550422.8480	1940753.8050	595.08	1550422.8120	1940754.9980	592.08
HGWA-44D	1550409.1260	1940756.1850	594.79	1550409.2230	1940757.6150	592.01
HGWA-45D	1551157.6780	1941907.5370	586.95	1551159.2250	1941907.4670	584.08
MW-46D	1551056.4780	1942929.1010	605.72	1551055.9530	1942927.8210	603.17
HGWA-47	1548990.9600	1934171.8440	580.33	1548989.2780	1934171.6440	577.39
HGWA-48D	1548989.3900	1934178.1460	580.26	1548988.1150	1934177.8070	577.29

Benchmark	Northing	Easting	Elevation
BM H-1	1547964.9650	1937219.0690	579.02
BM H-2	1548149.4490	1938960.2220	590.68
BM H-4	1549952.4470	1941611.3640	585.71

SURVEY DATA CERTIFICATION FOR SOUTHERN COMPANY TO DETERMINE NORTHING, EASTING, AND VERTICAL ELEVATION OF THE NAIL IN THE CONCRETE PAD & THE PVC WELL CASING. DATE OF FIELD SURVEY & INSPECTION: 09/01/2020-09/02/2020. FIELD SURVEY POSITIONAL TOLERANCE=0.5 FEET HORIZONTAL-NAD'83, 0.01 VERTICAL-NAVD'88. EQUIPMENT USED FOR HORIZONTAL LOCATION: TRIMBLE R10 RTK GPS & TRIMBLE S5 ROBOTIC TOTAL STATION. THE VERTICAL LOCATION OF EACH SURVEYED POINT WAS ESTABLISHED BASED UPON LEVEL RUNS WITH A DIGITAL LEVEL LOOP FROM VERTICAL CONTROL ESTABLISHED BY ON-SITE BENCHMARKS BM H-1, BM-H2 & BM-H4 SET BY GEL SOLUTIONS DURING PREVIOUS SURVEYS USING A TRIMBLE DINI LEVEL

GEORGIA REGISTERED LAND SURVEYOR
No. LS-3119
JIMMY R. TOOLE

9/10/2020