Prepared for

Georgia Power Company
241 Ralph McGill Blvd NE
Atlanta, Georgia 30308

PLANT HAMMOND ASH POND 3 TRANSIENT GROUNDWATER MODEL REPORT

Submitted by

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engineers | scientists | innovators

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Project Number: GR9134

February 2023

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LIST OF ABBREVIATION & ACRONYMS

AP	Ash Pond
CCR	Coal Combustion Residuals
CSM	Conceptual Site Model
ft	Feet
ft/d	Feet per day
GA EPD	Georgia Environmental Protection Division
GPC	Georgia Power Company
HAR	Hydrogeologic Assessment Report
HDPE	High Density Polyethylene
HWR	Highly Weathered Rock
MDu	Mississippian Devonian Undifferentiated
NRMSE	Normalized Root Mean Square Error
SCS	Southern Company Services
Srm	Silurian Red Mountain

1.0 INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec) has prepared this *Plant Hammond Ash Pond 3 Transient Groundwater Model Report* (Report) on behalf of Georgia Power Company (Georgia Power) and Southern Company Services (SCS). The purpose of this Report is to document the development of a transient groundwater model to represent groundwater flow conditions in the vicinity of Ash Pond 3 (AP-3 or Site) at Plant Hammond (**Figure 1**). This Report also summarizes model-predicted groundwater flow and the predicted extent of AP-3 coal combustion residuals (CCR) below the potentiometric surface, under post-closure conditions.

1.1 Site Background

Plant Hammond (Plant) is a former four-unit, coal-fired, electric generating facility located approximately ten miles west of Rome, Georgia. The Plant is bordered by Georgia Highway 20 to the north, Cabin Creek to the east, and the Coosa River to the south (**Figure 1**). The Plant is owned and operated by Georgia Power. The Plant commenced commercial operations in 1952. In July 2019, all four electric generating units were decommissioned and no longer produce electricity. CCR resulting from past power generation have historically been transferred and stored in onsite ash ponds AP-1, AP-2, AP-3, and AP-4 at the Plant.

AP-1 is a 35-acre surface impoundment that received CCR materials from its commission in 1952 until 1969. After 1969, AP-1 was utilized as a co-treatment pond to handle return water flows from the other ponds and for recycling of process water for plant operations. AP-2 is a 21-acre surface impoundment. Dewatered CCR from AP-2 is currently being excavated and transported to the nearby Huffaker Road facility, a permitted solid waste landfill owned and operated by Georgia Power. AP-4 was commissioned in 1986 as a surface impoundment with a corresponding surface area of approximately 54 acres. Dry ash stacking operations in AP-4 began in 1994 and continued until 2010; AP-4 received both fly ash and bottom ash during this period. AP-4 was capped in place in 2011-2012. Georgia Power will close AP-1, AP-2, and AP-4 through removal of the CCR material from the CCR units. Details of the closure approaches are provided on Georgia Power's CCR Rule Compliance website[1]. The closure permits (No. 057-023D[CCR] for AP-1 and No. 057-024D[CCR] for AP-2) were approved by the Georgia Environmental Protection Division (GA EPD) in June 2020[2]; GA EPD approved the closure permit (No. 057-025D[CCR]) for AP-4 in January 2021.

[1] https://www.georgiapower.com/company/environmental-compliance/plant-list/plant-hammond.html
[2] https://epd.georgia.gov/ccr-permits

AP-3 is a 25-acre former ash pond that was constructed in 1973 and 1974. AP-3 is closed in place with an engineered final cover system consisting of a 60-millimeter-high density polyethylene (HDPE) liner, geo-composite drainage media, a minimum 18-inch-thick protective soil cover, and a 6-inch-thick vegetative layer. The final cover system was designed to limit infiltration of precipitation with low permeability materials and is graded to promote positive drainage and shed stormwater away from AP-3 via riprap drainage ditches toward three outfall locations around AP-3. Final capping of the unit was completed in the second quarter of 2018. The closure permit application was issued draft by GA EPD in December 2021 and is awaiting final review and approval.

1.2 Modeling Background

In 2019, Geosyntec developed a steady state groundwater model for Georgia Power, to evaluate how the cover system at AP-3 and future dewatering of AP-1 could influence groundwater elevations in the vicinity of AP-3. The steady state model results predicted that under the two above scenarios the groundwater elevation in the vicinity of AP-3 and AP-1 would lower by approximately 4 feet (Geosyntec, 2019a). In 2020, Geosyntec updated the steady state groundwater model to include 107 TreeWells® east and downgradient of AP-3, which are proposed as a proven engineering method to enhance the closure of AP-3 (Geosyntec, 2020a). The results of the updated model predicted that the installed cover system at AP-3, combined with the TreeWells and future dewatering of AP-1, would result in a maximum height of CCR below the potentiometric surface of 3.7 feet, and a 92% reduction of the volume of the CCR below the potentiometric surface from 101,585 cubic yards (pre-closure conditions) to 8,143 cubic yards (post-closure conditions), at AP-3. The results of the 2019 and 2020 groundwater models were provided to GA EPD under separate covers.

1.3 Modeling Objectives

In response to a July 20, 2022, letter from GA EPD (GA EPD, 2022), Geosyntec updated the groundwater model to address GA EPD comments and to meet the below model objectives:

- Convert the steady state model to a transient model to better estimate the duration needed to achieve the predicted reduction in CCR below the groundwater potentiometric surface.
- Update the model layering, parameters[3], and boundary conditions[4] using new

[3]Parameters updated include hydraulic conductivity and storage.
[4]Boundary conditions updated include the Coosa River, creeks, CCR Pond surface water elevations, recharge, and evapotranspiration.

data[5] collected between 2018 and 2022.

- Update the model calibration in the areas of AP-1and AP-3 using groundwater elevation data measured from October 2018 to August 2022[6].
- Use the model to simulate planned closure conditions at AP-1 and AP-2 in conjunction with the operation of the engineering method (TreeWells) at AP-3, and evaluate the possible influence on groundwater flow conditions in the general area of AP-3.
- Use the model to evaluate the potentiometric surface within the CCR at AP-3 under planned closure conditions described above.

Model construction, calibration, and predictive scenario results are summarized below. For a detailed description of model construction, calibration, and scenarios, see **Appendix A**.

[5]Data used to update the model include geologic boring, slug test, precipitation, surface water elevation, and groundwater elevation data collected after development of the initial steady state model (Geosyntec, 2019a).
[6]The original steady state model was only calibrated to groundwater elevation data from February 2017.

2.0 GROUNDWATER FLOW MODEL SUMMARY

2.1 Pre-Closure Model

A pre-closure model was conceptualized and constructed based upon the conceptual site model (CSM) presented in the Hydrogeologic Assessment Report (HAR) prepared for each of the individual ash ponds (Geosyntec, 2019b, 2019c, 2020b). The CSM is summarized in **Appendix A** of this report. Note that the term "pre-closure" for the purposes of the Report refers to current conditions at the Plant, where AP-1 and AP-2 contain CCR and remain open to active infiltration of precipitation, and AP-3 is closed.

The modular, three-dimensional (3D), finite difference groundwater flow model software used to simulate groundwater flow was MODFLOW-NWT (Niswonger, et al., 2011). The software Groundwater Vistas version 8.30 Build 20, 64-bit, was used as the model pre- and post-processor.

Site features conceptualized in the flow model include: (i) surface water features (e.g., the Coosa River, Cabin Creek, Unnamed Creek, ponded water within AP-1 and AP-2); (ii) CCR, fill, alluvium, residuum, highly weathered/fractured rock (HWR), and bedrock lithologic units; (iii) evapotranspiration; and (iv) recharge.

The extent of the model grid is shown on **Figure 2**. Model boundary conditions representing the Coosa River, Cabin Creek, Unnamed Creek, AP-1 surface water, AP-2 surface water, and a groundwater divide (represented using inactive cells) are shown on **Figure 3**.

In general, the lithologic units/materials described in the CSM (**Appendix A**) are represented by the following model layers:

Table 1 - Model Layering

Model Layer	Description
1	CCR Material, Fill Material, and Alluvium
2	Alluvium
3	Residuum
4	HWR
5	Upper Bedrock (Limestone, Shale, & MDu[7])
6	Lower Bedrock (MDu)

[7] MDu = Mississippian Devonian Undifferentiated formation bedrock

An example cross section of the model layering is provided on **Figure 4.**

The model was built to simulate transient conditions, which incorporate changes in surface water stages (i.e., changes in the Coosa River, Unnamed Creek, Cabin Creek, AP-1, and AP-2), variability in evapotranspiration, and variability in aquifer recharge via infiltrating precipitation. The simulated transient time period is from July 2018 through August 2022. This time period was selected as it represents approximately 4 years of variation in precipitation, groundwater elevations, and on-site processes. Transient conditions were averaged into 17 quarterly stress periods.

Further details on model construction are documented in **Appendix A**.

2.1.1 Pre-Closure Model Calibration

The model was calibrated to groundwater elevation targets based on measurements collected between July 2018 to August 2022 from AP-1 and AP-3 wells shown in **Appendix A**.

The groundwater flow model was calibrated to observed on-site groundwater conditions by adjusting recharge, hydraulic conductivity, and storage coefficients. The model was calibrated through a mixture of manual adjustment and automated methods via PEST.

The model was considered calibrated once simulated output approximated inferred groundwater flow directions and groundwater elevations measured at monitoring wells. Simulated groundwater elevation contours from the alluvium layer of the calibrated model are shown on **Figure 5**. These contours represent model simulated groundwater elevations in the uppermost part of the unconfined aquifer (i.e., the alluvium) and generally mimic groundwater flow directions at AP-1 and AP-3 inferred from Site data (**Appendix B**).

The model was also considered calibrated once calibration statistics[8] for the groundwater elevation targets indicated a residual[9] mean error close to zero, and a normalized root mean square error (NRMSE) close to 10%. Model calibration statistics are summarized below:

---

[8] Calibration statistics as described by the ASTM standard D 5490-93

[9] Residual = measured groundwater elevation minus simulated groundwater elevation

Table 2 - Model Calibration Statistics

Model Calibration Statistics	
Residual Mean (ft)	-0.55
Residual Standard Deviation (ft)	3.01
Absolute Residual Mean (ft)	2.53
Root Mean Square (RMS) Error (ft)	3.06
Minimum Residual (ft)	-6.06
Maximum Residual (ft)	7.49
Range of Observations (ft)	24.15
Normalized RMS Error	12.7%

While industry practice is to target NRSME to be 10% or less, the proximity of the residual mean to zero and NRMSE slightly above 10% indicates that the model is reasonably calibrated for its intended purpose of predicting general groundwater flow trends and elevations in the modeled area. Some factors that limited reduction of the NRMSE below 10% include:

i. <u>Frequency of surface water level measurements at Cabin Creek</u>: To aid the construction and calibration of the transient model, the model was developed to simulate average quarterly conditions. However, surface water elevations used to inform the Cabin Creek model boundary were only measured periodically (not continuously), and represents discrete points in elevation and time that may not represent the actual quarterly average range in variability of surface water elevations that occur in the creek. Further, transient data for the creek was only available for the last half (2020 to 2022) of the model simulation time period. These factors introduced uncertainty in the model, with respect to Cabin Creek;

ii. <u>Frequency of groundwater level measurements at the Site</u>: As discussed above, the model simulates average quarterly conditions. However, groundwater elevation data used to calibrate the model was measured periodically (not continuously) and represent discrete data points that may not reflect average conditions. This factor sometimes resulted in difficulties matching simulated quarterly average conditions to discrete measurements;

iii. <u>Discrete creek elevation data east of AP-3</u>: The Cabin Creek boundary condition in the model was based on interpolated surface water elevations in the creek based on two measurement locations (one upstream and one downstream of the AP-3 area). Measuring points for surface water directly east of AP-3 were not available at the time of model construction. Due to natural variability in elevation of the creek between the two surveyed measuring points, the interpolated creek elevations do not always match observed groundwater elevation trends and elevations in wells and piezometers in the area east of AP-3. This added uncertainty to the model and affected the calibration of the model and resulting NRMSE.

iv. The nearly flat hydraulic gradient encountered along the eastern side of AP-3: Related to item iii above, the hydraulic gradient in the area east of AP-3 is very flat (low gradient), and therefore small changes in groundwater and surface water elevations can have more significant impacts to the model calibration statistics, especially in these areas of interpolated surface water elevations in Cabin Creek, where the creek elevation is uncertain.

While the factors discussed above had some effect on the model calibration statistics, it should be noted that the model is considered to be reasonably calibrated as it has a residual mean error close to zero, and can generally simulate (i) quarterly averaged groundwater elevations, (ii) average flow directions, and (iii) groundwater elevation trends.

2.1.2 Groundwater Flow Model Limitations

This groundwater model was developed using the most current Site information available at the time of model development, and application of industry standard modeling software and methods. However, all groundwater flow models are necessarily simplified mathematical representations of complex natural systems, and thus inherently have uncertainty associated with their predictions, and limits to their application. Model uncertainty will never be removed but can be mitigated by the addition of model components (e.g., transient groundwater elevations, boundaries, etc.) that more realistically mimic natural systems, and through calibration of model parameters based on various types of data. While there is still some uncertainty within this transient model, further calibration improvement and reduction in model uncertainty in the AP-3 area of the model may be achieved as the model is periodically updated with new data.

The updating of the prior steady state models to simulate more complex transient conditions, and the calibration statistics generated from the transient model, support the notion that the current transient model represents site conditions more realistically than previous model iterations. The transient model can therefore be used to approximate how groundwater elevations may change under post-closure conditions at AP-3.

2.2 Post-Closure Model

A post-closure model was constructed to simulate AP-1 and AP-3 under post-closure conditions, for an assumed post-closure care period of 30 years, and to predict the amount of CCR inside AP-3 below the potentiometric surface under these long term conditions. To simulate the post-closure conditions, the calibrated model inputs for hydraulic conductivity, specific yield, and layer elevations for model cells representing ash in AP-1 and AP-2 were modified to incorporate aspects of the AP-1 and AP-2 closure by removal designs. In-place closure design components for AP-3 were already included in the calibrated model, so no modifications were made to AP-3. Between AP-3 and Cabin Creek, 254 TreeWells (updated from the preliminary design of 107 since the 2020 model submittal) were simulated to represent the proposed advanced engineering measures. In general, each TreeWell in the model is installed in the residuum and highly weathered rock, with a general pumping rate of approximately 30 gallons per day per TreeWell, and a combined TreeWell system recovery rate of approximately 7,620 gallons per day. For further details on the post-closure model setup, see **Appendix A**.

2.2.1 Post-Closure Model Results

Post-closure model simulated groundwater elevation contours for the uppermost part of the aquifer at the end of the 30-year post-closure care period are shown on **Figure 6.** Overall, these contours indicate that groundwater flow will continue to be south towards the Coosa River, but without the radial flow component away from AP-1. Flow near AP-3 will be to the east and southeast as in pre-closure conditions.

Model results indicate that the potentiometric elevation inside AP-3 declines from an approximate elevation of 569 feet at the start of the simulation to 568 feet at the end of the 30-year simulation. The model also predicts that this potentiometric elevation reaches steady state conditions after approximately 20 years of post-closure conditions.

After 30 years of post-closure conditions, the model predicts a CCR volume below the potentiometric surface of approximately 5,262 cubic yards, which is a 95% decrease in volume of CCR below the potentiometric surface. This is a smaller but similar volume to what was predicted by the previous 2020 steady state model (8,143 cubic yards; Geosyntec, 2020a). A comparison of the steady state versus transient model predicted volume of CCR below the potentiometric surface is shown in the table below:

Table 3 - Summary of Model Prediction Results

Post Closure Model	AP-3 Condition	AP-1 Condition	Engineering Measure	Max Height of CCR Below the Potentiometric Surface (ft)	Volume of CCR Below the Potentiometric Surface (cubic yards)
2020 Steady State	Closed, Cover Installed	Closed by Removal	107 TreeWells	3.7	8,143
2022 Transient	Closed, Cover Installed	Closed by Removal	254 TreeWells	2.4	5,262

A map of the extent of CCR below the potentiometric surface after 30 years of post-closure conditions is shown on **Figure 7**.

3.0 CONCLUSIONS

A three-dimensional transient groundwater flow model was constructed and calibrated to simulate hydrogeologic conditions at AP-1 and AP-3. Once calibrated, the model was used to evaluate how groundwater elevations are expected to be influenced under post-closure conditions, and to estimate the post-closure CCR below the potentiometric surface inside AP-3. Results from the model indicate that under post-closure conditions the groundwater at AP-1 and AP-2 will generally flow towards the Coosa River and towards Cabin Creek at AP-3.

Model results predict that the potentiometric elevation inside of AP-3 declines to 568 feet at the end of the 30-year simulation. The model also predicts that the potentiometric elevation inside the CCR reaches steady state conditions after approximately 20 years of post-closure conditions. Based on the model results, it is estimated that the volume of CCR present at AP-3 below the potentiometric surface will be approximately 5,262 cubic yards, after 30 years of post-closure conditions.

4.0 REFERENCES

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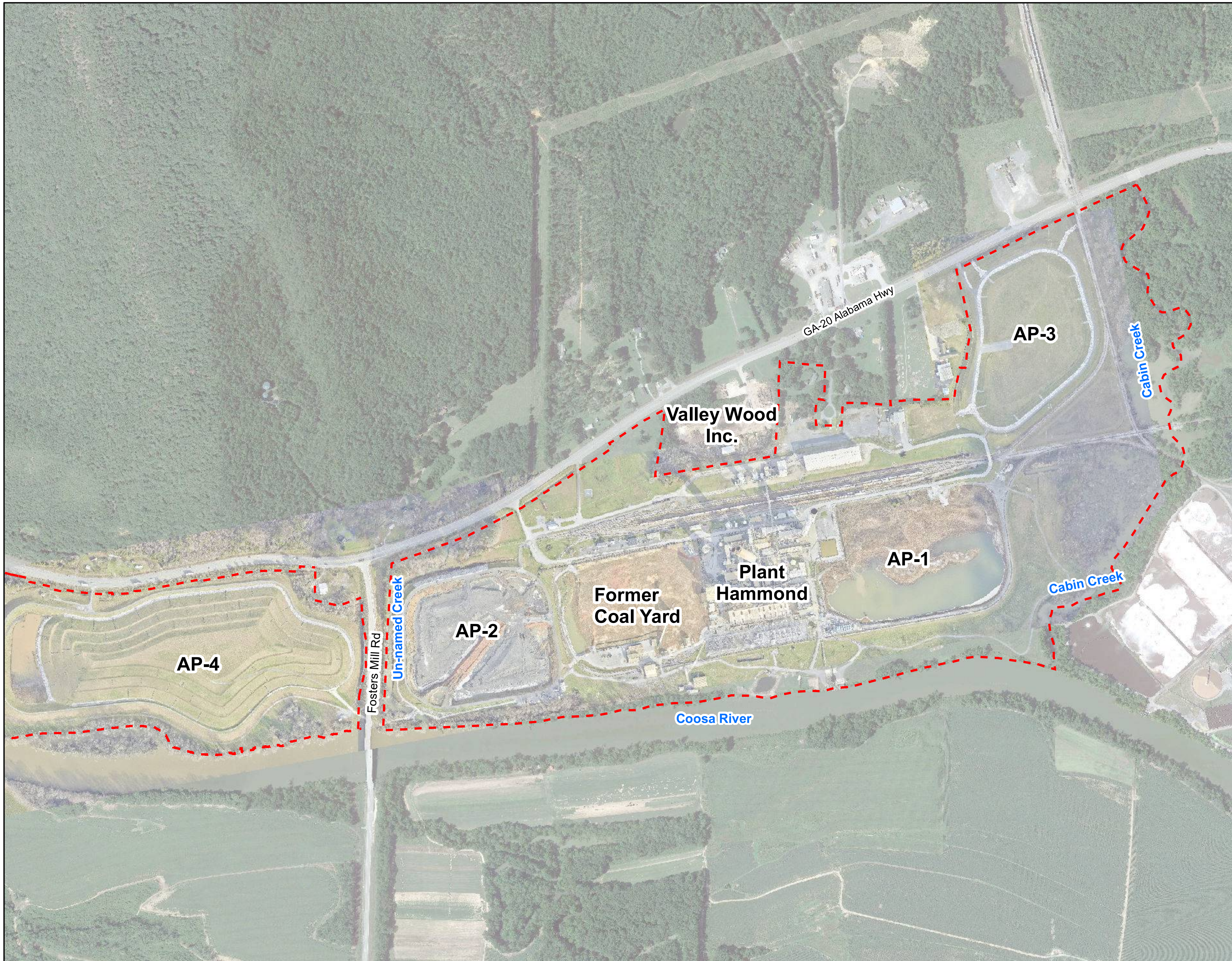
FIGURES



N

LEGEND

Plant Hammond Property Boundary

Note:
1. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 450 900 1,800

SCALE IN FEET

SITE MAP

GEORGIA POWER COMPANY
PLANT HAMMOND
ROME, FLOYD COUNTY, GEORGIA

Geosyntec consultants

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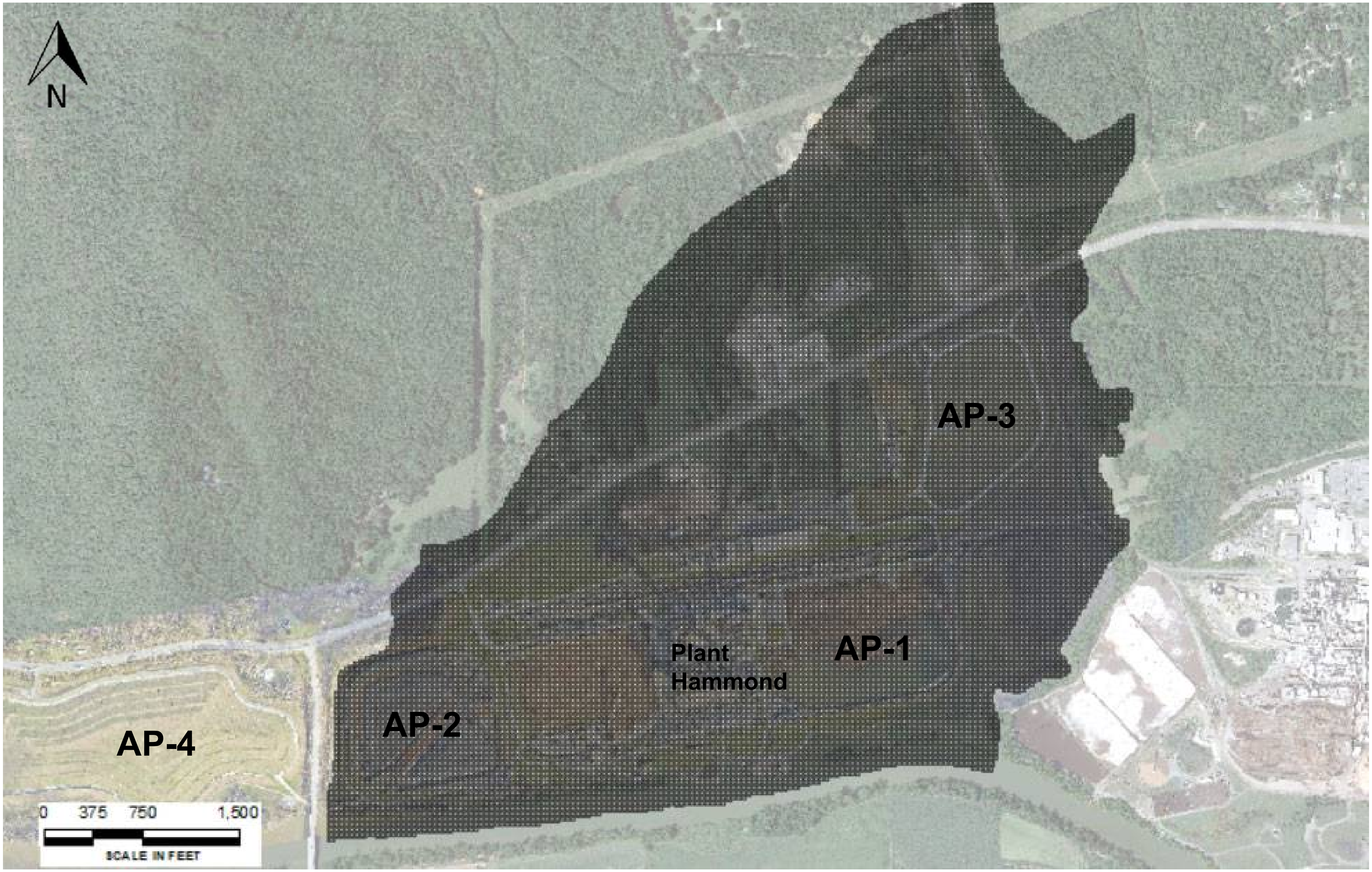
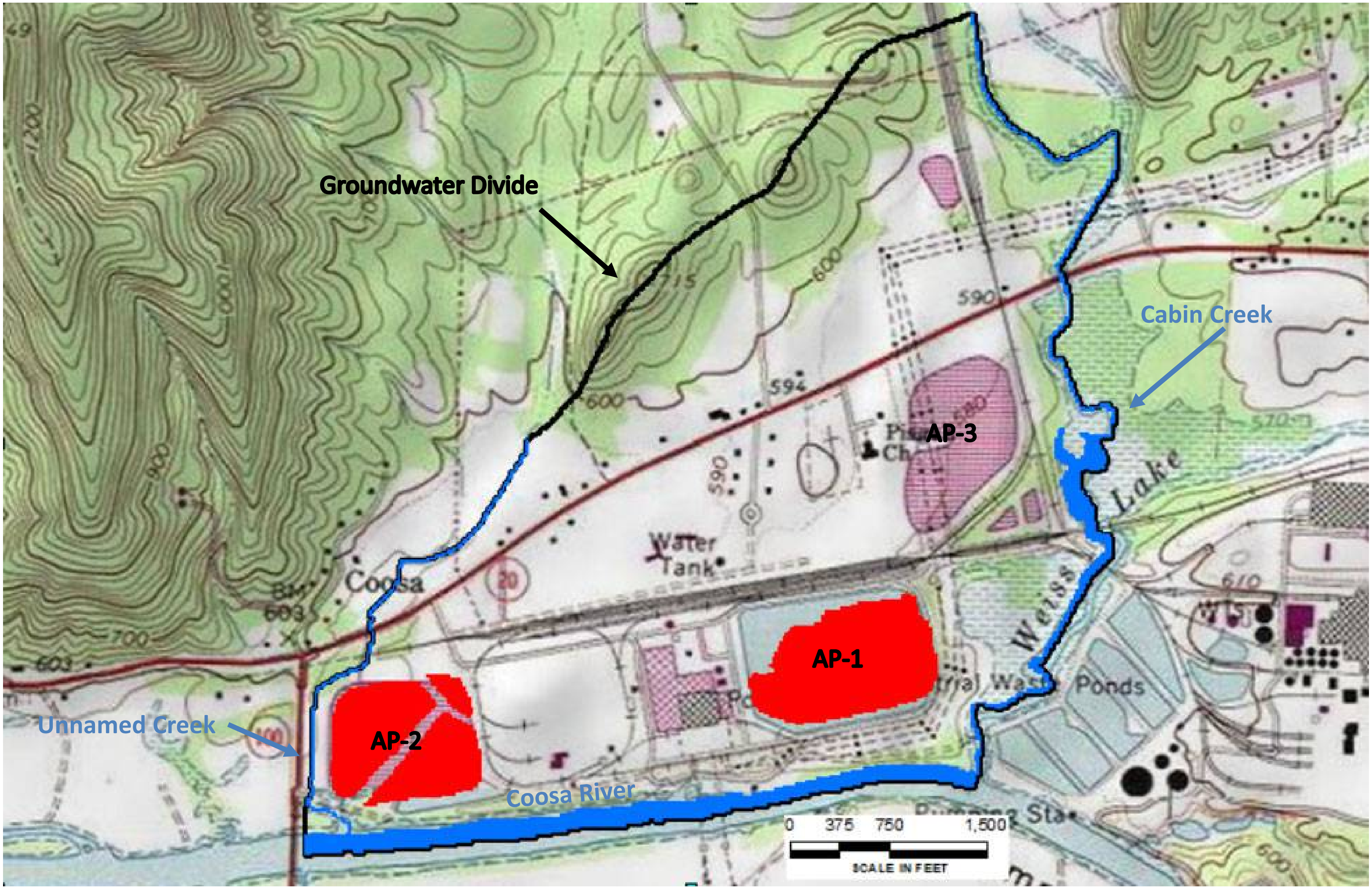
FIGURE 1



Notes

1. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

Model Grid Plant Hammond Rome, Floyd County, Georgia		Geosyntec consultants	Figure **2**
Kennesaw, GA	February 2023		



Notes
1. Topographic map from http://services.arcgisonline.com

Boundary Condition (MODFLOW Package)
Zero Flux Boundary (Basic Package)
Head Dependent Flux Boundary (River Package)
Head Dependent Flux Boundary (General Head Boundary Package)

Model Boundary Conditions
Plant Hammond
Rome, Floyd County, Georgia

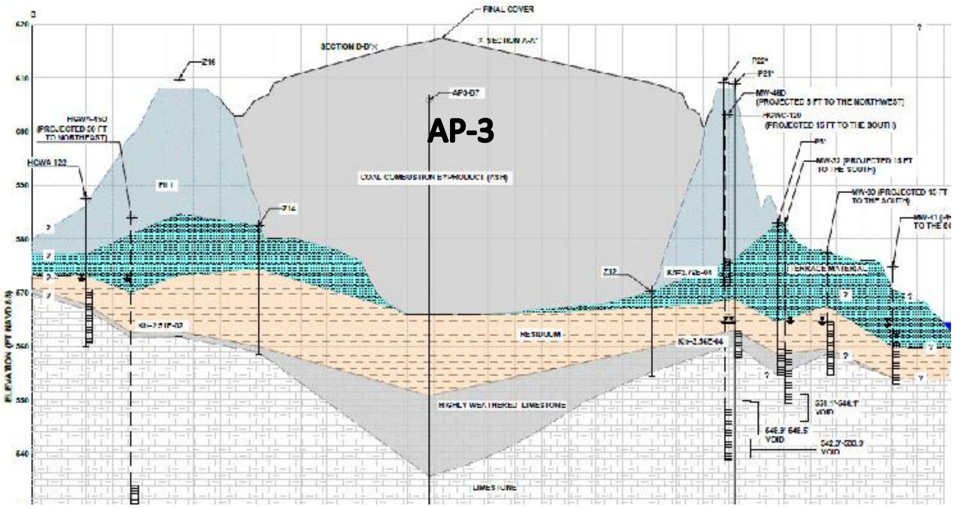
Geosyntec consultants

Kennesaw, GA

February 2023

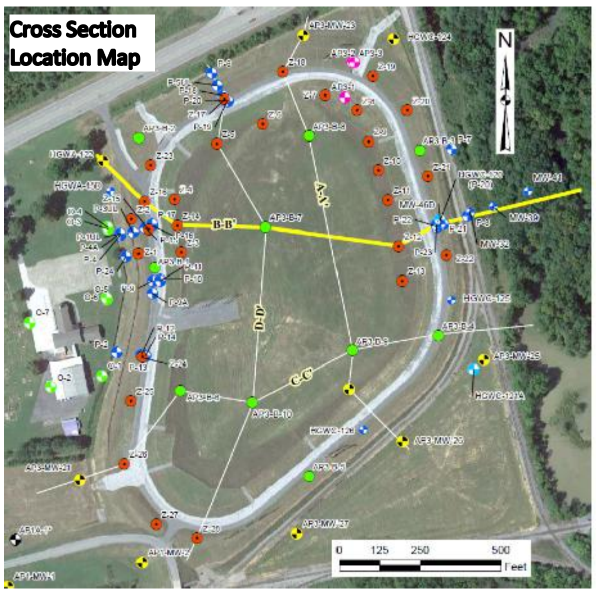
Figure 3

HAR AP-3 Cross Section B

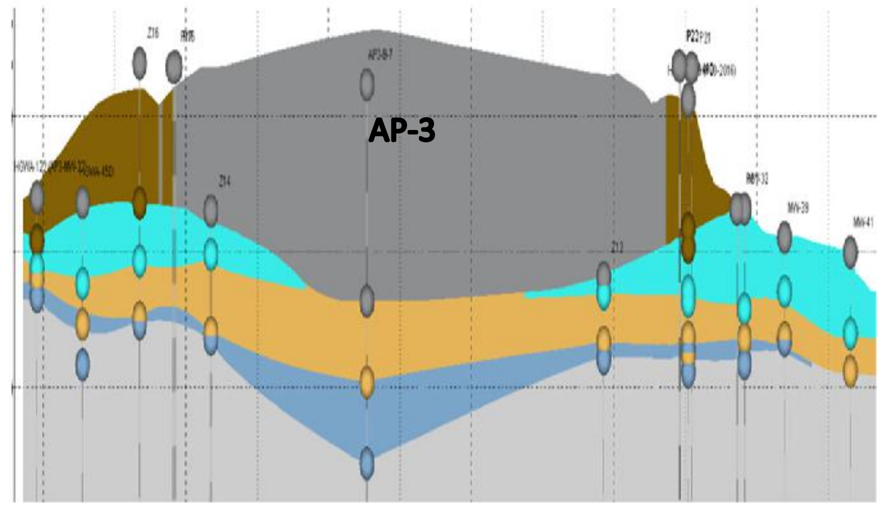


AP-3 HAR Cross Section Geology

- 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



Model Layering Along Cross Section B Line



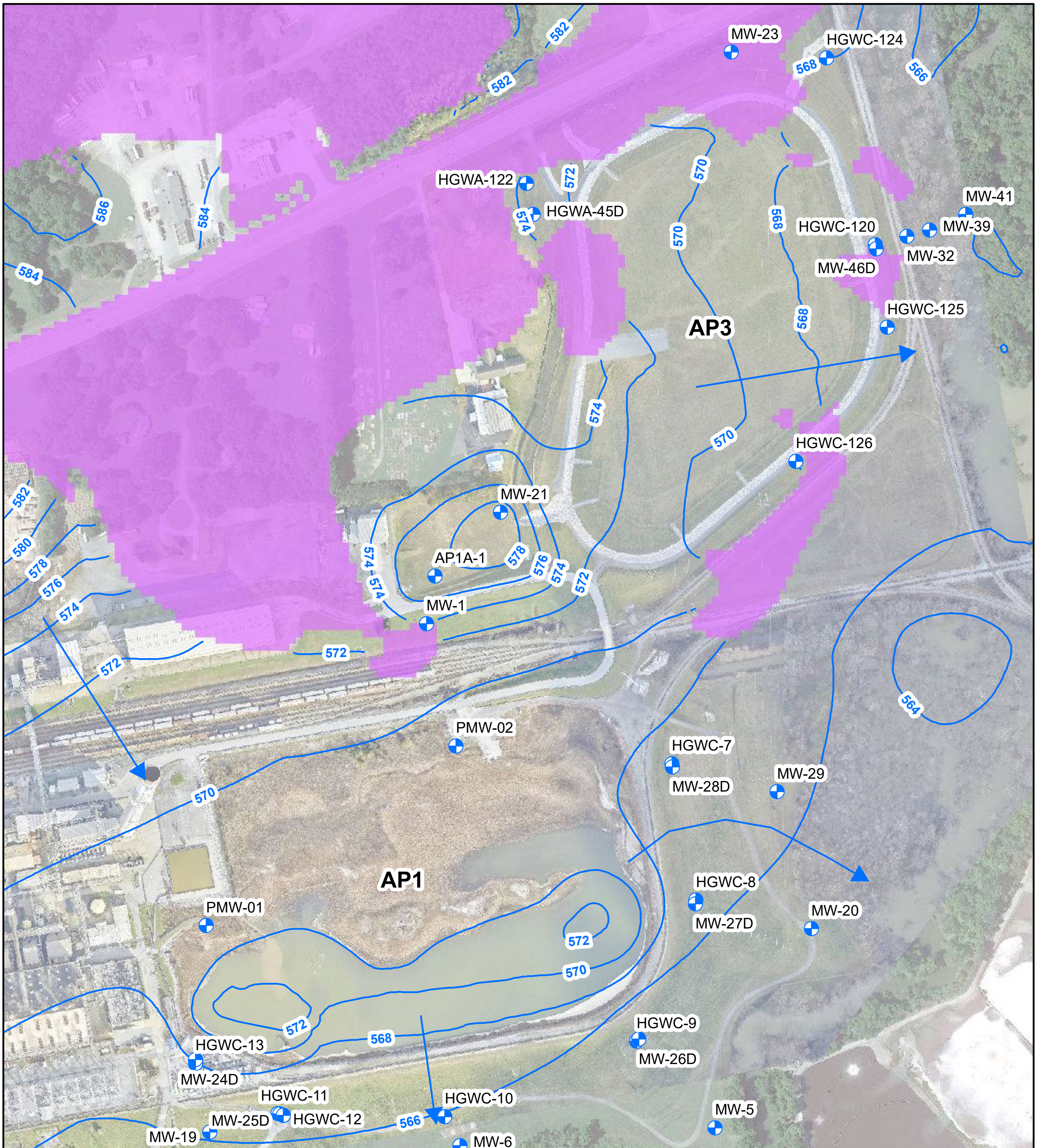
Model Layers

- CCR (Layer 1)
- Fill/Dike (Layer 1)
- Alluvium (Layer 2)
- Residuum (Layer 3)
- HWR (Layer 4)
- Bedrock (Layer 5 & 6)

Notes

1. AP-3 Cross Section B-B' is from AP-3 HAR (Geosyntec, 2020d).
2. Model layering shown above extracted from the model along the HAR cross section B-B' Line.
3. Minor differences between layering in the HAR cross section vs the Model cross section is due to resurveying of wells, and updated interpretation of geology.
4. Colored spheres/nodes shown on the model layering cross section represent geologic contacts from boring data, and are shown for reference.

Model Layering Plant Hammond Rome, Floyd County, Georgia	Geosyntec consultants	Figure
Kennesaw, GA	February 2023	4



Legend

- Monitoring Well
- Model Dry Cells
- Simulated Approximate Flow Direction
- Simulated Groundwater Elevation Contour (ft)

Notes:
1. Contour Interval is 2ft.
2. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

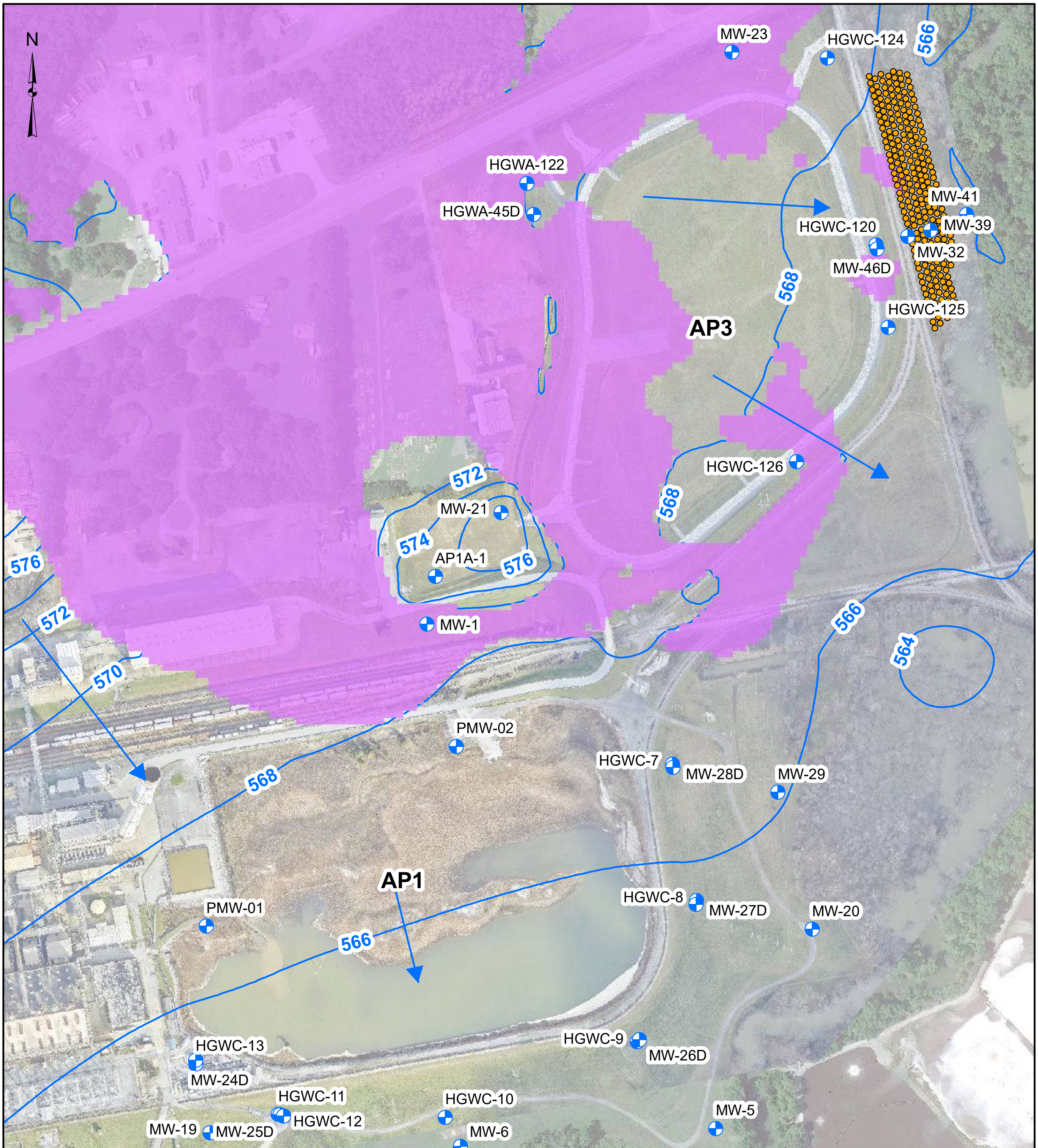
Simulated Groundwater Elevation Contours Q3 2022: Layer 2 (Alluvium)

Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure 5



Legend

Monitoring Well
TreeWell
Model Dry Cell
Simulated Approximate Flow Direction
Simulated Groundwater Elevation Contour (ft)

Notes:
1. Contour Interval is 2ft.
2. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 250 500 Feet

30 Year Post-Closure Simulated Groundwater Elevation Contours: Layer 2 (Alluvium)
Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure 6

Figure 7 - Model Results: AP-3 CCR Beneath Potentiometric Surface, 30 years Post-Closure

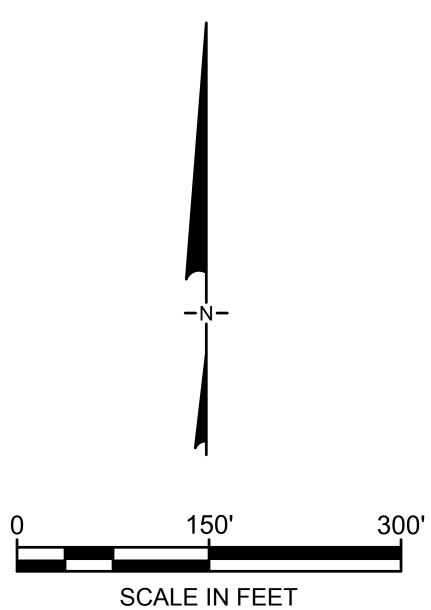
(AP-3 Closed, Cover Installed, 254 TreeWells east of AP-3, AP-1 & AP-2 Closed By Removal)

ELEVATION TABLE			
NUMBER	MINIMUM HEIGHT OF CCR BELOW POTENTIOMETRIC SURFACE (FT)	MAXIMUM HEIGHT OF CCR BELOW POTENTIOMETRIC SURFACE (FT)	COLOR
1	0.0	1.0	
2	1.0	2.0	
3	2.0	3.0	

LEGEND

355 — CONTOURS - BOTTOM ELEV. OF CCR (FT)

1 — CONTOURS - CCR HEIGHT (FT)



VOLUME OF CCR BELOW POTENTIOMETRIC SURFACE:	5,262 CU. YD.
ACREAGE OF CCR BELOW POTENTIOMETRIC SURFACE:	3.8 ACRES
MAX HEIGHT OF CCR BELOW POTENTIOMETRIC SURFACE:	2.4 FT

APPENDIX A
Transient Groundwater Model Construction and Calibration Report

Prepared for

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PLANT HAMMOND ASH POND 3

TRANSIENT GROUNDWATER MODEL CONSTRUCTION AND CALIBRATION REPORT

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engineers | scientists | innovators

1255 Roberts Boulevard, Suite 200
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Project Number: GR9134
February 2023

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Appendix D	Potentiometric Surface Contour Map – January 2022
Appendix E	Closure Plan Drawings

LIST OF ABBREVIATION & ACRONYMS

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CSM	Conceptual Site Model
EVS	Environmental Visualization System
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K_h	Horizontal Hydraulic Conductivity
K_v	Vertical Hydraulic Conductivity
MDu	Mississippian Devonian Undifferentiated
NAVD 88	North American Vertical Datum of 1988
NRMSE	Normalized Root Mean Square Error
SCS	Southern Company Services
Srm	Silurian Red Mountain
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

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1.1 Site Background

Plant Hammond (Site) is a former four-unit, coal-fired, electric generating facility located approximately ten miles west of Rome, Georgia. The Site is bordered by Georgia Highway 20 to the north, Cabin Creek to the east, and the Coosa River to the south (**Figure 1**). The Site is owned and operated by Georgia Power. The Site commenced commercial operations in 1952. In July 2019, all four electric generating units were retired and no longer produce electricity. CCR resulting from past power generation have historically been transferred and stored at ash ponds AP-1, AP-2, AP-3, and AP-4 at the Site.

AP-1 is a 35-acre surface impoundment that received CCR materials from its commission in 1952 until 1969. After 1969, AP-1 was utilized as a co-treatment pond to handle return water flows from the other ponds and for recycling of process water for plant operations. AP-2 is a 21-acre surface impoundment. Dewatered CCR from AP-2 is currently being excavated and transported to the nearby Huffaker Road facility, a permitted solid waste landfill owned and operated by Georgia Power. AP-4 was commissioned in 1986 as a surface impoundment with a corresponding surface area of approximately 54 acres. Dry ash stacking operations in AP-4 began in 1994 and continued until 2010; AP-4 received both fly ash and bottom ash during this period. AP-4 was capped in place in 2011-2012. Georgia Power will close AP-1, AP-2, and AP-4 through removal of the CCR material from the CCR units. Details of the closure approaches are provided on Georgia Power's CCR Rule Compliance website[1]. The closure permits (No. 057-023D[CCR] for AP-1 and No. 057-024D[CCR] for AP-2) were approved by the Georgia Environmental

[1] https://www.georgiapower.com/company/environmental-compliance/plant-list/plant-hammond.html

Protection Division (GA EPD) in June 2020[2]; GA EPD approved the closure permit (No. 057-025D[CCR]) for AP-4 in January 2021.

AP-3 is a 25-acre former ash pond that was constructed in 1973 and 1974. AP-3 is closed in place with an engineered final cover system consisting of a 60-millimeter-high density polyethylene (HDPE) liner, geo-composite drainage media, a minimum 18-inch-thick protective soil cover, and a 6-inch-thick vegetative layer. The final cover system was designed to limit infiltration of precipitation with low permeability materials and is graded to promote positive drainage and shed stormwater away from AP-3 via riprap drainage ditches toward three outfall locations around AP-3. Final capping of the unit was completed in the second quarter of 2018. The closure permit application was issued draft by GA EPD in December 2021 and is awaiting final review and approval.

1.2 Modeling Background

In 2019, Geosyntec developed a steady state groundwater model for Georgia Power, to evaluate how the cover system at AP-3 and future dewatering of AP-1 could influence groundwater elevations in the vicinity of AP-3. Model results predicted an approximately 4 ft reduction in groundwater elevation in the vicinity of AP-3 and AP-1 (Geosyntec, 2019a). In 2020, Geosyntec updated the steady state predictive model to include 107 TreeWells east of AP-3, which are proposed as a proven engineering method to enhance the closure of AP-3 (Geosyntec, 2020a). Model results predicted that the cover system at AP-3, combined with the TreeWells and future dewatering of AP-1, would result in a maximum height of CCR below the potentiometric surface of 3.7 ft, and a 92% reduction of the volume of such CCR from 101,585 cubic yards (pre-closure conditions) to 8,143 cubic yards (post-closure conditions), at AP-3. The results of the 2019 and 2020 were provided to GAEPD under separate covers.

1.3 Modeling Objectives

In response to a July 20, 2022 letter from GAEPD (GAEPD, 2022), Geosyntec updated the groundwater model to address GAEPD comments and to meet the below model objectives:

- Convert the steady state model to a transient model, to better estimate the duration to achieve the reduction in CCR below the groundwater potentiometric surface.

[2] https://epd.georgia.gov/ccr-permits

- Update the model layering, parameters[3], and boundary conditions[4] using new data[5] collected between 2018 to 2022.
- Update the model calibration in the areas of AP-1and AP-3 using groundwater elevation data measured from October 2018 to August 2022[6].
- Use the model to simulate planned closure conditions at AP-1 and AP-2 in conjunction with the operation of the engineering method (TreeWells) at AP-3, and evaluate possible influence on groundwater flow conditions in the general area of AP-3.
- Use the model to evaluate the potentiometric surface within the CCR at AP-3 under planned closure conditions described above.
- Simulate the possible response of the potentiometric surface inside AP-3 CCR to a 100 year flood event, under planned closure conditions.

Details regarding the conceptual site model, numerical model construction, calibration, and simulation results are discussed in the sections below.

[3]Parameters updated include hydraulic conductivity, and storage.
[4]Boundary conditions updated include the Coosa River, Creeks, Ash Pond surface water elevations, recharge, and evapotranspiration.
[5]Data used to update the model include geologic boring, slug test, precipitation, surface water elevation, and groundwater elevation data collected after development of the initial steady state model (Geosyntec, 2019a).
[6]The original steady state model was only calibrated to groundwater elevation data from February 2017.

2.0 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) used to develop the numerical groundwater model is based on the CSM presented by Geosyntec in the *Hydrogeologic Assessment Reports* for AP-1, AP-2, and AP-3 (Geosyntec, 2019b, 2019c, 2020d). The CSM is summarized in the sections below. For further details regarding the CSM, refer to the *Hydrogeologic Assessment Report* (HAR) for each ash pond.

2.1 Geology

In general, the geology at the Site is composed of overburden underlain by bedrock. Generally, the overburden consists of fill, alluvium deposits, and residuum. Beneath the overburden, there is highly weathered to fractured rock, followed by un-weathered fractured bedrock.

A geologic map developed by Golder (2018) representing bedrock is presented in **Appendix A**. Two thrust faults are present in the vicinity of the Site: i) the Rome Thrust Fault (running east-west) and ii) the Turnip Mountain Fault (running southeast-northwest). The bedrock is composed of shale (Cambrian Conasauga Lower Formation-Ccsl) to the west of the Turnip Mountain fault and limestone (Cambrian Conasauga Middle Units-Ccls) to the east of Turnip Mountain fault. North of the Rome Fault, the bedrock is composed of the Silurian Red Mountain (Srm) formation northwest of the Rome Fault and the Mississippian/Devonian Undifferentiated (MDu) formation northeast of the Rome fault (Golder, 2018). Representative geologic cross sections from the HARs (Geosyntec, 2019b,c,d) and remedy selection reports (Geosyntec 2022a,b) are presented in **Appendix B**.

2.2 Hydraulic Conductivity

The estimated horizontal hydraulic conductivity (K_h) values for each of the stratigraphic units as reported in the HARs and other reports are summarized by ash pond in **Appendix C**. Statistics are also provided. Note that statistics were only calculated for wells screened in a single geologic unit. Many wells were screened across multiple geologic units (e.g. MW-1, which is screened across residuum, HWR, and limestone bedrock) and were thus not included in the statistics.

Literature hydraulic conductivity values for the Srm and Mdu formations north of the Site are not available. However, information from Cressler (1970) indicates that these formations have sufficient hydraulic conductivity to produce groundwater, with flow rates from 0 to 50 gpm (Cressler, 1970). Based on this flow rate information, it was assumed that hydraulic conductivity within the Srm and Mdu formations upgradient of the Site is elevated enough to promote groundwater flow, and that groundwater flow occurs within these units.

2.3 Aquifer Recharge

The United States Geological Survey (USGS) performed a baseflow and aquifer recharge study for the Coosa River basin (USGS, 1996). The study evaluated average baseflow (which is assumed to represent aquifer recharge) for the 4,700 square mile drainage basin of the Coosa River in northwest Georgia. The baseflow study estimated that the average aquifer recharge rate for the entire basin was 13.2 inches per year but may be as low as 3.1 inches per year during droughts. Actual recharge will vary locally based on topography, surface water run-off, man-made drainage features, rainfall intensity, land cover/land use, and other factors.

At the Site, during the pre-closure period, anthropogenic sources of recharge include ponded water related to operations at AP-1 and AP-2. Additionally, Valley Wood, Inc., a wood treating facility, is present just north of the Site and is assumed to protect their stored timber from fire by continuous wetting, thus providing another source of anthropogenic recharge. Natural sources of recharge near the Site may include the Coosa River, Cabin Creek, and Unnamed Creek during their high stage following more intense rainfall episodes.

2.4 Groundwater Flow

The uppermost aquifer at the Site is an unconfined aquifer that occurs in the alluvium, residuum, the highly weathered rock, and fractured bedrock. The aquifer is primarily recharged from infiltration of precipitation and influenced from surface water bodies located on Site. Groundwater flow direction is controlled primarily by the regional groundwater flow regime and is generally in a southerly direction towards the Coosa River. At AP-1, groundwater flows towards the south and to the east. At AP-3, groundwater flows locally to the east, towards Cabin Creek, with the hydraulic gradient flattening as groundwater approaches Cabin Creek. At AP-2, groundwater flows south toward the Coosa River and to the southwest toward the Unnamed Creek. An example sitewide potentiometric surface map is included in **Appendix D**.

3.0 NUMERICAL MODEL CONSTRUCTION

The numerical groundwater flow model is conceptualized based on the CSM discussed above. Features conceptualized in the flow model include (i) Surface water features (e.g., the Coosa River, Cabin Creek, AP-1, AP-2, etc.); (ii) lithologic units (e.g. CCR, fill, residuum, alluvium, highly weathered rock (HWR), and bedrock units), (iii) evapotranspiration, and (iv) recharge.

The model was built to simulate transient conditions, which incorporate changes in surface water stages (i.e., changes in Coosa River, Unnamed Creek, Cabin Creek, AP-1, and AP-2), variability in evapotranspiration, and variability in aquifer recharge. The simulated transient time period is from July 2018 through August 2022. This time period was selected as it represents approximately 4 years of variation in precipitation, groundwater elevations, and on-Site processes. Transient conditions were averaged into 17 quarterly stress periods.

The following sections describe how the model was constructed to represent the conceptual site model described above.

3.1 Model Program

The modular, three-dimensional (3D), finite difference groundwater flow model software (MODFLOW), created by the United States Geological Survey (Harbaugh, 2005), was used as the modeling program to simulate groundwater flow. Specifically, the Newton-Raphson version of MODFLOW, MODFLOW-NWT (Niswonger, et al., 2011), was utilized due to its capabilities in efficiently solving non-linear equations associated with unconfined aquifers and non-linear boundary conditions, both conditions being relevant to the Site. The MODFLOW River package and General Head Boundary package were used to simulate surface water features such as rivers, creeks, and man-made ponds (i.e., AP-1 and AP-2). The MODFLOW recharge package was used to simulate groundwater recharge, the Evapotranspiration Package was used to simulate evapotranspiration, and the Well package was used to simulate TreeWells. The software Groundwater Vistas version 8.30 Build 20, 64 bit, was used as the model pre- and post-processor.

3.2 Model Grid

The active area of the numerical model grid extent encompasses approximately 0.83 square miles (mi^2) in size and includes AP-1, AP-2, AP-3, the area north of Highway 20 to the nearest ridge, surrounding creeks, and the Coosa River (**Figure 2**). The model grid has 346,124 active cells. The model grid has a uniform cell size of 20 ft x 20 ft. The grid is orientated north-south and approximately matches natural surface water orientations without needing grid rotation.

3.3 Model Layering

The model is composed of 6 vertical layers. These layers represent the CCR materials within AP-1 through AP-3, fill materials, alluvium, residuum, HWR, limestone, shale, and MDu bedrock formation.

In general, these lithologic units/materials are represented by the following model layers:

Model Layer	Description
1	CCR Material, Fill Material, and Alluvium
2	Alluvium
3	Residuum
4	HWR
5	Upper Bedrock (Limestone, Shale, & MDu)
6	Lower Bedrock (MDu)

A cross section of the model layering is provided on **Figure 3.**

Note that the summary table above is only a general description of model layering, based on the dominant material within each layer.

3.3.1 Layer Elevations

Model layer elevations were based on a combination of ground surface topography from publicly available regional data, Site specific ground surface topography, subsurface geologic boring log descriptions from Site-specific field investigations, historical maps of ash pond construction, and post closure plan elevations. Data from these sources were imported into the 3D visualization software Environmental Visualization System (EVS) and interpolated to create surfaces for the top and bottom of each model layer. Surfaces generated in EVS were then imported into Groundwater Vistas to define the top and bottom of model layers. Often, materials or lithologic units are not present (i.e. pinch out) in a given model layer. In a case where a material is not present (i.e. pinches out), the corresponding surfaces generated in EVS and subsequently the model cells were reduced to a minimum thickness of 0.25 ft. Then, the parameters of the underlying layer below the thinned cells were applied to the thinned portion of the layer. **Figures 4** through **9** show the location of cells representing the stated geologic materials within the model domain.

The top of model layer 1 represents ground surface. The top of model layer 1 was created by combining Site specific LIDAR ground elevations[7] with Site specific bathymetry data, and USGS DEM data[8]. The bottom of model layer 1 primarily represents the bottom of CCR material within each ash pond, and the bottom of the ash pond dikes (composed of fill). The bottom of CCR and bottom of dike/fill material was derived from provided technical reports and CADD drawings.

Outside the ash ponds, the bottom of layer 1 represents the bottom of fill material, as informed by boring log data. Where boring log data was not available, fill was assumed to exist in areas of the Site with structures, roads, and railroads. For areas where fill material pinches out, model cells were assigned a minimum thickness of 0.25 ft, and assigned hydraulic properties of alluvium or residuum (**Figure 4**).

The bottom of layers 2 through 6 represent the rest of the lithologic units noted in **Section 3.3** and were interpolated using lithology elevations from boring logs available in the HARs and subsequent field investigations.

The Rome fault was incorporated into the bottom of model layer 5, based on the geologic map (**Appendix A**) and based on information from Golder (2018). The bottom of layer 6 was assigned an assumed elevation of 375 feet NAVD88. The 375 feet NAVD88 elevation was arbitrarily selected as the model base to reduce potential bottom boundary effects and help with model convergence.

3.4 Model Boundaries

For a hydrogeologic system, hydraulic boundaries (e.g., groundwater divides) represent the limits of the system. Such boundaries are generally formed or influenced by physical boundaries like topographic ridges, rivers, or relatively impermeable geologic units. To represent these physical/hydraulic boundaries, model boundary conditions such as Constant/Specified Head, Specified Flow (which includes zero flow i.e., "no flow"), or Head-Dependent Flow boundaries are applied numerically within the model domain. The following sub-sections describe the numerical boundary conditions applied to the model.

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[7] Site specific ground elevations are from electronic LIDAR files provided by Southern Company Services in 2020

[8] Site specific bathymetry of the Coosa River, Cabin Creek, Unnamed Creek, and Western Swamp was provided by SCS in August 2020. A 1/3 arc resolution DEM was downloaded from the USGS with the file name USGS_13_n35w086.tif dated 3/13/2020.

3.4.1 External Boundaries

External model boundaries are boundary conditions that define the edges of the active model area and were primarily defined at surface water bodies such as Unnamed Creek west of AP-2, Cabin Creek to the east of AP-1 and AP-3, Coosa River to the South[9], and the ridge to the north of the Site. This was done based on the assumption that the creeks, river, and ridge act as groundwater divides. For reference, a summary map of the external boundary conditions from the model is shown on **Figure 10.**

A generalized boundary summary by layer is provided in the table below:

Model Boundary Location	Model Layer	Model Boundary Type	MODFLOW Package Used
North: Ridge Line	1-6	Specified (zero) Flow	Basic (BAS)
East: Cabin Creek	1-5	Head Dependent Flow	River (RIV)
South: Coosa River	1-4	Head Dependent Flow	River (RIV)
West: Unnamed Creek	1-2	Head Dependent Flow	River (RIV)
Model Bottom	6	Specified (zero) Flow	Basic (BAS)

Coosa River Boundary

The MODFLOW River package was used to simulate the Coosa River along the southern border of the model. Boundary parameters such as channel bottom were defined using bathymetric data from a survey performed in August 2020 by SCS. The river water level in the model was defined using quarterly averaged river stage values (**Figure 11**) based on Site data[10] measured daily between July 2018 and August 2022. It was assumed that the river channel extends into the highly weathered rock. Therefore, the boundary was assigned to model layers 1 through 4. The conductance of the river boundary condition was calculated to be 40 ft^2/d, based on a model cell size of 20 ft x 20 ft, an assumed bed thickness of 1ft, and an assumed vertical conductivity of 0.1 ft/d. This parameter was not modified during calibration.

[9] Note: Coosa River flows from east to west; Unnamed Creek and Cabin Creek flow from north to south.
[10] IEM :: DCP/HADS Data Download (iastate.edu)
https://mesonet.agron.iastate.edu/request/dcp/fe.phtml?network=GA_DCP

Cabin Creek Boundary

Along the eastern edge of the model, a head dependent flow boundary was used to represent Cabin Creek and simulated using the MODFLOW River package. The Cabin Creek boundary was assigned to model layers 1 through 5.

North of Highway-20, the creek was simulated as a steady state boundary. Creek surface water stage approximately ranges from 568 ft to 570 ft, approximately based on ground surface estimated in the vicinity of the creek. The creek bottom was assumed to occur 1 ft below the stage elevation. The conductance of the creek was calculated to range between 1 ft^2/d to 27 ft^2/d, based on an assumed creek width of 1ft, an assumed bed thickness of 1ft, an assumed vertical conductivity of 1 ft/d, and creek channel length within the cell. This parameter was not modified during calibration.

South of Highway-20, the creek was simulated as a transient state boundary. The creek water level was defined using interpolated stage values calculated from average quarterly Coosa River and average Cabin Creek measurements[11]. As part of the calculation it was assumed that creek stage varied linearly and proportionally to changes in the Coosa stage. The conductance of the creek was calculated to be 400 ft^2/d, based on a model cell size of 20 ft x 20 ft, an assumed bed thickness of 1ft, and an assumed vertical conductivity of 1 ft/d. This parameter was not modified during calibration.

Unnamed Creek Boundary

Along the western edge of the model, a head dependent flow boundary was inserted to represent the Unnamed Creek and simulated using the MODFLOW River package. The Unnamed creek boundary was assigned to model layers 1 through 2.

North of Highway-20, the creek was simulated as a steady state boundary. Creek stage elevation was assumed to be equal to the land surface (top of layer 1) and creek bottom elevation was assumed to be 1 foot lower than the water elevation. The conductance of the creek was calculated to range between 1 ft^2/d to 27 ft^2/d, based on an assumed creek width of 1ft, an assumed bed thickness of 1ft, an assumed vertical conductivity of 1 ft/d, and creek channel length within the cell. This parameter was not modified during calibration.

South of Highway-20, the creek was simulated as a transient state boundary. The creek water level was defined using interpolated water elevation values calculated from average

[11] Cabin Creek water elevation data were only collected two to three times a year, and only available from August 2020 to August 2022.

quarterly Coosa River water elevations and average Unnamed Creek water elevations[12]. As part of the calculation, it was assumed that creek water elevations varied linearly and proportionally to changes in the Coosa River elevation. The conductance of the creek was calculated to range between 0.1 ft^2/d to 2.6 ft^2/d, based on an assumed creek width of 1ft, an assumed bed thickness of 1ft, an assumed vertical conductivity of 0.1 ft/d, and creek channel length within the cell. This parameter was not modified during calibration.

Northern Boundary

A Specified (zero) Flow boundary was assigned to the northern edge of the model, along topographic ridges (which represent groundwater divides) and parallel to inferred groundwater flow lines, based on the assumption that groundwater flow does not occur across groundwater divides or flow lines. The boundary was simulated using the Basic (BAS) package's inactive cells in model layers 1 through 6.

Model Bottom Boundary

The bottom of the model was assigned as a specified (zero) flow boundary. This was based on the assumption that below the bottom of the model (i.e. below 375 ft elevation) the bedrock porosity and hydraulic conductivity decreases such that no groundwater flow occurs at depth.

3.4.2 Internal Boundaries

Internal boundaries are boundaries that lie within the inside of the perimeter of the model. Internal boundaries for this model were used to simulate three hydrologic features at the Site: CCR pond elevations, aquifer recharge, and evapotranspiration.

Ash Ponds 1 and 2

Ponded surface water inside AP-1 and AP-2 was simulated in the model as a transient general head boundary condition in model layer 1 using the MODFLOW GHB package (**Figure 10**). For AP-1 the general head elevation in the model was informed by quarterly averaged surface water measurements collected from July 2018 (Q3 2018) through August 2022 (Q3 2022) and provided by SCS and Georgia Power (**Figure 12**). As shown in **Figure 12** the quarterly average water level in AP-1 remained steady from Q3 2018 through Q2 2020 then began decreasing in Q3 2020 with one increase in Q1 2022. To simulate the variation in surface water extent, the shape of the general head boundary

[12] Unnamed Creek water elevation data was only collected two to three times a year, and only available from August 2020 to August 2022.

condition in AP-1 changes to reflect the elevation contour associated with the surface water elevation during the quarter (**Figure 13**). Surface water extent in the boundary was adjusted slightly northward in stress periods 1 through 8 during the calibration process.

For AP-2, surface water elevation data relevant to the model simulation period was only available between July 2018 (Q3 2018) to April 2020 (Q2 2020) (**Figure 12**), as measured from the northeast corner of AP-2 (**Figure 14**). Based on quarterly averaged surface water elevations, the water in AP-2 was kept at an elevation of approximately 595 ft during this time period. However, review of aerial images from Google Earth indicate that surface water was periodically moved to the southeast and southwest portions of AP-2 by GPC. Records of water levels in the southeast and southwest portions of AP-2 were not available at the time of this model update. Therefore, for the purposes of the model, 3 general head boundary conditions were inserted within the footprint of AP-2 in layer 1 (**Figure 14**). The first general head boundary represents the northeast ponded water as reported by the measured water levels. The other two boundaries represent the ponded water observed in aerial images, in the southeast and southwest corners of AP-2. Since water levels for the southwest and southeast areas are not known, it was assumed that water levels in the southeast and southwest portions of AP-2 were 1.5 ft lower than the values measured in the northeast corner of the pond.

Recharge

Model net recharge zones were defined using a simplified version of the land cover types that fell within the model domain (**Figure 15**). Land cover types were acquired from the United States Geologic Survey 2019 National Land Cover Database. Calibrated transient recharge values are provided in **Table 1** and shown on **Figure 16**.

For AP-1, a transient recharge zone was applied to areas representing dewatered (dry) ash, as a function of the declining water level inside AP-1 (**Figure 17**). Model cells representing saturated ash were assigned a recharge value of zero, as inflow in these cells was defined by the general head boundary for AP-1, described above. For AP-2, a zero recharge value was assigned because a general head boundary encompasses AP-2, and represents inflow from precipitation and surface water inside AP-2. For AP-3, recharge was assumed to be zero since the unit is closed and capped.

Some areas of the Site model domain are expected to have greater than average recharge. These areas include the Valley Wood, Inc. timber yard where it is suspected that the timber is continuously kept wet to prevent end checking/cracking of the timber, and a stormwater pond southwest of AP-3 that receives runoff from the AP-3 cap.

It should be noted that within the model domain, recharge rates are only model calibrated values, and represent average quarterly conditions for each stress period. There is uncertainty regarding background recharge occurring at the Site as Site specific groundwater recharge rates were not available at the time of model development.

Evapotranspiration

The MODFLOW Evapotranspiration (ET) package simulates the effects of plant transpiration and direct evaporation in removing groundwater from the uppermost saturated model layer. ET for different areas of the model domain was calculated using the following equation commonly used for irrigation planning studies (Allen, et al., 1998):

$$ET = ET_0 \times K_c$$

Where:

$ET = evapotranspiration\ [L/T]$

$ET_0 = reference\ crop\ evapotranspiration\ [L/T]$

$K_c = \ crop\ coefficient\ [dimensionless]$

ET_0 was obtained from the University of Georgia Weather Network - Rome, GA Station[13], as it is the closest station measuring ET data to the Site. Daily ET data, calculated using the Priestly-Taylor Method and a 15-minute time step, was averaged by month for the transient model period from July 2018 through August 2022.

K_c values were obtained from literature values (Allen, et al., 1998; Corbari et al., 2017) for different crop and land cover types present within the model domain. Some K_c values vary based on calendar day to model seasonal variations in ET.

Land cover types for the model domain were acquired from the United State Geologic Survey 2019 National Land Cover Database (NLCD). The land cover types were imported as zones into the model domain.

For each land cover type in the model domain, the appropriate crop coefficient (K_c) was multiplied by the measured ET_0 value for a given month. The resulting monthly ET values were then averaged by quarter and applied to specific areas of the model, based on land

[13] (http://www.georgiaweather.net/mindex.php?content=calculator&variable=CC&site=FLOYD)

cover type. There were some land uses within the model domain, such as the ash ponds and the coal yard, that do not have literature value K_c values. These areas were applied a reasonable K_c value based on the other K_c values used. A plan view of model ET zones is shown on **Figure 18** and average quarterly ET values used for each land cover type zone are shown on **Figure 19**. Model ET values are provided in **Table 2**.

In addition to ET rates, the MODFLOW ET Package requires the input of the extinction depth. Extinction depth is the depth where ET from the water table ceases. This value was assumed to be 4 feet during the calibration process.

3.5 Specific Storage & Specific Yield Values

To simulate transient conditions, specific storage (Ss) and specific yield (Sy) values were input for each model layer as shown in the table below:

Material	Sy	Ss
CCR/Ash	0.08	0.005
Dike	0.05	0.001
Fill	0.06	0.0011
Alluvium	0.2	0.002
Residuum	0.15	0.0017
HWR	0.1	0.0005
Limestone	0.09	0.0002
Shale	0.04	0.0001
MDu Bedrock	0.09	0.0002

Site specific values have not been measured. Therefore, input values were estimated through a mixture of calibration and best professional judgement.

3.6 Hydraulic Conductivity Values

Hydraulic conductivity values in the model were defined by spatial zones for each layer (**Figures 4** to **9**). In general, zones were assigned to the model based on material type or geologic unit. Bedrock types and formations juxtaposed via faulting (**Appendix A**) were also represented by conductivity zone in model layer 5. Model hydraulic conductivity values were informed by site specific slug test and packer testing derived values shown in **Appendix C**. However, model values were adjusted during the calibration effort. Calibrated values are shown on **Figures 4** to **9**.

As described above, the Site specific hydraulic conductivity values used slug test and packer testing results (**Appendix C**). It has been documented that the actual hydraulic conductivity in an aquifer may be up to an order of magnitude greater than that measured using slug testing techniques (Butler, 1998). Furthermore, in areas with voids noted in boring logs, the hydraulic conductivities used in the model may exceed those estimated via slug testing.

3.7 Model Calibration

The model was calibrated to groundwater elevation targets based on measurements collected between July 2018 to August 2022 from AP-1 and AP-3 wells shown on **Figure 20**. Model target coordinates (using the Georgia West State Plane coordinate system), layer assignments, groundwater elevation measurements, and simulated elevations for each target are shown on **Table 3**.

The groundwater flow model was calibrated to observed on-Site groundwater conditions by adjusting recharge, hydraulic conductivity, and storage coefficients. The model was calibrated through a mixture of manual adjustment and automated methods via PEST. The model was considered calibrated once simulated output approximated inferred groundwater flow directions and groundwater elevations measured at monitoring wells. Simulated groundwater elevation contours from the calibrated model are shown on **Figure 21**. These contours represent model simulated groundwater elevations in the uppermost part of the unconfined aquifer (i.e. the alluvium) and generally mimic groundwater flow directions at AP-1 and AP-3 inferred from Site data (**Appendix D**).

The model was also considered calibrated once calibration statistics for the groundwater elevation targets indicated a residual[14] mean error close to zero, and a normalized root mean square error (NRMSE) close to 10%. **Figure 22** plots measured vs. simulated groundwater elevation values for the targets and shows a generally good match between measured and simulated elevations based on proximity of the results to the 1:1 correlation line. Model calibration statistics are summarized below:

Model Calibration Statistics	
Residual Mean (ft)	-0.55
Residual Standard Deviation (ft)	3.01
Absolute Residual Mean (ft)	2.53
Root Mean Square (RMS) Error (ft)	3.06
Minimum Residual (ft)	-6.06

[14] Residual = measured groundwater elevation minus simulated groundwater elevation

Maximum Residual (ft)	7.49
Range of Observations (ft)	24.15
Normalized RMS Error	12.7%

While we typically target NRSME to be 10% or less, the proximity of the residual mean to zero and NRMSE slightly above 10% indicates that the model is reasonably calibrated for its intended purpose of predicting general groundwater flow trends and elevations in the modeled area. Some factors that limited reduction of the NRMSE below 10% include:

i. Frequency of surface water level measurements at Cabin Creek: To aid the construction and calibration of the transient model, the model was developed to simulate average quarterly conditions. However, surface water elevation used to inform the Cabin Creek model boundary was only measured periodically (not continuously), and represents discrete points in elevation and time that may not represent the actual quarterly average range in variability of surface water elevations that occur in the creek. Further, transient data for the creek was only available for the last half (2020 to 2022) of the model simulation time period. These factors introduced uncertainty in the model, with respect to Cabin Creek;

ii. Frequency of groundwater level measurements at the Site: As discussed above, the model simulates average quarterly conditions. However, groundwater elevation data used to calibrate the model was measured periodically (not continuously) and represent discrete data points that may not reflect average conditions. This factor sometimes resulted in difficulties matching simulated quarterly average conditions to discrete measurements;

iii. Discrete creek elevation data and surface water-groundwater interactions east of AP-3: The Cabin Creek boundary condition in the model was based on interpolated surface water elevations in the creek based on two measurement locations (one upstream and one downstream of the AP-3 area). Measuring points for surface water directly east of AP-3 were not available at the time of model construction. Due to natural variability in elevation of the creek between the two surveyed measuring points, the interpolated creek elevations do not always match observed groundwater elevations in wells and piezometers in the area east of AP-3. This affected the calibration of the model and resulting NRMSE.

iv. The flat hydraulic gradient encountered along the eastern side of AP-3: Related to item iii above, the hydraulic gradient in the area east of AP-3 is very flat (low gradient), and therefore small changes in groundwater and surface water elevations can have more significant impacts to the model calibration statistics, especially in these areas of interpolated surface water elevations in Cabin Creek.

Despite the factors discussed above, the model is considered to be reasonably calibrated as it has a residual mean error close to zero, and can generally simulate (i) quarterly averaged groundwater elevations, (ii) average flow directions, and (iii) groundwater elevation trends.

3.8 Groundwater Flow Model Limitations

This groundwater model was developed using the most current information available at the time of model development, using industry standard modeling software and methods. However, all groundwater flow models are necessarily simplified mathematical representations of complex natural systems, and thus have uncertainty associated with their predictions, and limits to their application. Model uncertainty will never be removed but can be mitigated by addition of model components (e.g., transient groundwater elevations, boundaries, etc.) that more realistically mimic natural systems, and through calibration of model parameters based on various types of data. While there is still some uncertainty within this transient model, further calibration improvement and reduction in model uncertainty in the AP-3 area of the model may be achieved as the model is periodically updated with new data.

The updating of this model to simulate more complex transient conditions and resulting calibration statistics discussed above support that the model represents site conditions more realistically than the previous steady state model. This model can therefore be used to approximate how groundwater elevations may change under post-closure conditions at AP-3.

4.0 PREDICTIVE SCENARIOS

Once calibrated, the groundwater model was used to evaluate potential future groundwater elevations that might occur in the vicinity of AP-3 after of the designed unit closure at AP-1 and AP-2 is complete. As part of the evaluation, two scenarios were examined. The scenarios are outlined in the table below:

Scenario	Post-Closure Scenario Description
1	AP-1, AP-2, & AP-3 Post Closure Conditions, with TreeWells
2	AP-1, AP-2, & AP-3 Post Closure Conditions, with TreeWells, & 100-yr Flood

4.1 Scenario 1 (Post-Closure Conditions)

The purpose of Scenario 1 was to simulate AP-1 and AP-3 under post-closure conditions, for a period of 30 years, and predict the level of CCR below the potentiometric surface inside AP-3 under long term post-closure conditions. To simulate the post-closure conditions, the calibrated model was modified to incorporate aspects of the closure by removal designs for AP-1 and AP-2; in place closure design components for AP-3 are already included in the calibrated model. Post-closure model setup is discussed below.

4.1.1 Post-Closure Model Layering

Post-closure design grades for AP-1 and AP-2 were provided by SCS and Stantec (**Appendix E**). These grades were incorporated into the top of model layer 1, to represent post-closure grading in the model. All other model layers were left unchanged.

4.1.2 Post-Closure Model Conductivity and Specific Yield

According to the post-closure design documents, the ash in AP-1 and AP-2 will be excavated and graded to drain. Clean back fill properties (i.e., hydraulic conductivity, specific yield, and porosity) were not available at the time of model development. However, according to email communication from Stantec, the closure design specifies that soils ranging from clay to silt to sand will be used as backfill material. Based on this information it was assumed that the clean fill material in the model would approximate a silt. Literature derived conductivity and specific yield values for silt (USEPA, 1998) were applied to the interior of AP-1 and AP-2, in model layer 1, to represent the clean backfill material. For AP-3, CCR conductivity and specific yield values were left unchanged, as the CCR in AP-3 is already closed in place. Below is a summary table of the hydraulic conductivity and specific yield input parameters for the post closure simulation:

Ash Pond	Material	Hydraulic Conductivity (cm/s)	Hydraulic Conductivity (ft/d)	Specific Yield	Source
AP-1	Backfill (silt)	1.0E-05	2.83E-02	0.02	USEPA, 1998
AP-2	Backfill (silt)	1.0E-05	2.83E-02	0.02	USEPA, 1998
AP-3	CCR/Ash	5.0E-04	1.42	0.08	Model Calibrated

4.1.3 Post-Closure Model Stress Period Setup

The post-closure model was constructed to represent a period extending approximately 30 years post closure. The model includes 121 transient stress periods. In general, each stress period represents an annual quarter (i.e., 3 months). Stress periods are shown on **Table 4**.

4.1.4 Post-Closure Model Initial Heads

Post-closure model initial heads are defined by the simulated results from the final stress period and time step (i.e., stress period 17, time step 6) of the calibrated pre-closure model.

4.1.5 Post-Closure Model Boundaries

For post-closure recharge, it was assumed that historical precipitation data for the past 30 years could be used as a proxy for precipitation for the next 30 years. Zonal recharge for the 30-year simulation was calculated as a function of the calibrated percentage of precipitation infiltration using 30 years of historical precipitation data from the Rome, Georgia Gauge USC00097600[15]. A 30-year average recharge for each zone and for each annual quarter was calculated and applied cyclically to the corresponding model stress periods. **(Table 5)**. For post-closure evapotranspiration, historical data was limited, therefore evapotranspiration values used in the pre-closure simulation were used to calculate quarterly averages, and applied to the post-closure model **(Table 6).** Evapotranspiration extinction depths from the pre-closure model were used in the post-closure model.

[15] Historical precipitation data source: Daily Summaries Station Details: ROME, GA US, GHCND:USC00097600 | Climate Data Online (CDO) | National Climatic Data Center (NCDC) (noaa.gov)

Model boundary conditions representing AP-1 and AP-2 surface water were removed to represent the complete dewatering of both units. Based on the review of the closure design drawings, it was assumed that under post-closure conditions, minimal aquifer recharge would occur inside the units, due to the assumed low permeability of the clean fill and the post-closure grades which are designed to divert and drain water towards the Coosa River. Based on the above assumption, recharge within the footprint of AP-1 and AP-2 was reduced to a value of 3×10^{-7} ft/d.

Between AP-3 and Cabin Creek, 254 TreeWells (**Figure 23**) were simulated to represent the proposed engineering measures. In the model each tree well is installed in the residuum and highly weathered rock, per the Tree Well design, with each well pumping at a rate of 30 gallons per day for Q1 through Q3 stress periods, and a decreased rate 3 gallons per day for Q4 stress periods.

4.1.6 Scenario 1 Results

Scenario 1 simulated groundwater elevation contours for the upper most part of the aquifer (i.e., the alluvium) at the end of the 30-year post-closure period are shown on **Figure 24.** Overall, these contours indicate that groundwater flow conditions will continue to flow south towards the Coosa River, but without the radial flow component away from AP-1. Flow near AP-3 will be to the east and southeast as in pre-closure conditions.

Model results indicate that the potentiometric elevation in CCR of AP-3 (model layer 1) declines from an approximate elevation of 569 ft at the start of the simulation to 568 ft at the end of the 30-year simulation (**Figure 25**). The model also predicts that the potentiometric elevation inside the saturated CCR reaches steady state conditions after approximately 20 years of post-closure conditions.

The model also predicts a saturated CCR volume of approximately 5,262 cubic yards, after 30 years of post-closure conditions. This is a smaller but similar volume than the volume of 8,143 cubic yards predicted by the previous 2020 steady state model (Geosyntec, 2020a). A comparison of the steady state vs transient model predicted CCR volume is shown in the table below:

Post Closure Model	AP-3 Condition	AP-1 Condition	Engineering Measure	Max Height of CCR Below the Potentiometric Surface (ft)	Volume of CCR Below the Potentiometric Surface (cubic yards)
2020 Steady State	Closed, Cover Installed	Closed by Removal	107 TreeWells	3.7	8,143
2022 Transient	Closed, Cover Installed	Closed by Removal	254 TreeWells	2.4	5,262

A map of the CCR below the potentiometric surface 30 years post-closure is shown on **Figure 26**.

4.2 Scenario 2 (Post-Closure Flood Conditions)

The post-closure model was also used to simulate a 100-year flood scenario under AP-1 and AP-3 post-closure conditions. The model was modified to simulate a five day 100-year flood event, with flood waters assigned an elevation of 586 ft. Flood water elevation and extent was based on information from FEMA (FEMA Flood Map Service Center | Search By Address). The 100-year flood extent is shown on **Figure 27** and was simulated using the MODFLOW Time Variant Specified Head Package. Model results show that the potentiometric surface within the AP-3 CCR does not significantly increase during the simulated 5 day flood event.

5.0 CONCLUSIONS

A three-dimensional transient groundwater flow model was constructed and calibrated to simulate hydrogeologic conditions at AP-1 and AP-3. Once calibrated, the model was used to evaluate how groundwater elevations change under post-closure conditions, and to estimate the post-closure CCR below the potentiometric surface inside AP-3. Results from the model indicate that under post-closure conditions the groundwater at AP-1 and AP-2 will generally flow towards the Coosa River and towards Cabin Creek at AP-3.

Model results predict that the potentiometric elevation within the CCR of AP-3 declines from an approximate elevation of 569 ft at the start of the simulation to 568 ft at the end of the 30-year simulation. The model also predicts that the potentiometric elevation inside the CCR reaches steady state conditions after approximately 20 years of post-closure conditions. Based on the model results, it is estimated that the volume of CCR present at

AP-3 below the potentiometric surface will be approximately 5,262 cubic yards, after 30 years of post-closure conditions (**Figure 26**).

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TABLES

Table 1
Pre-Closure Model Recharge Values

Quarter	Model Stress Period	Total Quarterly Precipitation (ft)	Average Quarterly Precipitation (ft/d)	Recharge: Zone 1 (ft/d)	Recharge Percentage: Zone 1 (%)	Recharge: Zone 2 (ft/d)	Recharge Percentage: Zone 2 (%)	Recharge: Zone 3 (ft/d)	Recharge Percentage: Zone 3 (%)
Q3 2018	1	1.22	1.32E-02	0.0E+00	0.00	6.61E-05	0.50	1.32E-04	1
Q4 2018	2	2.07	2.25E-02	0.0E+00	0.00	1.12E-04	0.50	2.25E-04	1
Q1 2019	3	1.91	2.12E-02	1.2E-05	0.06	1.06E-04	0.50	2.12E-04	1
Q2 2019	4	0.83	9.16E-03	0.0E+00	0.00	4.58E-05	0.50	9.16E-05	1
Q3 2019	5	0.75	8.15E-03	0.0E+00	0.00	4.08E-05	0.50	8.15E-05	1
Q4 2019	6	1.54	1.68E-02	0.0E+00	0.00	8.38E-05	0.50	1.68E-04	1
Q1 2020	7	2.08	2.28E-02	0.0E+00	0.00	1.14E-04	0.50	2.28E-04	1
Q2 2020	8	1.22	1.34E-02	0.0E+00	0.00	6.71E-05	0.50	1.34E-04	1
Q3 2020	9	1.13	1.22E-02	0.0E+00	0.00	6.12E-05	0.50	1.22E-04	1
Q4 2020	10	1.05	1.14E-02	1.2E-05	0.11	5.70E-05	0.50	1.14E-04	1
Q1 2021	11	1.50	1.67E-02	0.0E+00	0.00	8.36E-05	0.50	1.67E-04	1
Q2 2021	12	1.24	1.36E-02	0.0E+00	0.00	6.82E-05	0.50	1.36E-04	1
Q3 2021	13	1.88	2.04E-02	0.0E+00	0.00	1.02E-04	0.50	2.04E-04	1
Q4 2021	14	0.91	9.89E-03	0.0E+00	0.00	4.95E-05	0.50	9.89E-05	1
Q1 2022	15	1.53	1.70E-02	0.0E+00	0.00	8.49E-05	0.50	1.70E-04	1
Q2 2022	16	0.85	9.37E-03	0.0E+00	0.00	4.68E-05	0.50	9.37E-05	1
Q3 2022	17	0.56	1.82E-02	0.0E+00	0.00	9.10E-05	0.50	1.82E-04	1

Notes:
1. ft/d = feet per day.
2. Q3 2022 contains data from 2 months (July and August 2022).
   The remainder of the quarters contain data from 3 months.

Table 1
Pre-Closure Model Recharge Values

Quarter	Model Stress Period	Total Quarterly Precipitation (ft)	Average Quarterly Precipitation (ft/d)	Recharge: Zone 4 (ft/d)	Recharge Percentage: Zone 4 (%)	Recharge: Zone 5 (ft/d)	Recharge Percentage: Zone 5 (%)	Recharge: Zone 6 (ft/d)	Recharge Percentage: Zone 6 (%)	Recharge: Zone 7 (ft/d)	Recharge Percentage: Zone 7 (%)
Q3 2018	1	1.22	1.32E-02	1.98E-03	15	1.59E-03	12	3.17E-03	24	1.98E-02	150
Q4 2018	2	2.07	2.25E-02	3.37E-03	15	2.70E-03	12	5.39E-03	24	3.37E-02	150
Q1 2019	3	1.91	2.12E-02	3.18E-03	15	3.20E-03	15	5.08E-03	24	3.18E-02	150
Q2 2019	4	0.83	9.16E-03	1.37E-03	15	1.10E-03	12	2.20E-03	24	1.37E-02	150
Q3 2019	5	0.75	8.15E-03	1.22E-03	15	9.78E-04	12	1.96E-03	24	1.22E-02	150
Q4 2019	6	1.54	1.68E-02	2.51E-03	15	2.01E-03	12	4.02E-03	24	2.51E-02	150
Q1 2020	7	2.08	2.28E-02	3.42E-03	15	3.20E-03	14	5.48E-03	24	3.42E-02	150
Q2 2020	8	1.22	1.34E-02	2.01E-03	15	1.61E-03	12	3.22E-03	24	2.01E-02	150
Q3 2020	9	1.13	1.22E-02	1.84E-03	15	1.47E-03	12	2.94E-03	24	1.84E-02	150
Q4 2020	10	1.05	1.14E-02	1.71E-03	15	3.00E-03	26	2.74E-03	24	1.71E-02	150
Q1 2021	11	1.50	1.67E-02	2.51E-03	15	2.01E-03	12	4.01E-03	24	2.51E-02	150
Q2 2021	12	1.24	1.36E-02	2.05E-03	15	1.95E-03	14	3.27E-03	24	2.05E-02	150
Q3 2021	13	1.88	2.04E-02	3.06E-03	15	2.45E-03	12	4.89E-03	24	3.06E-02	150
Q4 2021	14	0.91	9.89E-03	1.48E-03	15	3.00E-03	30	2.37E-03	24	1.48E-02	150
Q1 2022	15	1.53	1.70E-02	2.55E-03	15	2.04E-03	12	4.07E-03	24	2.55E-02	150
Q2 2022	16	0.85	9.37E-03	1.41E-03	15	1.12E-03	12	2.25E-03	24	1.41E-02	151
Q3 2022	17	0.56	1.82E-02	2.73E-03	15	2.18E-03	12	4.37E-03	24	2.73E-02	150

Notes:
1. ft/d = feet per day.
2. Q3 2022 contains data from 2 months (July and August 2022).
The remainder of the quarters contain data from 3 months.

Table 1
Pre-Closure Model Recharge Values

Quarter	Model Stress Period	Total Quarterly Precipitation (ft)	Average Quarterly Precipitation (ft/d)	Recharge: Zone 8 (ft/d)	Recharge Percentage: Zone 8 (%)	Recharge: Zone 9 (ft/d)	Recharge Percentage: Zone 9 (%)	Recharge: Zone 10 (ft/d)	Recharge Percentage: Zone 10 (%)	Recharge: Zone 11 (ft/d)	Recharge Percentage: Zone 11 (%)
Q3 2018	1	1.22	1.32E-02	1.45E-02	110	1.32E-04	1	7.93E-04	6	1.19E-03	9
Q4 2018	2	2.07	2.25E-02	2.47E-02	110	2.25E-04	1	1.35E-03	6	2.02E-03	9
Q1 2019	3	1.91	2.12E-02	2.33E-02	110	1.00E-03	5	1.27E-03	6	1.91E-03	9
Q2 2019	4	0.83	9.16E-03	1.01E-02	110	9.16E-05	1	5.49E-04	6	8.24E-04	9
Q3 2019	5	0.75	8.15E-03	8.97E-03	110	8.15E-05	1	4.89E-04	6	7.34E-04	9
Q4 2019	6	1.54	1.68E-02	1.84E-02	110	1.68E-04	1	1.01E-03	6	1.51E-03	9
Q1 2020	7	2.08	2.28E-02	2.51E-02	110	2.00E-03	9	1.37E-03	6	2.05E-03	9
Q2 2020	8	1.22	1.34E-02	1.48E-02	110	1.34E-04	1	8.05E-04	6	1.21E-03	9
Q3 2020	9	1.13	1.22E-02	1.35E-02	110	1.22E-04	1	7.35E-04	6	1.10E-03	9
Q4 2020	10	1.05	1.14E-02	1.25E-02	110	3.00E-03	26	6.84E-04	6	1.03E-03	9
Q1 2021	11	1.50	1.67E-02	1.84E-02	110	1.67E-04	1	1.00E-03	6	1.50E-03	9
Q2 2021	12	1.24	1.36E-02	1.50E-02	110	2.00E-03	15	8.19E-04	6	1.23E-03	9
Q3 2021	13	1.88	2.04E-02	2.24E-02	110	2.04E-04	1	1.22E-03	6	1.83E-03	9
Q4 2021	14	0.91	9.89E-03	1.09E-02	110	3.00E-03	30	5.93E-04	6	8.90E-04	9
Q1 2022	15	1.53	1.70E-02	1.87E-02	110	1.70E-04	1	1.02E-03	6	1.53E-03	9
Q2 2022	16	0.85	9.37E-03	1.03E-02	110	9.37E-05	1	5.62E-04	6	8.43E-04	9
Q3 2022	17	0.56	1.82E-02	2.00E-02	110	1.82E-04	1	1.09E-03	6	1.64E-03	9

Notes:
1. ft/d = feet per day.
2. Q3 2022 contains data from 2 months (July and August 2022).
The remainder of the quarters contain data from 3 months.

Table 2
Pre-Closure Model Evapotranspiration Values

Quarter	Model Stress Period	ET: Zone 1 (ft/d)	ET: Zone 2 (ft/d)	ET: Zone 3 (ft/d)	ET: Zone 4 (ft/d)	ET: Zone 5 (ft/d)	ET: Zone 6 (ft/d)	ET: Zone 7 (ft/d)	ET: Zone 8 (ft/d)	ET: Zone 9 (ft/d)	ET: Zone 10 (ft/d)	ET: Zone 11 (ft/d)
Q3 2018	1	0.0E+00	5.2E-04	0.0E+00	5.2E-04	5.2E-03	1.1E-02	5.2E-04	5.2E-04	1.4E-02	5.2E-03	5.2E-04
Q4 2018	2	0.0E+00	1.1E-04	0.0E+00	1.1E-04	1.1E-03	1.6E-03	1.1E-04	1.1E-04	3.0E-03	1.1E-03	1.1E-04
Q1 2019	3	0.0E+00	1.4E-04	0.0E+00	1.4E-04	1.4E-03	5.6E-04	1.4E-04	1.4E-04	3.8E-03	1.4E-03	1.4E-04
Q2 2019	4	0.0E+00	5.2E-04	0.0E+00	5.2E-04	5.2E-03	9.3E-03	5.2E-04	5.2E-04	1.4E-02	5.2E-03	5.2E-04
Q3 2019	5	0.0E+00	5.5E-04	0.0E+00	5.5E-04	5.5E-03	1.1E-02	5.5E-04	5.5E-04	1.4E-02	5.5E-03	5.5E-04
Q4 2019	6	0.0E+00	1.2E-04	0.0E+00	1.2E-04	1.2E-03	1.6E-03	1.2E-04	1.2E-04	3.2E-03	1.2E-03	1.2E-04
Q1 2020	7	0.0E+00	1.4E-04	0.0E+00	1.4E-04	1.4E-03	5.6E-04	1.4E-04	1.4E-04	3.7E-03	1.4E-03	1.4E-04
Q2 2020	8	0.0E+00	5.3E-04	0.0E+00	5.3E-04	5.3E-03	9.3E-03	5.3E-04	5.3E-04	1.4E-02	5.3E-03	5.3E-04
Q3 2020	9	0.0E+00	5.3E-04	0.0E+00	5.3E-04	5.3E-03	1.1E-02	5.3E-04	5.3E-04	1.4E-02	5.3E-03	5.3E-04
Q4 2020	10	0.0E+00	1.4E-04	0.0E+00	1.4E-04	1.4E-03	1.8E-03	1.4E-04	1.4E-04	3.8E-03	1.4E-03	1.4E-04
Q1 2021	11	0.0E+00	1.6E-04	0.0E+00	1.6E-04	1.6E-03	6.2E-04	1.6E-04	1.6E-04	4.3E-03	1.6E-03	1.6E-04
Q2 2021	12	0.0E+00	5.4E-04	0.0E+00	5.4E-04	5.4E-03	9.3E-03	5.4E-04	5.4E-04	1.4E-02	5.4E-03	5.4E-04
Q3 2021	13	0.0E+00	5.2E-04	0.0E+00	5.2E-04	5.2E-03	1.1E-02	5.2E-04	5.2E-04	1.4E-02	5.2E-03	5.2E-04
Q4 2021	14	0.0E+00	1.4E-04	0.0E+00	1.4E-04	1.4E-03	1.7E-03	1.4E-04	1.4E-04	3.6E-03	1.4E-03	1.4E-04
Q1 2022	15	0.0E+00	1.9E-04	0.0E+00	1.9E-04	1.9E-03	7.3E-04	1.9E-04	1.9E-04	4.9E-03	1.9E-03	1.9E-04
Q2 2022	16	0.0E+00	5.7E-04	0.0E+00	5.7E-04	5.7E-03	1.0E-02	5.7E-04	5.7E-04	1.5E-02	5.7E-03	5.7E-04
Q3 2022	17	0.0E+00	5.9E-04	0.0E+00	5.9E-04	5.9E-03	1.2E-02	5.9E-04	5.9E-04	1.6E-02	5.9E-03	5.9E-04

Notes:
1. ET = Evapotranspiration
2. ft/d = feet per day.
3. Q3 2022 contains data from 2 months (July and August 2022). The remainder of the quarters contain data from 3 months.

Table 3
Model Targets: Measured and Simulated Groundwater Elevations

Name	Date	Model Days	X (ft)	Y (ft)	Model Layer	Measured Groundwater Elev. (ft)	Simulated Groundwater Elev. (ft)	Residual (ft)
AP1A-1	10/1/2018	92	1941614	1550080	2	580.61	579.48	1.13
AP1A-1	3/11/2019	253	1941614	1550080	2	582.21	582.30	-0.09
AP1A-1	4/1/2019	274	1941614	1550080	2	580.7	582.55	-1.85
AP1A-1	8/21/2019	416	1941614	1550080	2	576.31	579.48	-3.17
AP1A-1	9/23/2019	449	1941614	1550080	2	575.09	579.15	-4.06
AP1A-1	10/21/2019	477	1941614	1550080	2	574.72	579.54	-4.82
AP1A-1	3/2/2020	610	1941614	1550080	2	581.6	581.65	-0.05
AP1A-1	3/23/2020	631	1941614	1550080	2	582.19	582.03	0.16
AP1A-1	6/4/2020	704	1941614	1550080	2	579.22	580.94	-1.72
AP1A-1	8/11/2020	772	1941614	1550080	2	577.26	580.31	-3.05
AP1A-1	9/14/2020	806	1941614	1550080	2	576.25	579.96	-3.71
AP1A-1	2/8/2021	953	1941614	1550080	2	580.93	579.23	1.70
AP1A-1	3/10/2021	983	1941614	1550080	2	580.46	579.32	1.14
AP1A-1	8/11/2021	1137	1941614	1550080	2	577.01	579.28	-2.27
AP1A-1	1/31/2022	1310	1941614	1550080	2	579.59	577.39	2.20
AP1A-1	8/1/2022	1492	1941614	1550080	2	578.25	577.01	1.24
HGWA-122	10/1/2018	92	1941887	1551251	3	577.98	574.12	3.86
HGWA-122	3/11/2019	253	1941887	1551251	3	582.67	575.62	7.05
HGWA-122	4/1/2019	274	1941887	1551251	3	580.02	575.84	4.18
HGWA-122	8/21/2019	416	1941887	1551251	3	572.67	574.94	-2.27
HGWA-122	9/23/2019	449	1941887	1551251	3	571.69	574.78	-3.09
HGWA-122	10/21/2019	477	1941887	1551251	3	571.09	574.61	-3.52
HGWA-122	3/2/2020	610	1941887	1551251	3	582.25	575.25	7.00
HGWA-122	3/23/2020	631	1941887	1551251	3	582.72	575.47	7.25
HGWA-122	6/4/2020	704	1941887	1551251	3	576.72	575.44	1.28
HGWA-122	8/11/2020	772	1941887	1551251	3	573.31	575.17	-1.86
HGWA-122	8/24/2020	785	1941887	1551251	3	573.7	575.10	-1.40
HGWA-122	9/14/2020	806	1941887	1551251	3	572.77	575.01	-2.24
HGWA-122	2/8/2021	953	1941887	1551251	3	579.44	574.54	4.90
HGWA-122	3/10/2021	983	1941887	1551251	3	580.08	574.48	5.60
HGWA-122	8/11/2021	1137	1941887	1551251	3	574.81	574.50	0.31
HGWA-122	1/31/2022	1310	1941887	1551251	3	578.66	573.82	4.84
HGWA-122	8/1/2022	1492	1941887	1551251	3	575.1	573.26	1.84
HGWA-45D	9/14/2020	806	1941908	1551158	5	572.87	573.79	-0.92
HGWA-45D	2/8/2021	953	1941908	1551158	5	579.7	573.02	6.68
HGWA-45D	3/10/2021	983	1941908	1551158	5	580.21	573.03	7.18
HGWA-45D	8/11/2021	1137	1941908	1551158	5	574.9	573.21	1.69
HGWA-45D	1/31/2022	1310	1941908	1551158	5	578.81	572.25	6.56
HGWA-45D	8/1/2022	1492	1941908	1551158	5	575.45	571.70	3.75
HGWC-10	10/1/2018	92	1941644	1548469	2	567.62	568.78	-1.16
HGWC-10	3/11/2019	253	1941644	1548469	2	573.49	572.70	0.79
HGWC-10	4/1/2019	274	1941644	1548469	2	567.81	572.74	-4.93
HGWC-10	9/23/2019	449	1941644	1548469	2	564.5	568.41	-3.91
HGWC-10	3/2/2020	610	1941644	1548469	2	568.66	571.75	-3.09
HGWC-10	3/23/2020	631	1941644	1548469	2	569.57	571.82	-2.25
HGWC-10	8/11/2020	772	1941644	1548469	2	565.74	568.30	-2.56
HGWC-10	9/14/2020	806	1941644	1548469	2	565.29	568.20	-2.91
HGWC-10	2/8/2021	953	1941644	1548469	2	564.47	567.45	-2.98
HGWC-10	3/10/2021	983	1941644	1548469	2	565.62	567.47	-1.85
HGWC-10	8/11/2021	1137	1941644	1548469	2	565.29	567.62	-2.33
HGWC-10	1/31/2022	1310	1941644	1548469	2	562.22	567.95	-5.73
HGWC-10	8/1/2022	1492	1941644	1548469	2	565.99	565.96	0.03
HGWC-11	10/1/2018	92	1941147	1548478	2	566.89	569.34	-2.45
HGWC-11	3/11/2019	253	1941147	1548478	2	571.41	573.06	-1.65
HGWC-11	4/1/2019	274	1941147	1548478	2	567.37	573.11	-5.74
HGWC-11	9/23/2019	449	1941147	1548478	2	564.58	569.03	-4.45
HGWC-11	3/2/2020	610	1941147	1548478	2	571.11	572.11	-1.00
HGWC-11	3/23/2020	631	1941147	1548478	2	567.67	572.21	-4.54
HGWC-11	8/11/2020	772	1941147	1548478	2	565.85	568.88	-3.03
HGWC-11	9/14/2020	806	1941147	1548478	2	565.31	568.74	-3.43
HGWC-11	2/8/2021	953	1941147	1548478	2	563.6	567.91	-4.31
HGWC-11	3/10/2021	983	1941147	1548478	2	564.99	567.94	-2.95
HGWC-11	8/11/2021	1137	1941147	1548478	2	565.298	567.98	-2.68
HGWC-11	1/31/2022	1310	1941147	1548478	2	562.45	568.00	-5.55
HGWC-11	8/1/2022	1492	1941147	1548478	2	564.96	566.23	-1.27

Table 3
Model Targets: Measured and Simulated Groundwater Elevations

Name	Date	Model Days	X (ft)	Y (ft)	Model Layer	Measured Groundwater Elev. (ft)	Simulated Groundwater Elev. (ft)	Residual (ft)
HGWC-12	10/1/2018	92	1941152	1548477	2	566.81	569.33	-2.52
HGWC-12	3/11/2019	253	1941152	1548477	2	571.3	573.05	-1.75
HGWC-12	4/1/2019	274	1941152	1548477	2	567.28	573.10	-5.82
HGWC-12	9/23/2019	449	1941152	1548477	2	564.56	569.01	-4.45
HGWC-12	3/2/2020	610	1941152	1548477	2	570.64	572.10	-1.46
HGWC-12	3/23/2020	631	1941152	1548477	2	567.36	572.20	-4.84
HGWC-12	8/11/2020	772	1941152	1548477	2	565.84	568.87	-3.03
HGWC-12	9/14/2020	806	1941152	1548477	2	565.25	568.73	-3.48
HGWC-12	2/8/2021	953	1941152	1548477	2	563.58	567.90	-4.32
HGWC-12	3/10/2021	983	1941152	1548477	2	564.91	567.93	-3.02
HGWC-12	8/11/2021	1137	1941152	1548477	2	565.3	567.97	-2.67
HGWC-12	1/31/2022	1310	1941152	1548477	2	562.42	568.00	-5.58
HGWC-12	8/1/2022	1492	1941152	1548477	2	564.93	566.22	-1.29
HGWC-120	10/1/2018	92	1942927	1551067	5	566.07	567.67	-1.60
HGWC-120	3/11/2019	253	1942927	1551067	5	569.95	572.30	-2.35
HGWC-120	4/1/2019	274	1942927	1551067	5	566.61	572.36	-5.75
HGWC-120	8/21/2019	416	1942927	1551067	5	564.94	567.31	-2.37
HGWC-120	9/23/2019	449	1942927	1551067	5	564.33	567.26	-2.93
HGWC-120	10/21/2019	477	1942927	1551067	5	564.21	565.89	-1.68
HGWC-120	3/2/2020	610	1942927	1551067	5	569.64	571.17	-1.53
HGWC-120	3/23/2020	631	1942927	1551067	5	567.87	571.27	-3.40
HGWC-120	6/4/2020	704	1942927	1551067	5	565.58	569.05	-3.47
HGWC-120	8/11/2020	772	1942927	1551067	5	564.93	567.71	-2.78
HGWC-120	8/24/2020	785	1942927	1551067	5	565.15	567.66	-2.51
HGWC-120	9/14/2020	806	1942927	1551067	5	564.62	567.63	-3.01
HGWC-120	2/8/2021	953	1942927	1551067	5	565.27	567.06	-1.79
HGWC-120	3/10/2021	983	1942927	1551067	5	565.49	567.11	-1.62
HGWC-120	8/11/2021	1137	1942927	1551067	5	565.22	568.35	-3.13
HGWC-120	1/31/2022	1310	1942927	1551067	5	565.16	568.54	-3.38
HGWC-124	10/1/2018	92	1942781	1551625	5	568.66	568.23	0.43
HGWC-124	3/11/2019	253	1942781	1551625	5	573.6	572.52	1.08
HGWC-124	4/1/2019	274	1942781	1551625	5	569.14	572.62	-3.48
HGWC-124	8/21/2019	416	1942781	1551625	5	564.84	568.03	-3.19
HGWC-124	9/23/2019	449	1942781	1551625	5	564.06	567.95	-3.89
HGWC-124	10/21/2019	477	1942781	1551625	5	564.74	566.70	-1.96
HGWC-124	3/2/2020	610	1942781	1551625	5	572.84	571.41	1.43
HGWC-124	3/23/2020	631	1942781	1551625	5	572.27	571.54	0.73
HGWC-124	6/4/2020	704	1942781	1551625	5	566.46	569.62	-3.16
HGWC-124	8/11/2020	772	1942781	1551625	5	566.56	568.39	-1.83
HGWC-124	8/24/2020	785	1942781	1551625	5	566.71	568.35	-1.64
HGWC-124	9/14/2020	806	1942781	1551625	5	564.36	568.30	-3.94
HGWC-124	2/8/2021	953	1942781	1551625	5	570	567.69	2.31
HGWC-124	3/10/2021	983	1942781	1551625	5	568.85	567.72	1.13
HGWC-124	8/11/2021	1137	1942781	1551625	5	566.42	568.90	-2.48
HGWC-124	1/31/2022	1310	1942781	1551625	5	567.88	568.96	-1.08
HGWC-124	8/1/2022	1492	1942781	1551625	5	568.5	567.59	0.91
HGWC-125	6/4/2020	704	1942963	1550821	4	565.23	568.67	-3.44
HGWC-125	8/11/2020	772	1942963	1550821	4	564.61	567.33	-2.72
HGWC-125	8/24/2020	785	1942963	1550821	4	565	567.27	-2.27
HGWC-125	9/14/2020	806	1942963	1550821	4	564.39	567.22	-2.83
HGWC-125	2/8/2021	953	1942963	1550821	4	564.99	566.60	-1.61
HGWC-125	3/10/2021	983	1942963	1550821	4	565.14	566.70	-1.56
HGWC-125	8/11/2021	1137	1942963	1550821	4	564.92	568.03	-3.11
HGWC-125	1/31/2022	1310	1942963	1550821	4	564.86	567.95	-3.09
HGWC-125	8/1/2022	1492	1942963	1550821	4	565.13	566.64	-1.51
HGWC-126	6/4/2020	704	1942689	1550422	4	570.8	570.73	0.07
HGWC-126	8/11/2020	772	1942689	1550422	4	569.36	569.94	-0.58
HGWC-126	8/24/2020	785	1942689	1550422	4	569.63	569.81	-0.18
HGWC-126	9/14/2020	806	1942689	1550422	4	569.38	569.65	-0.27
HGWC-126	2/8/2021	953	1942689	1550422	4	570.54	568.57	1.97
HGWC-126	3/10/2021	983	1942689	1550422	4	570.81	568.65	2.16
HGWC-126	8/11/2021	1137	1942689	1550422	4	569.98	569.41	0.57
HGWC-126	1/31/2022	1310	1942689	1550422	4	570.52	567.88	2.64
HGWC-126	8/1/2022	1492	1942689	1550422	4	570.34	567.90	2.44

Table 3
Model Targets: Measured and Simulated Groundwater Elevations

Name	Date	Model Days	X (ft)	Y (ft)	Model Layer	Measured Groundwater Elev. (ft)	Simulated Groundwater Elev. (ft)	Residual (ft)
HGWC-13	10/1/2018	92	1940901	1548628	2	577.61	575.51	2.10
HGWC-13	3/11/2019	253	1940901	1548628	2	578.16	577.77	0.39
HGWC-13	4/1/2019	274	1940901	1548628	2	576.48	577.82	-1.34
HGWC-13	9/23/2019	449	1940901	1548628	2	572.81	575.34	-2.53
HGWC-13	3/2/2020	610	1940901	1548628	2	578.15	577.17	0.98
HGWC-13	3/24/2020	632	1940901	1548628	2	578	577.25	0.75
HGWC-13	8/11/2020	772	1940901	1548628	2	575.18	573.71	1.47
HGWC-13	9/14/2020	806	1940901	1548628	2	574.71	573.56	1.15
HGWC-13	2/8/2021	953	1940901	1548628	2	573.45	572.35	1.10
HGWC-13	3/10/2021	983	1940901	1548628	2	573.51	572.37	1.14
HGWC-13	8/11/2021	1137	1940901	1548628	2	571.58	570.34	1.24
HGWC-13	1/31/2022	1310	1940901	1548628	2	571.4	571.11	0.29
HGWC-13	8/1/2022	1492	1940901	1548628	2	571.14	567.94	3.20
HGWC-7	10/1/2018	92	1942320	1549521	2	575.49	572.89	2.60
HGWC-7	3/11/2019	253	1942320	1549521	2	575.96	575.81	0.15
HGWC-7	4/1/2019	274	1942320	1549521	2	575.44	575.95	-0.51
HGWC-7	9/23/2019	449	1942320	1549521	2	572.68	572.77	-0.09
HGWC-7	3/2/2020	610	1942320	1549521	2	575.6	574.89	0.71
HGWC-7	3/23/2020	631	1942320	1549521	2	575.89	575.12	0.77
HGWC-7	6/4/2020	704	1942320	1549521	2	574.35	573.87	0.48
HGWC-7	8/11/2020	772	1942320	1549521	2	573.87	572.22	1.65
HGWC-7	9/14/2020	806	1942320	1549521	2	573.63	571.94	1.69
HGWC-7	2/8/2021	953	1942320	1549521	2	574.69	570.83	3.86
HGWC-7	3/10/2021	983	1942320	1549521	2	574.07	570.78	3.29
HGWC-7	8/11/2021	1137	1942320	1549521	2	571.82	569.91	1.91
HGWC-7	1/31/2022	1310	1942320	1549521	2	573.23	568.77	4.46
HGWC-7	8/1/2022	1492	1942320	1549521	2	573.73	567.75	5.98
HGWC-8	10/1/2018	92	1942393	1549115	2	577.06	571.55	5.51
HGWC-8	3/11/2019	253	1942393	1549115	2	578.14	574.84	3.30
HGWC-8	4/1/2019	274	1942393	1549115	2	577.83	574.92	2.91
HGWC-8	9/23/2019	449	1942393	1549115	2	573.22	571.26	1.96
HGWC-8	3/2/2020	610	1942393	1549115	2	577.67	573.91	3.76
HGWC-8	3/23/2020	631	1942393	1549115	2	577.47	574.09	3.38
HGWC-8	8/11/2020	772	1942393	1549115	2	574.78	570.81	3.97
HGWC-8	9/14/2020	806	1942393	1549115	2	574.42	570.55	3.87
HGWC-8	2/8/2021	953	1942393	1549115	2	574.99	569.41	5.58
HGWC-8	3/10/2021	983	1942393	1549115	2	574.53	569.47	5.06
HGWC-8	8/11/2021	1137	1942393	1549115	2	571.86	569.00	2.86
HGWC-8	1/31/2022	1310	1942393	1549115	2	572.97	568.00	4.97
HGWC-8	8/1/2022	1492	1942393	1549115	2	571.67	566.82	4.85
HGWC-9	10/1/2018	92	1942215	1548693	2	567.65	567.95	-0.30
HGWC-9	3/11/2019	253	1942215	1548693	2	572.12	572.11	0.01
HGWC-9	4/1/2019	274	1942215	1548693	2	568.5	572.14	-3.64
HGWC-9	9/23/2019	449	1942215	1548693	2	565.36	567.53	-2.17
HGWC-9	3/2/2020	610	1942215	1548693	2	571.47	571.12	0.35
HGWC-9	3/23/2020	631	1942215	1548693	2	569.01	571.18	-2.17
HGWC-9	8/11/2020	772	1942215	1548693	2	566.56	567.56	-1.00
HGWC-9	9/14/2020	806	1942215	1548693	2	566.15	567.46	-1.31
HGWC-9	2/8/2021	953	1942215	1548693	2	565.13	566.78	-1.65
HGWC-9	3/10/2021	983	1942215	1548693	2	566.31	566.82	-0.51
HGWC-9	8/11/2021	1137	1942215	1548693	2	565.87	567.25	-1.38
HGWC-9	1/31/2022	1310	1942215	1548693	2	564.07	567.50	-3.43
HGWC-9	8/1/2022	1492	1942215	1548693	2	565.26	565.66	-0.40
MW-1	10/1/2018	92	1941589	1549938	2	580.8	577.60	3.20
MW-1	3/11/2019	253	1941589	1549938	2	582.17	579.49	2.68
MW-1	4/1/2019	274	1941589	1549938	2	580.65	579.77	0.88
MW-1	8/21/2019	416	1941589	1549938	2	576.61	578.32	-1.71
MW-1	9/23/2019	449	1941589	1549938	2	575.24	578.01	-2.77
MW-1	10/21/2019	477	1941589	1549938	2	574.86	577.89	-3.03
MW-1	3/2/2020	610	1941589	1549938	2	581.51	578.67	2.84
MW-1	3/23/2020	631	1941589	1549938	2	582.15	579.01	3.14
MW-1	6/4/2020	704	1941589	1549938	2	579.47	579.06	0.41
MW-1	8/11/2020	772	1941589	1549938	2	577.8	578.57	-0.77
MW-1	9/14/2020	806	1941589	1549938	2	576.64	578.16	-1.52
MW-1	2/8/2021	953	1941589	1549938	2	580.92	576.84	4.08
MW-1	3/10/2021	983	1941589	1549938	2	580.38	576.70	3.68
MW-1	8/11/2021	1137	1941589	1549938	2	576.03	576.09	-0.06
MW-1	1/31/2022	1310	1941589	1549938	2	579.58	574.70	4.88
MW-1	8/1/2022	1492	1941589	1549938	2	578.46	574.36	4.10

Table 3
Model Targets: Measured and Simulated Groundwater Elevations

Name	Date	Model Days	X (ft)	Y (ft)	Model Layer	Measured Groundwater Elev. (ft)	Simulated Groundwater Elev. (ft)	Residual (ft)
MW-19	3/11/2019	253	1940943	1548423	2	573.45	572.70	0.75
MW-19	4/1/2019	274	1940943	1548423	2	570.29	572.77	-2.48
MW-19	9/23/2019	449	1940943	1548423	2	567.28	568.58	-1.30
MW-19	3/2/2020	610	1940943	1548423	2	573.11	571.72	1.39
MW-19	3/23/2020	631	1940943	1548423	2	571.3	571.83	-0.53
MW-19	8/11/2020	772	1940943	1548423	2	569.04	568.53	0.51
MW-19	9/14/2020	806	1940943	1548423	2	568.42	568.37	0.05
MW-19	2/8/2021	953	1940943	1548423	2	567.15	567.53	-0.38
MW-19	3/10/2021	983	1940943	1548423	2	567.97	567.57	0.40
MW-19	8/11/2021	1137	1940943	1548423	2	567.41	567.78	-0.37
MW-19	1/31/2022	1310	1940943	1548423	2	565.61	567.66	-2.05
MW-19	8/1/2022	1492	1940943	1548423	2	567.06	566.05	1.01
MW-20	3/11/2019	253	1942737	1549030	2	570.93	570.82	0.11
MW-20	4/1/2019	274	1942737	1549030	2	567.2	570.86	-3.66
MW-20	9/23/2019	449	1942737	1549030	2	563.44	565.61	-2.17
MW-20	3/2/2020	610	1942737	1549030	2	570.37	569.66	0.71
MW-20	3/23/2020	631	1942737	1549030	2	568.3	569.77	-1.47
MW-20	8/11/2020	772	1942737	1549030	2	564.5	566.00	-1.50
MW-20	9/14/2020	806	1942737	1549030	2	564.13	565.88	-1.75
MW-20	2/8/2021	953	1942737	1549030	2	564.6	565.27	-0.67
MW-20	3/10/2021	983	1942737	1549030	2	565.72	565.35	0.37
MW-20	8/11/2021	1137	1942737	1549030	2	564.67	566.45	-1.78
MW-20	1/31/2022	1310	1942737	1549030	2	563.58	566.37	-2.79
MW-20	8/1/2022	1492	1942737	1549030	2	564.76	564.97	-0.21
MW-21	10/1/2018	92	1941810	1550270	2	579.96	579.77	0.19
MW-21	3/11/2019	253	1941810	1550270	2	582.1	582.55	-0.45
MW-21	4/1/2019	274	1941810	1550270	2	580.29	582.82	-2.53
MW-21	8/21/2019	416	1941810	1550270	2	575.48	579.62	-4.14
MW-21	9/23/2019	449	1941810	1550270	2	574.42	579.35	-4.93
MW-21	10/21/2019	477	1941810	1550270	2	574.07	579.80	-5.73
MW-21	3/2/2020	610	1941810	1550270	2	581.73	581.97	-0.24
MW-21	3/23/2020	631	1941810	1550270	2	582.43	582.35	0.08
MW-21	6/4/2020	704	1941810	1550270	2	578.71	581.07	-2.36
MW-21	8/11/2020	772	1941810	1550270	2	576.55	580.51	-3.96
MW-21	8/24/2020	785	1941810	1550270	2	577.01	580.40	-3.39
MW-21	9/14/2020	806	1941810	1550270	2	575.57	580.25	-4.68
MW-21	2/8/2021	953	1941810	1550270	2	580.62	579.88	0.74
MW-21	3/10/2021	983	1941810	1550270	2	580.42	580.00	0.42
MW-21	8/11/2021	1137	1941810	1550270	2	576.77	580.14	-3.37
MW-21	1/31/2022	1310	1941810	1550270	2	579.47	578.82	0.65
MW-21	8/1/2022	1492	1941810	1550270	2	577.84	578.62	-0.78
MW-23	10/1/2018	92	1942497	1551641	4	573.94	569.08	4.86
MW-23	3/11/2019	253	1942497	1551641	4	579.87	572.76	7.11
MW-23	4/1/2019	274	1942497	1551641	4	575.42	572.92	2.50
MW-23	8/21/2019	416	1942497	1551641	4	569.42	569.16	0.26
MW-23	9/23/2019	449	1942497	1551641	4	568.61	569.03	-0.42
MW-23	10/21/2019	477	1942497	1551641	4	568.44	568.15	0.29
MW-23	3/2/2020	610	1942497	1551641	4	578.46	571.69	6.77
MW-23	3/23/2020	631	1942497	1551641	4	578.8	571.89	6.91
MW-23	6/4/2020	704	1942497	1551641	4	572.5	570.50	2.00
MW-23	8/11/2020	772	1942497	1551641	4	570.13	569.49	0.64
MW-23	8/24/2020	785	1942497	1551641	4	570.57	569.41	1.16
MW-23	9/14/2020	806	1942497	1551641	4	569.71	569.33	0.38
MW-23	2/8/2021	953	1942497	1551641	4	574.41	568.57	5.84
MW-23	3/10/2021	983	1942497	1551641	4	575.24	568.63	6.61
MW-23	8/11/2021	1137	1942497	1551641	4	571.11	569.65	1.46
MW-23	1/31/2022	1310	1942497	1551641	4	574.09	569.19	4.90
MW-23	8/1/2022	1492	1942497	1551641	4	572.26	568.33	3.93
MW-24D	3/11/2019	253	1940900	1548639	5	573.67	573.26	0.41
MW-24D	4/1/2019	274	1940900	1548639	5	570.67	573.33	-2.66
MW-24D	9/23/2019	449	1940900	1548639	5	567.68	569.34	-1.66
MW-24D	3/2/2020	610	1940900	1548639	5	573.4	572.32	1.08
MW-24D	3/24/2020	632	1940900	1548639	5	572.83	572.43	0.40
MW-24D	8/11/2020	772	1940900	1548639	5	569.4	569.17	0.23
MW-24D	9/14/2020	806	1940900	1548639	5	568.77	569.02	-0.25
MW-24D	2/8/2021	953	1940900	1548639	5	567.31	568.14	-0.83
MW-24D	3/10/2021	983	1940900	1548639	5	568.14	568.15	-0.01
MW-24D	8/11/2021	1137	1940900	1548639	5	567.43	568.16	-0.73
MW-24D	1/31/2022	1310	1940900	1548639	5	565.63	568.22	-2.59
MW-24D	8/1/2022	1492	1940900	1548639	5	567	566.40	0.60

Table 3
Model Targets: Measured and Simulated Groundwater Elevations

Name	Date	Model Days	X (ft)	Y (ft)	Model Layer	Measured Groundwater Elev. (ft)	Simulated Groundwater Elev. (ft)	Residual (ft)
MW-25D	3/11/2019	253	1941162	1548473	5	570.92	572.97	-2.05
MW-25D	4/1/2019	274	1941162	1548473	5	566.96	573.02	-6.06
MW-25D	9/23/2019	449	1941162	1548473	5	564.3	568.87	-4.57
MW-25D	3/2/2020	610	1941162	1548473	5	570.56	572.02	-1.46
MW-25D	3/23/2020	631	1941162	1548473	5	567.39	572.11	-4.72
MW-25D	8/11/2020	772	1941162	1548473	5	565.8	568.72	-2.92
MW-25D	9/14/2020	806	1941162	1548473	5	565.2	568.59	-3.39
MW-25D	2/8/2021	953	1941162	1548473	5	563.61	567.78	-4.17
MW-25D	3/10/2021	983	1941162	1548473	5	564.96	567.79	-2.83
MW-25D	8/11/2021	1137	1941162	1548473	5	565.26	567.86	-2.60
MW-25D	1/31/2022	1310	1941162	1548473	5	562.53	568.07	-5.54
MW-25D	8/1/2022	1492	1941162	1548473	5	565.01	566.15	-1.14
MW-26D	3/11/2019	253	1942222	1548700	5	571.93	572.12	-0.19
MW-26D	4/1/2019	274	1942222	1548700	5	568.28	572.14	-3.86
MW-26D	9/23/2019	449	1942222	1548700	5	565.19	567.51	-2.32
MW-26D	3/2/2020	610	1942222	1548700	5	571.47	571.14	0.33
MW-26D	3/23/2020	631	1942222	1548700	5	568.97	571.19	-2.22
MW-26D	8/11/2020	772	1942222	1548700	5	566.54	567.49	-0.95
MW-26D	9/14/2020	806	1942222	1548700	5	566.06	567.42	-1.36
MW-26D	2/8/2021	953	1942222	1548700	5	565.07	566.77	-1.70
MW-26D	3/10/2021	983	1942222	1548700	5	566.24	566.78	-0.54
MW-26D	8/11/2021	1137	1942222	1548700	5	565.86	567.19	-1.33
MW-26D	1/31/2022	1310	1942222	1548700	5	564.02	567.68	-3.66
MW-26D	8/1/2022	1492	1942222	1548700	5	565.8	565.63	0.17
MW-27D	3/11/2019	253	1942391	1549104	5	577.83	573.20	4.63
MW-27D	4/1/2019	274	1942391	1549104	5	576.58	573.25	3.33
MW-27D	9/23/2019	449	1942391	1549104	5	572.94	569.02	3.92
MW-27D	3/2/2020	610	1942391	1549104	5	577.55	572.23	5.32
MW-27D	3/23/2020	631	1942391	1549104	5	577.08	572.34	4.74
MW-27D	8/11/2020	772	1942391	1549104	5	574.71	568.88	5.83
MW-27D	9/14/2020	806	1942391	1549104	5	574.38	568.75	5.63
MW-27D	2/8/2021	953	1942391	1549104	5	574.92	567.96	6.96
MW-27D	3/10/2021	983	1942391	1549104	5	574.54	567.97	6.57
MW-27D	8/11/2021	1137	1942391	1549104	5	571.86	567.98	3.88
MW-27D	1/31/2022	1310	1942391	1549104	5	572.97	568.09	4.88
MW-27D	8/1/2022	1492	1942391	1549104	5	572.21	566.23	5.98
MW-28D	3/11/2019	253	1942321	1549511	5	575.79	575.04	0.75
MW-28D	4/1/2019	274	1942321	1549511	5	575.2	575.16	0.04
MW-28D	9/23/2019	449	1942321	1549511	5	572.46	571.76	0.70
MW-28D	3/2/2020	610	1942321	1549511	5	575.52	574.12	1.40
MW-28D	3/23/2020	631	1942321	1549511	5	575.85	574.32	1.53
MW-28D	8/11/2020	772	1942321	1549511	5	573.76	571.41	2.35
MW-28D	9/14/2020	806	1942321	1549511	5	573.5	571.17	2.33
MW-28D	2/8/2021	953	1942321	1549511	5	574.6	570.18	4.42
MW-28D	3/10/2021	983	1942321	1549511	5	573.97	570.16	3.81
MW-28D	8/11/2021	1137	1942321	1549511	5	571.74	569.51	2.23
MW-28D	1/31/2022	1310	1942321	1549511	5	573.2	568.95	4.25
MW-28D	8/1/2022	1492	1942321	1549511	5	572.48	567.50	4.98
MW-29	3/11/2019	253	1942634	1549438	2	571.18	573.06	-1.88
MW-29	4/1/2019	274	1942634	1549438	2	569.8	573.20	-3.40
MW-29	9/23/2019	449	1942634	1549438	2	566.06	568.87	-2.81
MW-29	3/2/2020	610	1942634	1549438	2	571.45	571.78	-0.33
MW-29	3/23/2020	631	1942634	1549438	2	571.8	572.12	-0.32
MW-29	6/4/2020	704	1942634	1549438	2	568.57	570.23	-1.66
MW-29	8/11/2020	772	1942634	1549438	2	567.42	569.01	-1.59
MW-29	9/14/2020	806	1942634	1549438	2	567.08	568.76	-1.68
MW-29	2/8/2021	953	1942634	1549438	2	570.58	568.07	2.51
MW-29	3/10/2021	983	1942634	1549438	2	569.72	568.12	1.60
MW-29	8/11/2021	1137	1942634	1549438	2	567.19	568.27	-1.08
MW-29	1/31/2022	1310	1942634	1549438	2	569.46	567.12	2.34
MW-29	8/1/2022	1492	1942634	1549438	2	567.76	566.52	1.24
MW-32	3/2/2020	610	1943021	1551093	4	569.62	571.06	-1.44
MW-32	3/23/2020	631	1943021	1551093	4	567.76	571.19	-3.43
MW-32	6/4/2020	704	1943021	1551093	4	565.57	568.92	-3.35
MW-32	8/11/2020	772	1943021	1551093	4	564.88	567.58	-2.70
MW-32	8/24/2020	785	1943021	1551093	4	565.16	567.52	-2.36
MW-32	9/14/2020	806	1943021	1551093	4	564.66	567.47	-2.81
MW-32	2/8/2021	953	1943021	1551093	4	565.29	566.88	-1.59
MW-32	3/10/2021	983	1943021	1551093	4	565.49	566.97	-1.48
MW-32	8/11/2021	1137	1943021	1551093	4	565.25	568.28	-3.03
MW-32	1/31/2022	1310	1943021	1551093	4	565.14	568.28	-3.14

Table 3
Model Targets: Measured and Simulated Groundwater Elevations

Name	Date	Model Days	X (ft)	Y (ft)	Model Layer	Measured Groundwater Elev. (ft)	Simulated Groundwater Elev. (ft)	Residual (ft)
MW-39	6/4/2020	704	1943089	1551111	3	565.51	568.87	-3.36
MW-39	8/11/2020	772	1943089	1551111	3	565.87	567.50	-1.63
MW-39	8/24/2020	785	1943089	1551111	3	565.12	567.45	-2.33
MW-39	9/14/2020	806	1943089	1551111	3	564.58	567.42	-2.84
MW-39	2/8/2021	953	1943089	1551111	3	565.22	566.87	-1.65
MW-39	3/10/2021	983	1943089	1551111	3	565.43	566.93	-1.50
MW-39	8/11/2021	1137	1943089	1551111	3	565.2	568.24	-3.04
MW-39	1/31/2022	1310	1943089	1551111	3	565.09	568.40	-3.31
MW-39	8/1/2022	1492	1943089	1551111	3	565.32	566.89	-1.57
MW-41	6/4/2020	704	1943196	1551158	2	565.36	569.21	-3.85
MW-41	8/11/2020	772	1943196	1551158	2	564.76	568.99	-4.23
MW-41	8/24/2020	785	1943196	1551158	2	565	568.92	-3.92
MW-41	9/14/2020	806	1943196	1551158	2	564.46	568.83	-4.37
MW-41	2/8/2021	953	1943196	1551158	2	565.05	568.43	-3.38
MW-41	3/10/2021	983	1943196	1551158	2	565.26	568.29	-3.03
MW-41	8/11/2021	1137	1943196	1551158	2	565.04	568.89	-3.85
MW-41	1/31/2022	1310	1943196	1551158	2	564.94	568.38	-3.44
MW-41	8/1/2022	1492	1943196	1551158	2	565.2	567.92	-2.72
MW-46D	9/14/2020	806	1942929	1551056	5	564.67	567.61	-2.94
MW-46D	2/8/2021	953	1942929	1551056	5	565.3	567.04	-1.74
MW-46D	3/10/2021	983	1942929	1551056	5	565.81	567.09	-1.28
MW-46D	8/11/2021	1137	1942929	1551056	5	565.23	568.34	-3.11
MW-46D	1/31/2022	1310	1942929	1551056	5	565.36	568.53	-3.17
MW-46D	8/1/2022	1492	1942929	1551056	5	565.5	566.99	-1.49
MW-5	10/1/2018	92	1942449	1548436	2	564.95	566.13	-1.18
MW-5	3/11/2019	253	1942449	1548436	2	570.03	570.80	-0.77
MW-5	4/1/2019	274	1942449	1548436	2	565.87	570.81	-4.94
MW-5	9/23/2019	449	1942449	1548436	2	562.92	565.64	-2.72
MW-5	3/2/2020	610	1942449	1548436	2	569.72	569.74	-0.02
MW-5	3/23/2020	631	1942449	1548436	2	566.82	569.77	-2.95
MW-5	8/11/2020	772	1942449	1548436	2	564.23	565.89	-1.66
MW-5	9/14/2020	806	1942449	1548436	2	563.8	565.84	-2.04
MW-5	2/8/2021	953	1942449	1548436	2	562.69	565.32	-2.63
MW-5	3/10/2021	983	1942449	1548436	2	564.24	565.35	-1.11
MW-5	8/11/2021	1137	1942449	1548436	2	564.37	566.29	-1.92
MW-5	1/31/2022	1310	1942449	1548436	2	562.19	566.80	-4.61
MW-5	8/1/2022	1492	1942449	1548436	2	564.31	564.88	-0.57
MW-6	10/1/2018	92	1941689	1548383	2	565.9	567.99	-2.09
MW-6	3/11/2019	253	1941689	1548383	2	571.31	572.11	-0.80
MW-6	4/1/2019	274	1941689	1548383	2	566.54	572.14	-5.60
MW-6	9/23/2019	449	1941689	1548383	2	563.62	567.59	-3.97
MW-6	3/2/2020	610	1941689	1548383	2	570.88	571.13	-0.25
MW-6	3/23/2020	631	1941689	1548383	2	567.59	571.19	-3.60
MW-6	8/11/2020	772	1941689	1548383	2	565.04	567.57	-2.53
MW-6	9/14/2020	806	1941689	1548383	2	564.54	567.48	-2.94
MW-6	2/8/2021	953	1941689	1548383	2	563.06	566.81	-3.75
MW-6	3/10/2021	983	1941689	1548383	2	564.65	566.82	-2.17
MW-6	8/11/2021	1137	1941689	1548383	2	564.82	567.17	-2.35
MW-6	1/31/2022	1310	1941689	1548383	2	562.25	567.59	-5.34
MW-6	8/1/2022	1492	1941689	1548383	2	565.01	565.59	-0.58
MW-7	10/1/2018	92	1941087	1548230	2	564.84	567.54	-2.70
MW-7	3/11/2019	253	1941087	1548230	2	569.76	571.71	-1.95
MW-7	4/1/2019	274	1941087	1548230	2	565.71	571.76	-6.05
MW-7	9/23/2019	449	1941087	1548230	2	563.15	567.15	-4.00
MW-7	3/2/2020	610	1941087	1548230	2	569.23	570.69	-1.46
MW-7	3/23/2020	631	1941087	1548230	2	565.73	570.77	-5.04
MW-7	8/11/2020	772	1941087	1548230	2	564.44	567.24	-2.80
MW-7	9/14/2020	806	1941087	1548230	2	563.832	567.12	-3.29
MW-7	2/8/2021	953	1941087	1548230	2	561.942	566.42	-4.47
MW-7	3/10/2021	983	1941087	1548230	2	563.662	566.45	-2.79
MW-7	8/11/2021	1137	1941087	1548230	2	564.532	566.98	-2.45
MW-7	1/31/2022	1310	1941087	1548230	2	561.092	567.11	-6.02
MW-7	8/1/2022	1492	1941087	1548230	2	564.162	565.39	-1.23
PMW-01	3/11/2019	253	1940932	1549039	1	584.89	583.95	0.94
PMW-01	4/1/2019	274	1940932	1549039	1	584.81	583.97	0.84
PMW-01	3/24/2020	632	1940932	1549039	1	585.24	583.89	1.35
PMW-01	8/11/2020	772	1940932	1549039	1	585.24	577.75	7.49
PMW-02	3/11/2019	253	1941677	1549574	1	584.69	584.11	0.58
PMW-02	4/1/2019	274	1941677	1549574	1	584.51	584.13	0.38
PMW-02	3/24/2020	632	1941677	1549574	1	584.87	584.06	0.81
PMW-02	8/11/2020	772	1941677	1549574	1	584.87	579.61	5.26

Table 4
Post-Closure Model Stress Periods

Stress Period Number	Quarter	Period Length	No. Time Steps	Time Step Multiplier
1	Q4 2022	92	1	1.1
2	Q1 2023	90	6	1.2
3	Q2 2023	91	6	1.2
4	Q3 2023	92	6	1.2
5	Q4 2023	92	6	1.2
6	Q1 2024	91	6	1.2
7	Q2 2024	91	6	1.2
8	Q3 2024	92	6	1.2
9	Q4 2024	92	6	1.2
10	Q1 2025	90	6	1.2
11	Q2 2025	91	6	1.2
12	Q3 2025	92	6	1.2
13	Q4 2025	92	6	1.2
14	Q1 2026	90	6	1.2
15	Q2 2026	91	6	1.2
16	Q3 2026	92	6	1.2
17	Q4 2026	92	6	1.2
18	Q1 2027	90	6	1.2
19	Q2 2027	91	6	1.2
20	Q3 2027	92	6	1.2
21	Q4 2027	92	6	1.2
22	Q1 2028	91	6	1.2
23	Q2 2028	91	6	1.2
24	Q3 2028	92	6	1.2
25	Q4 2028	92	6	1.2
26	Q1 2029	90	6	1.2
27	Q2 2029	91	6	1.2
28	Q3 2029	92	6	1.2
29	Q4 2029	92	6	1.2
30	Q1 2030	90	6	1.2
31	Q2 2030	91	6	1.2
32	Q3 2030	92	6	1.2
33	Q4 2030	92	6	1.2
34	Q1 2031	90	6	1.2
35	Q2 2031	91	6	1.2
36	Q3 2031	92	6	1.2
37	Q4 2031	92	6	1.2
38	Q1 2032	91	6	1.2
39	Q2 2032	91	6	1.2
40	Q3 2032	92	6	1.2
41	Q4 2032	92	6	1.2
42	Q1 2033	90	6	1.2
43	Q2 2033	91	6	1.2
44	Q3 2033	92	6	1.2
45	Q4 2033	92	6	1.2

Table 4
Post-Closure Model Stress Periods

Stress Period Number	Quarter	Period Length	No. Time Steps	Time Step Multiplier
46	Q1 2034	90	6	1.2
47	Q2 2034	5	5	1.2
48	Q2 2034	86	6	1.2
49	Q3 2034	92	6	1.2
50	Q4 2034	92	6	1.2
51	Q1 2035	90	6	1.2
52	Q2 2035	91	6	1.2
53	Q3 2035	92	6	1.2
54	Q4 2035	92	6	1.2
55	Q1 2036	91	6	1.2
56	Q2 2036	91	6	1.2
57	Q3 2036	92	6	1.2
58	Q4 2036	92	6	1.2
59	Q1 2037	90	6	1.2
60	Q2 2037	91	6	1.2
61	Q3 2037	92	6	1.2
62	Q4 2037	92	6	1.2
63	Q1 2038	90	6	1.2
64	Q2 2038	91	6	1.2
65	Q3 2038	92	6	1.2
66	Q4 2038	92	6	1.2
67	Q1 2039	90	6	1.2
68	Q2 2039	91	6	1.2
69	Q3 2039	92	6	1.2
70	Q4 2039	92	6	1.2
71	Q1 2040	91	6	1.2
72	Q2 2040	91	6	1.2
73	Q3 2040	92	6	1.2
74	Q4 2040	92	6	1.2
75	Q1 2041	90	6	1.2
76	Q2 2041	91	6	1.2
77	Q3 2041	92	6	1.2
78	Q4 2041	92	6	1.2
79	Q1 2042	90	6	1.2
80	Q2 2042	91	6	1.2
81	Q3 2042	92	6	1.2
82	Q4 2042	92	6	1.2
83	Q1 2043	90	6	1.2
84	Q2 2043	91	6	1.2
85	Q3 2043	92	6	1.2
86	Q4 2043	92	6	1.2
87	Q1 2044	91	6	1.2
88	Q2 2044	91	6	1.2
89	Q3 2044	92	6	1.2
90	Q4 2044	92	6	1.2

Table 4
Post-Closure Model Stress Periods

Stress Period Number	Quarter	Period Length	No. Time Steps	Time Step Multiplier
91	Q1 2045	90	6	1.2
92	Q2 2045	91	6	1.2
93	Q3 2045	92	6	1.2
94	Q4 2045	92	6	1.2
95	Q1 2046	90	6	1.2
96	Q2 2046	91	6	1.2
97	Q3 2046	92	6	1.2
98	Q4 2046	92	6	1.2
99	Q1 2047	90	6	1.2
100	Q2 2047	91	6	1.2
101	Q3 2047	92	6	1.2
102	Q4 2047	92	6	1.2
103	Q1 2048	91	6	1.2
104	Q2 2048	91	6	1.2
105	Q3 2048	92	6	1.2
106	Q4 2048	92	6	1.2
107	Q1 2049	90	6	1.2
108	Q2 2049	91	6	1.2
109	Q3 2049	92	6	1.2
110	Q4 2049	92	6	1.2
111	Q1 2050	90	6	1.2
112	Q2 2050	91	6	1.2
113	Q3 2050	92	6	1.2
114	Q4 2050	92	6	1.2
115	Q1 2051	90	6	1.2
116	Q2 2051	91	6	1.2
117	Q3 2051	92	6	1.2
118	Q4 2051	92	6	1.2
119	Q1 2052	91	6	1.2
120	Q2 2052	91	6	1.2
121	Q3 2052	92	6	1.2

Table 5
Post-Closure Model Recharge

Quarter	30 Year Average Quarterly Precipitation (ft)	30 Year Average Quarterly Precipitation (ft/d)	Recharge: Zone 1 (ft/d)	Recharge Percentage: Zone 1 (%)	Recharge: Zone 2 (ft/d)	Recharge Percentage: Zone 2 (%)	Recharge: Zone 3 (ft/d)	Recharge Percentage: Zone 3 (%)
Q1	1.34	1.49E-02	3.00E-07	0.00	7.44E-05	0.50	1.49E-04	1
Q2	1.11	1.22E-02	3.00E-07	0.00	6.11E-05	0.50	1.22E-04	1
Q3	1.05	1.14E-02	3.00E-07	0.00	5.70E-05	0.50	1.14E-04	1
Q4	1.12	1.21E-02	3.00E-07	0.00	6.06E-05	0.50	1.21E-04	1

Notes:
1. ft/d = feet per day
2. The quarterly values presented above are repeated annually for the duration of the model.

Table 5
Post-Closure Model Recharge

Quarter	Recharge: Zone 4 (ft/d)	Recharge Percentage: Zone 4 (%)	Recharge: Zone 5 (ft/d)	Recharge Percentage: Zone 5 (%)	Recharge: Zone 6 (ft/d)	Recharge Percentage: Zone 6 (%)	Recharge: Zone 7 (ft/d)	Recharge Percentage: Zone 7 (%)	Recharge: Zone 8 (ft/d)	Recharge Percentage: Zone 8 (%)
Q1	2.23E-03	15	1.79E-03	12	3.57E-03	24	2.23E-02	150	1.64E-02	110
Q2	1.83E-03	15	1.47E-03	12	2.93E-03	24	1.83E-02	150	1.34E-02	110
Q3	1.71E-03	15	1.37E-03	12	2.74E-03	24	1.71E-02	150	1.26E-02	110
Q4	1.82E-03	15	1.46E-03	12	2.91E-03	24	1.82E-02	150	1.33E-02	110

Table 5
Post-Closure Model Recharge

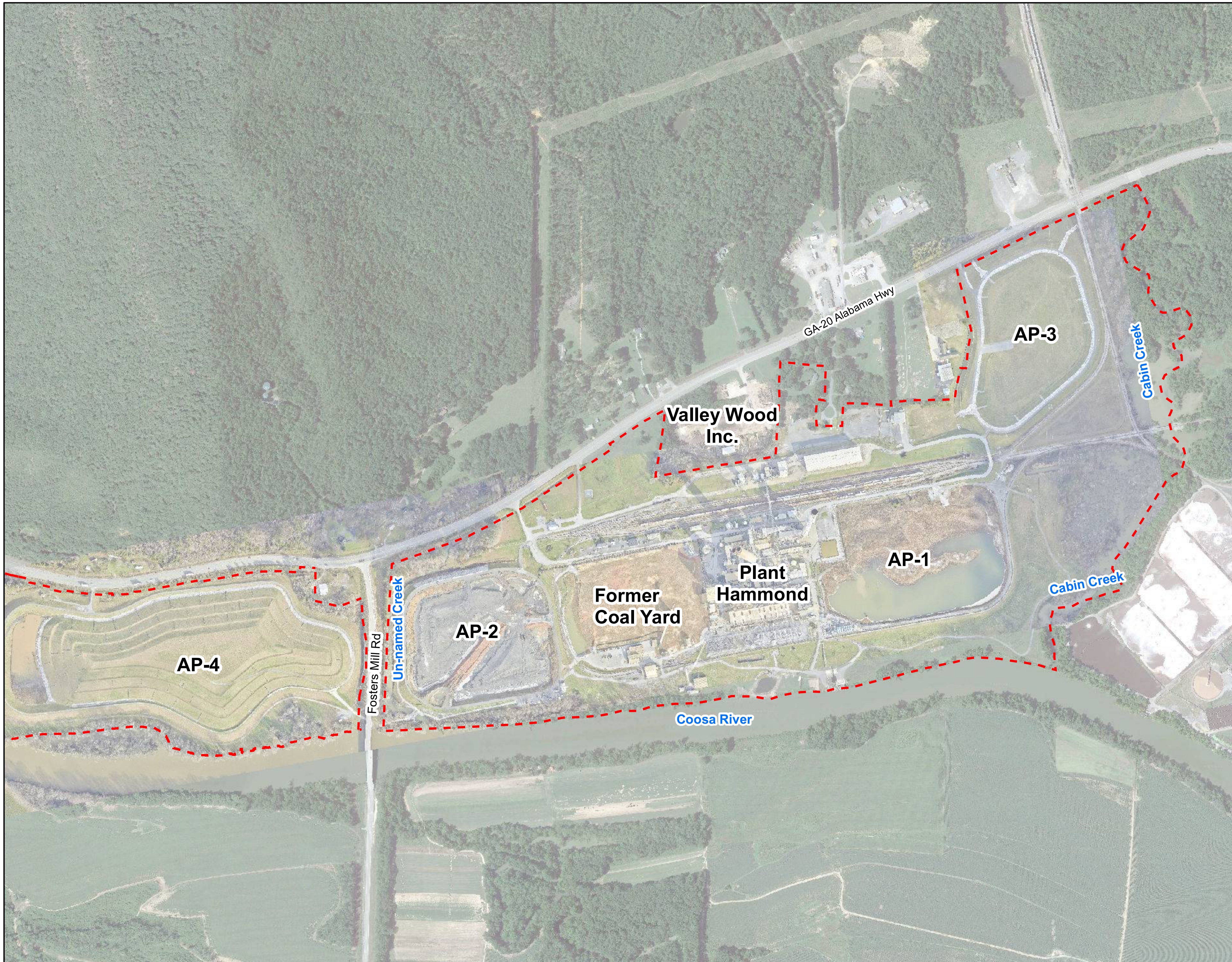
Quarter	Recharge: Zone 9 (ft/d)	Recharge Percentage: Zone 9 (%)	Recharge: Zone 10 (ft/d)	Recharge Percentage: Zone 10 (%)	Recharge: Zone 11 (ft/d)	Recharge Percentage: Zone 11 (%)
Q1	1.49E-04	1	8.93E-04	6	1.34E-03	9
Q2	1.22E-04	1	7.33E-04	6	1.10E-03	9
Q3	1.14E-04	1	6.85E-04	6	1.03E-03	9
Q4	1.21E-04	1	7.28E-04	6	1.09E-03	9

Table 6
Post-Closure Model Evapotranspiration

Quarter	ET: Zone 1 (ft/d)	ET: Zone 2 (ft/d)	ET: Zone 3 (ft/d)	ET: Zone 4 (ft/d)	ET: Zone 5 (ft/d)	ET: Zone 6 (ft/d)	ET: Zone 7 (ft/d)	ET: Zone 8 (ft/d)	ET: Zone 9 (ft/d)	ET: Zone 10 (ft/d)	ET: Zone 11 (ft/d)
Q1	0	1.59E-04	0	1.59E-04	1.59E-03	6.17E-04	1.59E-04	1.59E-04	4.18E-03	1.59E-03	1.59E-04
Q2	0	5.41E-04	0	5.41E-04	5.41E-03	9.52E-03	5.41E-04	5.41E-04	1.42E-02	5.41E-03	5.41E-04
Q3	0	5.43E-04	0	5.43E-04	5.43E-03	1.12E-02	5.43E-04	5.43E-04	1.42E-02	5.43E-03	5.43E-04
Q4	0	1.30E-04	0	1.30E-04	1.30E-03	1.67E-03	1.30E-04	1.30E-04	3.41E-03	1.30E-03	1.30E-04

Notes:
1. ET = Evapotranspiration
2. ft/d = feet per day.
3. Quarterly values repeat annually throughout the duration of the model.

FIGURES



N

LEGEND

Plant Hammond Property Boundary

Note:
1. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 450 900 1,800

SCALE IN FEET

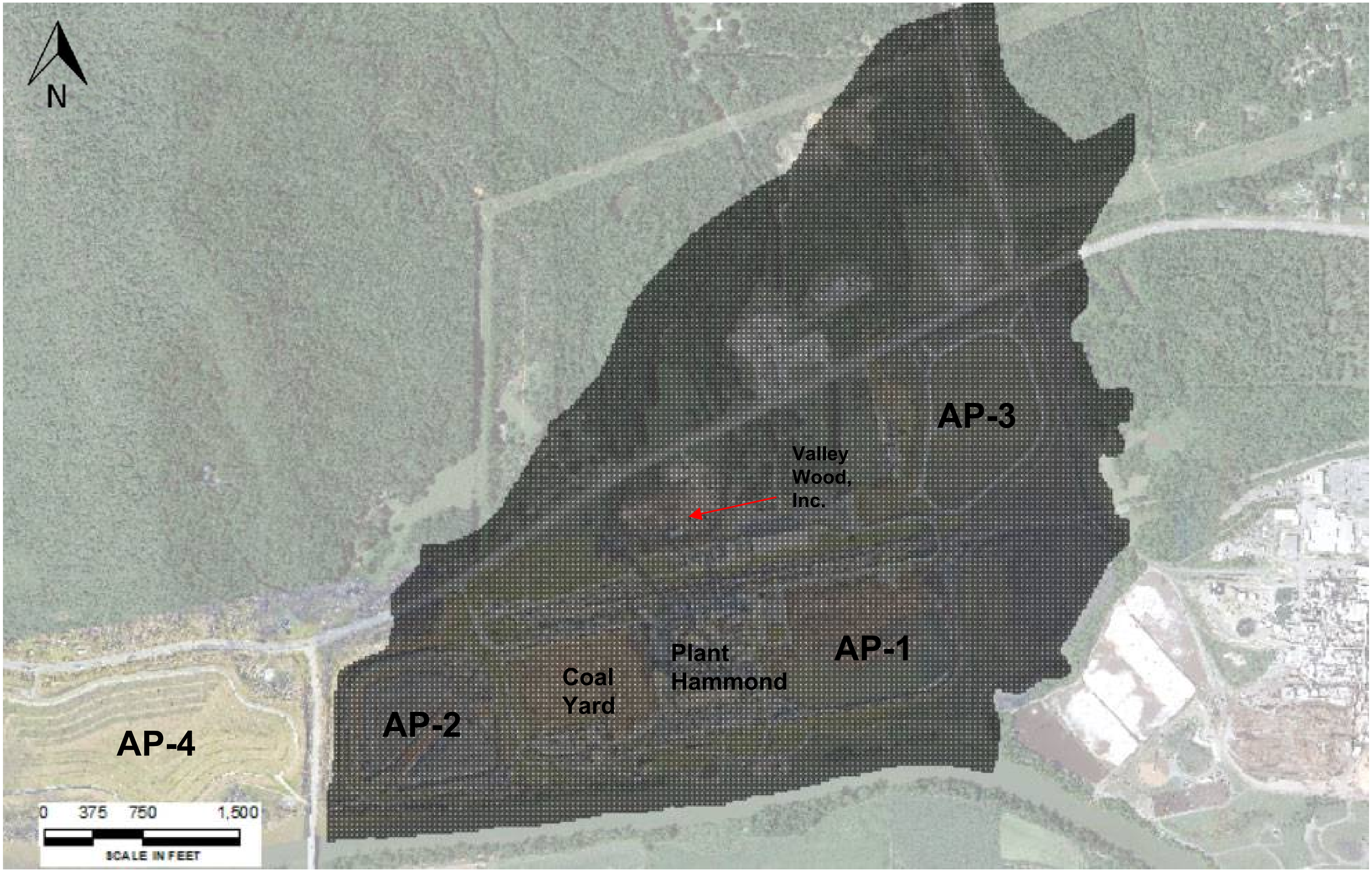
SITE MAP

GEORGIA POWER COMPANY
PLANT HAMMOND
ROME, FLOYD COUNTY, GEORGIA

Geosyntec consultants

FIGURE 1

KENNESAW, GA | FEBRUARY 2023

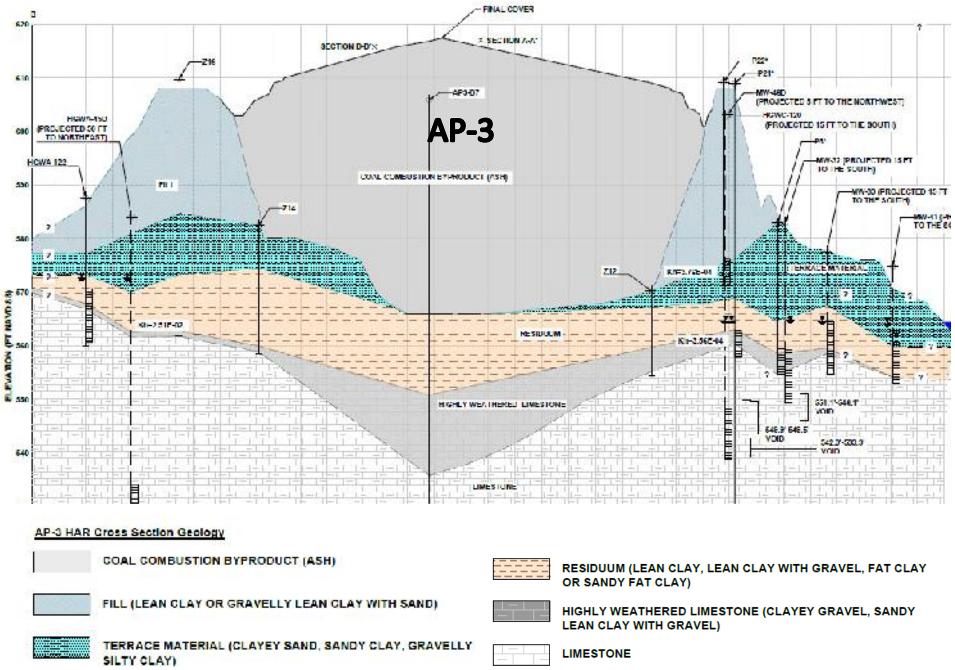


Notes

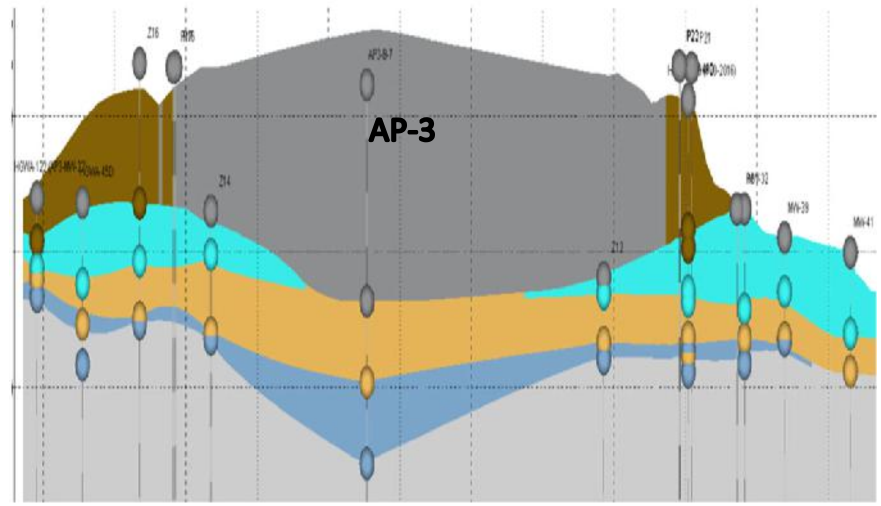
1. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

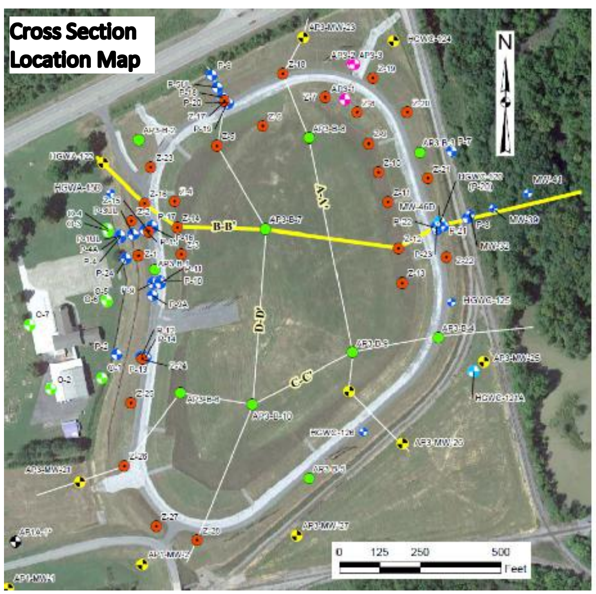
Model Grid Plant Hammond Rome, Floyd County, Georgia		Geosyntec consultants	Figure **2**
Kennesaw, GA	February 2023		

HAR AP-3 Cross Section B



Model Layering Along Cross Section B Line





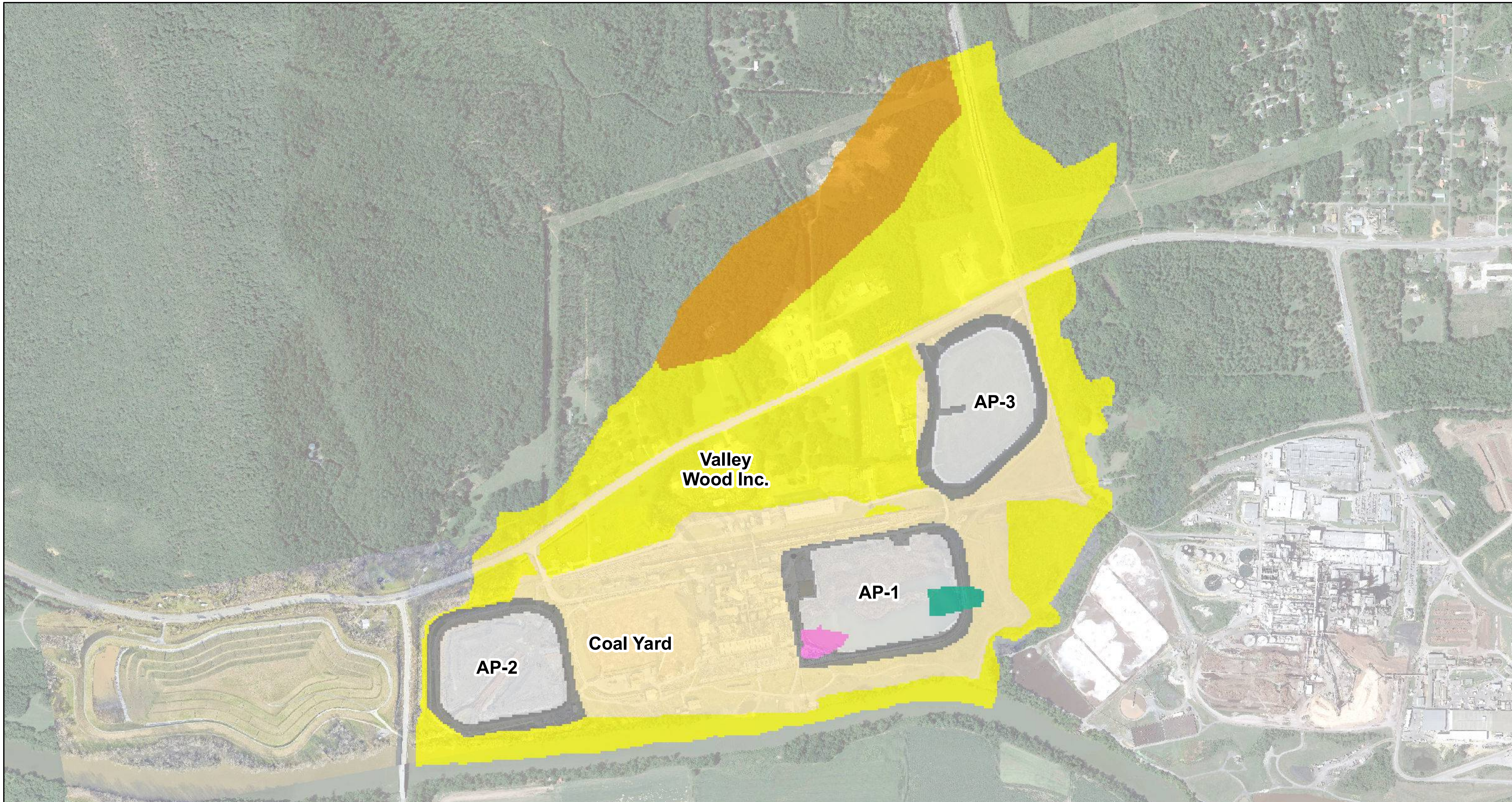
Model Layers

- CCR (Layer 1)
- Fill/Dike (Layer 1)
- Alluvium (Layer 2)
- Residuum (Layer 3)
- HWR (Layer 4)
- Bedrock (Layer 5 & 6)

Notes

1. AP-3 Cross Section B-B' is from AP-3 HAR (Geosyntec, 2020d).
2. Model layering shown above extracted from the model along the HAR cross section B-B' Line.
3. Minor differences between layering in the HAR cross section vs the Model cross section is due to resurveying of wells, and updated interpretation of geology.
4. Colored spheres/nodes shown on the model layering cross section represent geologic contacts from boring data, and are shown for reference.

Model Layering Plant Hammond Rome, Floyd County, Georgia	Geosyntec consultants	Figure
Kennesaw, GA	February 2023	**3**



Legend Kh, Kv in ft/d

- 1.42, 0.142 - CCR
- 0.025, 0.0025 - Dike
- 0.029, 0.005 - Fill
- 5.2, 1.66 - Alluvium
- 0.1, 0.01 - Residuum
- 5, 0.5
- 10, 1

Notes:
1. Kh = Horizontal Hydraulic Conductivity.
2. Kv = Vertical Hydraulic Conductivity.
3. ft/d = feet per day.
4. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 1,000 2,000 4,000 Feet

N

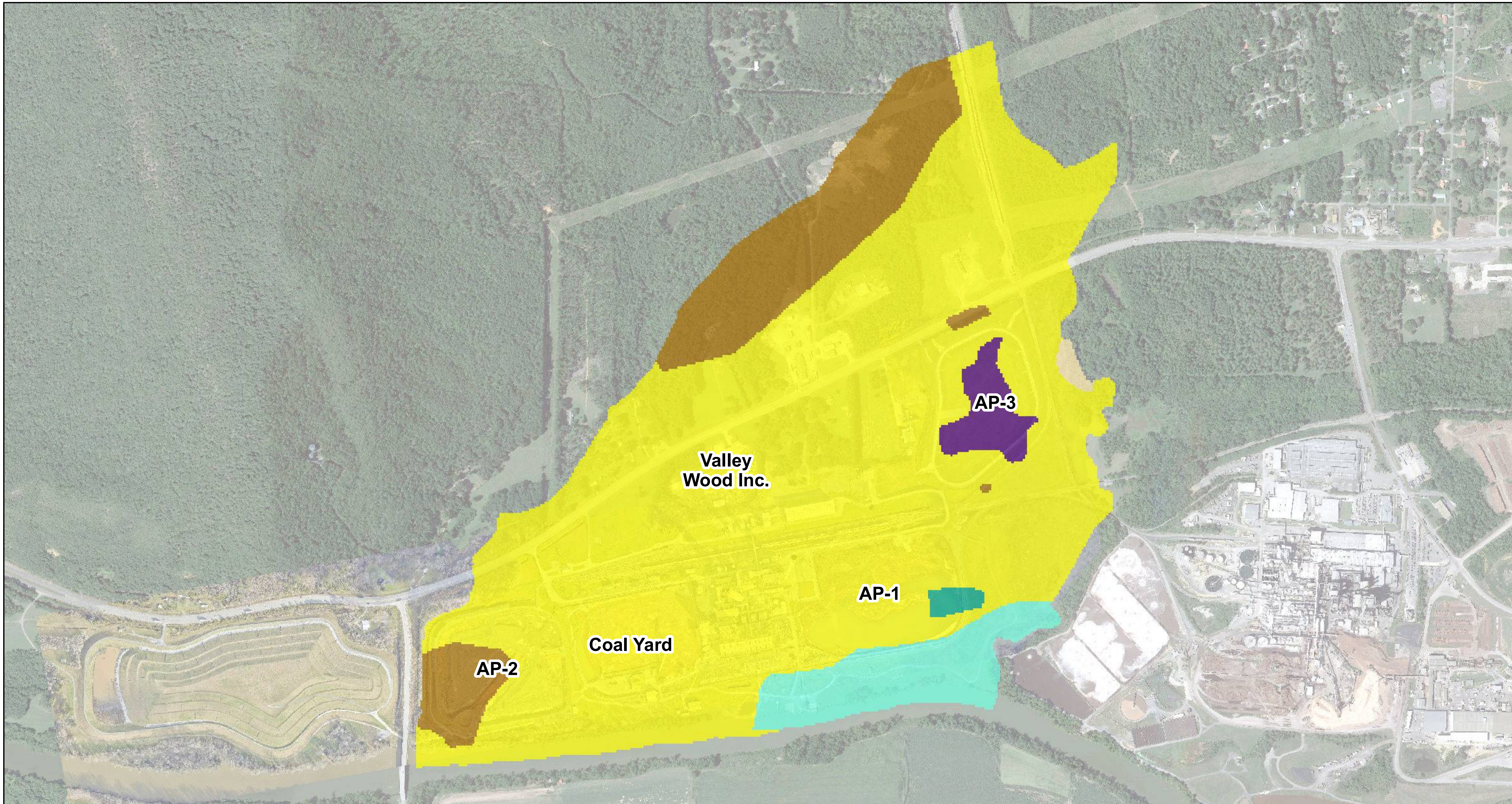
Model Layer 1 Hydraulic Conductivity (CCR, Fill, Alluvium, Residuum)

Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure 4



Legend Kh, Kv in ft/d

- 5.2, 1.66 - Alluvium
- 0.029, 0.005 - Alluvium
- 5, 0.5 - Alluvium
- 26, 5 - Alluvium
- 0.1, 0.01 - Alluvium or Residuum
- 0.1, 0.002 - Residuum

Notes:
1. Kh = Horizontal Hydraulic Conductivity.
2. Kv = Vertical Hydraulic Conductivity.
3. ft/d = feet per day.
4. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 1,000 2,000 4,000 Feet

N

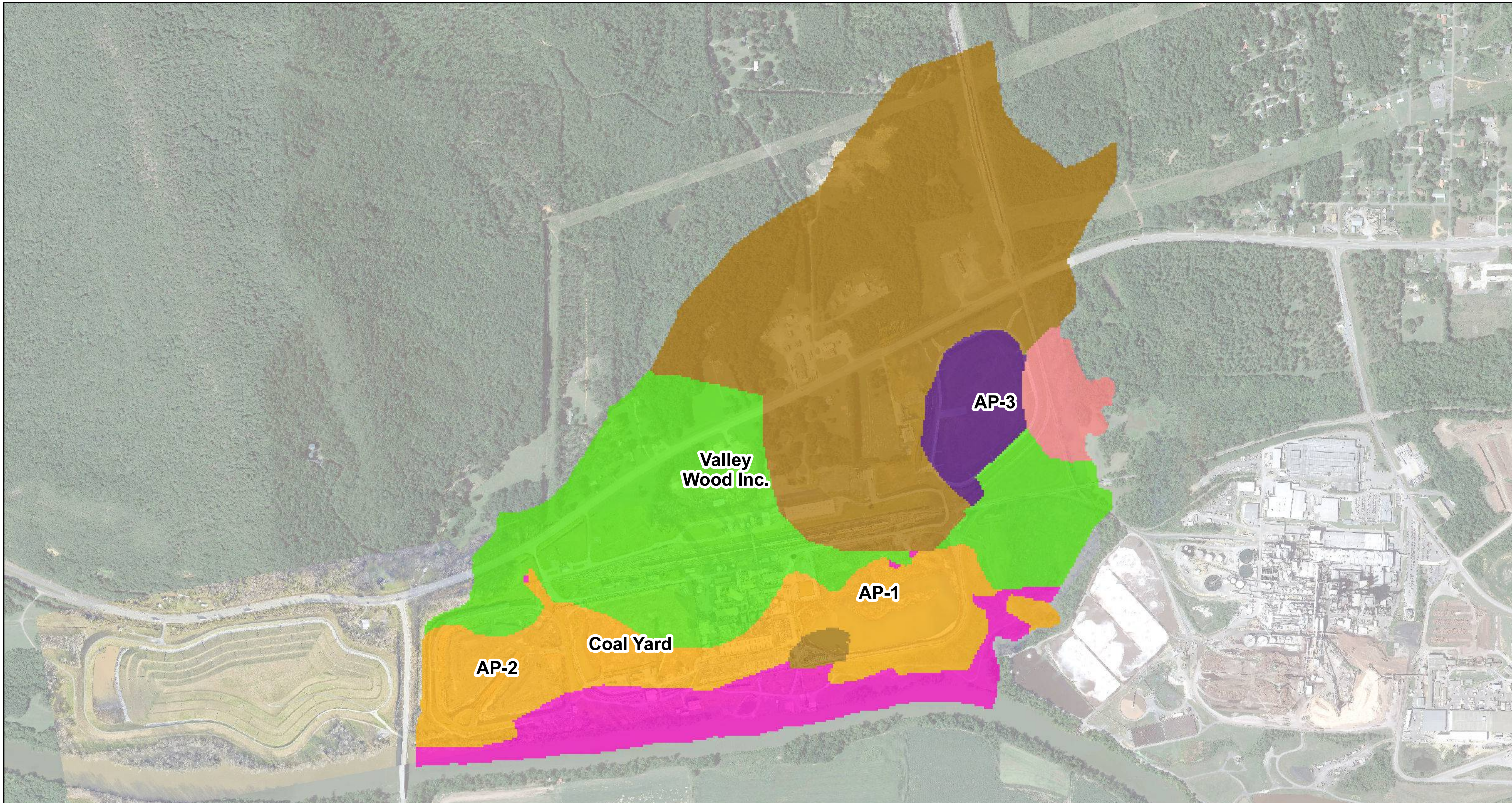
Model Layer 2 Hydraulic Conductivity (Alluvium & Residuum)

Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure 5



Legend Kh, Kv in ft/d

- 0.1, 0.01 - Residuum
- 64, 6.4 - Residuum
- 0.1, 0.002 - Residuum
- 6, 2 - Residuum
- 9.6, 0.96 - HWR
- 9.5, 0.95 - HWR

Notes:
1. Kh = Horizontal Hydraulic Conductivity.
2. Kv = Vertical Hydraulic Conductivity.
3. ft/d = feet per day.
4. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

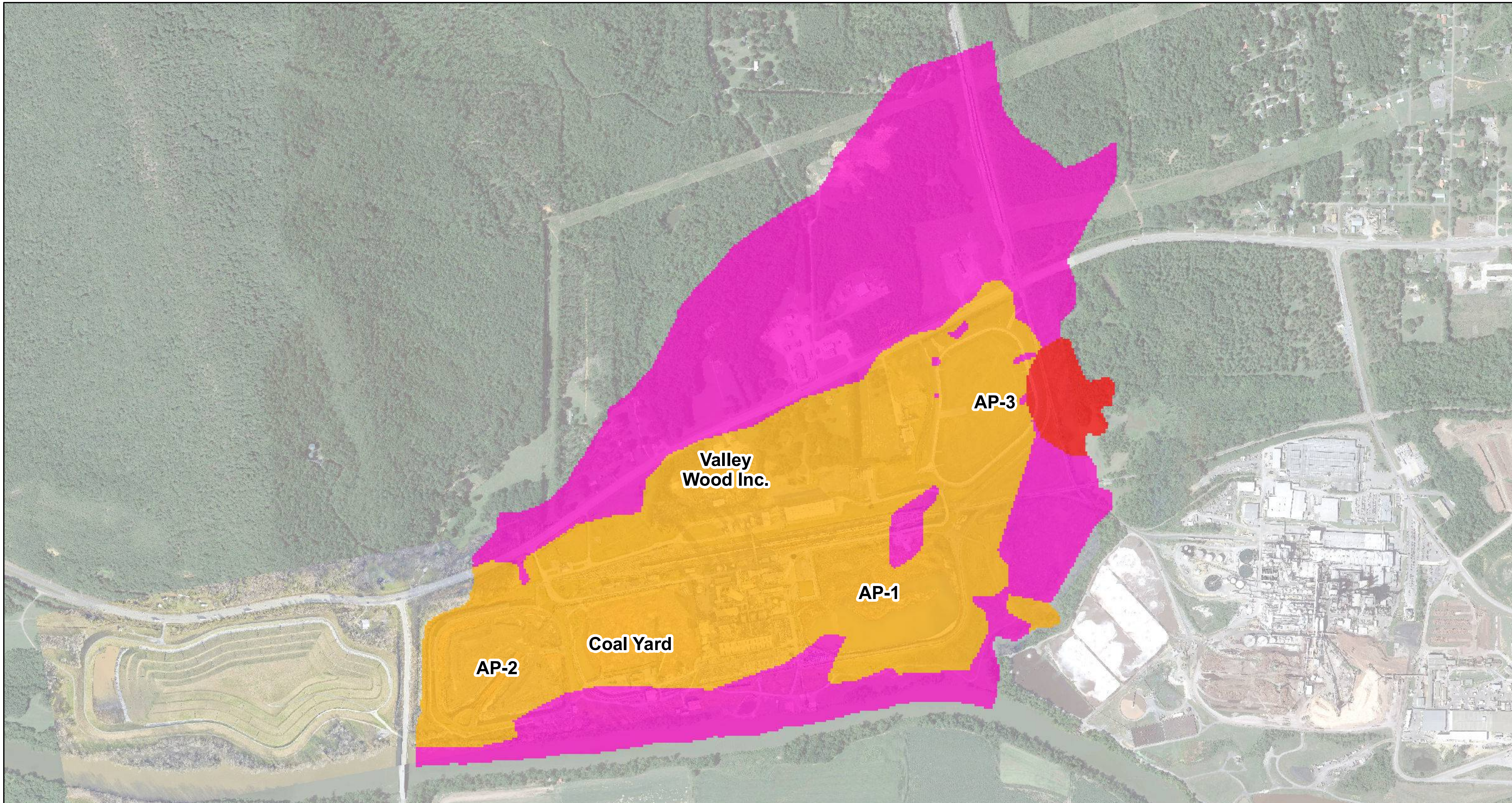
Model Layer 3 Hydraulic Conductivity (Residuum & HWR)

Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure 6



Legend Kh, Kv in ft/d

- 9.5, 0.95 - HWR
- 9.6, 0.96 - HWR
- 28, 4 - HWR

Notes:
1. Kh = Horizontal Hydraulic Conductivity.
2. Kv = Vertical Hydraulic Conductivity.
3. ft/d = feet per day.
4. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 1,000 2,000 4,000 Feet

N

Model Layer 4 Hydraulic Conductivity (HWR)

Plant Hammond
Rome, Floyd County, Georgia

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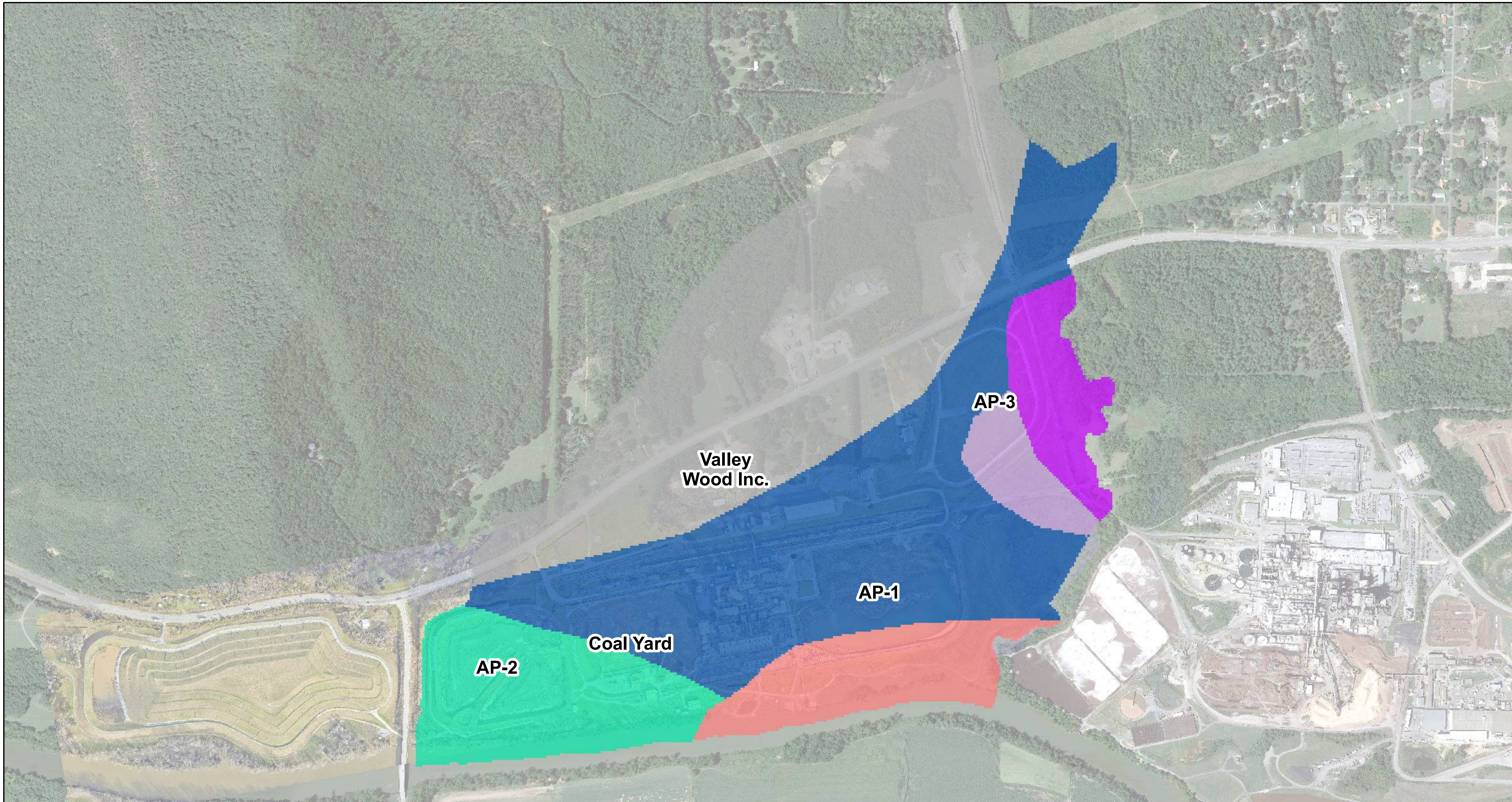
Kennesaw, GA | February 2023

Figure

7



Legend Kh, Kv in ft/d

- 0.1, 0.01 - Limestone
- 9.5, 0.95 - Limestone
- 20, 3 - Limestone
- 64, 6.4 - Limestone
- 1.5, 0.15 - Shale
- 0.9, 0.2 - MDu

Notes:
1. Kh = Horizontal Hydraulic Conductivity.
2. Kv = Vertical Hydraulic Conductivity.
3. ft/d = feet per day.
4. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 1,000 2,000 4,000 Feet

N

Model Layer 5 Hydraulic Conductivity (Upper Bedrock)

Plant Hammond
Rome, Floyd County, Georgia

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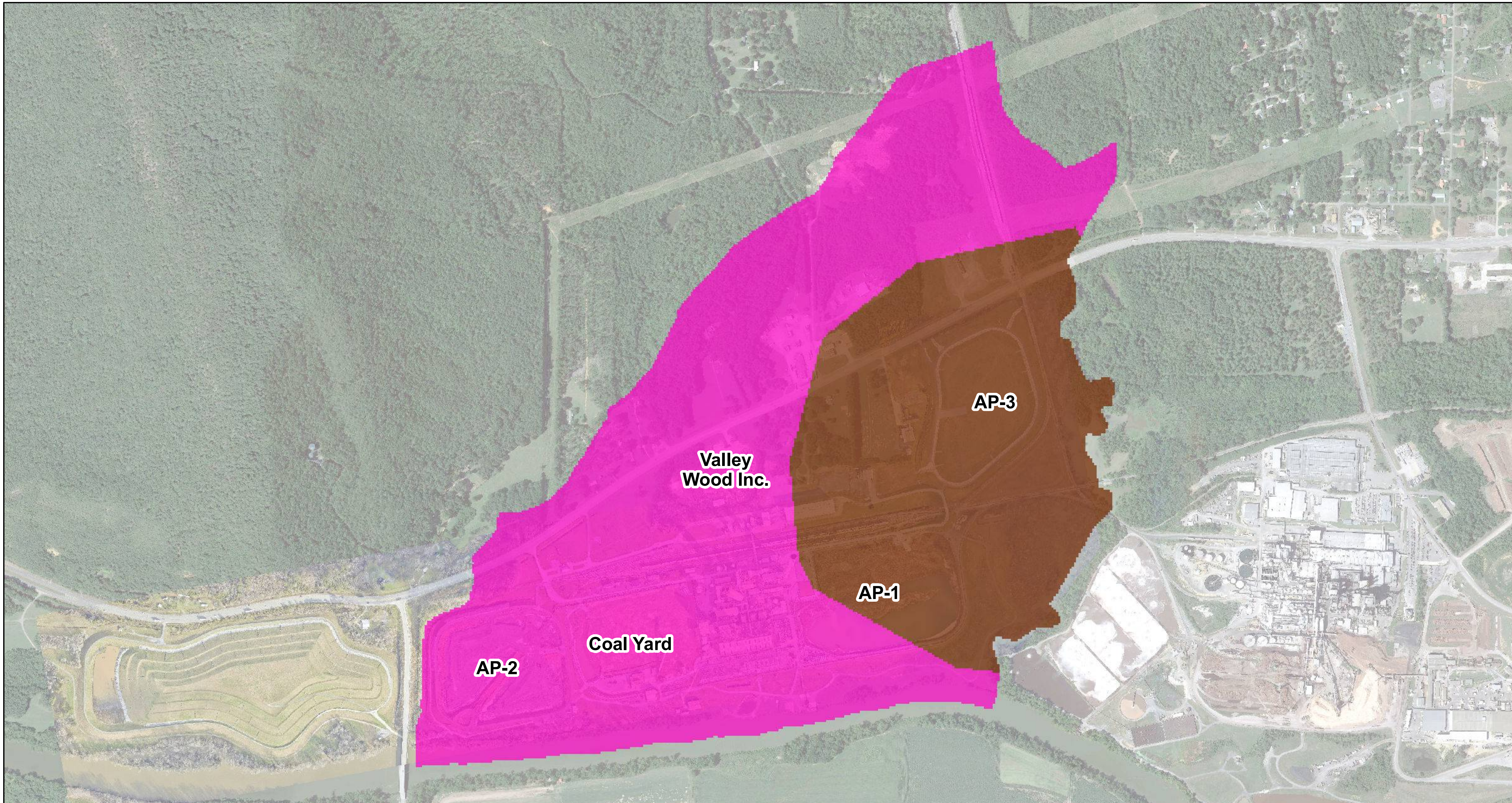
Kennesaw, GA | February 2023

Figure 8



Legend Kh, Kv in ft/d

- 0.1, 0.01 - MDu
- 9.5, 0.95 - MDu

Notes:
1. Kh = Horizontal Hydraulic Conductivity.
2. Kv = Vertical Hydraulic Conductivity.
3. ft/d = feet per day.
4. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

Model Layer 6 Hydraulic Conductivity (MDu)

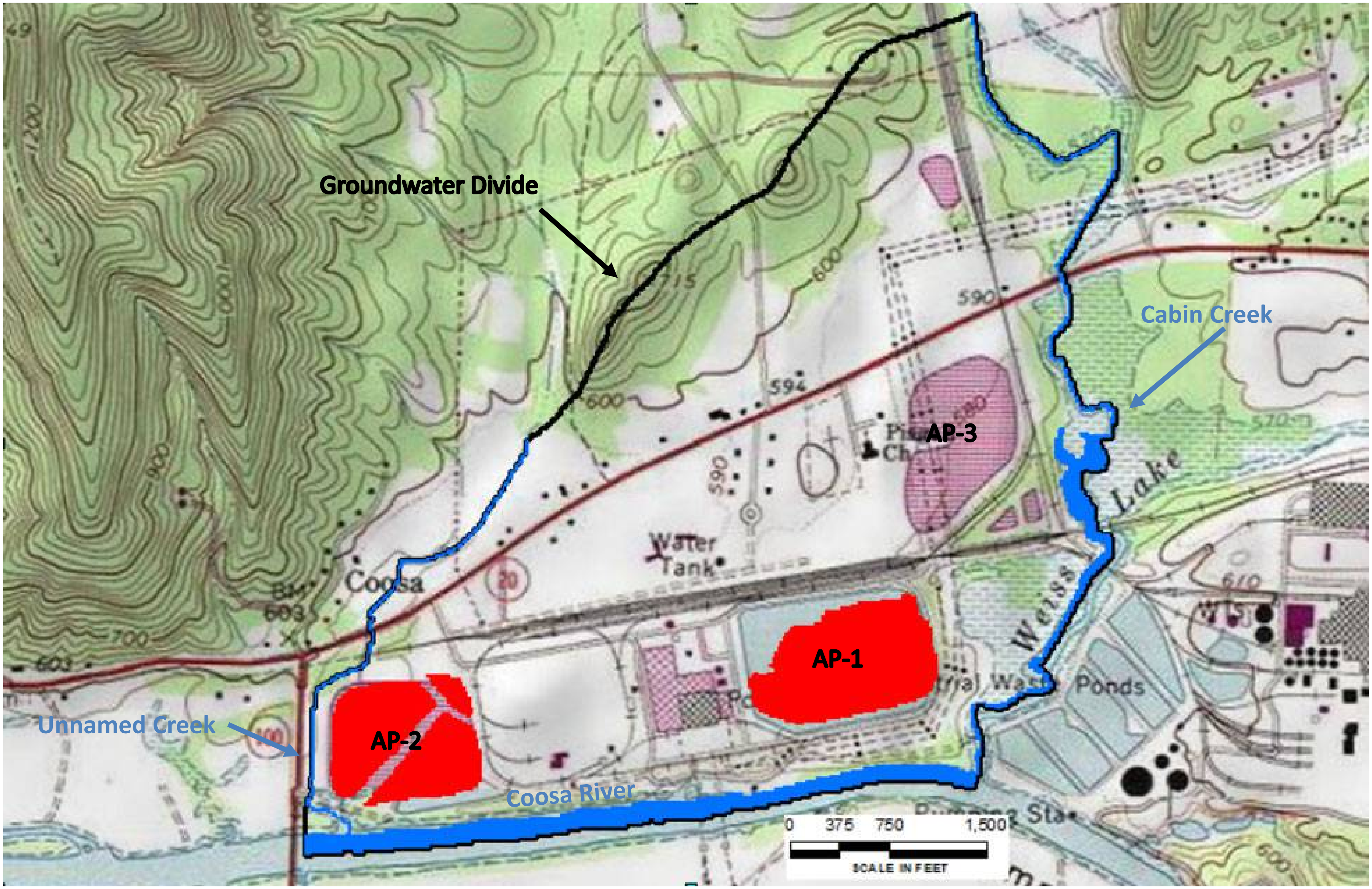
Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure

9



Notes
1. Topographic map from http://services.arcgisonline.com

Boundary Condition (MODFLOW Package)
Zero Flux Boundary (Basic Package)
Head Dependent Flux Boundary (River Package)
Head Dependent Flux Boundary (General Head Boundary Package)

Model Boundary Conditions
Plant Hammond
Rome, Floyd County, Georgia

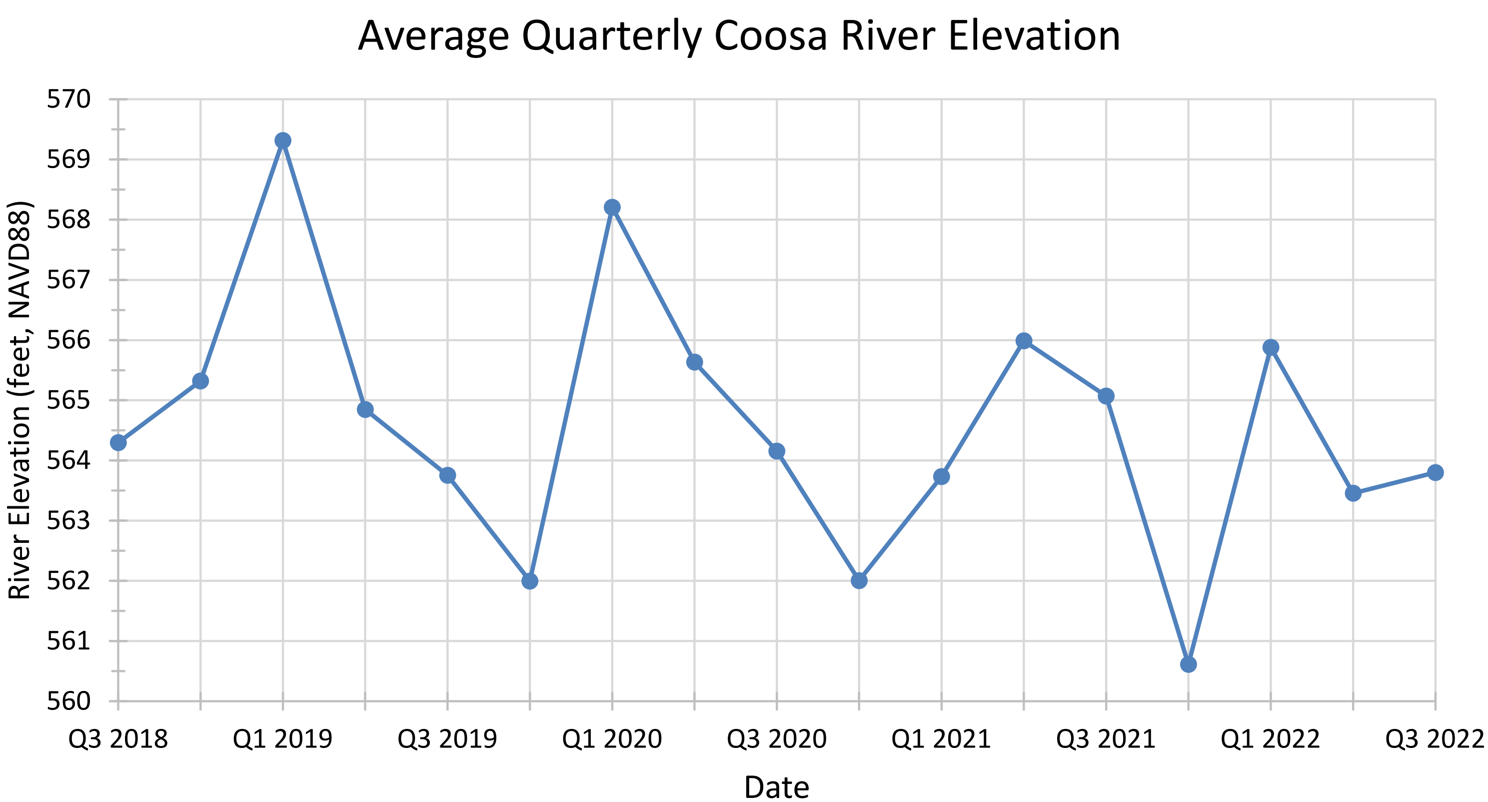
Geosyntec consultants

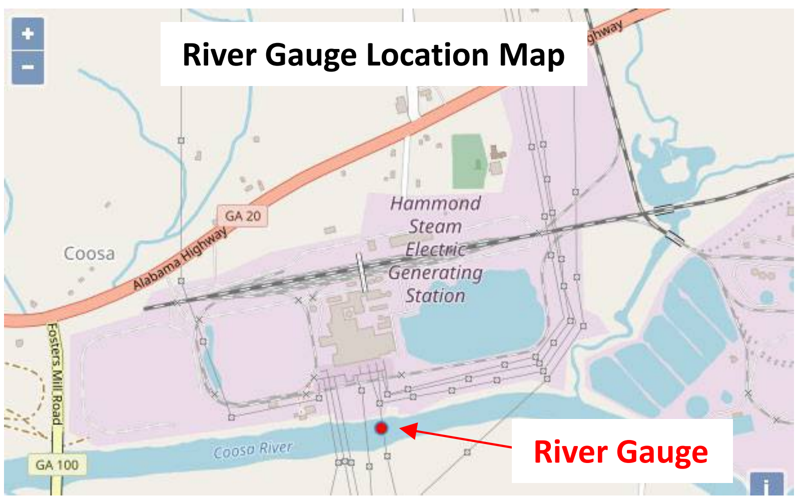
Kennesaw, GA

February 2023

Figure

10

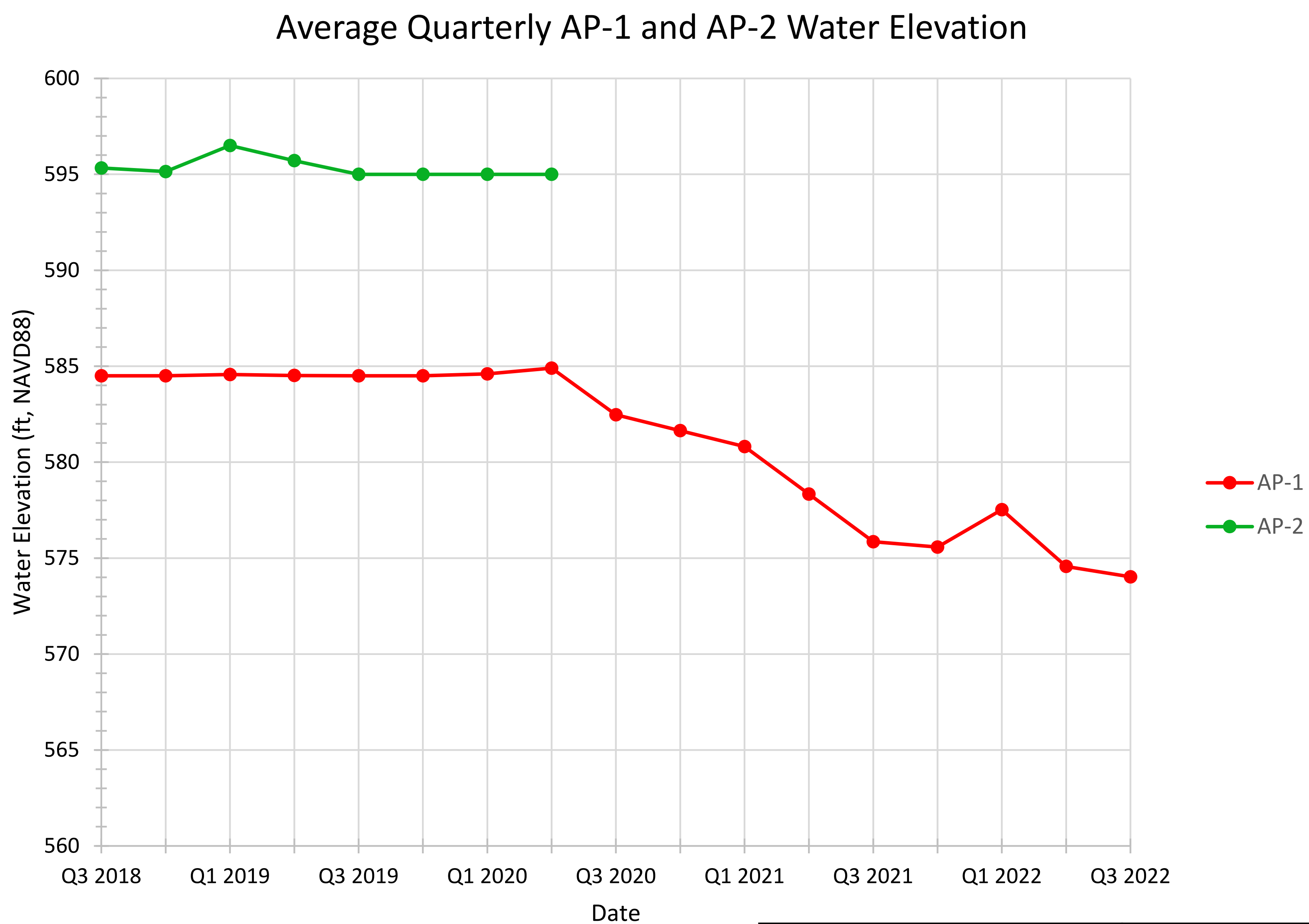




Notes

1. Q = Annual Quarter = 3 Months
2. River Elevations are Quarterly Averages
3. Data Source: https://mesonet.agron.iastate.edu/request/dcp/fe.phtml?network=GA_DCP

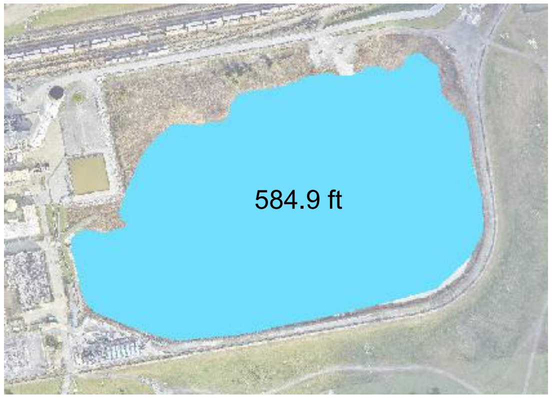
Quarterly Coosa River Elevations Plant Hammond Rome, Floyd County, Georgia		Geosyntec consultants	Figure
Kennesaw, GA	February 2023		**11**



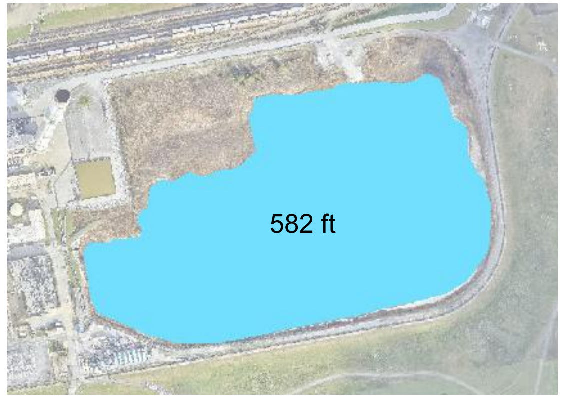
Notes

1. AP-2 water level elevation measurements available only through April 2020.
2. Q = Annual Quarter = 3 Months.
3. Water elevations are quarterly averages.

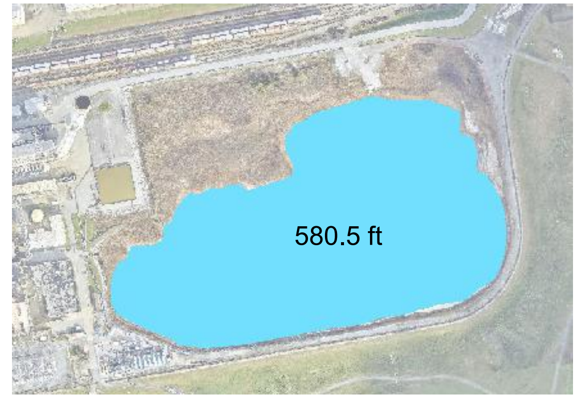
AP-1 and AP-2 Water Elevations Plant Hammond Rome, Floyd County, Georgia	Geosyntec consultants	Figure **12**
Kennesaw, GA	February 2023	



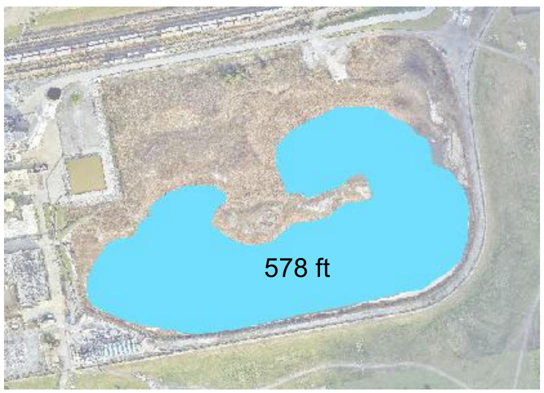
AP-1 General Head Boundary
Stress Periods 1 through 8
Q3 2018 – Q2 2020



AP-1 General Head Boundary
Stress Periods 9 through 10
Q3 2020 – Q4 2020



AP-1 General Head Boundary
Stress Period 11
Q1 2021



AP-1 General Head Boundary
Stress Period 12 and Stress Period 15
Q2 2021 and Q1 2022

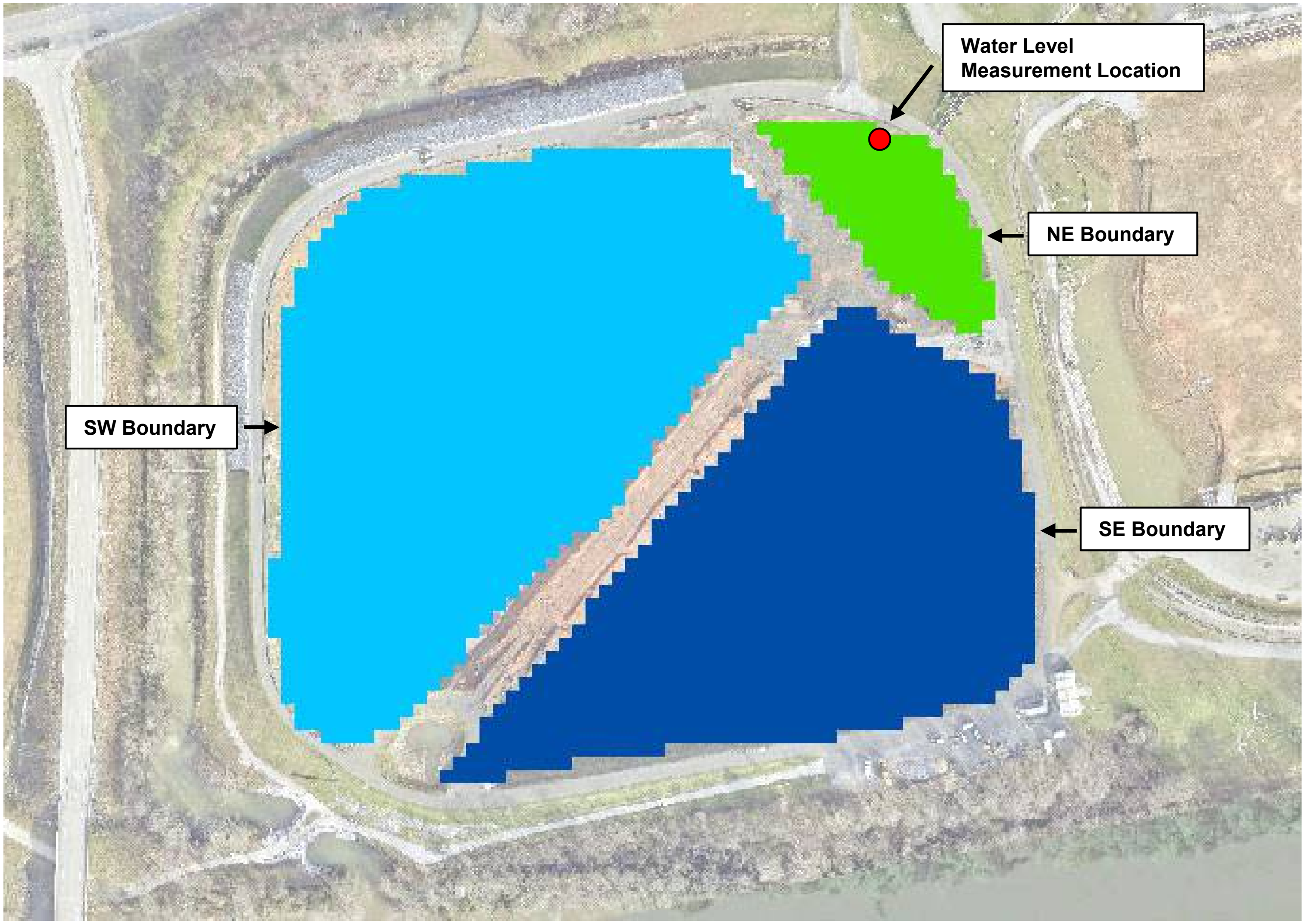
AP-1 General Head Boundary
Stress Periods 13 through 14
Q3 2021 – Q4 2021

AP-1 General Head Boundary
Stress Periods 16 through 17
Q2 2022 – Q3 2022

Notes

1. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

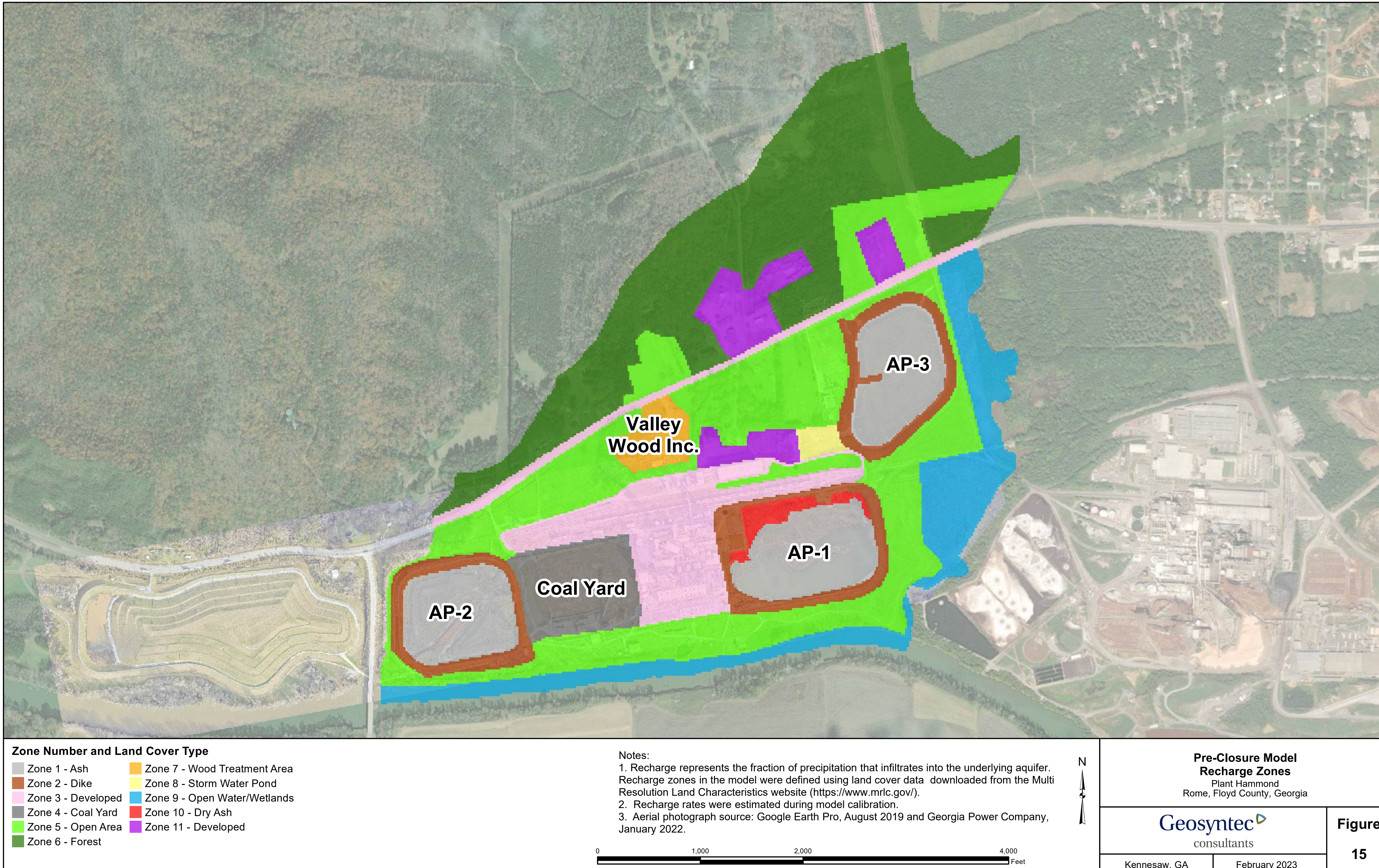
General Head Boundaries in AP-1 Plant Hammond Rome, Floyd County, Georgia		Geosyntec consultants	Figure
Kennesaw, GA	February 2023		**13**



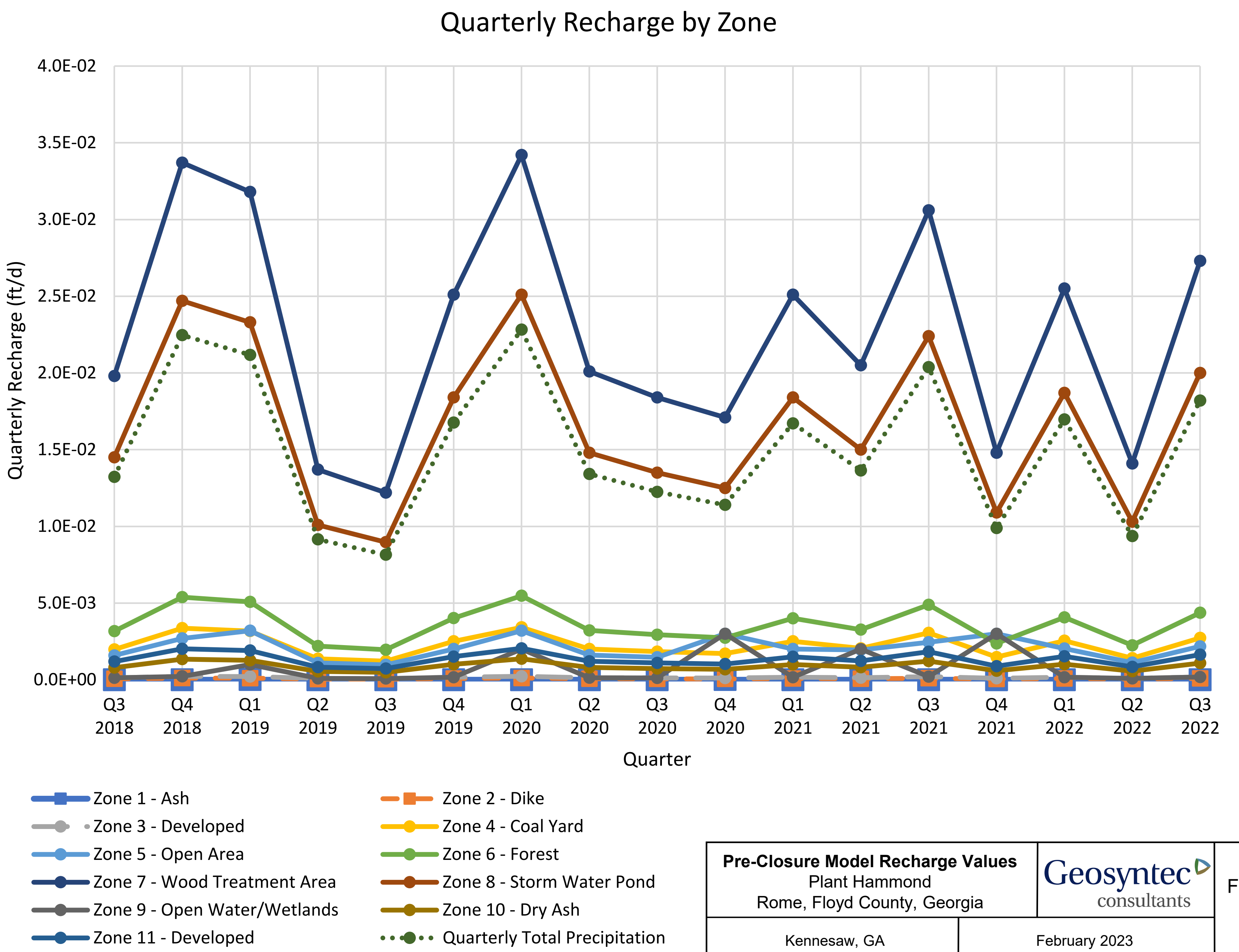
Notes

1. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

General Head Boundaries in AP-2 Plant Hammond Rome, Floyd County, Georgia		Geosyntec consultants	Figure 14
Kennesaw, GA	February 2023		



AP-3
Valley Wood Inc.
AP-1
Coal Yard
AP-2
Zone Number and Land Cover Type
Zone 1 - Ash
Zone 2 - Dike
Zone 3 - Developed
Zone 4 - Coal Yard
Zone 5 - Open Area
Zone 6 - Forest
Zone 7 - Wood Treatment Area
Zone 8 - Storm Water Pond
Zone 9 - Open Water/Wetlands
Zone 10 - Dry Ash
Zone 11 - Developed
Notes:
1. Recharge represents the fraction of precipitation that infiltrates into the underlying aquifer. Recharge zones in the model were defined using land cover data downloaded from the Multi Resolution Land Characteristics website (https://www.mrlc.gov/).
2. Recharge rates were estimated during model calibration.
3. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.
0
1,000
2,000
4,000
Feet
N
Pre-Closure Model
Recharge Zones
Plant Hammond
Rome, Floyd County, Georgia
Geosyntec consultants
Kennesaw, GA
February 2023
Figure
15



Pre-Closure Model Recharge Values
Plant Hammond
Rome, Floyd County, Georgia

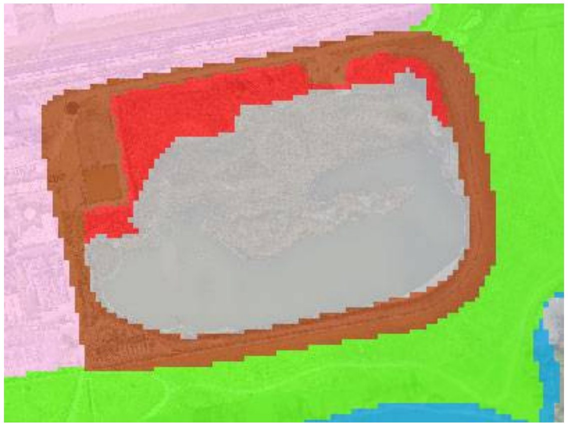
Geosyntec consultants

Kennesaw, GA

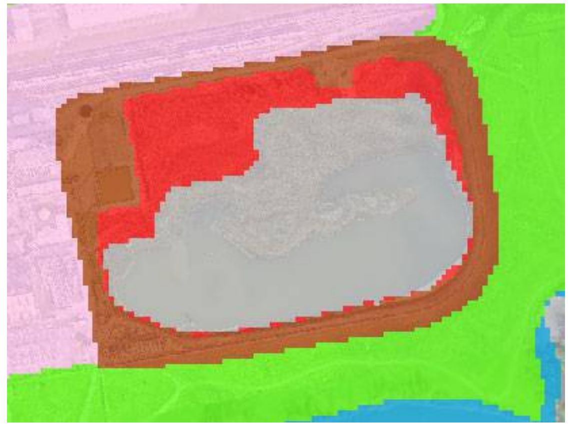
February 2023

Figure

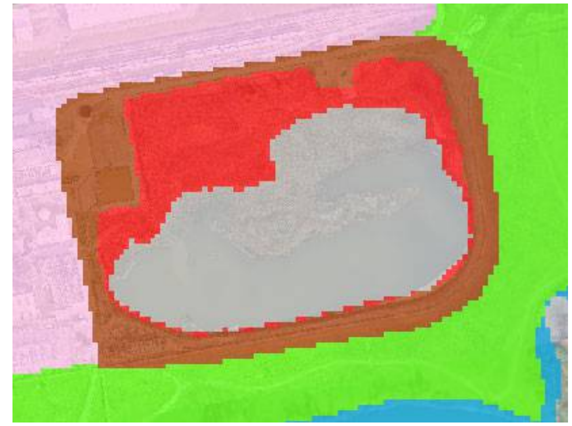
16



AP-1 Recharge Zones
Stress Periods 1 through 7
Q3 2018 – Q1 2020



AP-1 Recharge Zones
Stress Periods 8 through 10
Q2 2020 – Q4 2020



AP-1 Recharge Zones
Stress Period 11
Q1 2021

AP-1 Recharge Zones
Stress Period 12 and Stress Period 15
Q2 2021 and Q1 2022

AP-1 Recharge Zones
Stress Periods 13 through 14
Q3 2021 – Q4 2021

AP-1 Recharge Zones
Stress Periods 16 through 17
Q2 2022 – Q3 2022

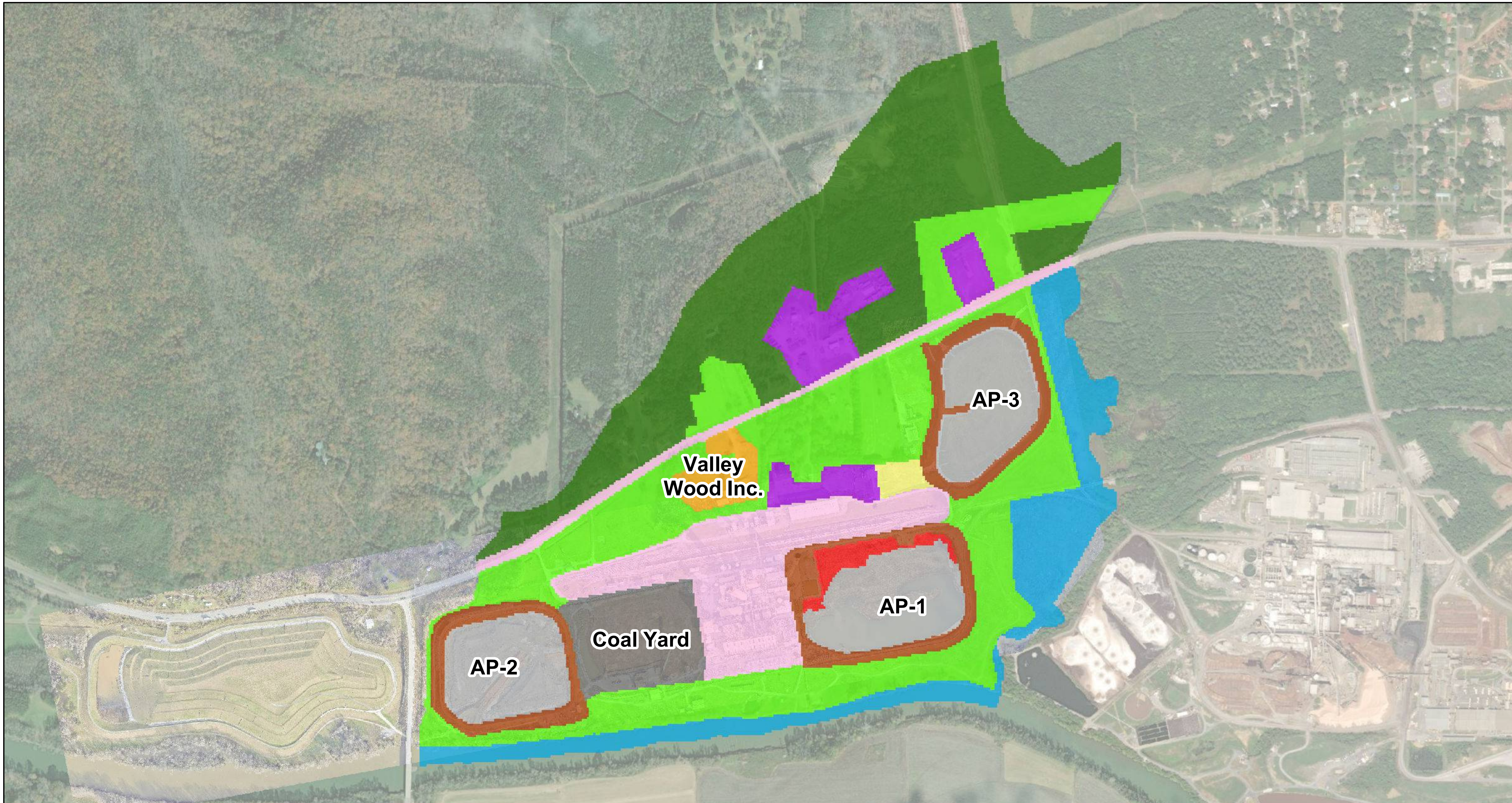
Zone Number and Land Cover Type

- Zone 1 - Ash
- Zone 2 - Dike
- Zone 3 - Developed
- Zone 5 - Open Area
- Zone 9 - Open Water/Wetlands
- Zone 10 - Dry Ash

Notes

1.Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

Transient Recharge Zones in AP-1 Plant Hammond Rome, Floyd County, Georgia	Geosyntec consultants	Figure
Kennesaw, GA	February 2023	**17**



Zone Number and Land Cover Type

- Zone 1 - Ash
- Zone 2 - Dike
- Zone 3 - Developed
- Zone 4 - Coal Yard
- Zone 5 - Open Area
- Zone 6 - Forest
- Zone 7 - Wood Treatment Area
- Zone 8 - Storm Water Pond
- Zone 9 - Open Water/Wetlands
- Zone 10 - Dry Ash
- Zone 11 - Developed

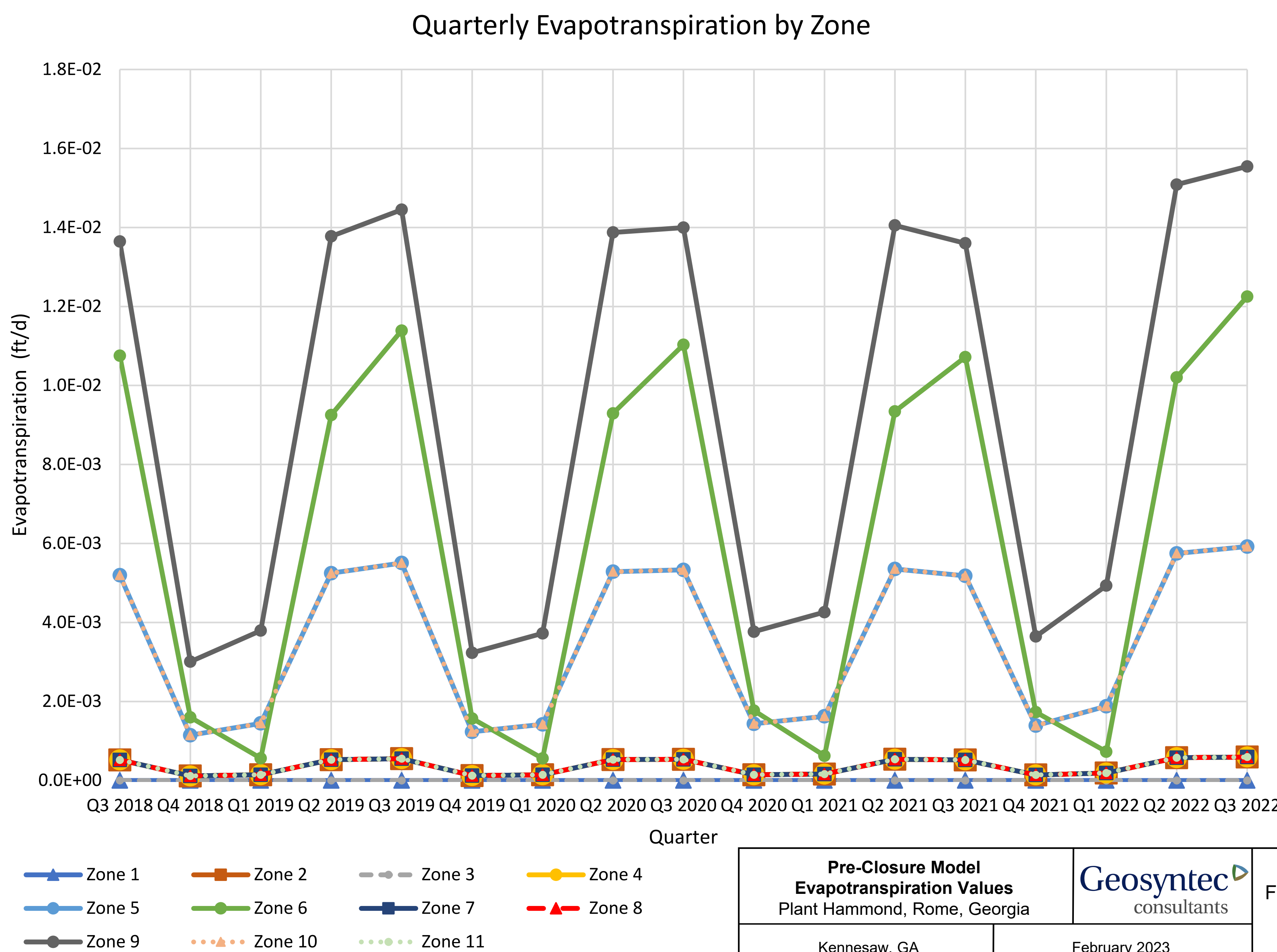
Notes:
1. Evapotranspiration represents the fraction of water that evaporates from the ground and other surfaces and by transpiration from plants. Evapotranspiration zones in the model were defined using the land cover shapefile data downloaded from the Natural Resource Conservation Service NRCS website. Evapotranspiration rates were estimated during model calibration.
2. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

Pre-Closure Model Evapotranspiration Zones
Plant Hammond
Rome, Floyd County, Georgia

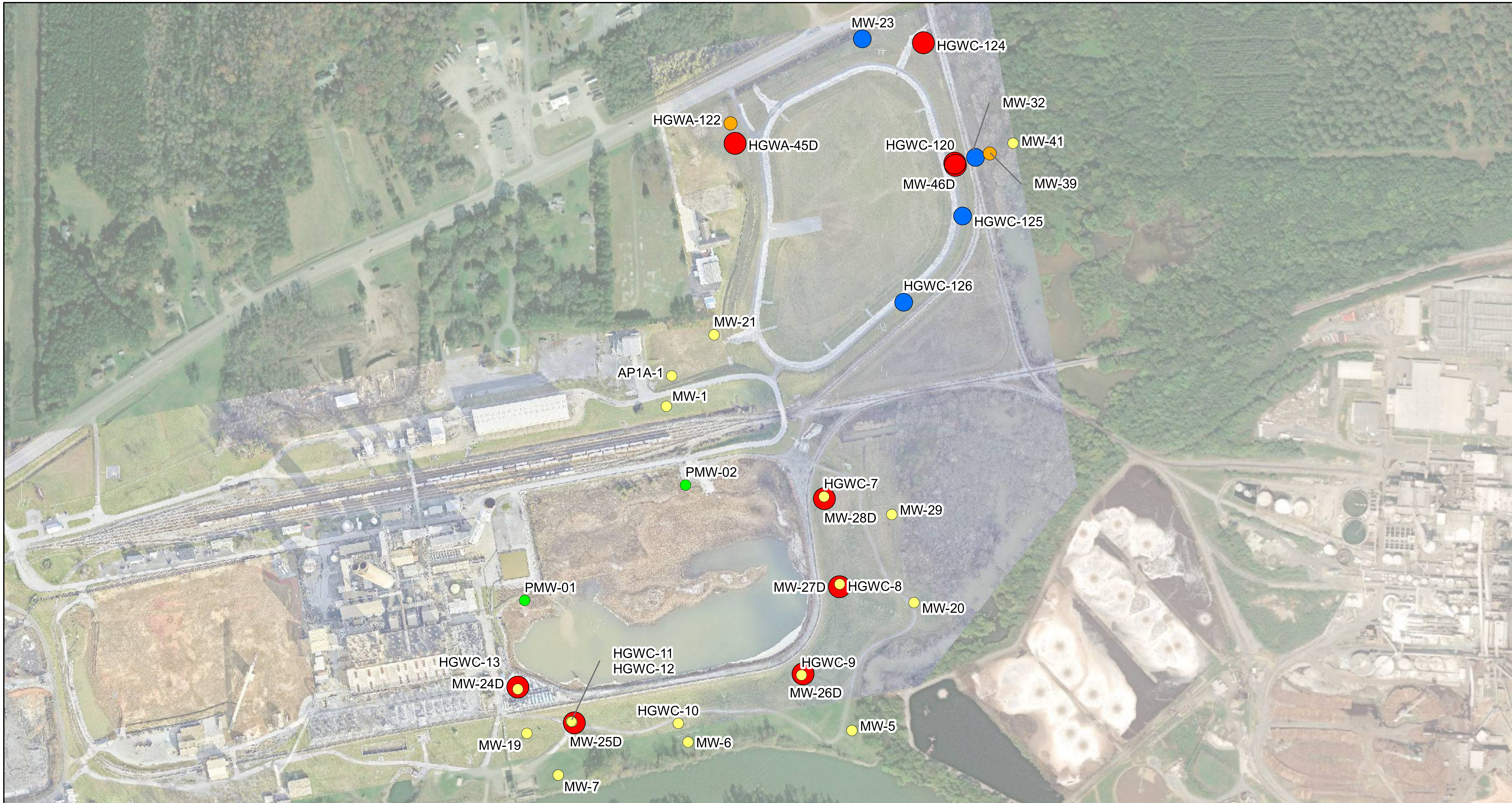
Geosyntec consultants

Kennesaw, GA | February 2023

Figure 18



Pre-Closure Model Evapotranspiration Values Plant Hammond, Rome, Georgia	Geosyntec consultants	Figure **19**
Kennesaw, GA	February 2023	



Target Assigned Layer and Geologic Unit

- Layer 1 - CCR/Ash
- Layer 2 - Alluvium
- Layer 3 - Residuum
- Layer 4 - Highly Weathered Rock
- Layer 5 - Bedrock

0 1,000 2,000 4,000 Feet

Notes:
1. Target wells that are screened across multiple geologic units were assigned to the model layer corresponding to the uppermost geologic unit in the well screen.
2. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

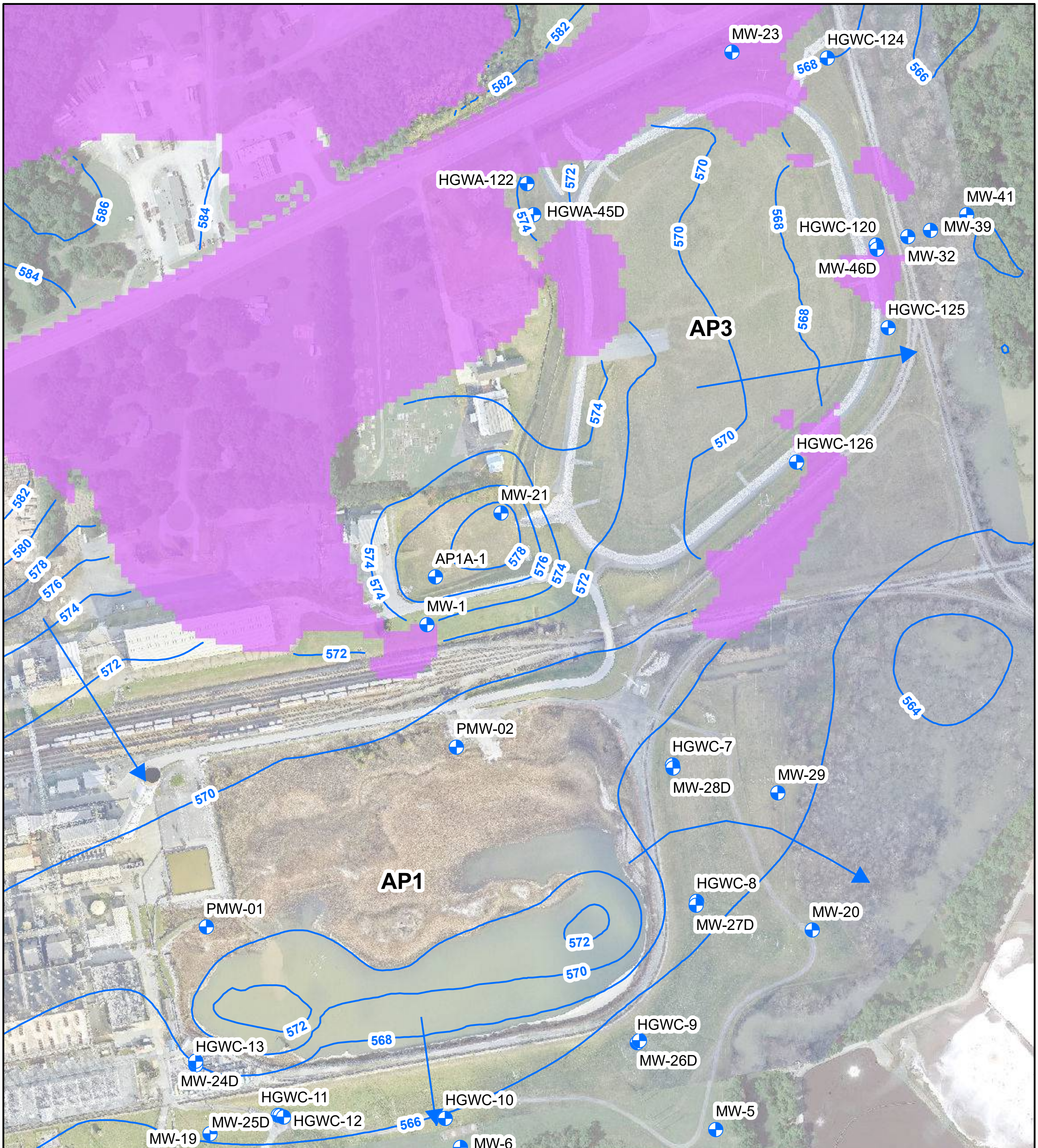
N

Model Calibration Target Locations
Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure
20



Legend

- Monitoring Well
- Model Dry Cells
- Simulated Approximate Flow Direction
- Simulated Groundwater Elevation Contour (ft)

Notes:
1. Contour Interval is 2ft.
2. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

N

0 250 500 Feet

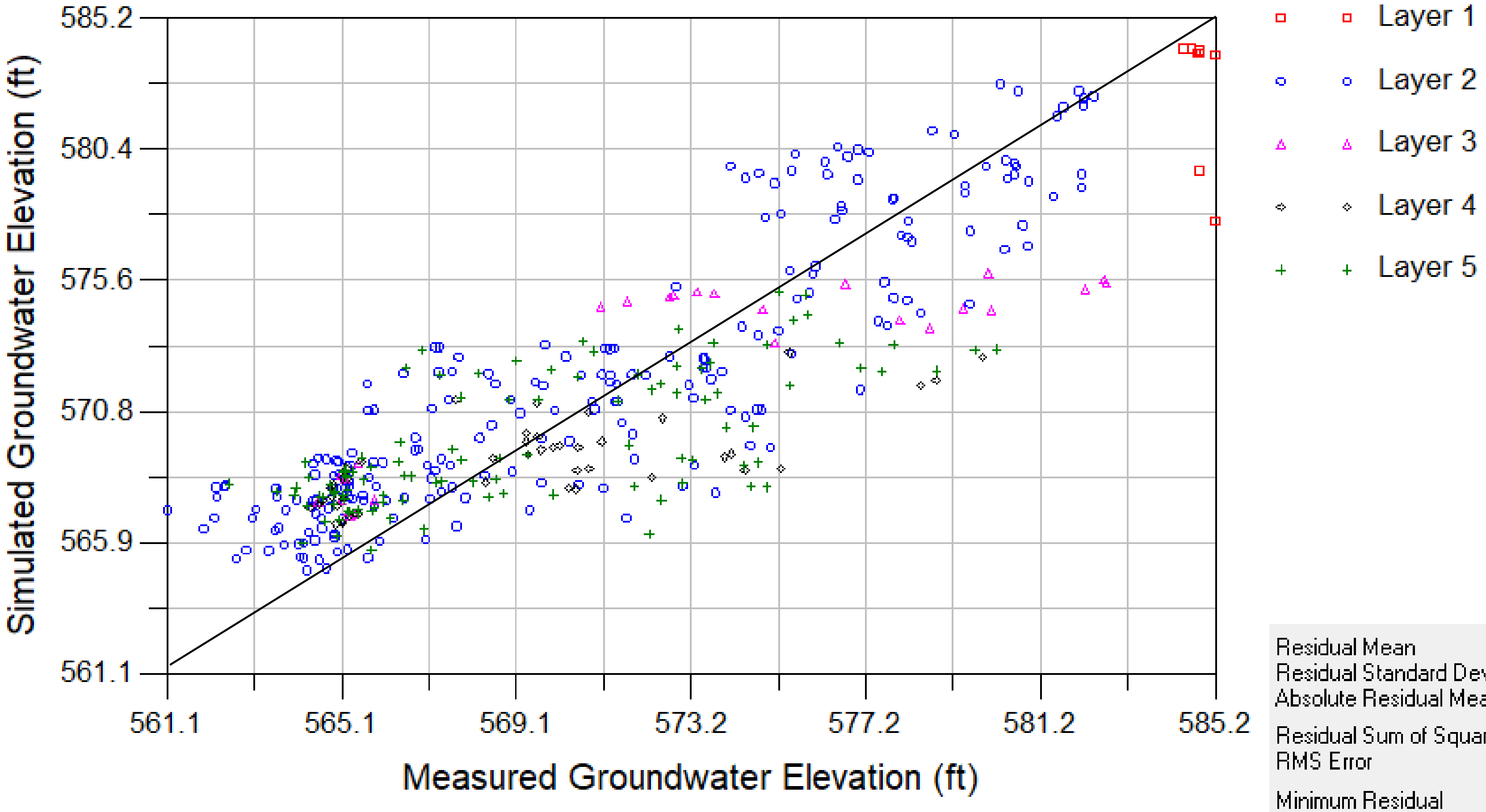
Simulated Groundwater Elevation Contours Q3 2022: Layer 2 (Alluvium)

Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

Figure 21



Residual Mean	= -0.55
Residual Standard Dev.	= 3.01
Absolute Residual Mean	= 2.53
Residual Sum of Squares	=3.85e+03
RMS Error	=3.06
Minimum Residual	= -6.06
Maximum Residual	= 7.49
Range of Observations	= 24.15
Scaled Res. Std. Dev.	= 0.125
Scaled Abs. Mean	= 0.105
Scaled RMS	= 0.127
Number of Observations	= 410

Notes:

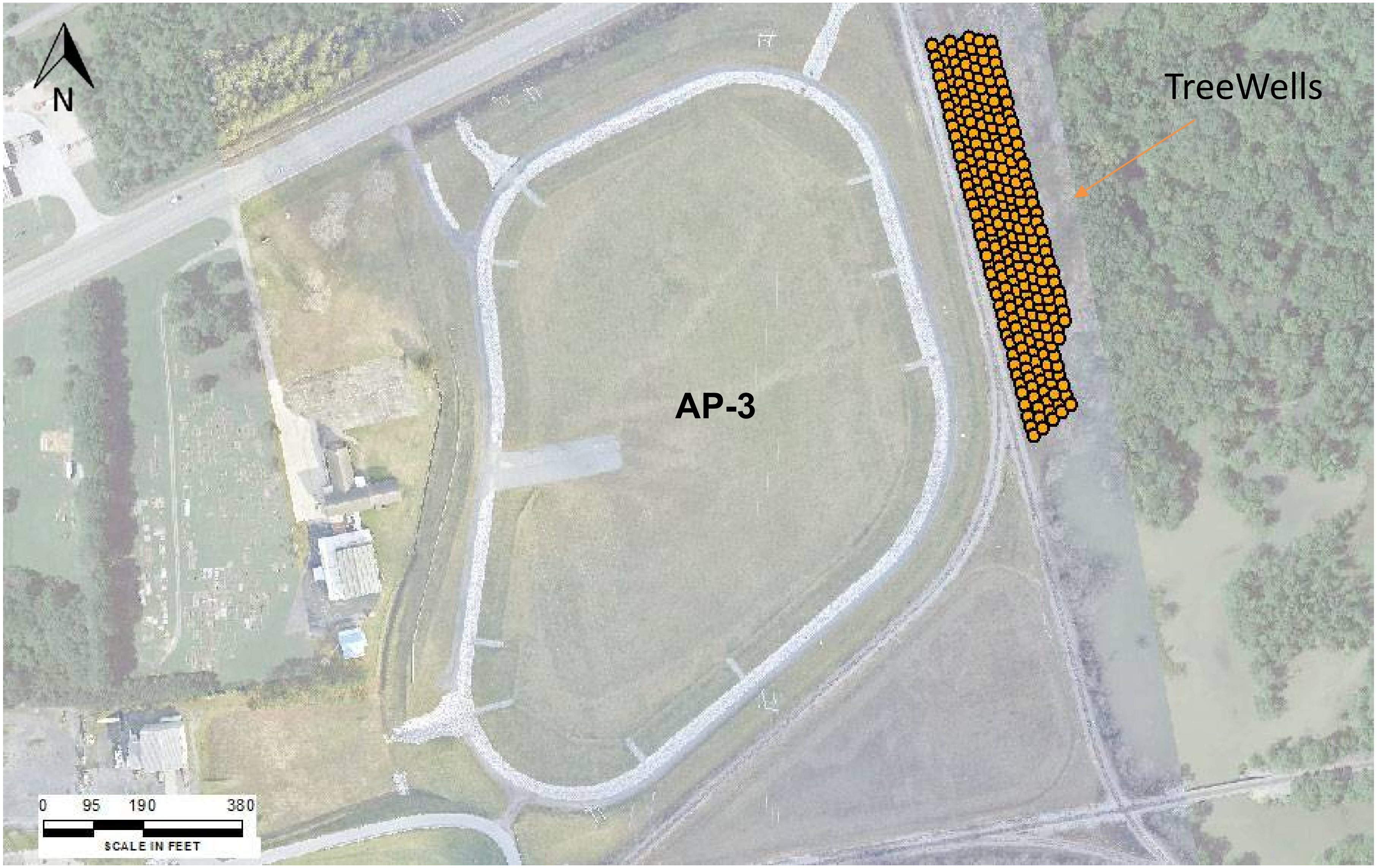
1. RMS = Root Mean Square
2. Scaled RMS = NRMSE = Normalized Root Mean Square Error

Measured vs. Simulated Groundwater Elevations
Plant Hammond, Rome, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

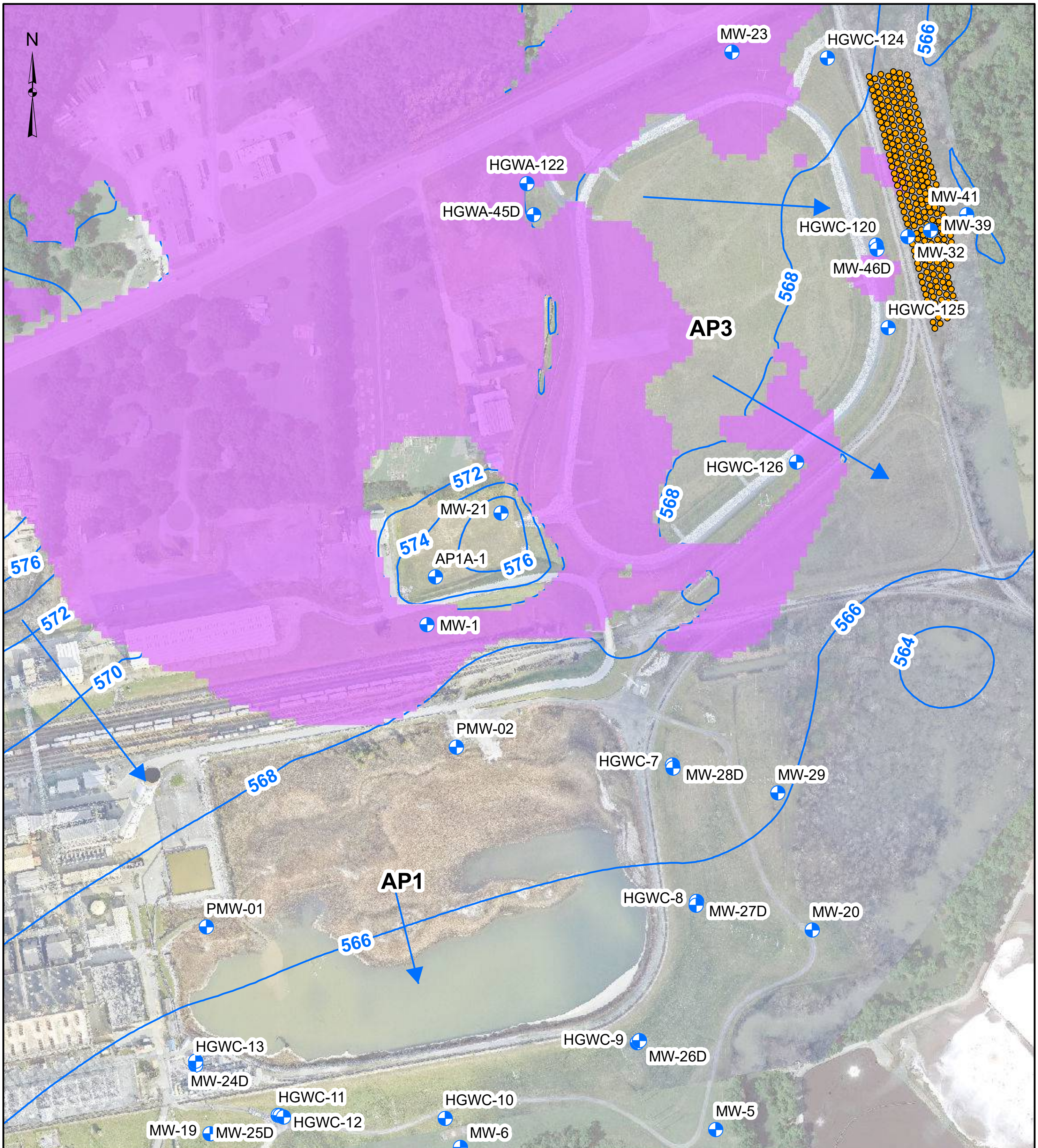
Figure 22



Notes

1. Tree wells are screened in either model layer 3 or 4.
2. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

AP-3 Proposed Tree Well Locations Plant Hammond Rome, Floyd County, Georgia	Geosyntec consultants	Figure
Kennesaw, GA	February 2023	23



Legend

- Monitoring Well
- TreeWell
- Model Dry Cell
- Simulated Approximate Flow Direction
- Simulated Groundwater Elevation Contour (ft)

Notes:
1. Contour Interval is 2ft.
2. Aerial photograph source: Google Earth Pro, August 2019 and Georgia Power Company, January 2022.

0 250 500 Feet

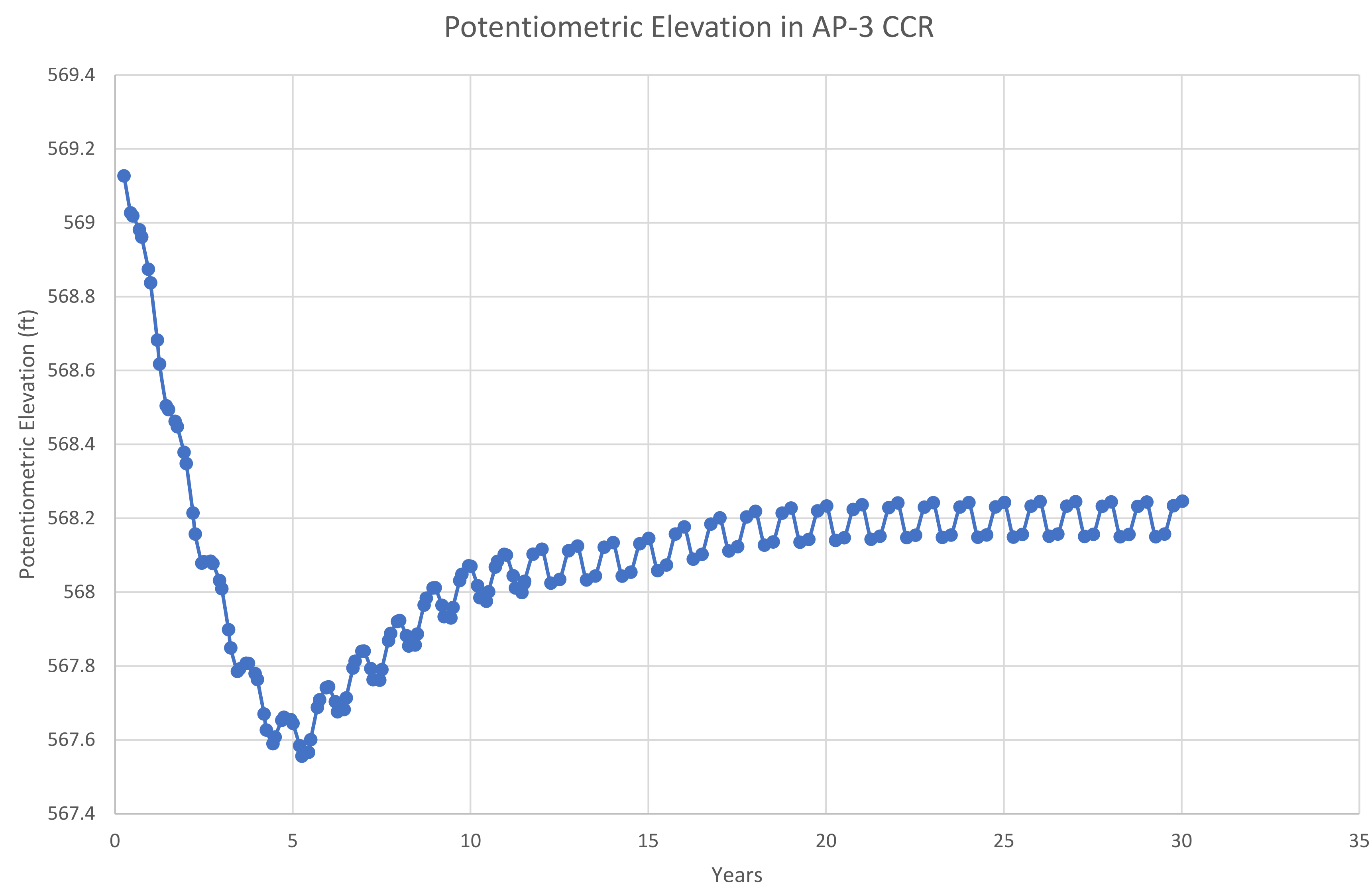
30 Year Post-Closure Simulated Groundwater Elevation Contours: Layer 2 (Alluvium)

Plant Hammond
Rome, Floyd County, Georgia

Geosyntec consultants

Kennesaw, GA | February 2023

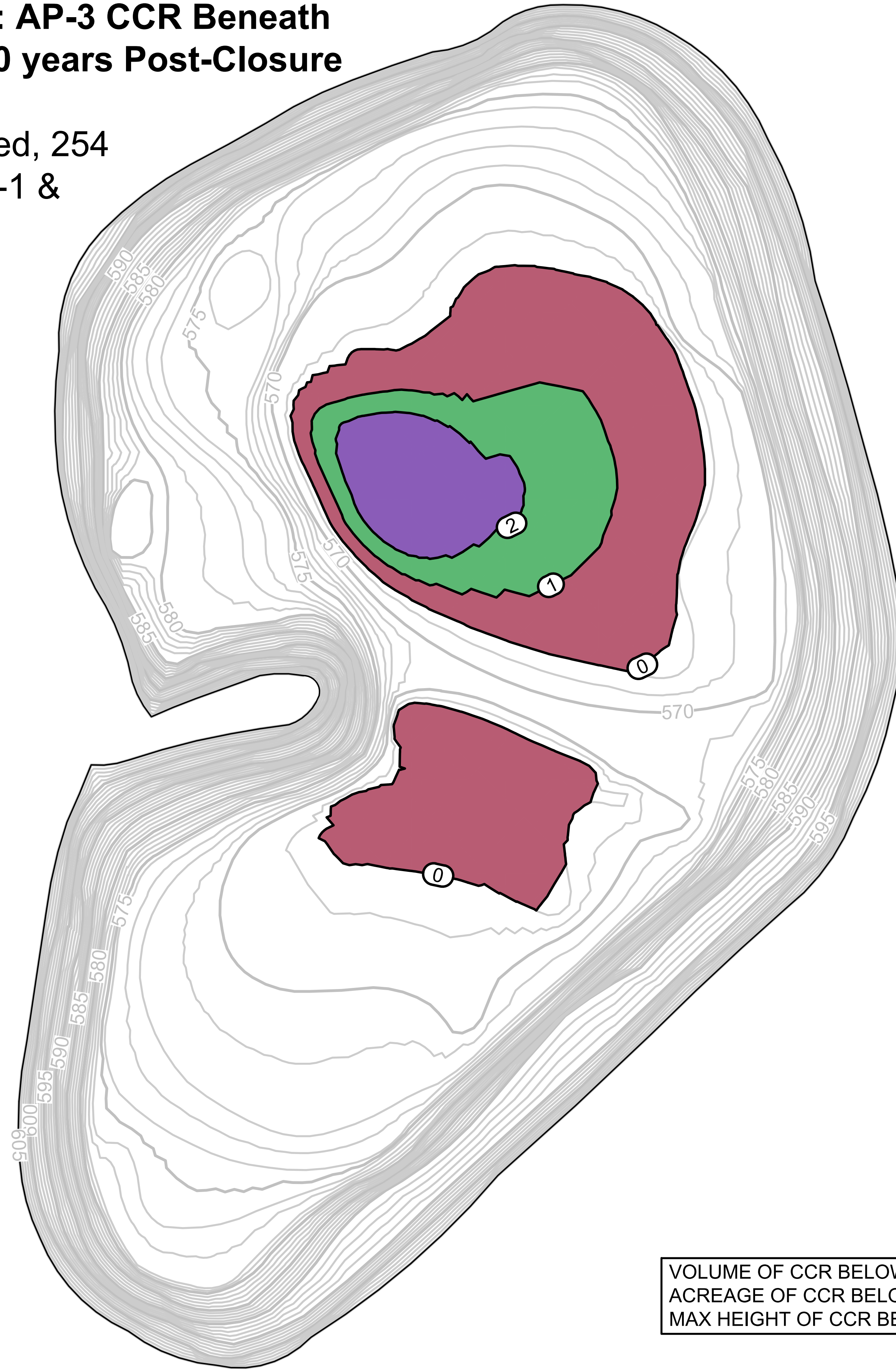
Figure 24



Post-Closure Simulated Potentiometric Elevation in AP-3 CCR Rome, Floyd County, Georgia	Geosyntec consultants	Figure **25**
Kennesaw, GA	February 2023	

Figure 26 - Model Results: AP-3 CCR Beneath Potentiometric Surface, 30 years Post-Closure

(AP-3 Closed, Cover Installed, 254 TreeWells east of AP-3, AP-1 & AP-2 Closed By Removal)

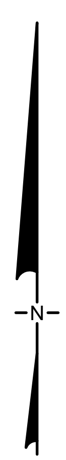


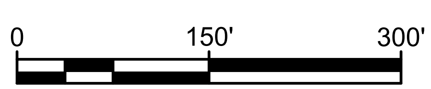
ELEVATION TABLE			
NUMBER	MINIMUM HEIGHT OF CCR BELOW POTENTIOMETRIC SURFACE (FT)	MAXIMUM HEIGHT OF CCR BELOW POTENTIOMETRIC SURFACE (FT)	COLOR
1	0.0	1.0	
2	1.0	2.0	
3	2.0	3.0	

LEGEND

355 — CONTOURS - BOTTOM ELEV. OF CCR (FT)

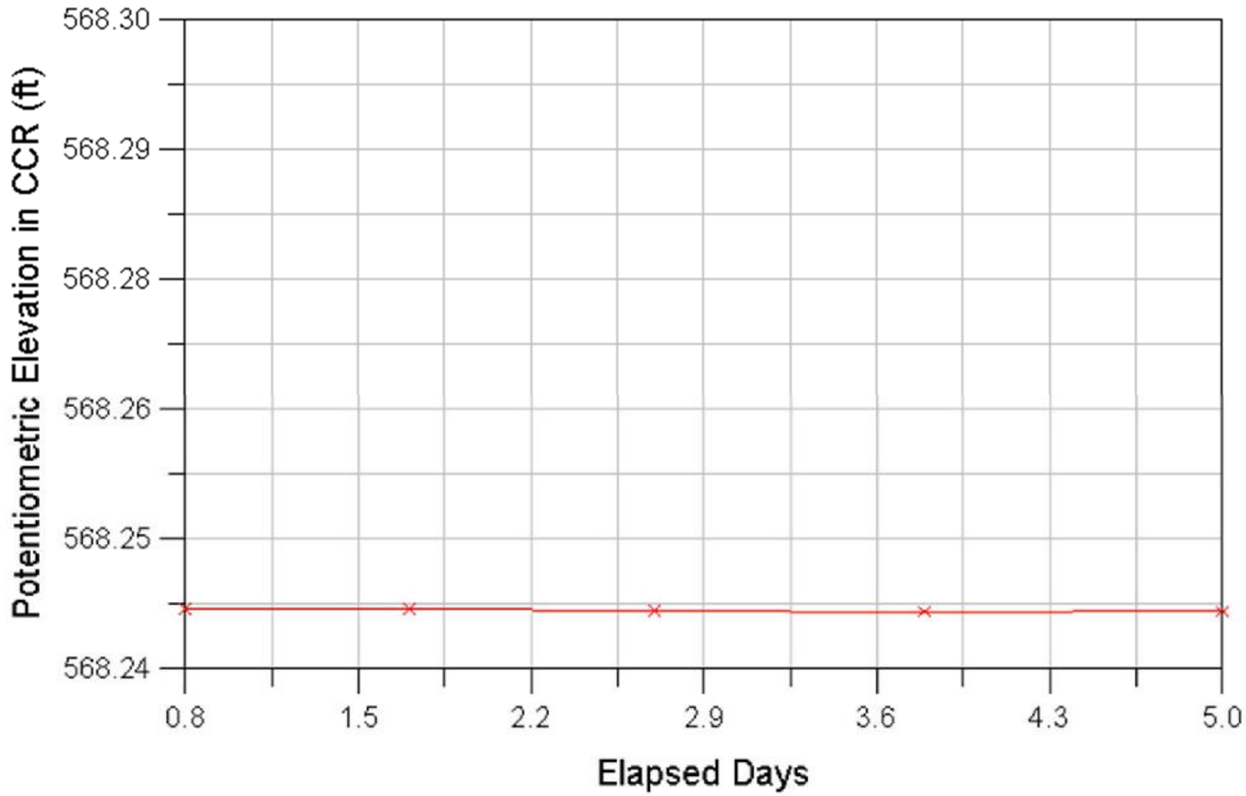
1 — CONTOURS - CCR HEIGHT (FT)





VOLUME OF CCR BELOW POTENTIOMETRIC SURFACE:	5,262.31 CU. YD.
ACREAGE OF CCR BELOW POTENTIOMETRIC SURFACE:	3.8 ACRES
MAX HEIGHT OF CCR BELOW POTENTIOMETRIC SURFACE:	2.4 FT

L:\CADD\GIGEORGIA POWER\PLANT HAMMOND GR6242\VOLUME\SCENARIO 1B VOLUME V4



Notes

1. 100 year flood elevation defined at 586 ft.
2. 100 year flood elevation and extent provided by FEMA: [FEMA Flood Map Service Center | Search By Address].

100 Year Flood Simulation Results Plant Hammond Rome, Floyd County, Georgia		Geosyntec consultants	Figure
Kennesaw, GA	February 2023		27

APPENDICES

APPENDIX A
SITE GEOLOGIC MAP

NOTES

1. GEOLOGIC MAPPING PERFORMED BY PETROLOGIC SOLUTIONS, INC. IN 2015.
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)
Dac - ARMUCHEE CHERT (DEVONIAN) & CHATTANOOGA SHALE (DEVONIAN)
Srm - RED MOUNTAIN FORMATION (SILURIAN)
Ꞓcls - CONASAUGA FORMATION MIDDLE UNITS (CAMBRIAN)
Ꞓcsl - CONASAUGA FORMATION LOWER UNITS (CAMBRIAN)

PROPERTY BOUNDARY (AS PROVIDED BY SOUTHERN COMPANY SERVICES, INC.)
INTERPRETED GEOLOGIC CONTACT
BEDDING
GEOLOGIC MAP STATION
THRUST FAULT
f.a. 29 FOLD AXIS

Ꞓcls - SHALEY LIMESTONE IN ROCK CORE
Ꞓcsl - GRAY & BROWN CALCAREOUS SHALE IN ROCK CORE
MDu - FISSILE, BLACK SHALE IN ROCK CORE

REFERENCES

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

CLIENT	Georgia Power
CONSULTANT	GOLDER
YYYY-MM-DD	2018-11-08
DESIGNED	DLP
PREPARED	DJC
REVIEWED	DLP
APPROVED	RPK

PROJECT
GEOLOGIC AND HYDROGEOLOGIC SUMMARY REPORT
PLANT HAMMOND

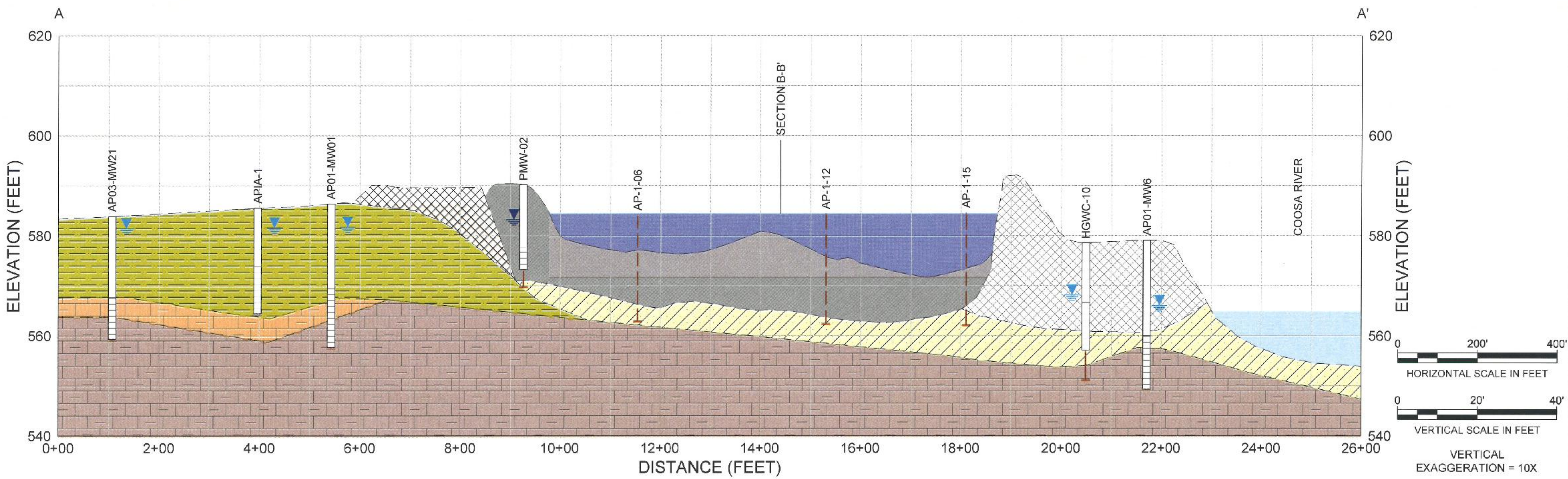
TITLE
GEOLOGIC MAP

PROJECT NO.	CONTROL	REV.	FIGURE
18111868	18111868A003.dwg	0	3

Path: \\detroit\cad\Projects\18x-Projects\18111868-Georgia Power Plant Hammond\PRODUCTION\A-GEOLOGIC AND HYDROGEOLOGIC REPORT | File Name: 18111868A003.dwg

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

APPENDIX B
GEOLOGIC CROSS SECTIONS



LEGEND

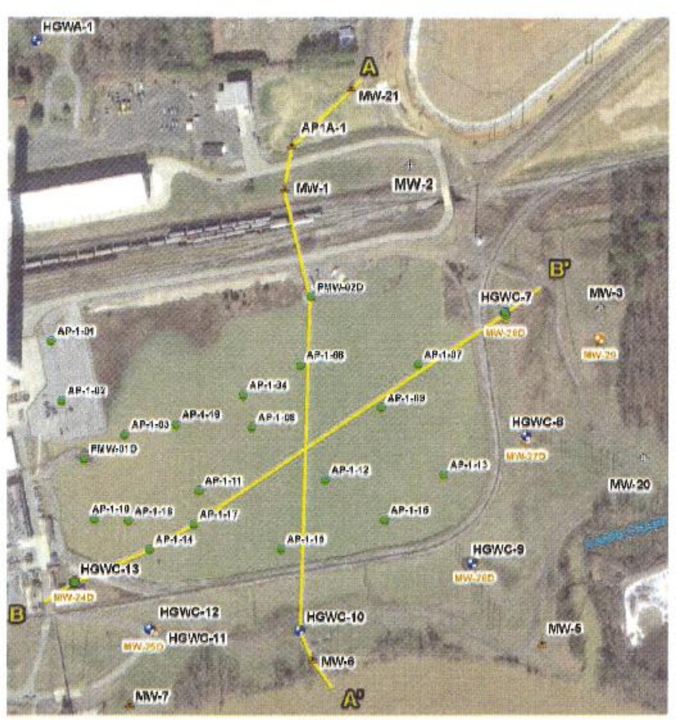
KEY MAP SYMBOLS

- AP-1 MONITORING WELL
- GROUNDWATER LEVEL MONITORING PIEZOMETER
- GROUNDWATER LEVEL MONITORING PIEZOMETER (INSTALLED IN 2018)
- PIEZOMETER (ABANDONED)
- BORING

LITHOLOGIC DESCRIPTIONS

- COAL COMBUSTION RESIDUALS (CCR) / ASH
- FILL: LEAN CLAY, SANDY CLAY WITH SOME GRAVEL
- SANDY LEAN CLAY / RESIDUAL SOIL
- ALLUVIUM: ALTERNATING LAYERS OF SILTY SAND, SILT, SAND, CLAYEY SAND, SANDY CLAY, CLAY, AND CLAYEY GRAVEL
- HIGHLY WEATHERED AND FRACTURED SHALEY LIMESTONE

- BEDROCK (SHALEY LIMESTONE) MIDDLE CONASAUGA
- SURFACE WATER (1 APRIL 2019)
- ASH POND FREE WATER (1 APRIL 2019)
- MONITORING WELL
- SCREEN INTERVAL
- SOIL BORING (DASHED WHERE PROJECTED)
- GROUNDWATER ELEVATION (1 APRIL 2019)
- PERCHED WATER IN ASH POND (1 APRIL 2019)



KEY MAP

NOTE:

1. SUBSURFACE LITHOLOGIC INFORMATION OBTAINED FROM BORING LOGS. LITHOLOGIC CONTACT BETWEEN BORINGS WERE INTERPOLATED AND THEREFORE ARE APPROXIMATE.
2. GROUND SURFACE BASED ON AN AERIAL SURVEY (DECEMBER 2012) SUPPLEMENTED BY ADDITIONAL SURVEY AND BATHYMETRY FROM JUNE 2018.
3. SURFACE WATER AND ASH POND FREE WATER SURFACE ELEVATIONS MEASURED AT COOSA RIVER AND AP-1 STAFF GAUGES, RESPECTIVELY.

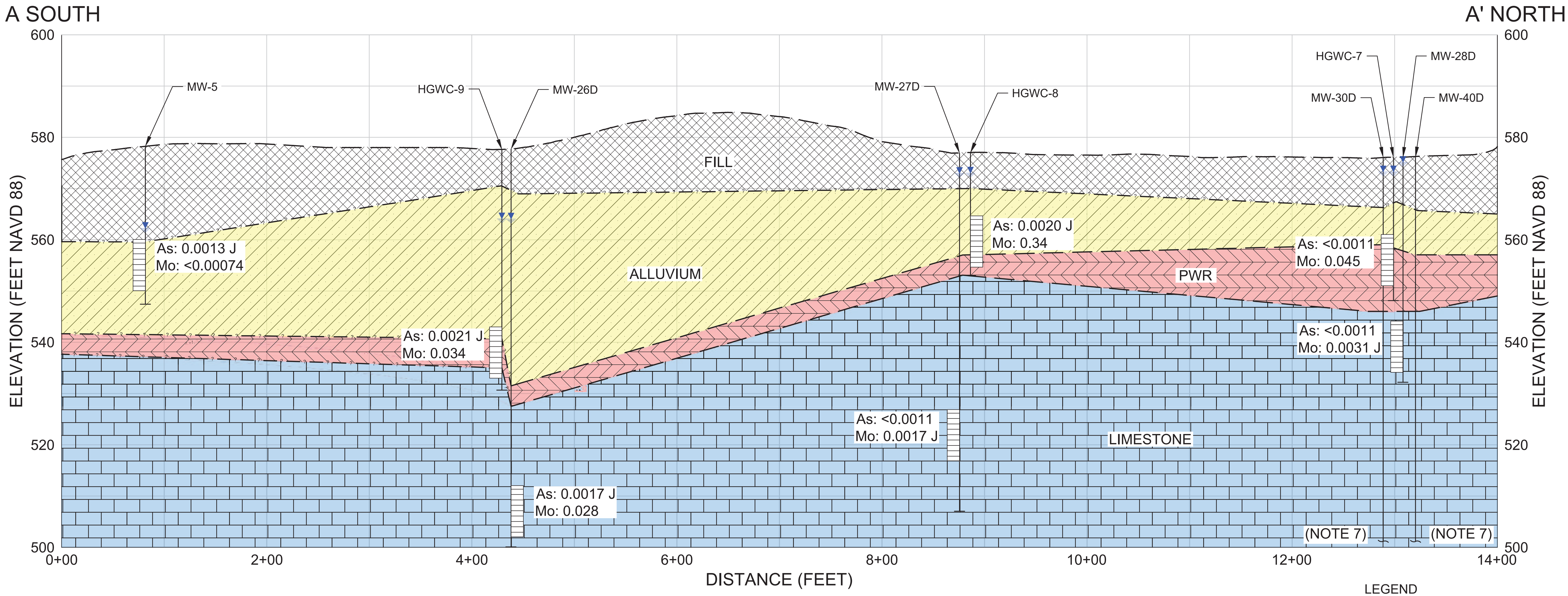
CROSS SECTION A-A'
PLANT HAMMOND ASH POND 1 (AP-1)
FLOYD COUNTY, GEORGIA

PREPARED BY: Geosyntec consultants, KENNESAW, GA

FIGURE 3-1A

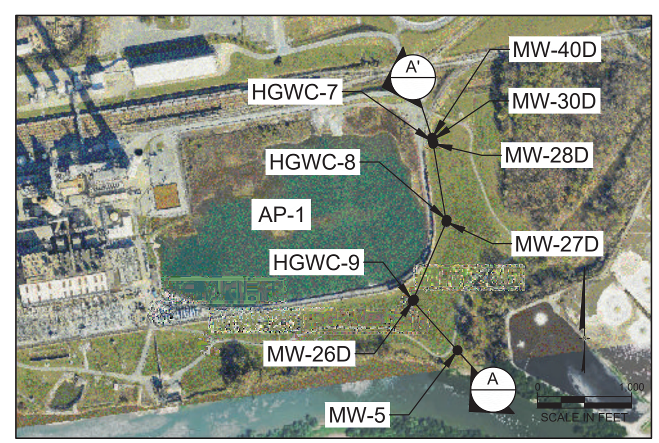
PROJECT NO: GW6581B | SEPTEMBER 2019

L:\CADD\GEORGIA POWER\PLANT HAMMOND GW6581B\FIGURES\6581B-F001



NOTES:

1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE BASED ON ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) 3D MODEL KRIGING AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATION PROVIDED IN FEET REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
3. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
4. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS AND MONITORING WELLS NOT INSTALLED BY GEOSYNTEC CONSULTANTS WERE PROVIDED BY GEORGIA POWER COMPANY.
5. GROUNDWATER LEVELS MEASURED BY GEOSYNTEC ON 31 JANUARY 2022.
6. ARSENIC (As), AND MOLYBDENUM (Mo) CONCENTRATION DATA ARE FROM FEBRUARY 2022 SEMIANNUAL GROUNDWATER MONITORING EVENT. CONCENTRATIONS ARE REPORTED IN MILLIGRAMS PER LITER. A "<" INDICATES THE CONSTITUENT WAS NOT DETECTED ABOVE THE ANALYTICAL METHOD DETECTION LIMIT (MDL). A "J" INDICATES THE CONSTITUENT WAS ESTIMATED AND DETECTED BETWEEN THE MDL AND THE REPORTING LIMIT.
7. NO SAMPLE WAS OBTAINED WITHIN UPPER 10 FEET OF BORING DUE TO HYDRO EXCAVATION AT MW-26D, MW-27D, MW-28D, MW-30D, AND MW-40D.
8. THE FULL EXTENT OF PIEZOMETERS MW-30D AND MW-40D ARE NOT SHOWN ON THE SECTION. PIEZOMETERS MW-30D AND MW-40 ARE SCREENED BETWEEN ELEVATIONS OF 450 AND 440 FT NAVD88, AND 481 AND 471 FT NAVD88 RESPECTIVELY AND WERE NOT SAMPLED IN FEBRUARY 2022.
9. THE GROUNDWATER PROTECTION STANDARD (GWPS) FOR ARSENIC IS 0.01 MG/L. THE GWPS FOR MOLYBDENUM IS 0.10 MG/L.



SECTION A-A' KEY MAP

LEGEND

- ESTIMATED LITHOLOGIC CONTACT
- EXTRAPOLATED SURFACE
- WELL
- SCREEN INTERVAL
- GROUNDWATER LEVEL (NOTE 5)
- FILL: LEAN CLAY, SILTY CLAY, CLAYEY SILT, SILT, SANDY CLAY WITH SOME GRAVEL
- ALLUVIUM: CLAY, SANDY CLAY, GRAVELLY CLAY, GRAVELLY SAND
- PARTIALLY WEATHERED ROCK (PWR)
- LIMESTONE

0 100
HORIZONTAL SCALE IN FEET

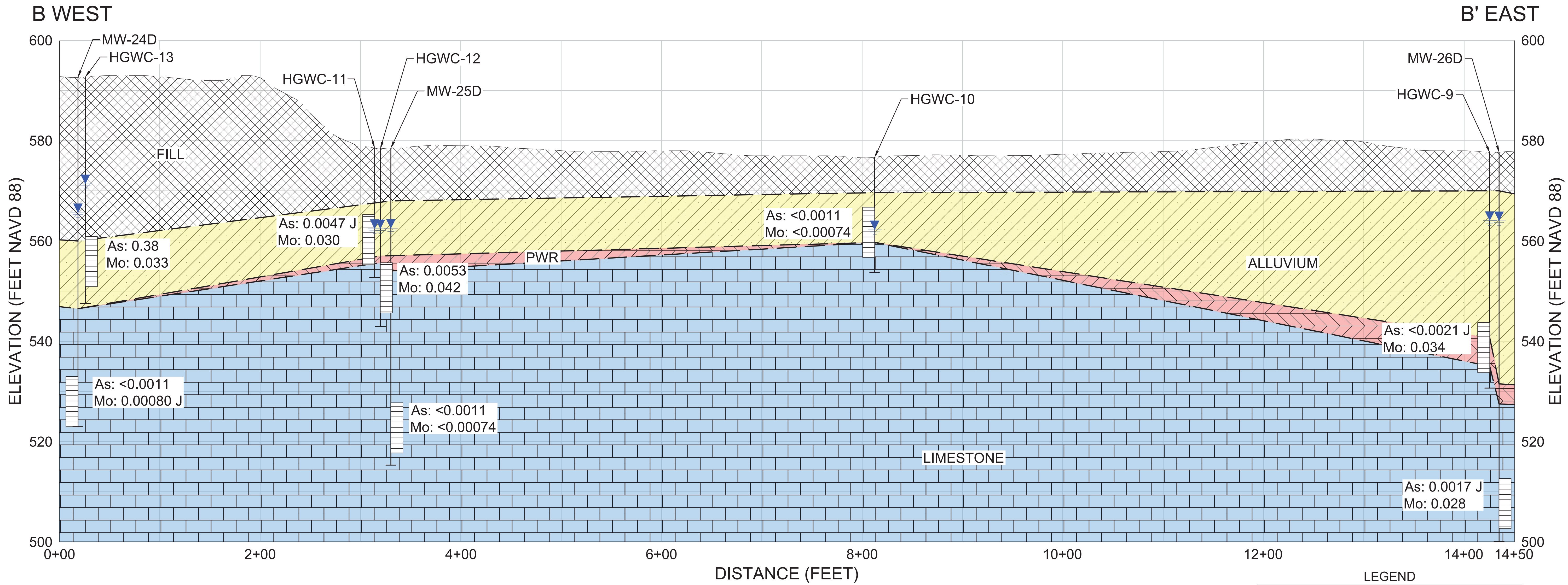
0 10
VERTICAL SCALE IN FEET

VERTICAL EXAGGERATION = 10X

GEOLOGIC SECTION A-A'
GEORGIA POWER COMPANY
PLANT HAMMOND ASH POND 1 (AP-1)
ROME, FLOYD COUNTY, GEORGIA

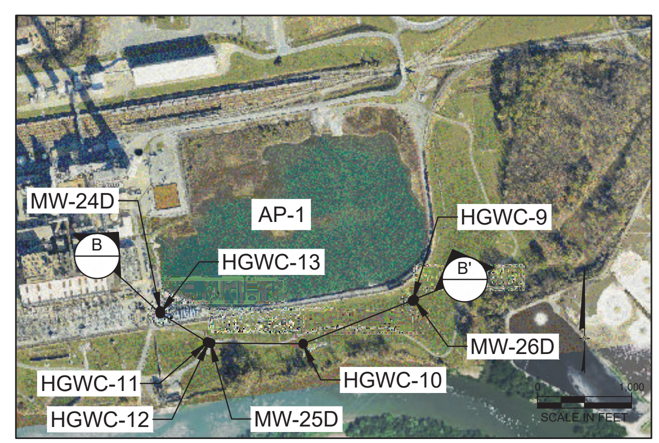
Geosyntec consultants
KENNESAW, GA

PROJECT NO: GW6581B	AUGUST 2022	FIGURE 3



NOTES:

1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE BASED ON ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) 3D MODEL KRIGING AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATION PROVIDED IN FEET REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
4. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS AND MONITORING WELLS NOT INSTALLED BY GEOSYNTEC CONSULTANTS WERE PROVIDED BY GEORGIA POWER COMPANY.
5. GROUNDWATER LEVELS MEASURED BY GEOSYNTEC ON 31 JANUARY 2022.
6. ARSENIC (As), AND MOLYBDENUM (Mo) CONCENTRATION DATA ARE FROM FEBRUARY 2022 SEMIANNUAL GROUNDWATER MONITORING EVENT. CONCENTRATIONS ARE REPORTED IN MILLIGRAMS PER LITER. A "<" INDICATES THE CONSTITUENT WAS NOT DETECTED ABOVE THE ANALYTICAL METHOD DETECTION LIMIT (MDL). A "J" INDICATES THE CONSTITUENT WAS ESTIMATED AND DETECTED BETWEEN THE MDL AND THE REPORTING LIMIT.
7. NO SAMPLE WAS OBTAINED WITHIN UPPER 10 FEET OF BORING DUE TO HYDRO EXCAVATION AT MW-24D, MW-25D, AND MW-26D.
8. THE GROUNDWATER PROTECTION STANDARD (GWPS) FOR ARSENIC IS 0.01 MG/L. THE GWPS FOR MOLYBDENUM IS 0.10 MG/L.



SECTION B-B' KEY MAP

LEGEND

- ESTIMATED LITHOLOGIC CONTACT
- EXTRAPOLATED SURFACE
- WELL
- SCREEN INTERVAL
- GROUNDWATER LEVEL (NOTE 5)
- FILL: LEAN CLAY, SILTY CLAY, CLAYEY SILT, SILT, SANDY CLAY WITH SOME GRAVEL
- ALLUVIUM: CLAY, SANDY CLAY, GRAVELLY CLAY, GRAVELLY SAND
- PARTIALLY WEATHERED ROCK (PWR)
- LIMESTONE

0 100
HORIZONTAL SCALE IN FEET

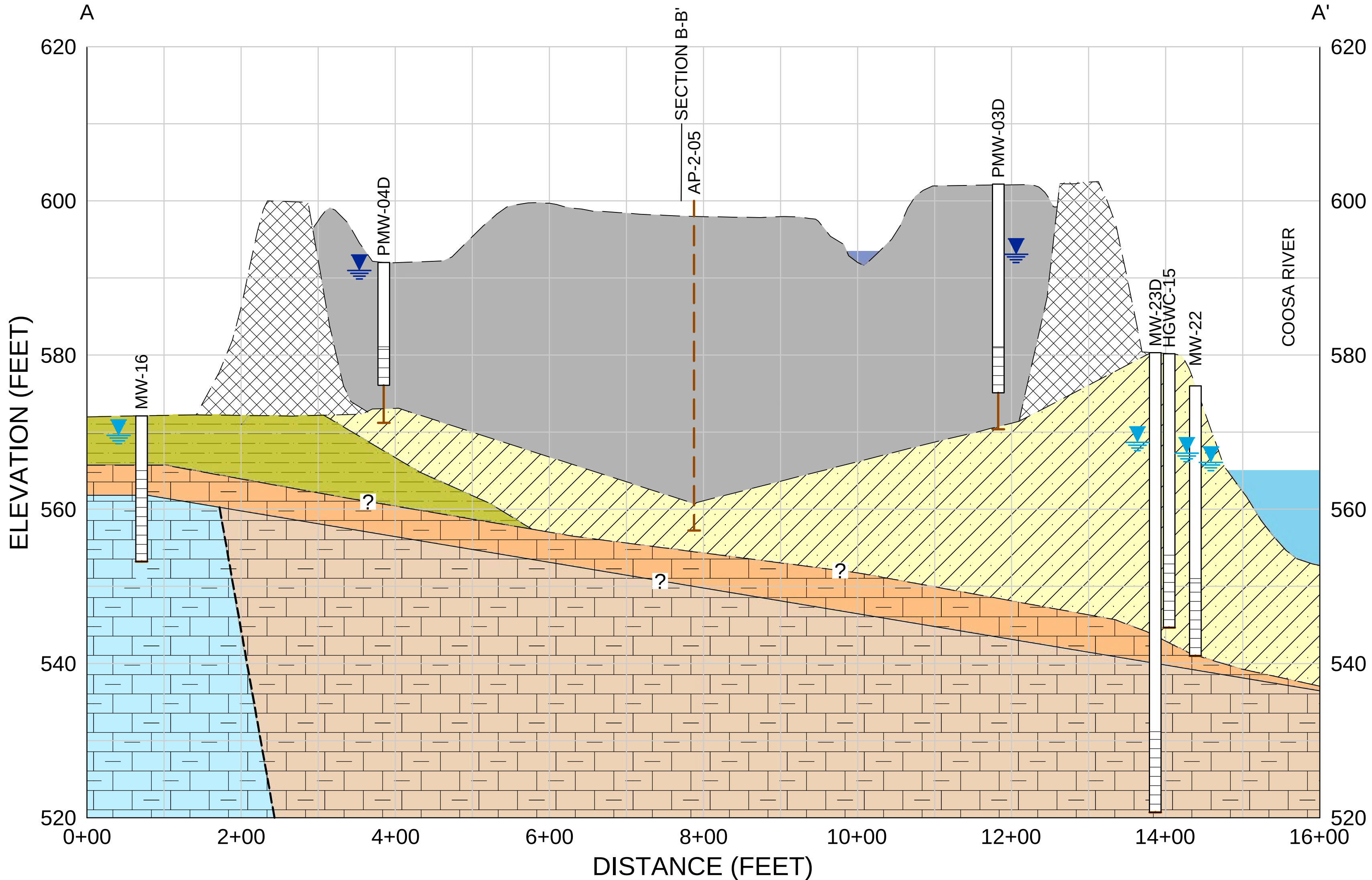
0 10
VERTICAL SCALE IN FEET

VERTICAL EXAGGERATION = 10X

GEOLOGIC SECTION B-B'
GEORGIA POWER COMPANY
PLANT HAMMOND ASH POND 1 (AP-1)
ROME, FLOYD COUNTY, GEORGIA

Geosyntec consultants
KENNESAW, GA

PROJECT NO: GW6581B	AUGUST 2022	FIGURE 4



0 200' 400'
HORIZONTAL SCALE IN FEET

0 20' 40'
VERTICAL SCALE IN FEET

VERTICAL
EXAGGERATION = 10X

LEGEND

KEY MAP SYMBOLS

- AP-2 MONITORING WELL
- GROUNDWATER LEVEL MONITORING PIEZOMETER
- GROUNDWATER LEVEL MONITORING PIEZOMETER (INSTALLED IN 2018)
- BORING

LITHOLOGIC DESCRIPTIONS

- COAL COMBUSTION RESIDUALS (CCR) / ASH
- FILL: LEAN CLAY, SANDY CLAY WITH SOME GRAVEL
- SANDY LEAN CLAY / RESIDUAL SOIL
- ALLUVIUM: ALTERNATING LAYERS OF SILTY SAND, SILT, SAND, CLAYEY SAND, SANDY CLAY, CLAY, AND CLAYEY GRAVEL
- PARTIALLY WEATHERED ROCK (PWR) SHALE
- BEDROCK (SHALE) LOWER CONASAUGA
- BEDROCK (SHALE) MIDDLE CONASAUGA
- SURFACE WATER (1 APRIL 2019)
- ASH POND FREE WATER (APPROXIMATE)

- MONITORING WELL
- SCREEN INTERVAL
- SOIL BORING
- GROUNDWATER ELEVATION (1 APRIL 2019)
- PERCHED WATER IN ASH POND (1 APRIL 2019)
- FAULT (APPROXIMATE LOCATION)

KEY MAP

NOTE:

1. SUBSURFACE LITHOLOGIC INFORMATION OBTAINED FROM BORING LOGS. LITHOLOGIC CONTACT BETWEEN BORINGS WERE INTERPOLATED AND THEREFORE ARE APPROXIMATE.
2. GROUND SURFACE BASED ON AN AERIAL SURVEY (DECEMBER 2012) SUPPLEMENTED BY ADDITIONAL SURVEY AND BATHYMETRY FROM JUNE 2018.
3. SURFACE WATER ELEVATION MEASURED AT COOSA RIVER STAFF GUAGE. ASH POND FREE WATER SURFACE ELEVATION ESTIMATED.

PRIVILEGED AND CONFIDENTIAL - ATTORNEY CLIENT WORK PRODUCT

GEOLOGIC CROSS SECTION A-A'
PLANT HAMMOND ASH POND 2 (AP-2)
FLOYD COUNTY, GEORGIA

PREPARED BY: Geosyntec consultants KENNESAW, GA		FIGURE 3-1A
PROJECT NO: GW6581B	OCTOBER 2019	

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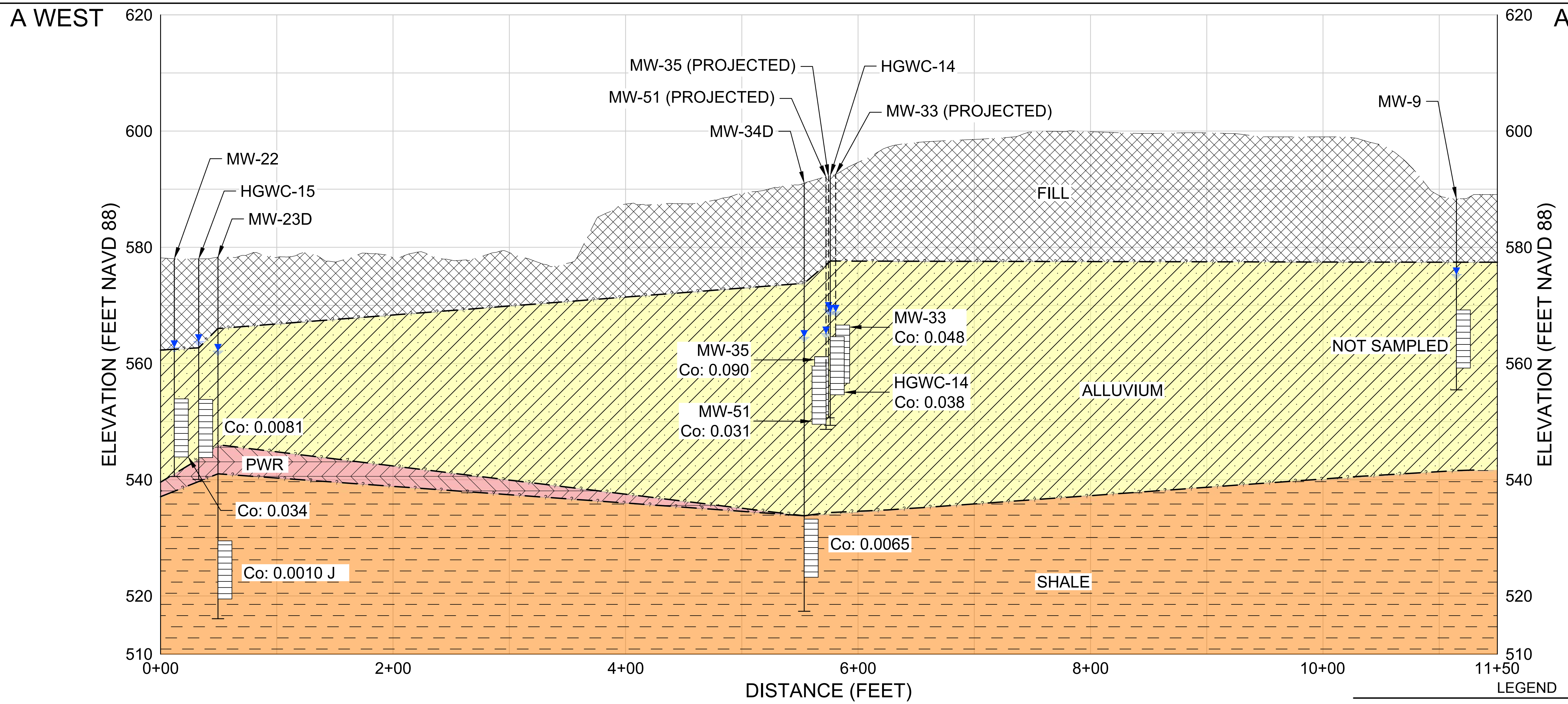
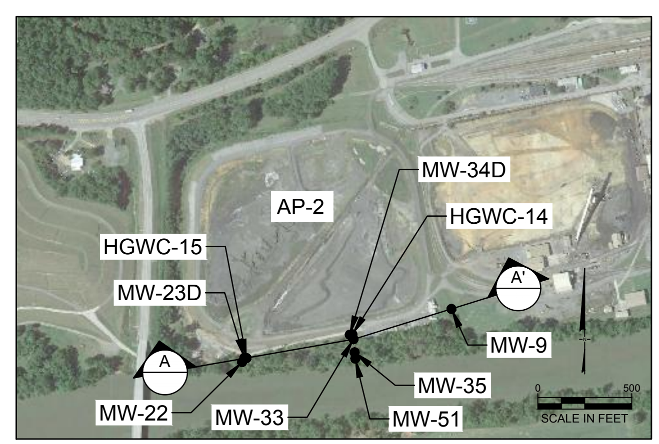


NOTES:

1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE BASED ON ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) 3D MODEL KRIGING AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATION PROVIDED IN FEET REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
4. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS AND MONITORING WELLS NOT INSTALLED BY GEOSYNTEC CONSULTANTS WERE PROVIDED BY GEORGIA POWER COMPANY.
5. GROUNDWATER LEVELS MEASURED BY GEOSYNTEC ON 31 JANUARY 2022.
6. COBALT (Co) CONCENTRATION DATA ARE FROM FEBRUARY 2022 SEMIANNUAL GROUNDWATER MONITORING EVENT. CONCENTRATIONS ARE REPORTED IN MILLIGRAMS PER LITER. A "<" INDICATES THE CONSTITUENT WAS NOT DETECTED ABOVE THE ANALYTICAL METHOD DETECTION LIMIT (MDL). A "J" INDICATES THE CONSTITUENT WAS ESTIMATED AND DETECTED BETWEEN THE MDL AND THE REPORTING LIMIT.
7. NO SAMPLE WAS OBTAINED WITHIN UPPER 10 TO 13 FEET OF BORING DUE TO HYDRO EXCAVATION AT MW-22, MW-23D, AND MW-34D.
8. MW-33, MW-35, AND MW-51 ARE PROJECTED AND LOCATED DOWNGRADED OF THE AP-2. LITHOLOGICAL DESCRIPTIONS FROM THESE BORING LOGS WERE EXCLUDED FROM THE CROSS SECTIONS.
9. THE STATE AND FEDERAL GROUNDWATER PROTECTION STANDARD (GWPS) FOR COBALT IS 0.038 MG/L.



SECTION A-A' KEY MAP

0 100
HORIZONTAL SCALE IN FEET

0 10
VERTICAL SCALE IN FEET

VERTICAL EXAGGERATION = 10X

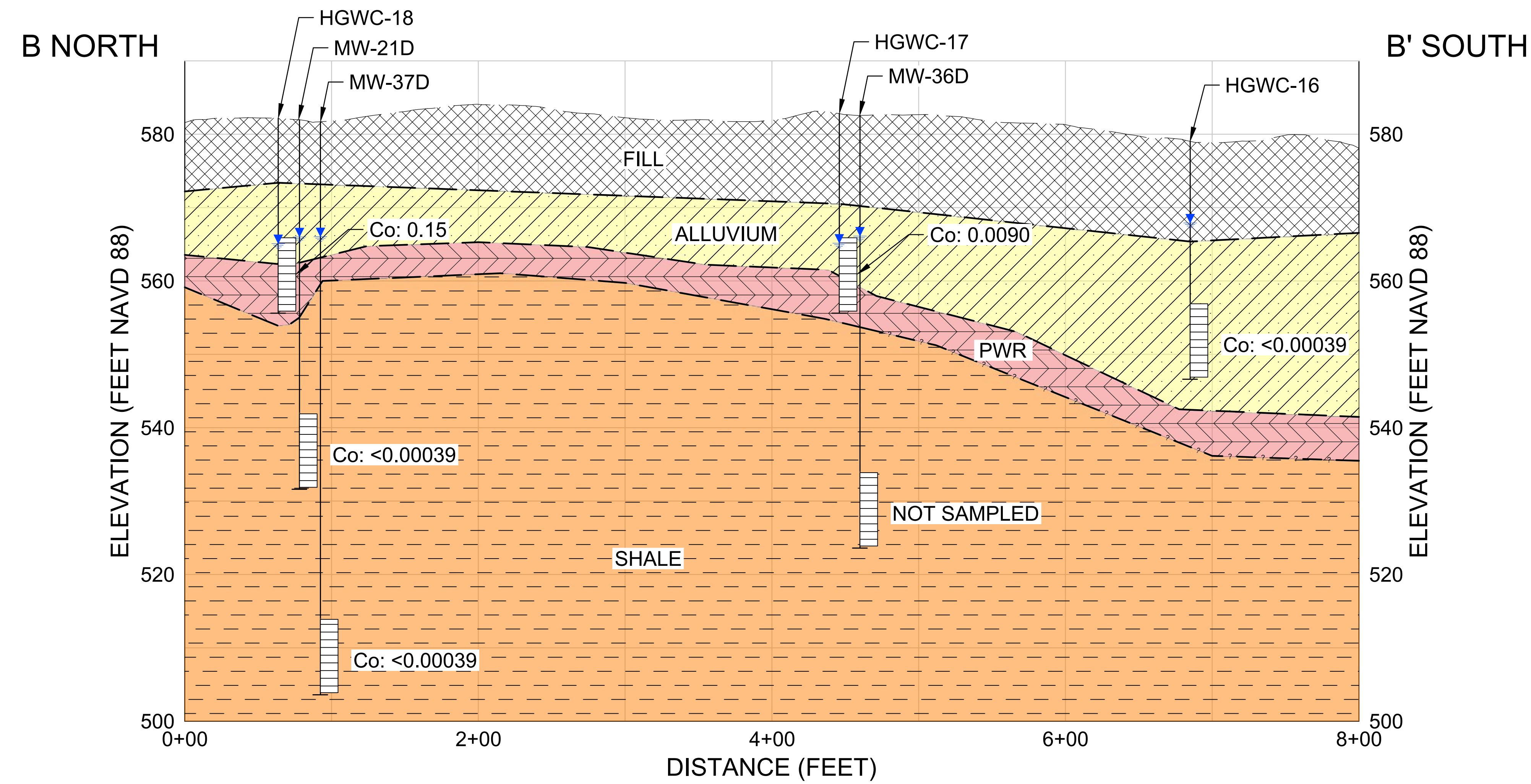
LEGEND

ESTIMATED LITHOLOGICS
EXTRAPOLATED SURFACE
WELL
PROJECTED WELL
SCREEN INTERVAL
GROUNDWATER LEVEL (NOTE 5)
FILL: SILTY CLAY, LEAN CLAY, SANDY CLAY WITH SOME GRAVEL
ALLUVIUM: CLAY, SILT, SANDY CLAY, CLAYEY GRAVEL, GRAVELLY CLAY
PARTIALLY WEATHERED ROCK (PWR)
SLIGHTLY TO MODERATELY WEATHERED SHALE

GEOLOGIC SECTION A-A
GEORGIA POWER COMPANY
PLANT HAMMOND ASH POND 2 (AP-2)
ROME, FLOYD COUNTY, GEORGIA

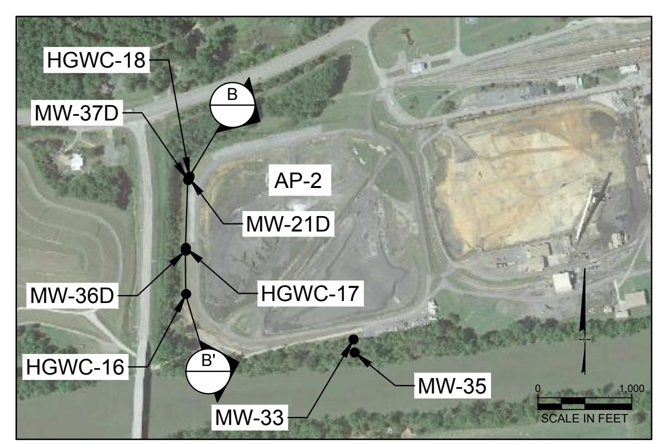
Geosyntec consultants
KENNESAW, GA

PROJECT NO: GW6581B	AUGUST 2022	FIGURE 3



NOTES:

1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE BASED ON ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) 3D MODEL KRIGING AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATION PROVIDED IN FEET REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
4. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS AND MONITORING WELLS NOT INSTALLED BY GEOSYNTEC CONSULTANTS WERE PROVIDED BY GEORGIA POWER COMPANY.
5. GROUNDWATER LEVELS MEASURED BY GEOSYNTEC ON 31 JANUARY 2022.
6. COBALT (Co) CONCENTRATION DATA ARE FROM FEBRUARY 2022 SEMIANNUAL GROUNDWATER MONITORING EVENT. CONCENTRATIONS ARE REPORTED IN MILLIGRAMS PER LITER. A "<" INDICATES THE CONSTITUENT WAS NOT DETECTED ABOVE THE ANALYTICAL METHOD DETECTION LIMIT (MDL).
7. NO SAMPLE WAS OBTAINED WITHIN UPPER 10 FEET OF BORING DUE TO HYDRO EXCAVATION AT MW-21D, MW-36D, AND MW-37D.
8. THE STATE AND FEDERAL GROUNDWATER PROTECTION STANDARD (GWPS) FOR COBALT IS 0.038 MG/L.



SECTION B-B' KEY MAP

LEGEND

- ESTIMATED LITHOLOGICS
- EXTRAPOLATED SURFACE
- WELL
- SCREEN INTERVAL
- GROUNDWATER LEVEL (NOTE 5)
- FILL: SILTY CLAY, LEAN CLAY, SANDY CLAY WITH SOME GRAVEL
- ALLUVIUM: CLAY, SILT, SANDY CLAY, CLAYEY GRAVEL, GRAVELLY CLAY
- PARTIALLY WEATHERED ROCK (PWR)
- SLIGHTLY TO MODERATELY WEATHERED SHALE

0 100
HORIZONTAL SCALE IN FEET
0 10
VERTICAL SCALE IN FEET
VERTICAL EXAGGERATION = 10X

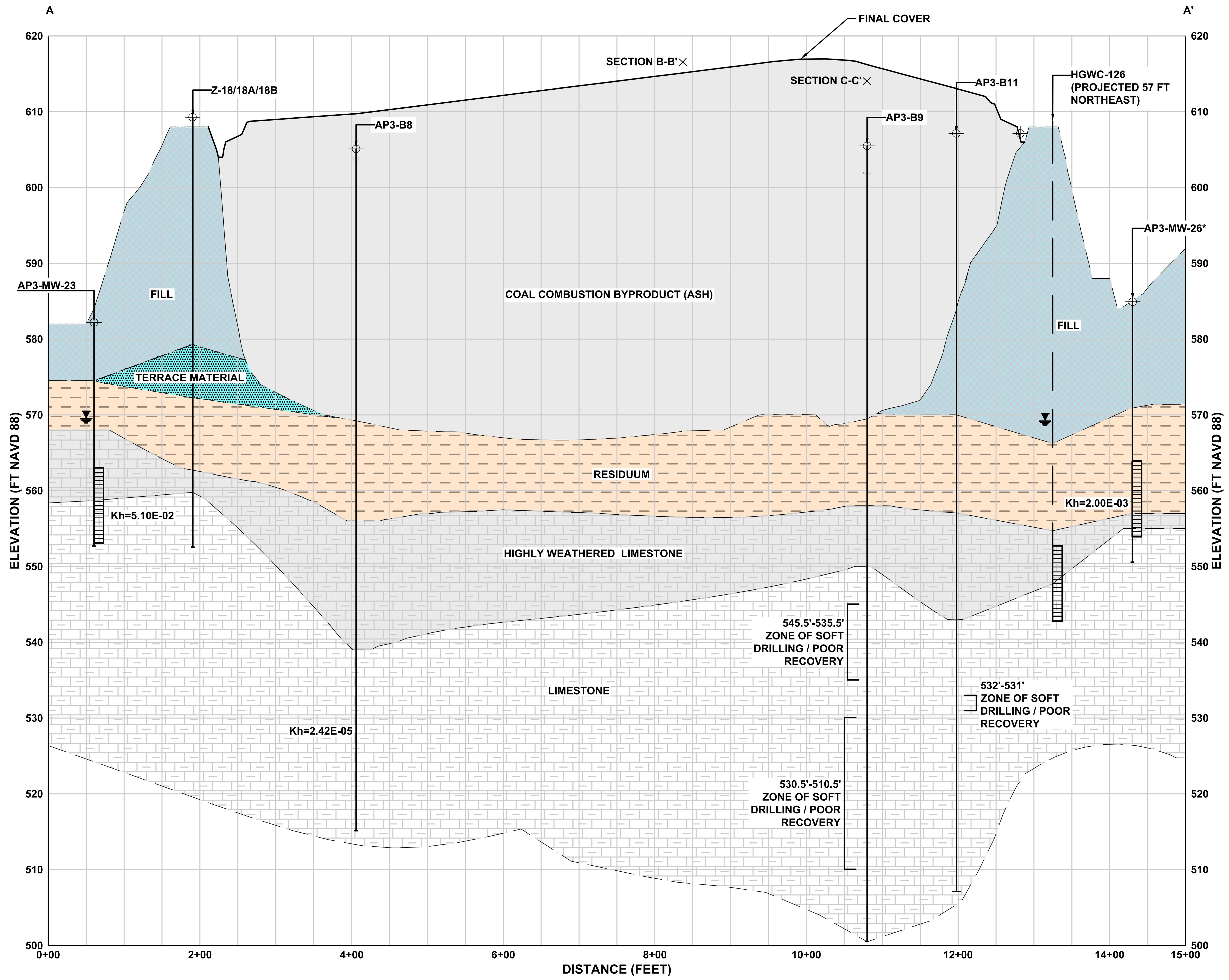
GEOLOGIC SECTION B-B'
GEORGIA POWER COMPANY
PLANT HAMMOND ASH POND 2 (AP-2)
ROME, FLOYD COUNTY, GEORGIA

Geosyntec consultants
KENNESAW, GA

PROJECT NO: GW6581B | AUGUST 2022

FIGURE 4

L:\G\GEORGIA POWER\PLANT HAMMOND GW6581B\FIGURES\GW6581B.01-FIG-001

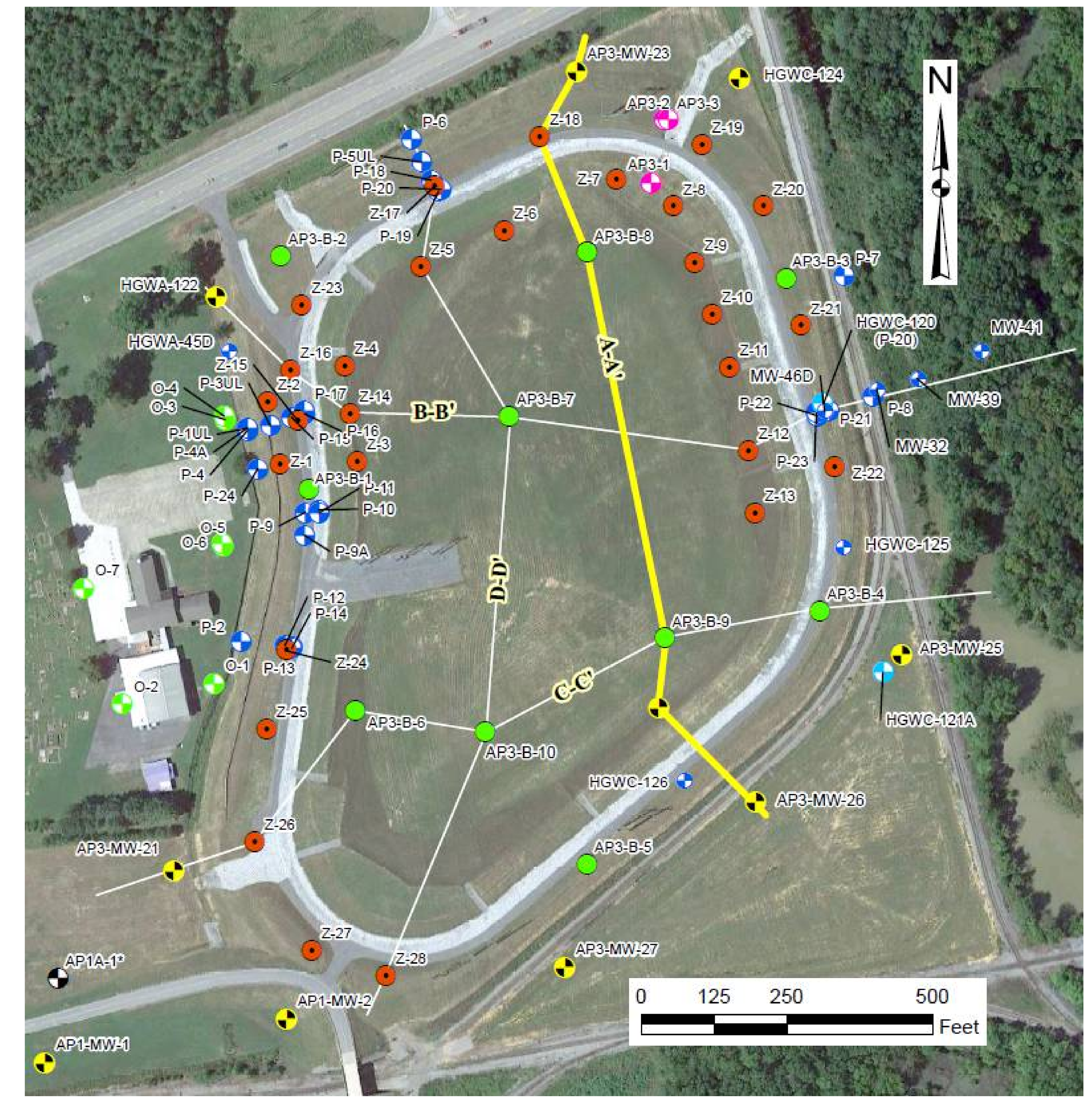


1 SECTION A-A'

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:

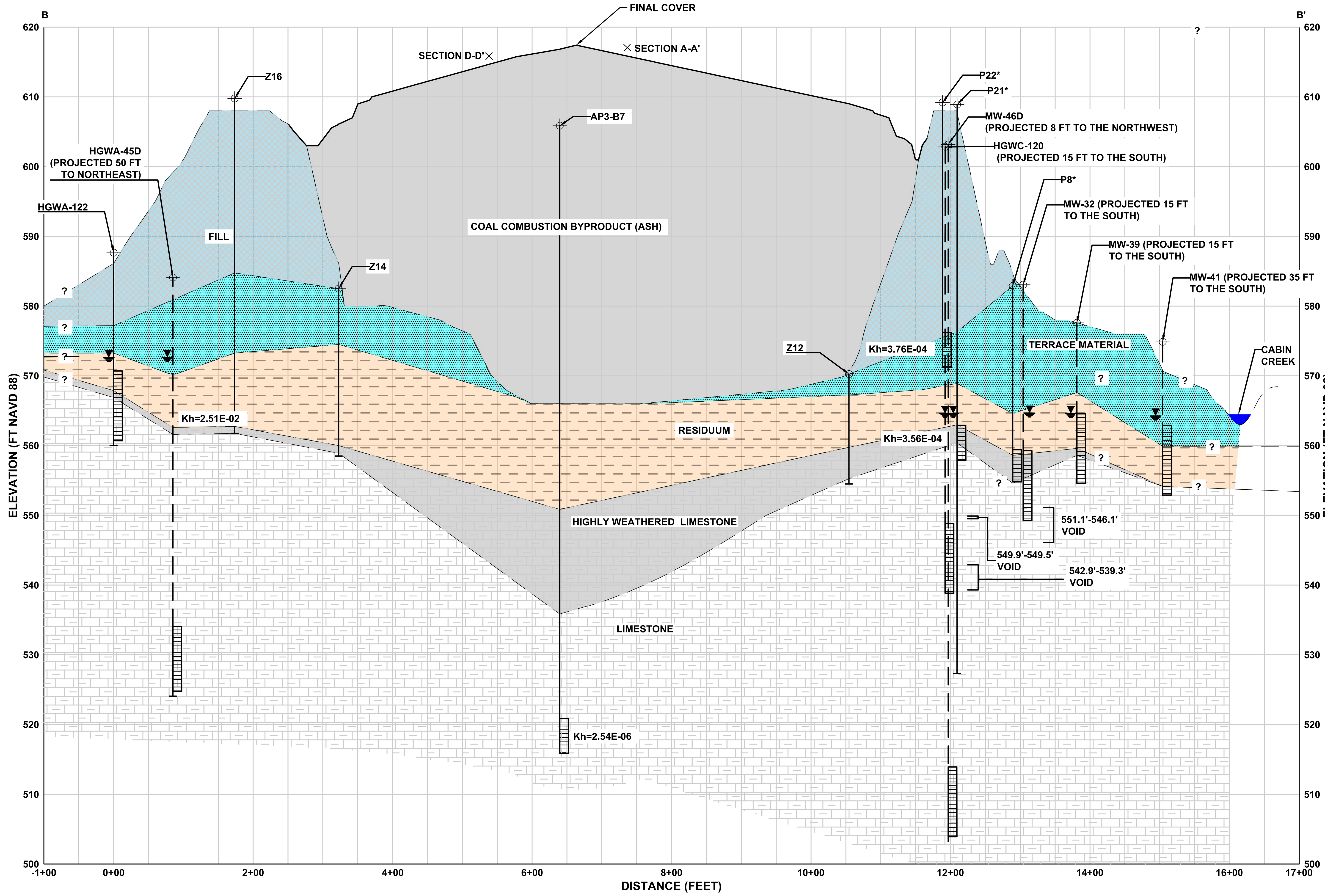
1. SUBSURFACE LITHOLOGIC ELEVATIONS BETWEEN BORINGS ARE INTERPRETED BASED ON AVAILABLE INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE.
2. ELEVATIONS OF LITHOLOGIC UNITS WERE ESTIMATED BASED ON GROUND SURFACE ELEVATIONS OF SOIL BORINGS.
3. BORING LOGS AND HYDROGEOLOGIC INFORMATION FOR SOIL BORINGS Z1 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

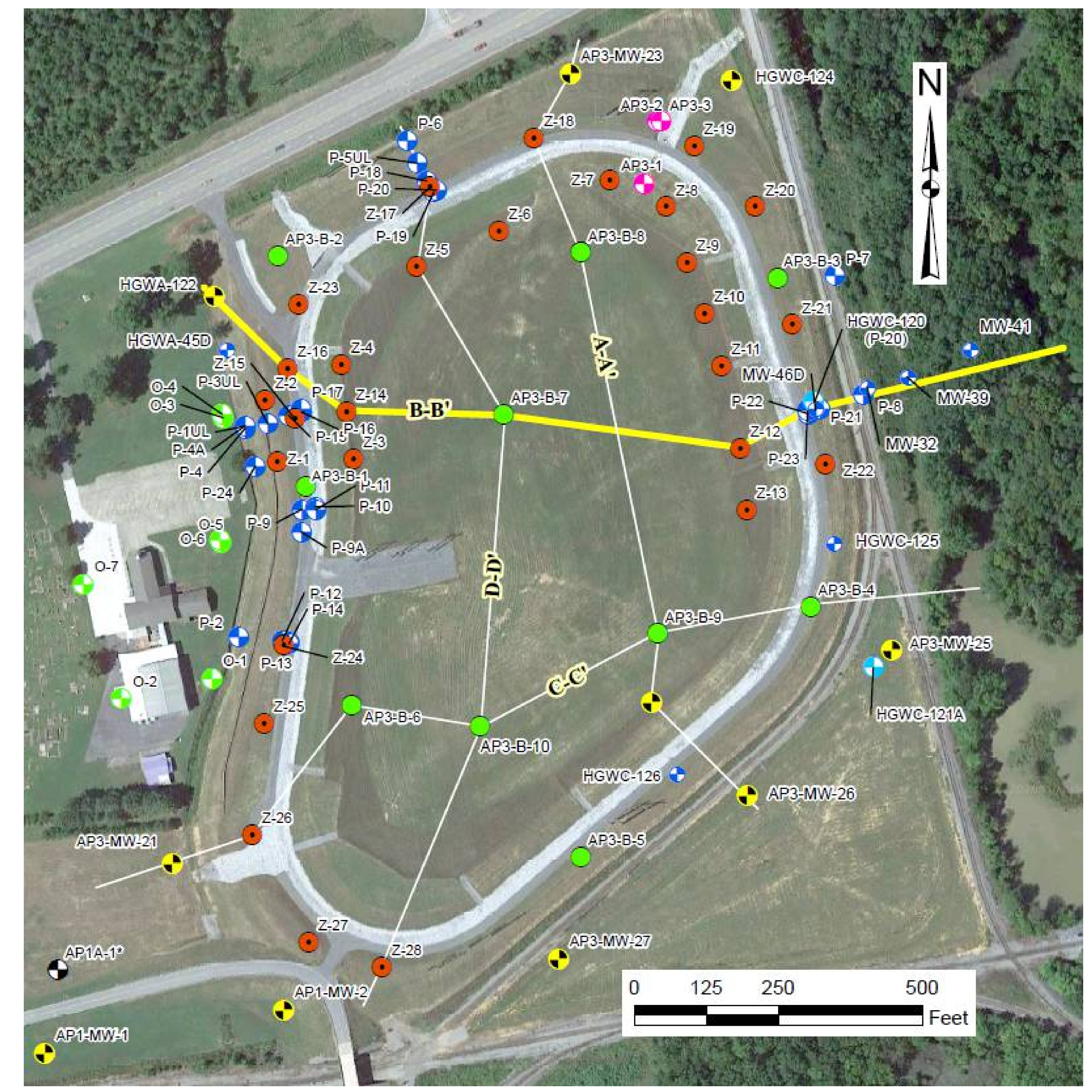
FIGURE 3-1A



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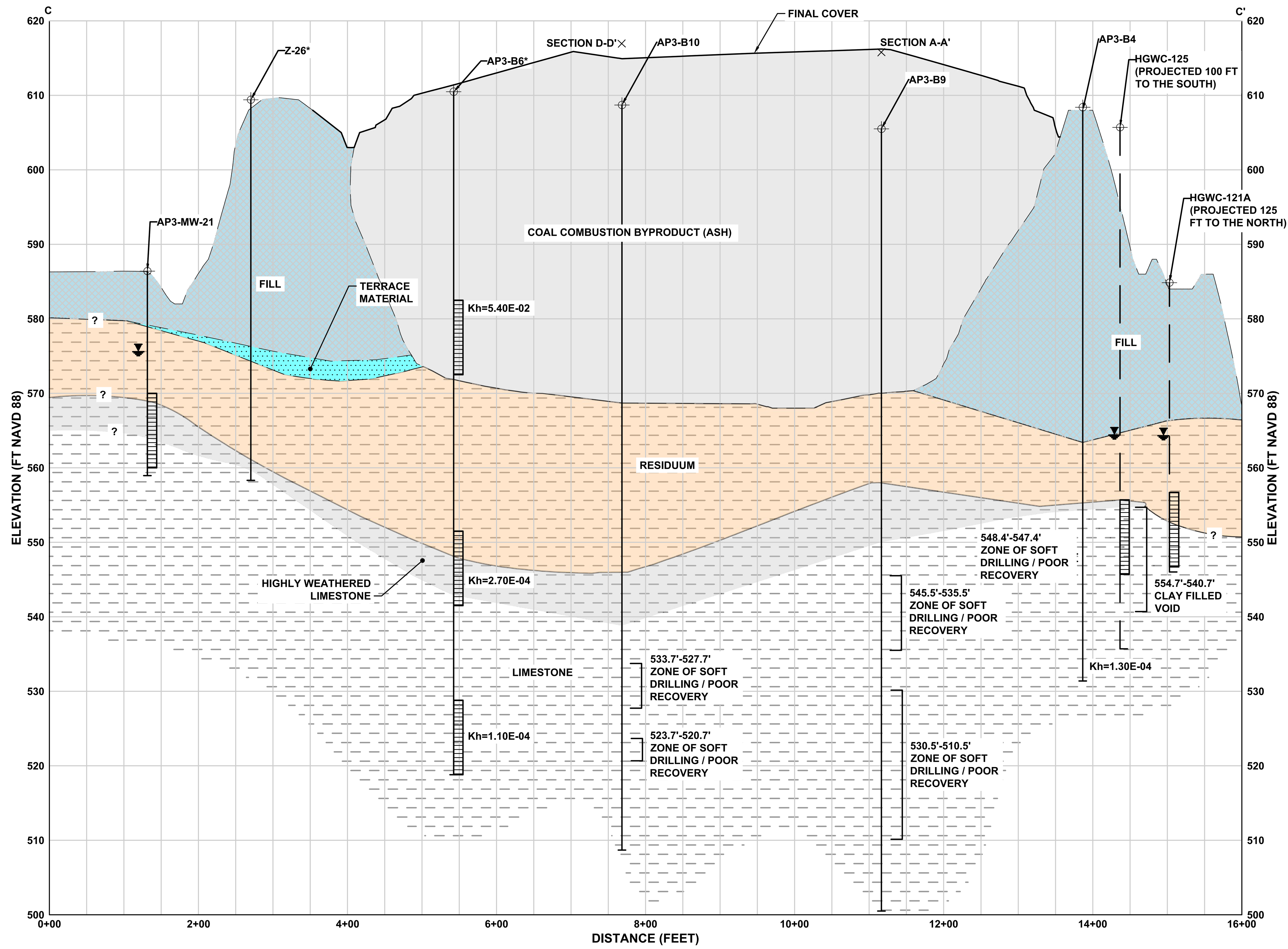
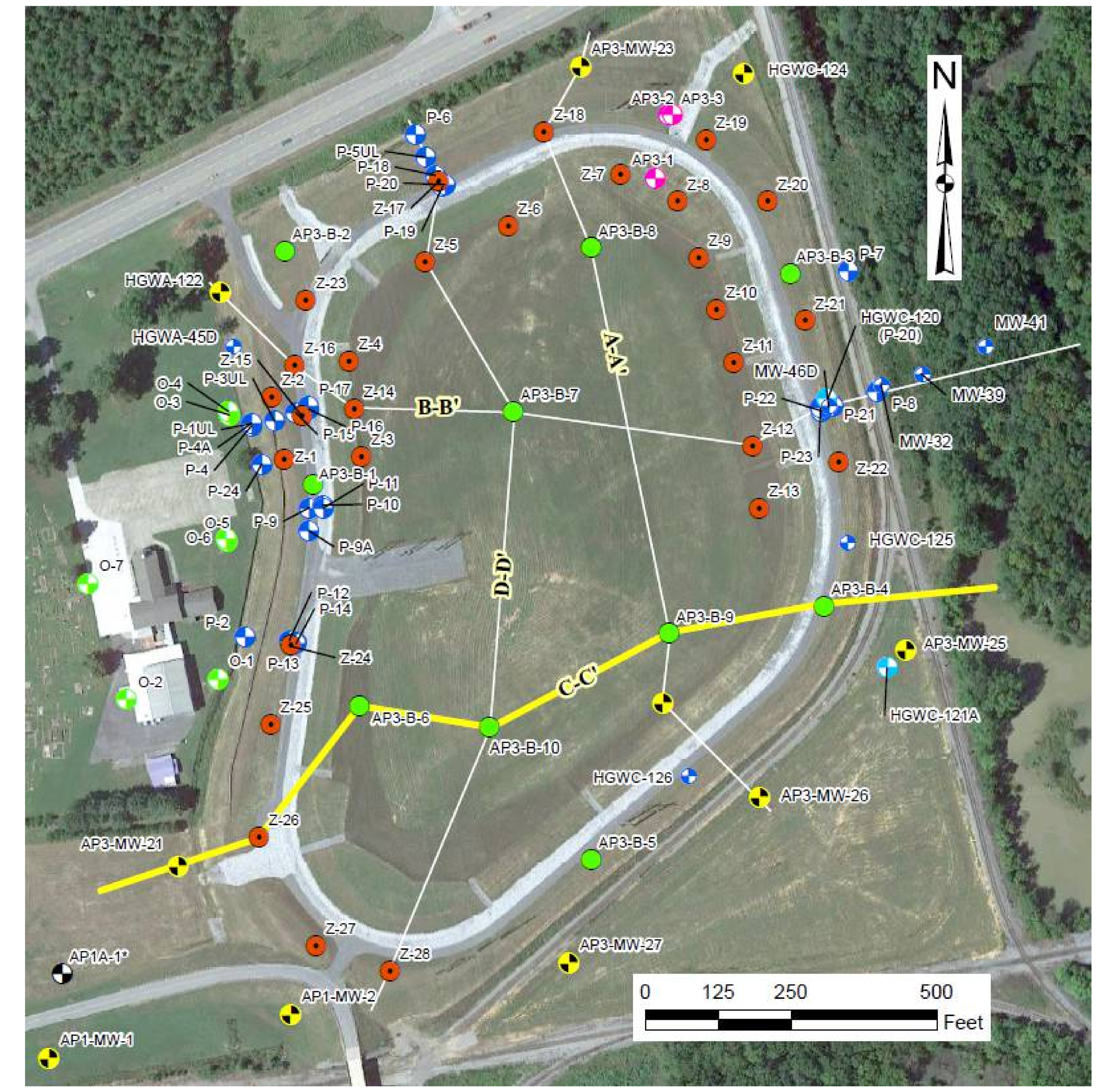
4. HORIZONTAL HYDRAULIC CONDUCTIVITY (Kh) IN CM/SEC. VERTICAL HYDRAULIC CONDUCTIVITY (Kv) IN CM/SEC.
5. EXISTING TOPOGRAPHIC MAP USED IN THE GEOLOGIC SECTION WAS BASED ON DRAWING NUMBER ES1844S1 PROVIDED BY SOUTHERN COMPANY SERVICES.
6. THE FINAL COVER CONSISTS OF A 60 MIL HDPE (HIGH DENSITY POLYETHYLENE)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

Geologic Section B-B' Georgia Power Company Plant Hammond AP3 Floyd County, Rome, Georgia	
Geosyntec consultants	FIGURE
Kennesaw, GA / September 2020	2-3B





KEY MAP

1

SECTION C-C'

0 100' 200'
HORIZONTAL SCALE

0 10' 20'
VERTICAL SCALE

VERTICAL EXAGGERATION: 10X

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.
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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.

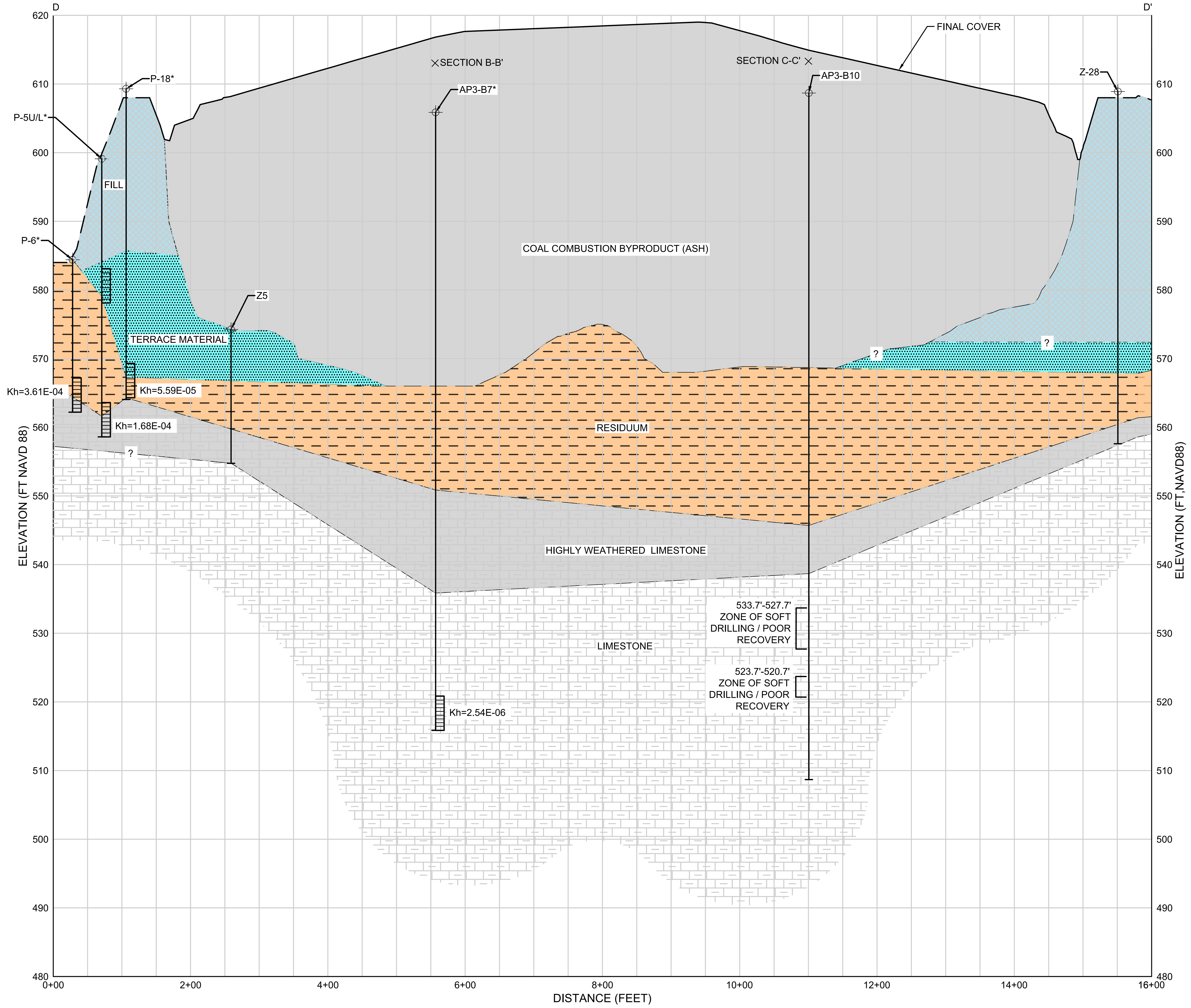
Geologic Section C-C'
Georgia Power Company
Plant Hammond AP3
Floyd County, Rome, Georgia

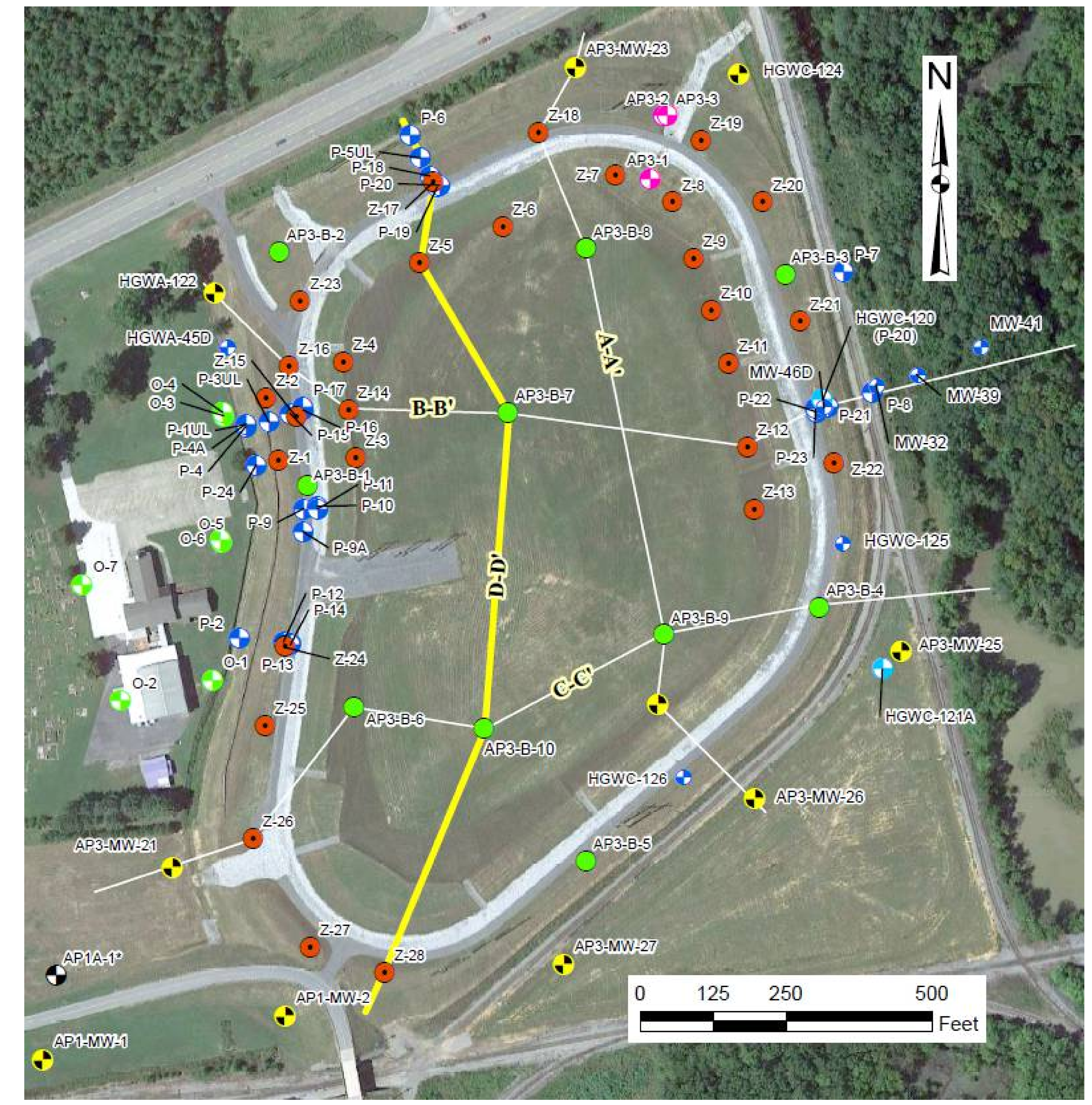
Geosyntec consultants

Kennesaw, GA | September 2020

FIGURE 2-3C

ATTORNEY-CLIENT PRIVILEGED AND CONFIDENTIAL





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)

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	FIGURE 3-1D
Kennesaw, GA September 2020	

APPENDIX C
HYDRAULIC
CONDUCTIVITY VALUES

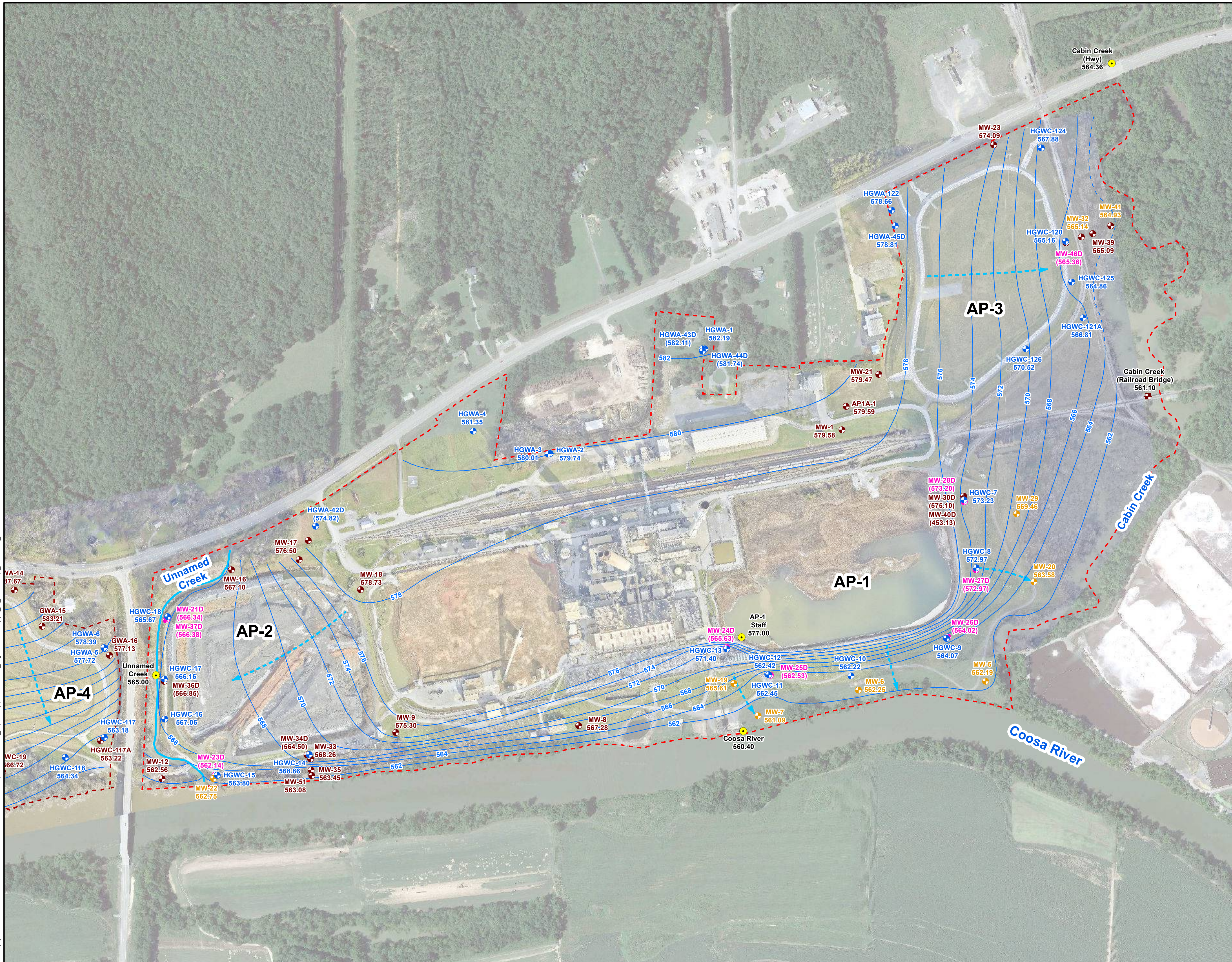
Appendix C
Hydraulic Conductivity Summary Table

Well ID	Ash Pond	Well Screen Geology	Average Kh (ft/d)	Average Kh (cm/s)	Reference
MW-1	AP-1	Residuum & HWR & Limestone	7.60	2.7E-03	AP-1 HAR Rev 1 (Geosyntec, 2019)
MW-2	AP-1	Residuum & Limestone	10.20	3.6E-03	
MW-3	AP-1	Residuum & Limestone	12.02	4.2E-03	
MW-4	AP-1	Alluvium & HWR	22.65	8.0E-03	
MW-5	AP-1	Alluvium	5.22	1.8E-03	
MW-6	AP-1	Alluvium & Limestone	32.32	1.1E-02	
MW-7	AP-1	Alluvium	66.61	2.3E-02	
MW-8	AP-1	Alluvium	2.34	8.3E-04	
MW-21	AP-1	Residuum & HWR & Limestone	24.00	8.5E-03	
HGWA-1 (MW-20)	NA	Limestone	4.00	1.4E-03	
HGWC-7	AP-1	Alluvium & HWR	1.50	5.3E-04	AP-1 ACM PR (Geosyntec, 2020)
HGWC-8	AP-1	Alluvium	10.00	3.5E-03	
HGWC-9	AP-1	Alluvium & HWR & Limestone	6.60	2.3E-03	
HGWC-12	AP-1	Alluvium & Limestone	22.68	8.0E-03	
HGWC-13	AP-1	Alluvium	2.10	7.4E-04	
MW-19	AP-1	Alluvium	1.60	5.6E-04	
MW-25D	AP-1	Limestone	0.19	6.7E-05	
HGWC-14 (MW-10)	AP-2	Alluvium	6.60	2.3E-03	AP-2 ACM PR (Geosyntec, 2020)
HGWC-15 (MW-11)	AP-2	Alluvium	0.95	3.4E-04	
HGWC-16 (MW-13)	AP-2	Alluvium	0.65	2.3E-04	
HGWC-17 (MW-14)	AP-2	Alluvium & HWR	0.70	2.5E-04	
HGWC-18 (MW-15)	AP-2	Alluvium & HWR	0.40	1.4E-04	
MW-9	AP-2	Alluvium	2.88	1.0E-03	AP-2 HAR Rev 1 (Geosyntec, 2019)
MW-12	AP-2	Alluvium	0.27	9.5E-05	
MW-17	AP-2	Residuum & HWR	3.79	1.3E-03	
MW-18	AP-2	Alluvium & HWR	4.28	1.5E-03	
MW-21D	AP-2	Shale	1.54	5.4E-04	AP-2 ACM PR (Geosyntec, 2020)
MW-23D	AP-2	Shale	2.70	9.5E-04	
MW-33	AP-2	Alluvium	1.97	6.9E-04	Geosyntec October 2021 Data Analysis
MW-34D	AP-2	Shale	2.00	7.1E-04	AP-2 ACM PR (Geosyntec, 2020)
MW-35	AP-2	Alluvium	0.24	8.5E-05	Geosyntec October 2021 Data Analysis
MW-51	AP-2	Alluvium	0.23	8.1E-05	
AP3-B1	AP-3	Limestone	1.75	6.2E-04	AP-3 HAR Rev 1 (Geosyntec, 2019)
AP3-B2	AP-3	Limestone	1.05	3.7E-04	
AP3-B3	AP-3	Limestone	8.24	2.9E-03	
AP3-B4*	AP-3	Limestone	2.69	9.5E-04	
AP3-B5	AP-3	Limestone	2.45	8.6E-04	
AP3-B6D	AP-3	Limestone	0.15	5.3E-05	
AP3-B6I	AP-3	Residuum to HWR	0.29	1.0E-04	
AP3-B6S*	AP-3	CCR	4.36	1.5E-03	
AP3-B8*	AP-3	Limestone	1.84	6.5E-04	
MW-32	AP-3	HWR & Limestone	50.56	1.8E-02	Tree Well Pre-Design (Geosyntec, 2021)
MW-39	AP-3	Residuum & HWR & Limestone	8.73	3.1E-03	
MW-41	AP-3	Alluvium to Residuum	6.56	2.3E-03	
TWB-01	AP-3	Alluvium & Limestone	13.58	4.8E-03	
TWB-02	AP-3	Alluvium & Limestone	28.96	1.0E-02	
TWB-03	AP-3	Alluvium & Limestone	28.81	1.0E-02	
TWB-04	AP-3	Alluvium & Limestone	2.57	9.1E-04	
TWB-05	AP-3	Limestone	3.92	1.4E-03	

Hydraulic Conductivity Statistics				
Well Screen Geology	Min (ft/d)	Max (ft/d)	Geomean (ft/d)	Count
CCR	4.40	4.40	NA	1
Alluvium	0.23	66.61	1.93	14
Limestone	0.15	8.24	1.55	10
Shale	1.54	2.70	2.03	3

Notes:
1. K_h = Horizontal Hydraulic Conductivity, estimated from slug test or packer test data.
2. NA = Not Applicable.
3. ft/d = feet per day.
4. cm/s = centimeters per second.
6. CCR = Coal Combustion Residual.
7. HWR = Highly Weathered Rock
8. -- = No Data.
9. Statistics were only calculated for wells screened in a single geologic unit.
10. Many wells were screened across multiple geologic units.
11. * denotes wells where conductivity values were revised from the original reported value.

APPENDIX D
POTENTIOMETRIC SURFACE
CONTOUR MAP - JANUARY 2022



N

LEGEND

- Compliance Monitoring Well
- Horizontal Delineation Well
- Vertical Delineation Well
- Piezometer
- Staff Gauge
- Surface Water Level Gauge Point
- Groundwater Elevation Iso-Contour (Inferred where dashed)
- Approximate Groundwater Flow Direction
- Plant Hammond Property Boundary

Notes:
1. Water level elevation recorded on January 31, 2022. Elevation provided in feet (ft) referenced to the North American Vertical Datum of 1988 (NAVD 88).
2. Groundwater elevations in parentheses were not used to make the groundwater contours because these wells are screened at a different elevation in the formation/aquifer.
4. Aerial photograph source: GPC, Jan 26, 2022.

0 290 580 870 1,160

SCALE IN FEET

POTENTIOMETRIC SURFACE CONTOUR MAP - JANUARY 2022

GEORGIA POWER COMPANY
PLANT HAMMOND
ROME, FLOYD COUNTY, GEORGIA

Prepared For: Georgia Power

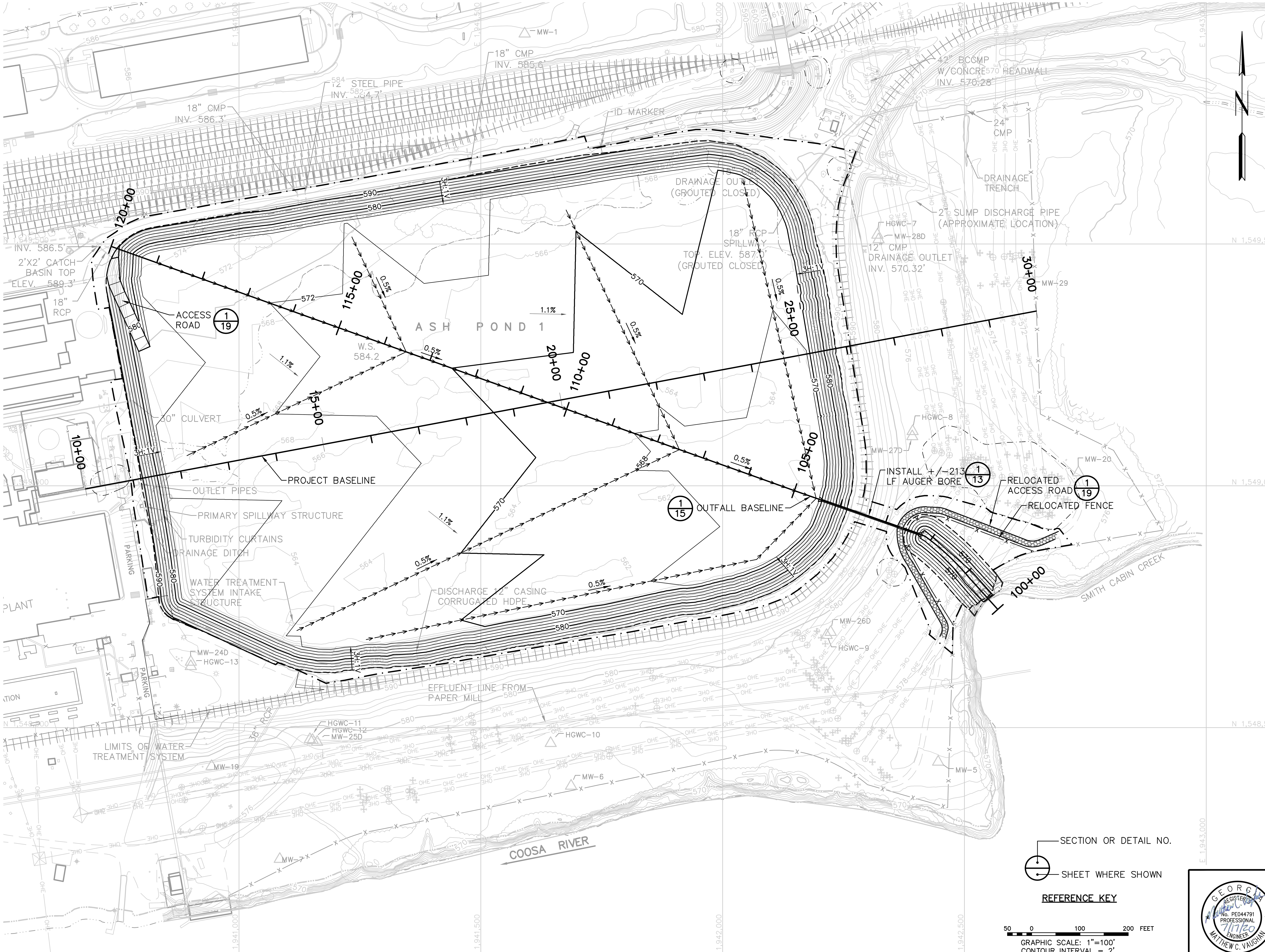
Prepared By: Geosyntec consultants

KENNESAW, GA | DECEMBER 2022

FIGURE 1

\\aro-01\prj1\$GA Power\Plant Hammond\Plant Hammond AP3\Model\Transient Update 2022\08_report\Appendix A\02_Figures\GIS\Appx_D_POT Map_Jan2022_Sitewide.mxd 11/7/2022 4:56:25 PM

APPENDIX E
CLOSURE PLAN DRAWINGS



MAPPING NOTE:

TOPOGRAPHIC AND PLANIMETRIC SURVEY INFORMATION FOR THE PLANS WERE OBTAINED FROM AN AERIAL SURVEY PERFORMED BY METRO ENGINEERING & SURVEYING CO., INC. IN DECEMBER 2012 SUPPLEMENTED WITH TOPOGRAPHIC AERIAL AND BATHYMETRIC SURVEYS PERFORMED BY METRO ENGINEERING & SURVEYING CO., INC. IN JUNE 2018 PROVIDED BY SOUTHERN COMPANY. ALL COORDINATES ARE BASED ON NORTH AMERICAN DATUM 83 (NAD 83), GEORGIA STATE PLANE, WEST ZONE. ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM 88 (NAVD 88).

NOTES:

1. CONTRACTOR SHALL NOT PLACE FILL MATERIAL FOR FINAL GRADE UNTIL RECEIVING APPROVAL FROM THE OWNER.
2. THE CONTOURS SHOWN DEPICT THE PROPOSED FINAL GRADE INCLUDING REQUIRED TOPSOIL. THE CONTRACTOR SHALL PLACE A MINIMUM OF SIX INCHES OF UNSETTLED TOPSOIL OR SOIL WITH PROGANICS (OR APPROVED EQUIVALENT) ON ALL AREAS TO RECEIVE PERMANENT SEEDING. THE CONTRACTOR SHALL FOLLOW THE TECHNICAL SPECIFICATION REQUIREMENTS FOR SOIL AMENDMENTS AND AGRONOMIC TESTING TO SUPPORT ESTABLISHMENT OF PERMANENT VEGETATION.
3. THE AUGER BORE OUTFALL CONSTRUCTION SHALL NOT BEGIN (AND PUMPING FROM THE DEWATERING BASIN SHALL CONTINUE) UNTIL APPROPRIATE ES&PC MEASURES ARE IN PLACE AND APPROVAL OBTAINED FROM THE OWNER.
4. THE RAILROAD TRACKS SHOWN ALONG THE SOUTHERN DIKE OF AP-1 WILL REMAIN IN SERVICE THROUGH THE PROJECT COMPLETION. CONTRACTOR SHALL NOT DISTURB THE RAIL OR INTERRUPT RAIL OPERATIONS EXCEPT DURING THE AUGER BORE PIPE INSTALLATION.
5. RELOCATED FENCE TO MATCH EXISTING SECURITY FENCE AND OWNER REQUIREMENTS. CONTRACTOR TO PROVIDE A GATE FOR PERSONNEL ACCESS TO THE DISCHARGE DITCH AS DIRECTED BY THE OWNER.

LEGEND

- 500 EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EDGE OF WATER
- GRAVEL ROAD
- TREE LINE
- FENCE
- GUARDRAIL
- RAILROAD TRACKS
- POWER POLE
- LIGHT POLE
- TRANSMISSION BASE
- GUY ANCHOR
- SIGN
- STEEL LATTICE
- LIMITS OF CONSTRUCTION
- 25-FOOT CLEARANCE
- PROPERTY BOUNDARY
- OHE OVERHEAD ELECTRIC
- 25' STATE STREAM BUFFER
- 500 PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- LIMITS OF GRADING
- DITCH FLOW DIRECTION

ISSUED FOR CONSTRUCTION

PLOT DATE: 07/16/2020 USER: JOHNSON, TRACY (LEXINGTON)
V:\1755\ACTIVE\175518002_TECHNICAL_PRODUCTION\DRAWING\SHEET_FILES\AP1\IFC\12_18002-104-FG01.DWG

REV	DATE	DESCRIPTION	DRN	CHK
0	07/17/20	ISSUED FOR CONSTRUCTION	TJ	CJJ

FINAL GRADE PLAN

AP-1 CLOSURE PLAN

FOR

PLANT HAMMOND - GEORGIA POWER

FLOYD COUNTY, GEORGIA

GEORGIA REGISTERED PROFESSIONAL ENGINEER No. PE044791 MATTHEW C. VAUGHAN 7/17/20

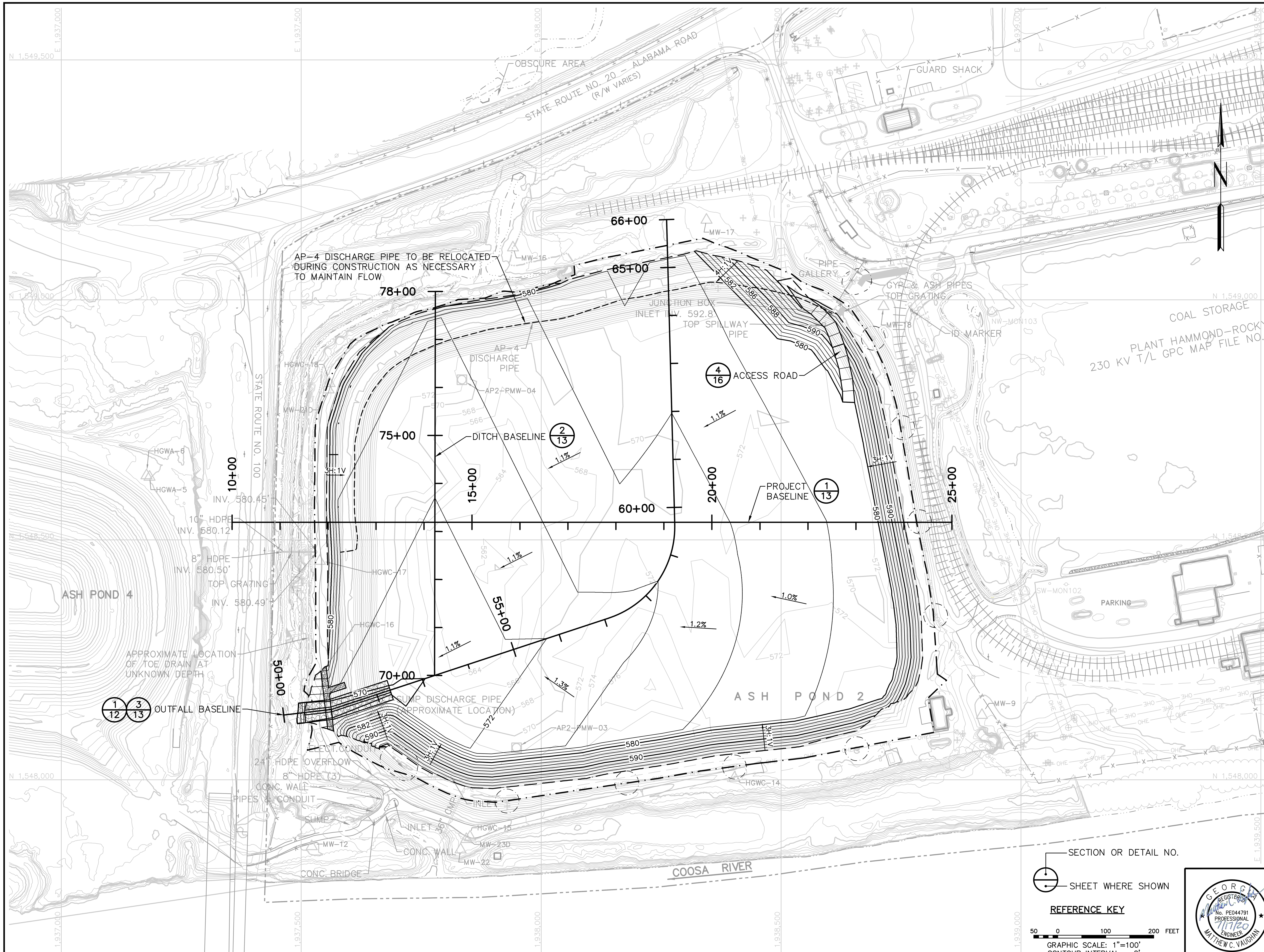
Stantec

1110 Market Street, Suite 214A
Chattanooga, Tennessee 37402-2863
www.stantec.com

PROJ. NO.	175518002	DWG. 12_18002-104-FG01	EDIT 07/17/20
SCALE	1"=100'	SHEET 12 OF 19	
DATE	JULY 2020		

RELEASED

ACCEPTED



MAPPING NOTE:

TOPOGRAPHIC AND PLANIMETRIC SURVEY INFORMATION FOR THE PLANS WERE OBTAINED FROM AN AERIAL SURVEY PERFORMED BY METRO ENGINEERING & SURVEYING CO., INC. IN DECEMBER 2012 SUPPLEMENTED WITH TOPOGRAPHIC AND PLANIMETRIC SURVEY INFORMATION OBTAINED FROM DRAWING P317–3, REV 3 BY METRO ENGINEERING & SURVEYING CO. INC. DATED FEBRUARY 26, 2013, TOPOGRAPHIC AERIAL AND BATHYMETRIC SURVEYS PERFORMED BY METRO ENGINEERING & SURVEYING CO., INC. IN JUNE 2018, PLANIMETRICS SURVEY PERFORMED BY METRO ENGINEERING & SURVEYING CO., INC. IN SEPTEMBER 2018 AND AN AERIAL SURVEY FLOWN IN DECEMBER 2019 PROVIDED BY SOUTHERN COMPANY. ALL COORDINATES ARE BASED ON NORTH AMERICAN DATUM 83 (NAD 83), GEORGIA STATE PLANE, WEST ZONE. ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM 88 (NAVD 88).

NOTES:

1. CONTRACTOR SHALL NOT PLACE FILL MATERIAL FOR FINAL GRADE UNTIL RECEIVING APPROVAL FROM THE OWNER.
2. THE CONTOURS SHOWN DEPICT THE PROPOSED FINAL GRADE INCLUDING REQUIRED TOPSOIL. THE CONTRACTOR SHALL PLACE A MINIMUM OF SIX INCHES OF UNSETTLED TOPSOIL OR SOIL WITH PROGANICS (OR APPROVED EQUIVALENT) ON ALL AREAS TO RECEIVE PERMANENT SEEDING. THE CONTRACTOR SHALL FOLLOW THE TECHNICAL SPECIFICATION REQUIREMENTS FOR SOIL AMENDMENTS AND AGRONOMIC TESTING TO SUPPORT ESTABLISHMENT OF PERMANENT VEGETATION.
3. THE PERIMETER DIKE BREACH SHALL NOT BE EXCAVATED (AND PUMPING FROM ASH POND 2 SHALL CONTINUE) UNTIL APPROPRIATE ES&PC MEASURES ARE IN PLACE AND APPROVAL OBTAINED FROM THE OWNER.

LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EDGE OF WATER
- GRAVEL ROAD
- TREE LINE
- FENCE
- GUARDRAIL
- RAILROAD TRACKS
- POWER POLE
- LIGHT POLE
- TRANSMISSION BASE
- GUY ANCHOR
- SIGN
- LIMITS OF CONSTRUCTION
- 25–FOOT CLEARANCE
- PROPERTY BOUNDARY
- OVERHEAD ELECTRIC
- 25' STATE STREAM BUFFER
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- LIMITS OF GRADING

PLOT DATE: 07/09/2020 USER: FLYNN, RENEE

ISSUED FOR CONSTRUCTION

REV	DATE	DESCRIPTION	DRN	CHK
0	07/17/20	ISSUED FOR CONSTRUCTION	TJ	CJJ

FINAL GRADE PLAN

AP-2 CLOSURE PLAN

FOR

PLANT HAMMOND - GEORGIA POWER

FLOYD COUNTY, GEORGIA

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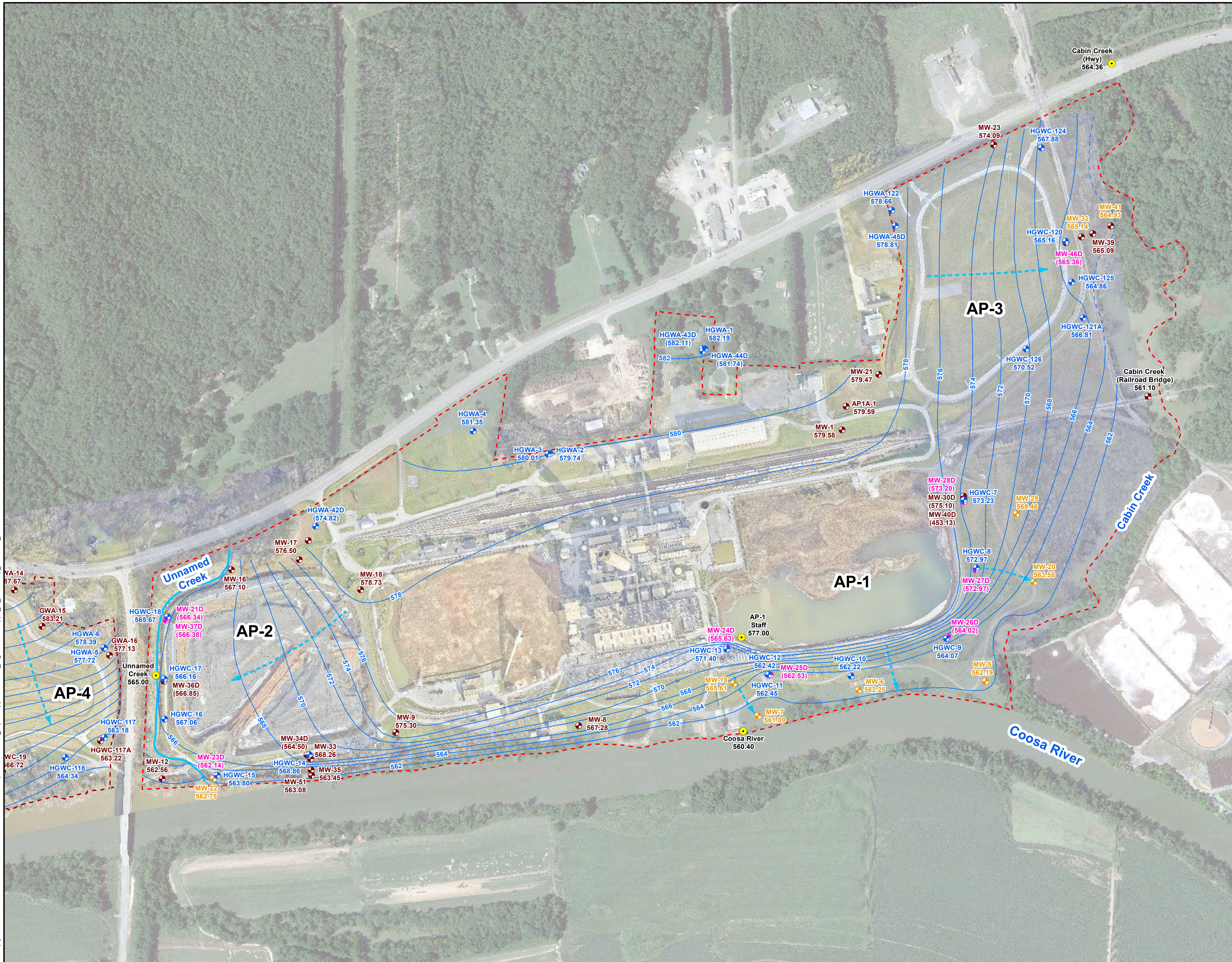
APPENDIX B
Potentiometric Surface Contour Map



LEGEND

- Compliance Monitoring Well
- Horizontal Delineation Well
- Vertical Delineation Well
- Piezometer
- Staff Gauge
- Surface Water Level Gauge Point
- Groundwater Elevation Iso-Contour (Inferred where dashed)
- Approximate Groundwater Flow Direction
- Plant Hammond Property Boundary

Notes:

1. Water level elevation recorded on January 31, 2022. Elevation provided in feet (ft) referenced to the North American Vertical Datum of 1988 (NAVD 88).
2. Groundwater elevations in parentheses were not used to make the groundwater contours because these wells are screened at a different elevation in the formation/aquifer.
4. Aerial photograph source: GPC, Jan 26, 2022.

0 290 580 870 1,160

SCALE IN FEET

POTENTIOMETRIC SURFACE CONTOUR MAP - JANUARY 2022

GEORGIA POWER COMPANY
PLANT HAMMOND
ROME, FLOYD COUNTY, GEORGIA

Prepared For: Georgia Power

Prepared By: Geosyntec consultants

FIGURE 1

KENNESAW, GA | DECEMBER 2022