LOCATION RESTRICTIONS REPORT

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

FOR

Georgia Power

September 2019

Geosyntec consultants

engineers | scientists | innovators

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TABLE OF CONTENTS

LIST OF FIGURES

APPENDIX

LIST OF ACRONYMS

ACRONYM	DEFINITION
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPD	Environmental Protection Division
FIRM	Flood Insurance Rate Map
GAEPD	Georgia Environmental Protection Division
GPC	Georgia Power Company
HAR	Hydrogeologic Assessment Report
LRR	Location Restrictions Report
USGS	United States Geological Survey
USEPA	United States Environmental Protection Agency

1. INTRODUCTION AND GENERAL SITE AREA

1.1 Introduction

Georgia Power Company's (GPC's) Plant Hammond (Plant) is a four-unit, coal-fired electric generating facility located in Rome, Floyd County, Georgia. The Plant is located along the Coosa River, approximately 10 miles west of Rome, Georgia. It is owned and operated by GPC. The Plant has been in operation since 1954 and over the course of power generation at the facility, four (4) Coal Combustion Residuals (CCR) ponds, identified as ponds AP-1, AP-2, AP-3, and AP-4, were utilized. Plant Hammond is currently in the processed of being decertified and decommissioned.

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

This Location Restriction Report (LRR) focuses only on AP-3 (Site), located on the northeastern corner of the Plant, as shown on **Figure 1-1**. This LRR was completed in accordance with relevant sections of the Georgia Rules for Solid Waste Management, Chapter 391-3-4-.10 on CCR and with the USEPA CCR Rule. This assessment provides site information regarding AP-3 as an inactive CCR surface impoundment that has been closed in place.

1.2 Description of the Area

The Plant occupies approximately 1,100 acres and is bordered by Georgia Highway 20 (GA-20) on the north, the Coosa River on the south, Cabin Creek and industrial land on the east, and sparsely populated, forested, rural and industrial land on the west. **Figure 1-1** shows a plan view of the Plant, including AP-3. The physical address of the Plant is 5963 Alabama Highway, Rome, Georgia, 30165.

AP-3 was constructed by GPC in 1974 covering an area of approximately 25 acres. Ash sluicing and placement operations at AP-3 commenced in June 1977. In 1982, AP-3 was converted into a dry ash disposal area and in the early 1990's the pond stopped receiving CCR materials. Final capping of the pond with a low-permeability cover system was completed in January 2018.

2. LOCATION RESTRICTIONS

The location restrictions from the USEPA CCR Rule that are relevent to AP-3 as an inactive CCR surface impoundment (as defined in 40 Code of Federal Regulations [CFR] 257.53) include placement above the uppermost aquifer, proximity to wetlands, fault areas, seismic impact zones, and unstable areas. In addition, the GAEPD Rules (391-3-4-.10) require that the location of the floodplain relative to the disposal unit be identified. Each of these relevant siting criteria is discussed in more detail below.

2.1 Placement Above the Uppermost Aquifer

The USEPA CCR Rule (40 CFR §257.60) states that existing CCR surface impoundments must be constructed with a base that is no less than five feet above the upper limit of the uppermost aquifer. A detailed description of the geology and hydrogeology of the AP-3 area is included in the *Hydrogeologic Assessment Report* (HAR) prepared by Geosyntec (2018), and is being updated in the 2019 permit resubmittal. A brief summary of the Site hydrogeology related to the uppermost aquifer is presented below.

The uppermost aquifer at the Site is a regional groundwater aquifer that occurs in the residuum and within the highly weathered and fractured bedrock. Under natural conditions the water table surface is a subdued reflection of the topography (see **Figure 2-1**), with groundwater generally flowing southward from the higher elevations of Judy Mountain and Turnip Mountain on the north side of GA-20 to lower elevations to the south and east.

Groundwater elevations and flow directions at the facility are influenced by the natural surface water features and by human-made surface water features on-site (i.e. nearby AP-1). The water levels present at AP-1 (until dewatering and closure are completed) may influence the groundwater elevations near the southern portions of AP-3.

Depth to the uppermost aquifer (water table) in the vicinity of AP-3 ranges from 10 to 15 feet below ground surface (ft bgs) outside of the pond footprint. A potentiometric surface map depicting recent groundwater elevations (June 2018) in the uppermost aquifer at AP-3 is included in **Figure 2-2**. Based upon our review of the current data, AP-3 does not meet the location restriction requirements of 40 CFR §257.60.

2.2 Proximity to Wetlands

The USEPA CCR Rule (40 CFR §257.61) states that existing CCR surface impoundments must not be located in wetlands, as defined by the U.S. Army Corps of Engineers without special considerations and permitting. A review of the National Wetlands Inventory database identifies areas of wetlands to the east and south of AP-3, as shown on **Figure 2-3**. The limits of AP-3 do not include any wetlands and no jurisdictional wetlands were identified in this review. In January 2018, a wetlands survey was conducted by GPC to further delineate jurisdictional wetlands, open waters, and streams (Ecological Solutions, 2018). No jurisdictional wetlands or waters of the state were identified within the footprint or directly adjacent to AP-3 as part of this survey. The results of the site-specific wetlands survey are included in **Appendix A.** Based on this review, AP-3 meets the location restriction requirement for 40 CFR §257.61.

2.3 Fault Areas

The USEPA CCR Rule (40 CFR §257.62) states that without special consideration, existing CCR surface impoundments must not be located within 200 feet of a fault that has had displacement in Holocene time. There are no known faults of Cretaceous or Cenozoic age in Floyd or the surrounding counties of northwest Georgia (Prowell, 1983). AP-3 is located just south of the northwest edge of the Rome Fault, a low-angle thrust sheet bringing Cambrian aged rocks of the Conasauga Limestone formation up and into contact with younger folded and faulted rocks of Cambrian through Mississippian age. In addition, Petrologic Solutions, Inc. and Golder Associates, Inc. (2018) documented a high angle reverse fault, referenced as the Turnip Mountain Fault, located approximately 700 feet south and southwest of AP-3. As with faults associated with the Rome thrust complex, it is believed that there has been no movement of these faults since the Late Paleozoic (i.e., approximately 250 million years before the present) (Higgins et al, 1988). Therefore, AP-3 meets the location restriction requirement of 40 CFR §257.62.

2.4 Seismic Impact Zones

The USEPA CCR Rule (40 CFR §257.63) states that existing CCR surface impoundments located in seismic impact zones must demonstrate that all structural components of the impoundments (including liner systems, leachate collection and removal systems, and surface water control systems) are designed to resist the maximum horizontal acceleration in lithified earth material in the area. A seismic impact zone is defined in the USEPA CCR Rule as an area having a 2 percent or greater probability that the maximum expected

horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g) will exceed 0.10g (or 10%g) in 50 years. This determination can be made using a seismic hazard map or the maximum expected horizontal acceleration based on a site-specific seismic risk assessment. The location of the Plant is shown on the seismic hazard map in **Figure 2-4** as being in a zone with an expected maximum acceleration ranging from 20-30 percent. The United States Geological Survey (USGS) hazard tool (USGS 2014) was also used to calculate the estimated maximum horizontal acceleration for the vicinity of AP-3. Based on the results of the USGS hazard tool calculation, AP-3 is in a seismic impact zone, as defined in 40 CFR §257.53, with a reported maximum horizontal acceleration in lithified earth material of 0.22g (or 22%g).

A slope stability analysis was conducted for AP-3 by Stantec (2018) to evaluate the stability of the dikes and the unit under seismic loading conditions of the design earthquake (maximum horizontal acceleration in lithified earth material of 0.22g). The details and results of this analysis are included in Section B of the Engineering Report included in Part B of the Georgia EPD CCR permit application package. The analysis resulted in a calculated factor of safety of 1.2, exceeding the required minimum factor of safety of 1.0 required in 40 CFR 257.73(e)(1)(iii). Additionally, a veneer stability analysis was conducted to assess the stability of the geomembrane cap system under the same seismic loading conditions. The details and results of this analysis are included in Section D of Part B of the Georgia EPD CCR permit application package. The analysis resulted in a calculated factor of safety of 2.5, exceeding the required minimum factor of safety of 1.0.

Based on the results of these analyses, AP-3 meets the location restriction requirement of 40 CFR §257.63.

2.5 Unstable Areas

The USEPA CCR Rule (40 CFR 257.64) states that an existing CCR surface impoundment must not be located in an unstable area unless appropriate engineering practices have been incorporated into the design of the unit. The following factors are generally considered when determining whether an area is unstable: (i) soil conditions that may result in significant differential settling; (ii) geologic or geomorphologic conditions (e.g. karst); and (iii) human-made features or events (both surface and subsurface). Engineering and operational practices associated with AP-3 or the near vicinity are also considered.

Soil Conditions

The soil conditions in the vicinity and beneath AP-3 are not expected to be susceptible to liquefaction or significant differential settling. Based on historical borings advanced at the Plant, the soil conditions in the vicinity and beneath AP-3 contain significant amounts of clay that is not susceptible to liquefaction. Soil within the dikes are reported to generally consist of lean clay or gravelly lean clay with sand. The alluvial soils beneath AP-3 include clayey sand, sandy clay, and gravelly silty clay and residuum soils consist of fat clay with sand and sandy fat clay. Soils in the vicinity of AP-3 are discussed in greater detail in the HAR. The dike materials and underlying soils are relatively stiff and have a low susceptibility to liquify during seismic events. Further, there is no known history of issues associated with settlement or differential settlement at AP-3. Therefore, soil conditions in the vicinity and beneath AP-3 should not result in significant differential settlement.

Geologic Conditions

The National Karst Map (United States Geological Survey [USGS,] 2014), which shows locations of karst and potential karst areas in soluble rocks in the contiguous United States, identifies the area in the vicinity of the Site as "carbonate rocks at or near the land surface (occurring in a humid climate)". The limestones in this area may potentially be affected by dissolution of the carbonate rock units present throughout the region. The site is underlain by Conasauga Formation limestone, which is potentially affected by karst processes. Observation of rock cores during drilling and review of boring logs from the site indicate the presence of discontinuous solution features and solution-enhanced joints and fractures, but do not suggest the presence of large, laterally continuous karst features such as caverns or sinkholes.

A review of 7.5-minute USGS topographic maps (Rock Mountain, GA and Livingston, GA) of the area identified as potentially karst found that the typical surface expressions of karst features, such as sinkholes, depressions, and sinking or disappearing streams are not exhibited. The presence of few springs and wet-weather seeps in western Floyd County suggests that large-scale karst dissolution features are not a major influence on regional groundwater flow and hydrogeology in the shaley limestone geologic formation underlying the Site.

It has been reported that the documented water loss from AP-3 (July 1977) during the early stages of operation, when the pond water level reached a maximum elevation of 595

feet mean sea level, was related to the stratigraphy of the foundation soils and the presence of solutioned cavities and slots (typically, solution-enhanced joints and fractures) in the underlying bedrock. These conditions were mitigated with repair of the area of water loss and conversion to dry handling operations at AP-3 in 1982. AP-3 ceased receiving CCR in the early 1990s. Additionally, the installation of an engineered low-permeability cap constructed in 2018 minimized to the extent practical the ability for stormwater to infiltrate into the CCR material, thereby eliminating the potential of developing a downward hydrostatic force, which negates further leakage and foundation instability. These actions have further reduced the potential for adverse effects on the structural components of the unit.

Human-made Features

Prior to completion of the final in-place closure of AP-3, human-made features such as pipes or other dike penetrations within the final closure footprint were decommissioned and removed. There are no human-made features or future activities at the Site that are anticipated to have a potential adverse impact on the structural components or integrity of the closed unit. Based on the foregoing, AP-3 will not be prone to disruption due to human-made features at the site.

Engineering and Operational Practices

As discussed above, in the early operational history of AP-3 there was documented leakage of water from a discrete area of the base of the impoundment, likely due to the wet-sluicing operations and the presence of solution-enhanced joints and fractures near the foundation. Mitigation activities were completed in the area and the impoundment was converted to dry handling operations in 1982. Dry handling of the CCR eliminates the addition of sluice water to the impoundment, removing the mechanism for erosion of foundation material into the underlying bedrock. Since the conversion to dry handling of CCR, there have been no documented cases of drop-outs, loss of water or material, or issues related to the foundation or dikes. The removal of free water from the pond and the placement of a low permeability cover system at AP-3 greatly reduced the potential for adverse effects on the structural components of the unit related to karst features.

The conditions at AP-3 have been stable for the last 40 years. The improved post-closure conditions with respect to infiltration and hydraulic gradients, as well as the recognized and generally-accepted good engineering practices that have been incorporated into the design of the impoundment, demonstrate that the integrity of the structural components

of the unit have not been disrupted. With the absence of unsuitable soils which could lead to liquefaction or differential settlement, the mitigation of the 1977 leakage, the change in operating conditions, the installation of a low-permeability cap, and the absence of human-made dike penetrations, AP-3 meets the location restriction requirement of 40 CFR §257.64.

2.6 Floodplains

The GAEPD Rule 391-3-4-.10(9)(c)6(iv) requires the location of the floodplain relative to the disposal unit be provided. A review of the Flood Insurance Rate Map (FIRM) (**Figure 2-5**) shows that in the northeast corner of AP-3, a portion of the downstream slope embankment is subject to inundation from the 100-year flood of the Coosa River. However, the downstream slopes are well vegetated and have not been impacted from past floods. The FIRM base flood elevation is 585 feet above mean sea level (ft MSL) and the top of the dike was constructed to an approximate elevation of 608 ft MSL. Approximately 5 feet of the exterior slope is inundated by the 100-year flood event and the north corner of AP-3 is approximately 3,000 feet from the floodway of the Coosa River. As such, AP-3 would not impede or restrict the flow of the 100-year base flood.

3. REFERENCES

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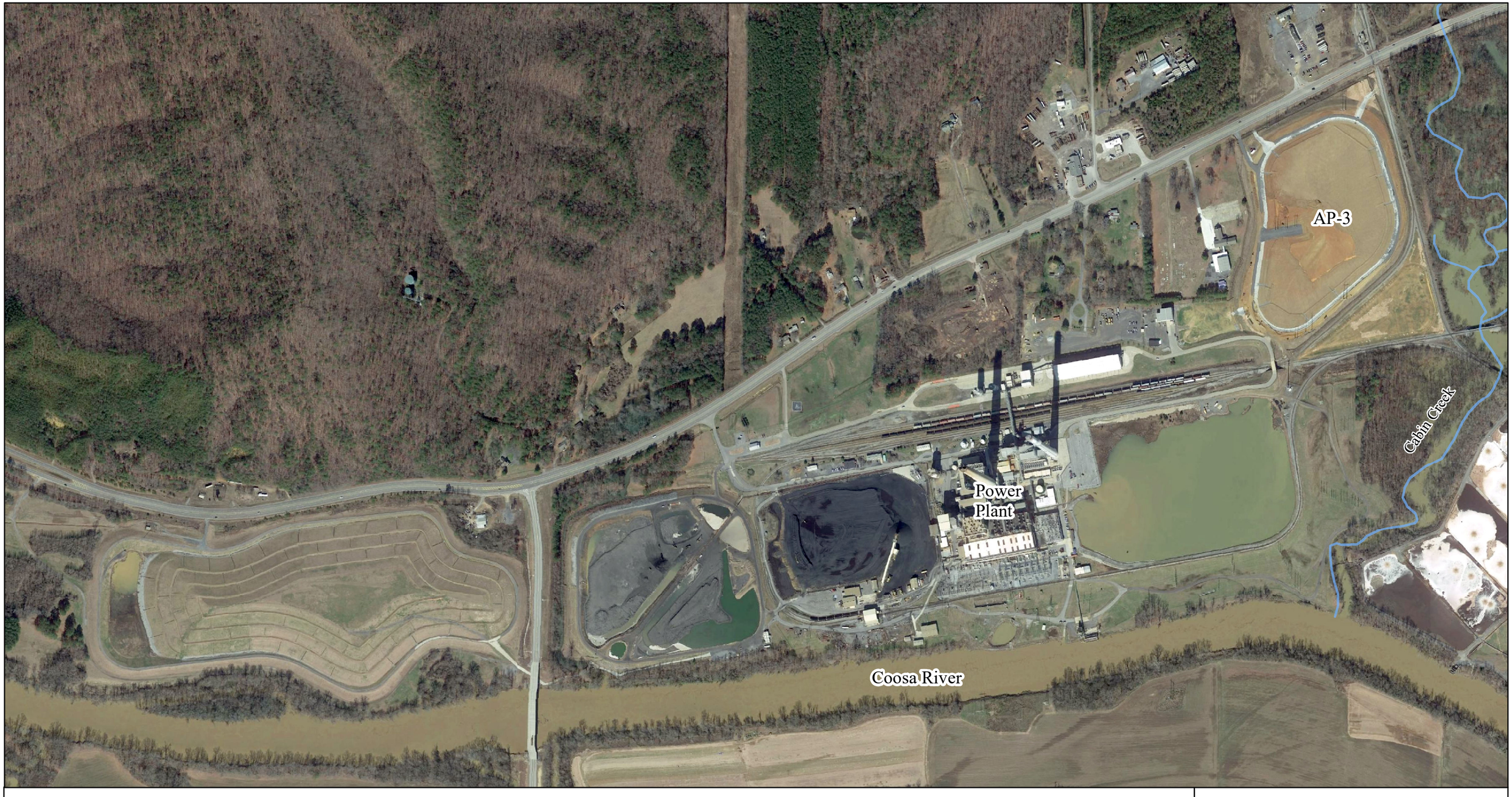
FIGURES



Cabin Creek

Notes:
1. Aerial Photograph approximate date - February 2018
Source: Google Earth.

N

0 300 600 1,200
Feet

Plant Hammond Site Map

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

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Figure 1-1

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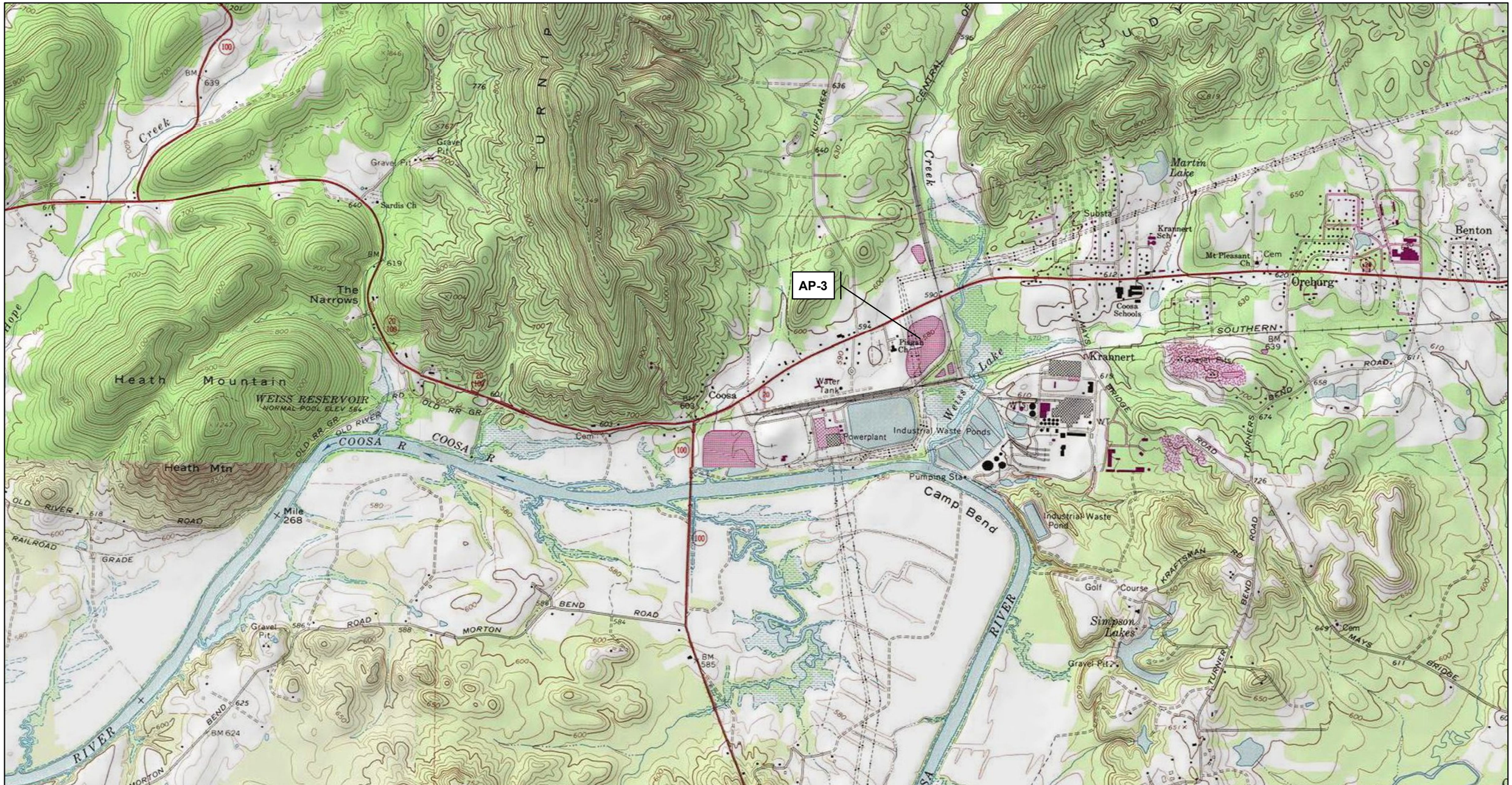

Notes:
1. Topo map provided by United States Geological Survey Rock Mountain and Livingston, GA, 7.5 Minute Quadrangles.

Site Vicinity and Topography

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Plant Hammond AP-3
Rome, Floyd County, Georgia

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Figure 2-1

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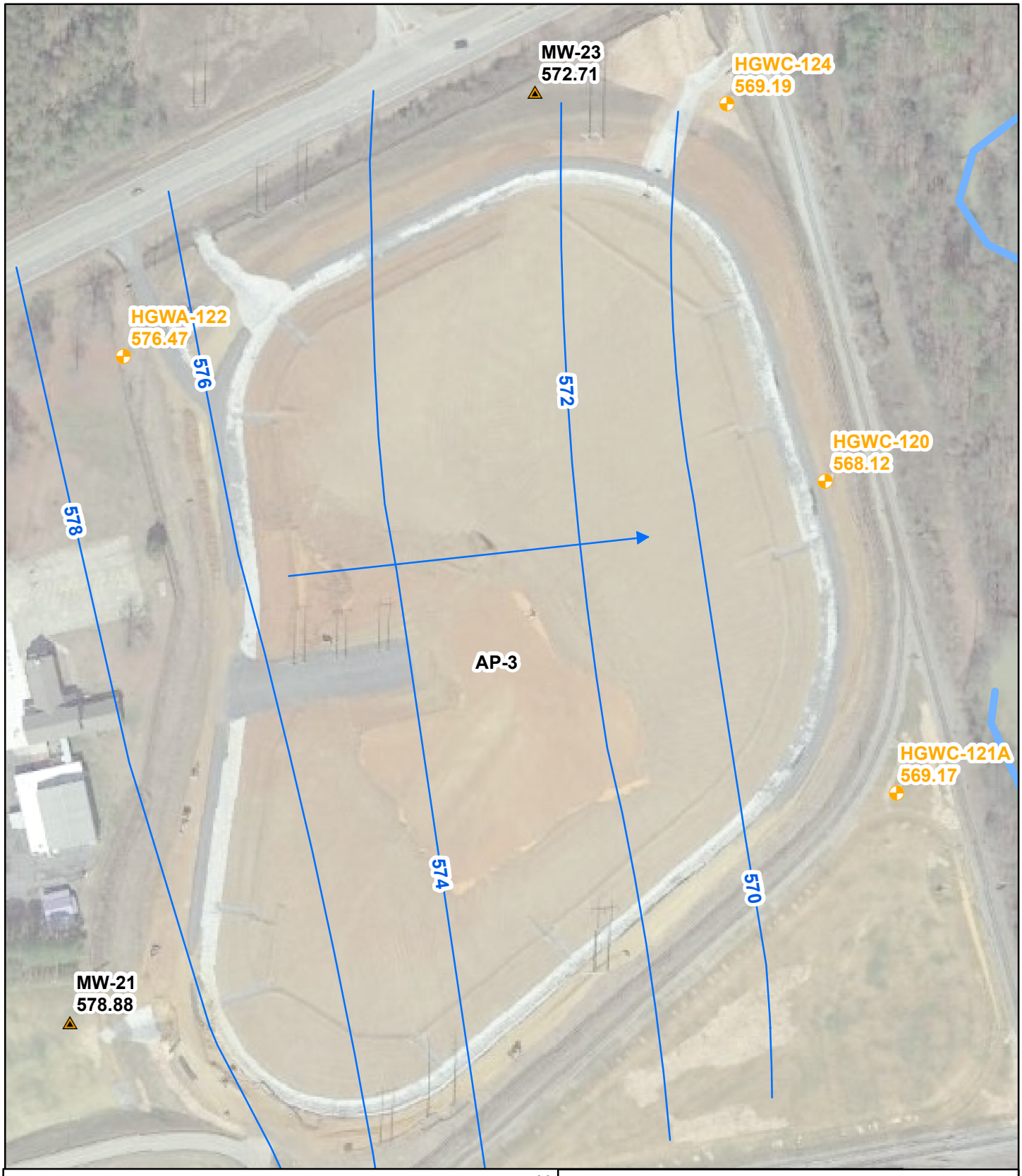

Piezometer (Groundwater elevation, ft MSL)
AP-3 Monitoring Well (Groundwater elevation, ft MSL)
4 June 2018 Groundwater Elevation Contour (ft, MSL)
Cabin Creek

N

0 100 200 400 Feet

Notes:
ft MSL - feet above mean

Potentiometric Surface Map
(4 June 2018)
Georgia Power Company
Plant Hammond AP-3
Rome, Floyd County, Georgia

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Figure 2-2

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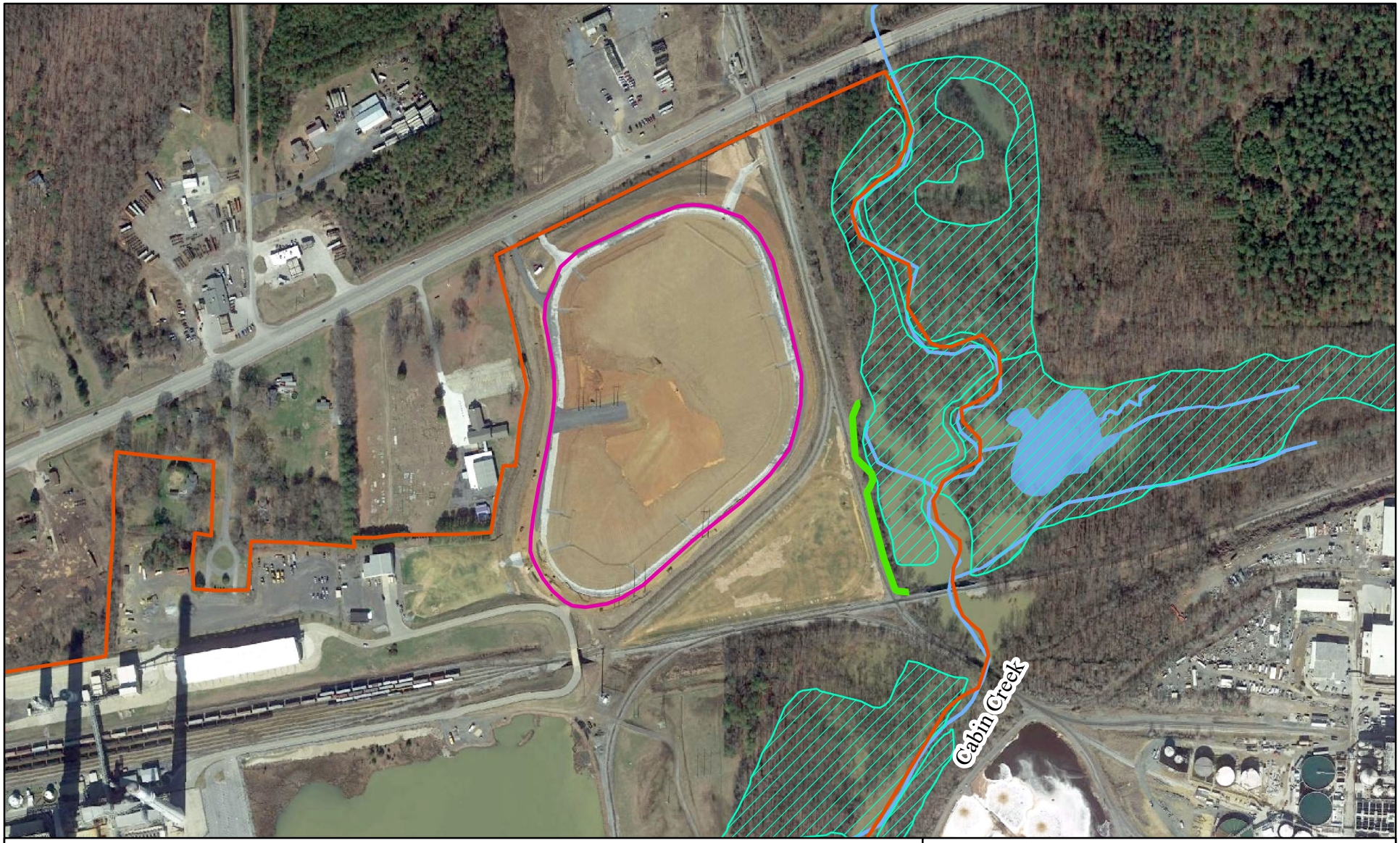

Approximate Waste Boundary
Wetlands (National Wetlands Inventory)
Cabin Creek
Western Extent of Wetland (surveyed)
Plant Hammond Property Boundary

Notes:
1. The National Wetlands Inventory - Version 2, Surface Waters and Wetlands Inventory shows the approximate delineation of the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979).

0 250 500 1,000 Feet

N

Proximity to Streams and Wetlands

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Plant Hammond AP-3
Rome, Floyd County, Georgia

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Figure 2-3

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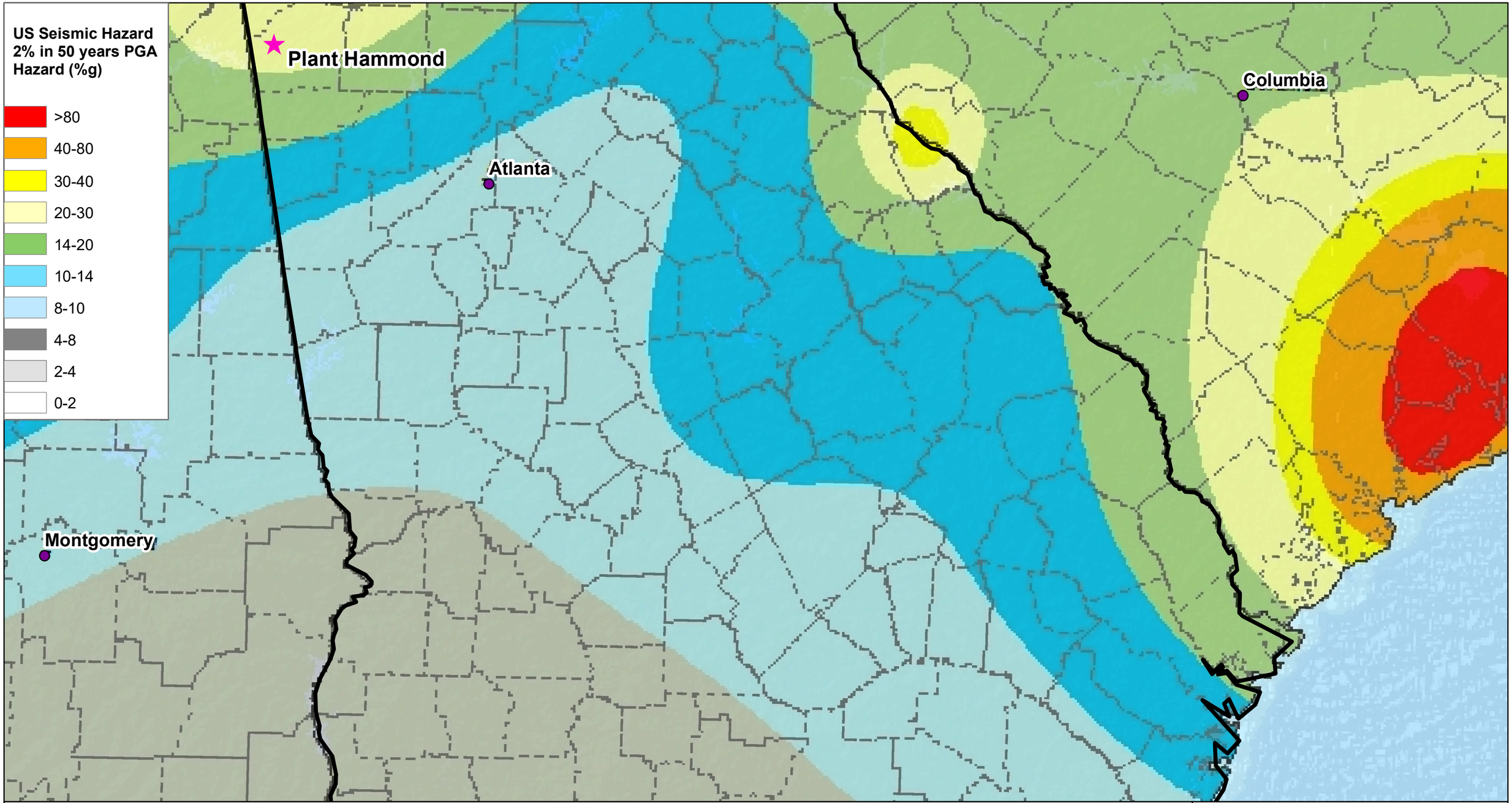

Notes:
Source: USGS-2014 Seismic Hazard Map https://earthquake.usgs.gov/earthquakes/byregion/georgia-haz.php

Seismic Hazard Map
Plant Hammond

Georgia Power Company
Rome, Floyd County, Georgia

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Figure 2-4

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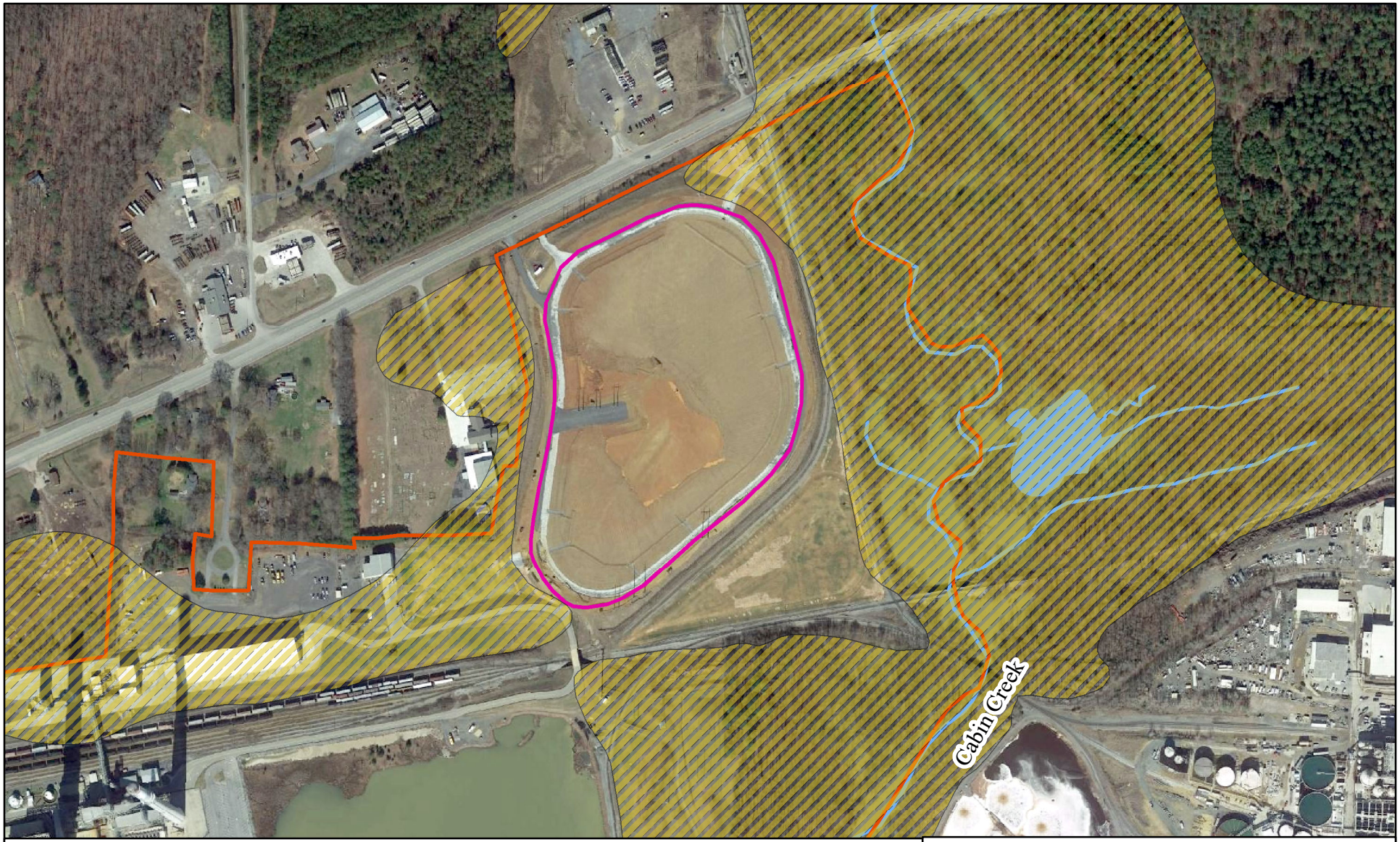

Cabin Creek
Plant Hammond Boundary
Approximate Waste Boundary
100-year Floodplain

N

0 250 500 1,000 Feet

Notes:
1. 100-year flood from Federal Emergency Management Agency in the Flood Insurance Rate Map (FIRM) dataset.

Proximity to 100-Year Floodplain

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Plant Hammond AP3
Rome, Floyd County, Georgia

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Figure 2-5

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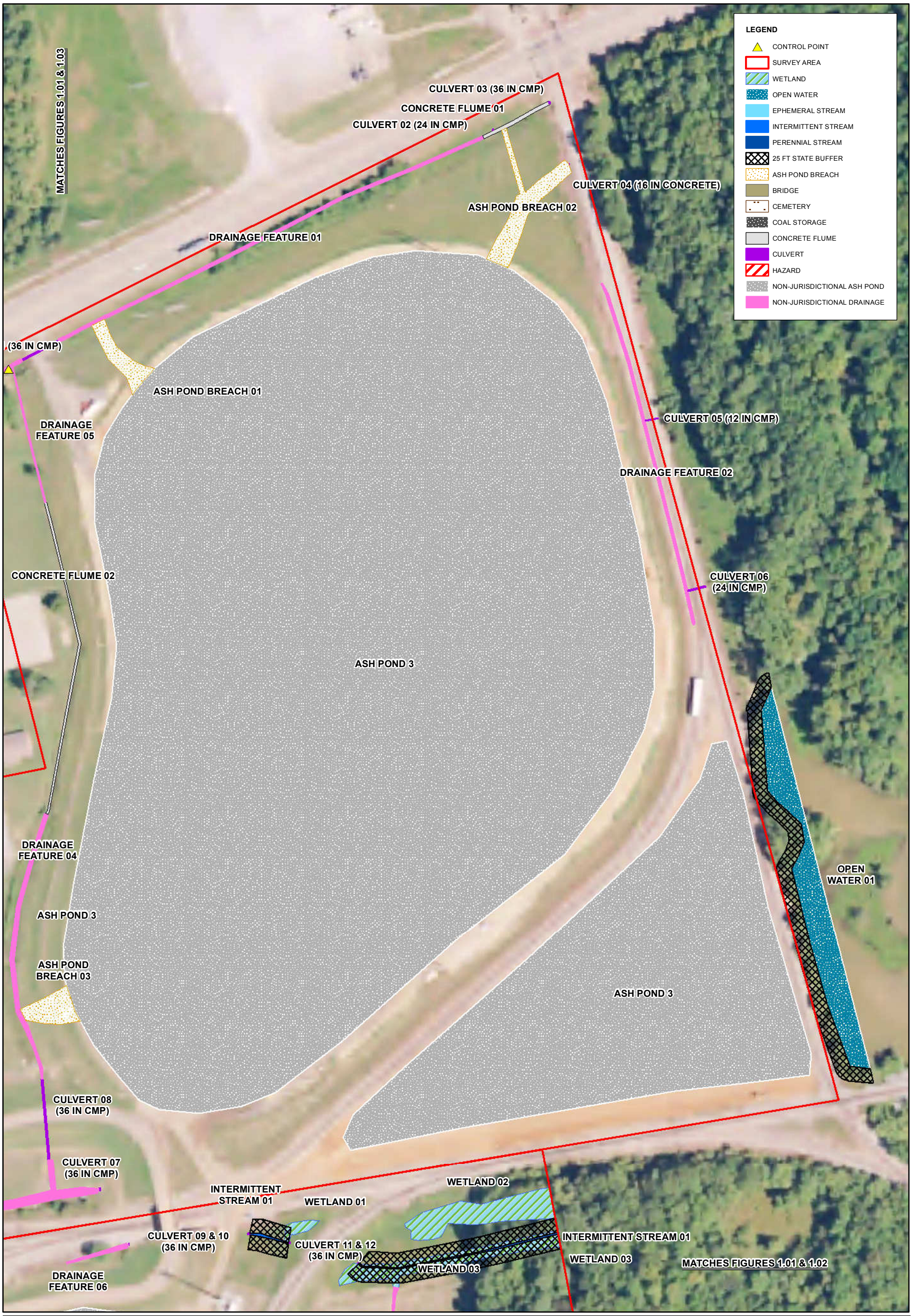
APPENDIX A – WETLANDS SURVEY (ECOLOGICAL SOLUTIONS)



Ecological Solutions Inc.

0 75 150 300 Feet

GEORGIA POWER COMPANY
PLANT HAMMOND ASH POND CLOSURE
FLOYD COUNTY, GA

ENVIRONMENTAL SURVEY FINDINGS

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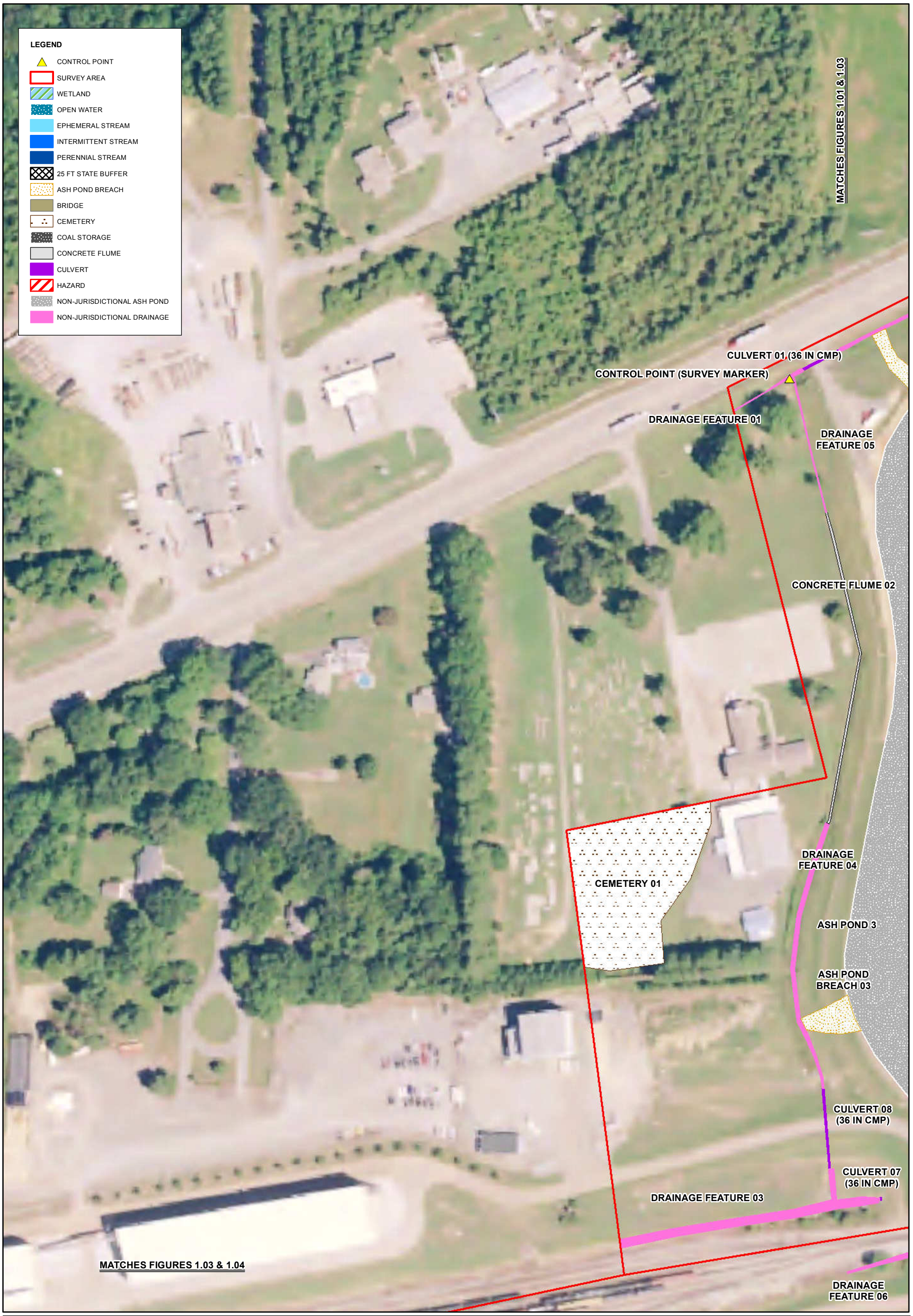
MARCH 2018
20236-579

FIGURE 1.01



Ecological Solutions Inc.

0 75 150 300 Feet

GEORGIA POWER COMPANY
PLANT HAMMOND ASH POND CLOSURE
FLOYD COUNTY, GA

ENVIRONMENTAL SURVEY FINDINGS

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MARCH 2018
20236-579

FIGURE 1.03