

Prepared for



Santee Cooper
One Riverwood Drive
Moncks Corner, SC 29461

**2021 PERIODIC STRUCTURAL STABILITY
ASSESSMENT, Revision 1
SOUTH ASH POND**

**WINYAH GENERATING STATION
Georgetown, South Carolina**

Prepared by



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Project No. GC8100

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CERTIFICATION STATEMENT

This periodic structural stability assessment was conducted in accordance with the requirements of §257.73(d) of the Code of Federal Regulations Title 40, Part 257, Subpart D, and was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering, and no other warranty is provided in connection therewith. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Santee Cooper. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others. Although we were not able to independently verify such data, we found that it was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Santee Cooper.



A handwritten signature in blue ink, appearing to read "Woo-Kuen Shin", written over a horizontal line.

Woo-Kuen Shin, Ph.D., P.E.
South Carolina Registration No. 36052

10 November 2021

Date

1. INTRODUCTION

1.1 Project Background

The Winyah Generating Station (WGS or “Site”) is an electric generating facility owned and operated by Santee Cooper. WGS is located between Pennyroyal and Turkey Creeks, tributaries to Sampit River, and is situated approximately four miles southwest of Georgetown, South Carolina (SC) (see Figures 1a and 1b for Site Location and Site Vicinity Maps).

On 17 April 2015, the United States Environmental Protection Agency (USEPA) published rules in 40 CFR Part 257 that regulate the design and management of existing and new CCR units (CCR Rule). The CCR Rule became effective on 17 October 2015. Within the CCR Rule, §257.73(d) outlines the structural stability criteria for existing CCR surface impoundments.

The South Ash Pond is situated immediately south of the Coal Pile and power block and west of the Discharge Canal (Figure 2). The South Ash Pond contains CCR in the form of fly ash, boiler slag, and bottom ash as well as stormwater. It is considered as an existing surface impoundment under the CCR Rule.

Geosyntec Consultants, Inc. (Geosyntec) prepared *2016 Surface Impoundment Periodic Structural Stability Assessment Report* (2016 Assessment) (Geosyntec, 2016) and this *2021 Periodic Structural Stability Assessment: South Ash Pond* (2021 Assessment) on behalf of Santee Cooper to demonstrate that the South Ash Pond continues to meet criteria for periodic structural stability assessment in accordance with §257.73(d) of the CCR Rule, respectively.

1.2 Site Background and Changes in Site Conditions

The South Ash Pond spans approximately 76 acres. This unlined surface impoundment was commissioned in 1980 and was designated for the disposal of fly ash, bottom ash, and boiler slag. The South Ash Pond is bounded by the Coal Pile and power block to the north, Pennyroyal Creek to the west, a forested area to the south, and an access road and the Discharge Canal to the east.

The South Ash Pond was constructed by recompacting excavated soils from the surface impoundment interior to form perimeter dikes. The South Ash Pond perimeter dikes have a maximum height of approximately 24 feet (ft), with a crest elevation of approximately 38.0 ft National Geodetic Vertical Datum of 1929 (NGVD29). The interior and downstream side slopes of the dikes are approximately 3 horizontal to 1 vertical (3H:1V),

except in the western corner where the downstream side slopes are approximately 4H:1V. The dike crest is typically 12 to 15 ft wide (Thomas and Hutton, 2012). The minimum elevation of the dike crest is 36.9 ft NGVD29 (Thomas and Hutton, 2012).

The South Ash Pond historically received fly ash, boiler slag, bottom ash, low volume wastewater, and stormwater. The normal operating level in the South Ash Pond is maintained by a rectangular concrete riser structure with 4 ft-long stoplogs on a single face. The water elevation within the South Ash Pond is at elevation 15 ft NGVD 29 and no stoplogs are in place on the riser at the time of this assessment to facilitate ongoing closure activities. A 36-inch diameter reinforced concrete pipe with an upstream invert elevation of 16.93 ft NGVD 29 conveys water from the riser structure to the Discharge Canal (Lockwood Greene, 1978).

Santee Cooper personnel indicated that no changes were made for the South Ash Pond perimeter dikes and adjacent areas outside the dikes since the 2016 Assessment. Also, no additional geotechnical subsurface investigations were conducted since 2016. A review of the topographic survey dated August 2021 (McKim & Creed, 2021) indicated that dewatering lowered the free water level in the east side of the South Ash Pond and CCR have been excavated from the east side of the surface impoundment (top of ash surface in the west side of the South Ash Pond is similar to that shown in the survey data used for the 2016 Assessment).

In accordance with §257.102(g), a Notice of Intent for the South Ash Pond was posted to the Operating Record on 9 April 2021 to initiate pond closure. CCR and wastewater inflow to the South Ash Pond ceased in April 2021. Santee Cooper indicated the surface impoundment is planned to be closed by CCR removal within five years.

1.3 Report Organization

This 2021 Assessment Report presents the subsequent periodic structural stability assessment for the South Ash Pond at WGS. The remainder of this 2021 Assessment Report is organized as follows:

- The structural stability assessment of the South Ash Pond perimeter dikes is presented in Section 2; and
- The summary and general conclusions from the structural stability assessment are presented in Section 3.

2. STRUCTURAL STABILITY ASSESSMENT

This section presents a summary of the structural stability assessment for the perimeter dikes surrounding the South Ash Pond, demonstrating that this structure meets the requirements of 257.73(d)(1)(i) through (iii) and (v) through (vii) of the CCR Rule.

2.1 Site Visit

Geosyntec visited WGS on 1 September 2021 to inspect the condition of the CCR surface impoundment dikes regulated by the CCR Rule. Prior to the dike inspection, annual dike inspection reports and available historical engineering reports were reviewed to develop an understanding of the operational and maintenance history of the South Ash Pond. During the inspection, Geosyntec observed the condition of the upstream slopes, downstream slopes, stormwater features, pond appurtenances, and pipe penetrations through the dikes of the South Ash Pond. Geosyntec observed that the surface impoundment was generally operated and maintained in accordance with commonly accepted engineering practice and did not observe evidence of deficiencies to the structural integrity of the surface impoundment. Details are presented in *2021 CCR Surface Impoundment Inspection Report* (Geosyntec, 2021a).

2.2 Stable Foundations and Abutments

The CCR Rule (§257.73(d)(1)) requires that the periodic structural stability assessment:

“...at minimum, document whether the CCR unit has been designed, constructed, and maintained with: (i) Stable foundations and abutments;”

Based on a review of 2021 Safety Factor Assessment results (Geosyntec, 2021b), the South Ash Pond appears to have been designed, constructed, and maintained with stable foundations. Potential slip surfaces through the foundation soils of the perimeter dikes were evaluated under static and seismic loading conditions in accordance with §257.73(e) and were found to meet or exceed the required safety factors under the CCR Rule. Details of the slope stability analyses are also provided in the 2021 Safety Factor Assessment Report (Geosyntec, 2021b).

2.3 Condition of Perimeter Dike Slopes

The CCR Rule (§257.73(d)(1)) requires that the periodic stability assessment:

“...at minimum, document whether the CCR unit has been designed, constructed, and maintained with:

...

(ii) Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown;"

The interior (upstream) side slopes of the South Ash Pond perimeter dikes have generally been lined with riprap slope protection. Sluiced fly ash has historically been deposited and vegetation (i.e., phragmites) has flourished within the voids of the riprap slope protection during the operations of the surface impoundment. The riprap provides protection from surface erosion and wave action which may be generated during rainfall events and periods of high wind. While localized bare areas were observed during the site visit, grass has been established and is routinely maintained on the downstream perimeter dike slopes. Since the concrete riser structure inlet is higher in elevation than ponded water, rapid drawdown within the South Ash Pond is not anticipated. Thus, the South Ash Pond perimeter dikes have been constructed, operated, and maintained in general accordance with §257.73(d)(1)(ii) of the CCR Rule.

Note that §257.73(d)(1)(iv) was vacated by a United States court and is no longer a requirement of the CCR rule. However, WGS continues to cut the grass on a routine basis as part of regular maintenance activities.

2.4 Compaction of Dike Fill Materials

The CCR Rule (§257.73(d)(1)) requires that the periodic stability assessment:

"...at minimum, document whether the CCR unit has been designed, constructed, and maintained with:

...

(iii) Dike mechanically compacted to a density sufficient to withstand the range of loading."

The 2016 Assessment (Geosyntec, 2016) demonstrated the perimeter dikes of the South Ash Pond appeared to have been mechanically compacted to sufficient densities to withstand the range of anticipated loading conditions. Since Santee Cooper personnel indicated that no changes were made for the South Ash Pond perimeter dikes and no observations during the site visit refuted the 2016 Assessment (Geosyntec, 2016), the previous assessment in terms of §257.73(d)(1)(iii) is considered still valid.

2.5 Hydraulic Structures Underlying the CCR Unit

The CCR Rule (§257.73(d)(1)) requires that the periodic stability assessment:

“...at minimum, document whether the CCR unit has been designed, constructed, and maintained with:

...

(v) a single spillway or a combination of spillways configured as specified in paragraph (d)(1)(v)(A) of this section. The combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge event specified in paragraph (d)(1)(v)(B) of this section.”

...

(vi) Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris, which may negatively affect the operation of the hydraulic structure”

Based on a review of hydrologic and hydraulic (H&H) analyses presented in *Inflow Design Flood Control System Plan: South Ash Pond (H&H Analyses)* (Geosyntec, 2021c) and observations made during the site visit (Geosyntec, 2021a), hydraulic structures in the South Ash Pond appears to meet the criteria of §257.73(d)(1)(v) and (vi).

2.6 Sudden Drawdown of Adjacent Water Body

The CCR Rule (§257.73(d)(1)) requires that the periodic stability assessment:

“...at minimum, document whether the CCR unit has been designed, constructed, and maintained with:

...

(vii) For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream, or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body of sudden drawdown of the adjacent water body.”

The South Ash Pond is not located adjacent to a body of water at the Site. Therefore, sudden drawdown or structural stability during the low pool was not evaluated within this Stability Assessment Report.

3. SUMMARY AND GENERAL CONDITIONS

The 2021 Assessment was conducted based on: (i) the 2016 Assessment (Geosyntec, 2016); (ii) the site visit (Geosyntec, 2021a); (iii) H&H Analyses results (Geosyntec, 2021c) and geotechnical engineering analysis results presented in the 2021 Safety Factor Assessment Report (Geosyntec, 2021b); and (iv) available Site information. Based on the evaluations presented within this 2021 Assessment Report, the South Ash Pond at

WGS satisfies the periodic structural stability criteria for existing surface impoundments within §257.73(d) of the CCR Rule.

4. REFERENCES

Geosyntec Consultants, Inc. (2016), “2016 Surface Impoundment Periodic Structural Stability Assessment Report: South Ash Pond,” Project No. GSC5242.

Geosyntec Consultants, Inc. (2021a), “2021 CCR Surface Impoundment Inspection Report,” Project No. GC8100.

Geosyntec Consultants, Inc. (2021b), “2021 Periodic Safety Factor Assessment: South Pond,” Project No. GC8100.

Geosyntec Consultants, Inc. (2021c), “Inflow Design Flood Control System Plan: South Ash Pond,” Project No. GC8100.

McKim & Creed (2021), “Topographic Survey for Winyah Generating Station.”

Thomas and Hutton (2012). “Topographic Survey of A Portion of Santee Cooper Winyah Generating Station,” prepared for Santee Cooper, 14 January 2014.

FIGURES



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Service Layer Source: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



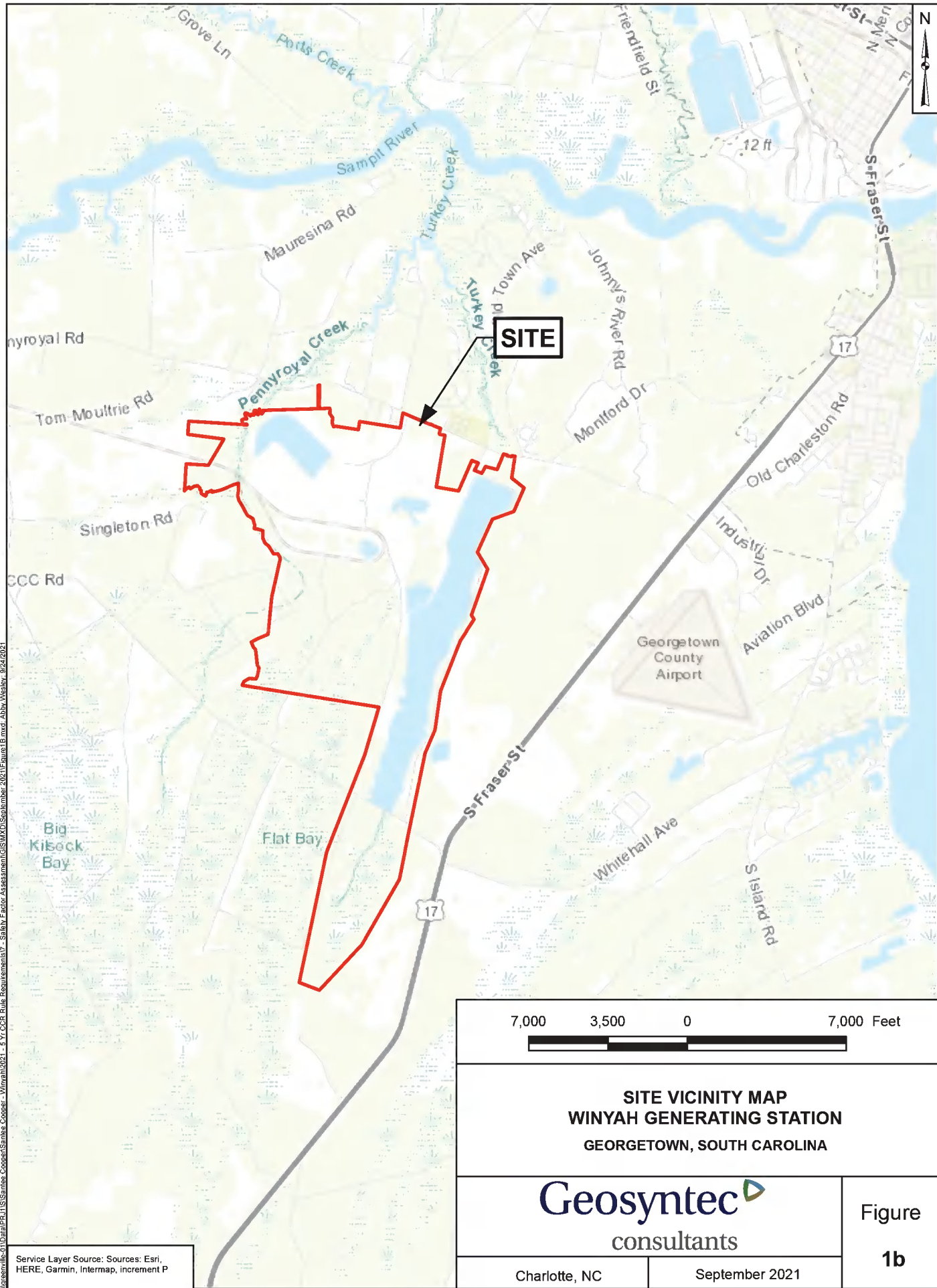
SITE LOCATION MAP
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

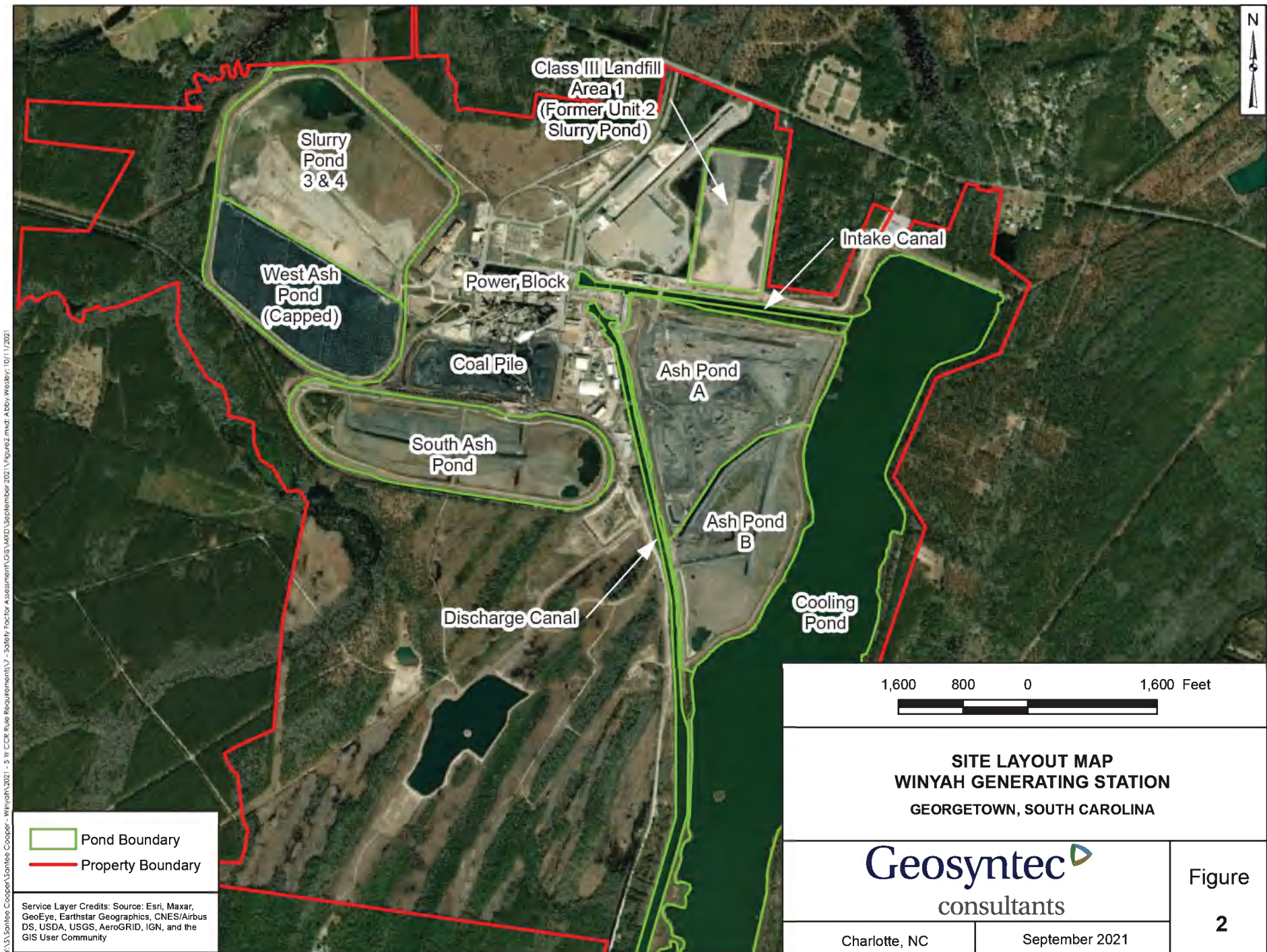
Geosyntec
 consultants

Figure
1a

Charlotte, NC

September 2021





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Pond Boundary
 Property Boundary

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



SITE LAYOUT MAP
WINYAH GENERATING STATION
 GEORGETOWN, SOUTH CAROLINA

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Figure
2

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