Prepared for

Santee Cooper
One Riverwood Drive
Moncks Corner, SC 29461

2021 PERIODIC STRUCTURAL STABILITY ASSESSMENT, Revision 1
SLURRY 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.

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 Slurry Pond 3&4 (Slurry Pond) is situated west of the power block (Figure 2). The Slurry Pond contains CCR in the form of flue gas desulfurization (FGD) residuals 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: Slurry Pond* (2016 Assessment) (Geosyntec, 2016) and this *2021 Periodic Structural Stability Assessment: Slurry Pond* (2021 Assessment) on behalf of Santee Cooper to demonstrate that the Slurry Pond continues to meet criteria for periodic structural stability assessment in accordance with §257.73(d) of the CCR Rule.

1.2 Site Background and Changes in Site Conditions

The Slurry Pond spans approximately 106 acres. This unlined surface impoundment was commissioned in 1980 and was designated to receive FGD that do not meet specifications for beneficial use as wallboard-grade gypsum, process water resulted from the power generating activities, and stormwater runoffs from the Limestone Slurry/Ball Mill area and Coal Pile (generally from the west half of the Coal Pile). The Slurry Pond is bounded to the south by the West Ash Pond (capped) and to the east by plant cooling towers and the plant area. The Slurry Pond perimeter dikes are bordered by Pennyroyal Creek and residential property on the west and north sides.

The Slurry Pond was constructed by compacting excavated soils from the surface impoundment interior to form the perimeter dikes and the divider dike, which separates the Slurry Pond from the adjacent West Ash Pond to the southwest. During the initial

construction, a finger dike was constructed into the center of the Slurry Pond primarily to allow solids to settle prior to recirculation of the wastewater, but also provided for access, maintenance, and observation of the pond interior. The Slurry Pond perimeter dikes are approximately 25 to 30 ft in height in the northern and western sections, approximately 20 to 25 ft in height in the eastern section, and approximately 15 ft in height in the southern section (Thomas and Hutton, 2012). The upstream and downstream slopes of the perimeter dikes range from 2 Horizontal to 1 Vertical (2H:1V) to 3H:1V. The dike crest is approximately 12- to 15-ft wide and typically at elevations 37.0 to 39.0 ft National Geodetic Vertical Datum of 1929 (NGVD29) (Thomas and Hutton, 2012).

Stormwater runoffs from the Slurry Pond area are collected in Detention Ponds No. 1 and No. 2 located outside the Slurry Pond. These detention ponds were designed to manage the 25-year, 24-hour storm event (Santee Cooper, 2004). Pump Station No. 2 receives water from Detention Pond No. 2 and discharges to the Slurry Pond. Detention Pond No. 2 is equipped with a spillway to Pennyroyal Creek which may only be activated during storm events greater than the 25-year, 24-hour storm. Non-contact stormwater collected on top of the geosynthetic cover in the West Ash Pond drains to the Slurry Pond by gravity through two 36-inch diameter culverts. There is also an emergency spillway that hydraulically connects between the Slurry Pond and the West Ash Pond. A Floating Pump Station equipped with two Tsurumi GSZ-4-45-4 submersible pumps, installed in the Slurry Pond in 2015, normally conveys water from the Slurry Pond directly to the Discharge Canal. The capacity of these pumps operating in parallel is 3,100 gallons per minute (gpm) at the maximum head, normal pool operating elevation of 19.6 NGVD 29. Piping is valved such that the Floating Pump Station may convey water to the Pump Station No. 1 sump located immediately east of the Slurry Pond. Pump Station No. 1 conveys water to the West Low Volume Waste Pond to be further treated prior to discharging to the Cooling Pond.

Santee Cooper personnel indicated that no changes were made for the Slurry 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 September 2021 (McKim & Creed, 2021) and the topographic survey used in the 2016 Assessment indicated that CCR have been moved within the surface impoundment but the volume of CCR impounded within the surface impoundment has changed insignificantly since the last assessment.

In accordance with §257.102(g), a Notice of Intent for the Slurry Pond was posted to the Operating Record on 9 April 2021 to initiate pond closure, and CCR and wastewater inflow to the Slurry 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 Slurry Pond at WGS. The remainder of this 2021 Assessment Report is organized as follows:

- The structural stability assessment of the Slurry 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 Slurry 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 Slurry 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 Slurry 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 Slurry 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 Slurry Pond perimeter dikes have generally been lined with riprap slope protection. Sluiced FGD 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. WGS personnel have been trained in the operation of the Floating Pump Station and do not rapidly draw down impounded free water after a rainfall event. Thus, the Slurry 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 Slurry 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 Slurry 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: Slurry Pond 3 and 4* (H&H Analyses) (Geosyntec, 2021c) and observations made during the site visit (Geosyntec, 2021a), hydraulic structures in the Slurry 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 Slurry Pond is not located adjacent to a water body at the Site, and 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 Slurry 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: Slurry 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: Slurry Pond," Project No. GC8100.

Geosyntec Consultants, Inc. (2021c), "Inflow Design Flood Control System Plan: Slurry Pond 3 And 4," Project No. GC8100.

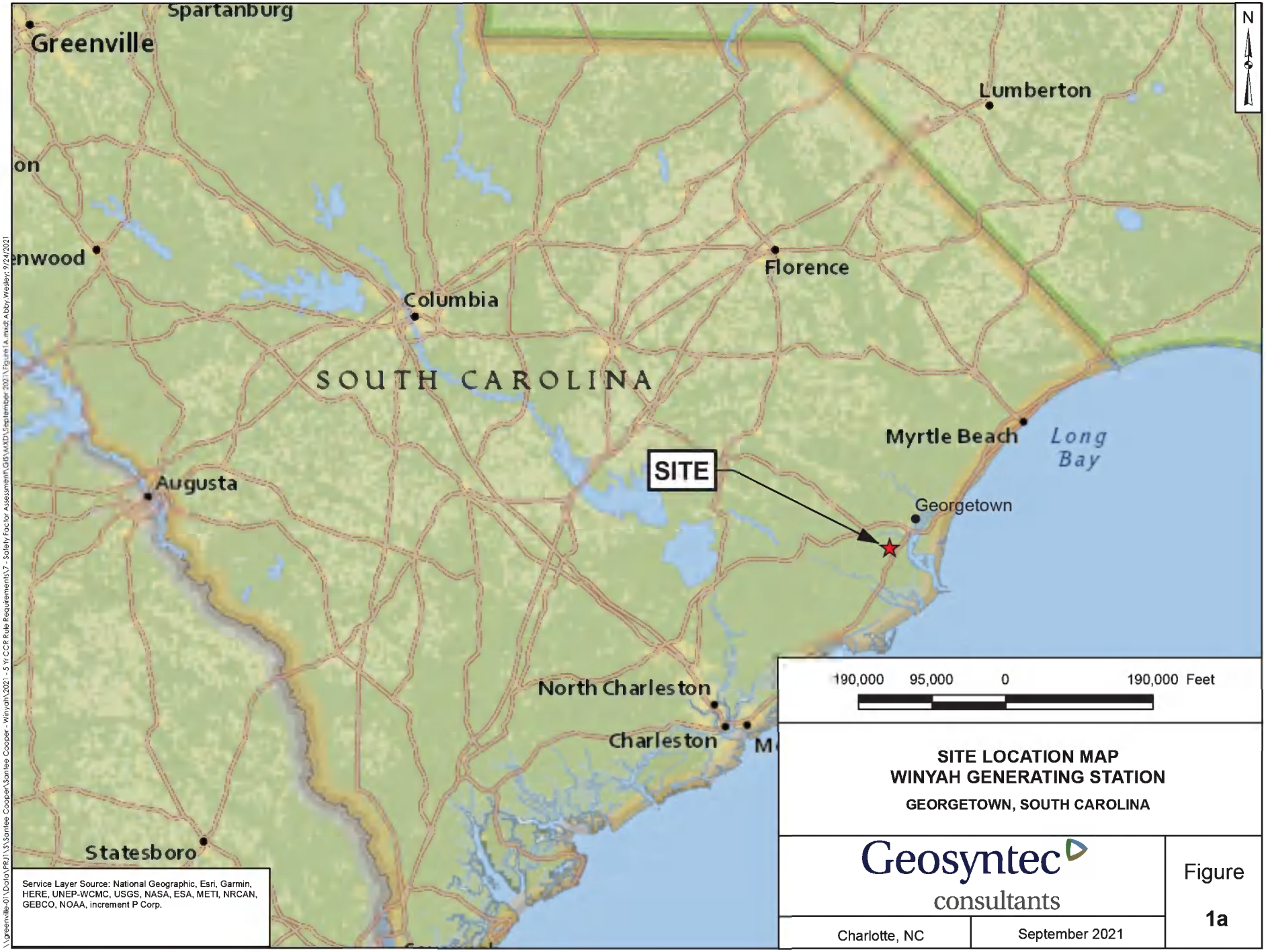
McKim & Creed (2021), "Topographic Survey for Winyah Generating Station."

Santee Cooper (2004), "Pump Station Design Report - Winyah Generating Station Redirect Drainage Project."

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

Thomas and Hutton (2016), "Topographic Survey of the Dike Crests at Santee Cooper Winyah Generating Station."

FIGURES



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SITE LOCATION MAP
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

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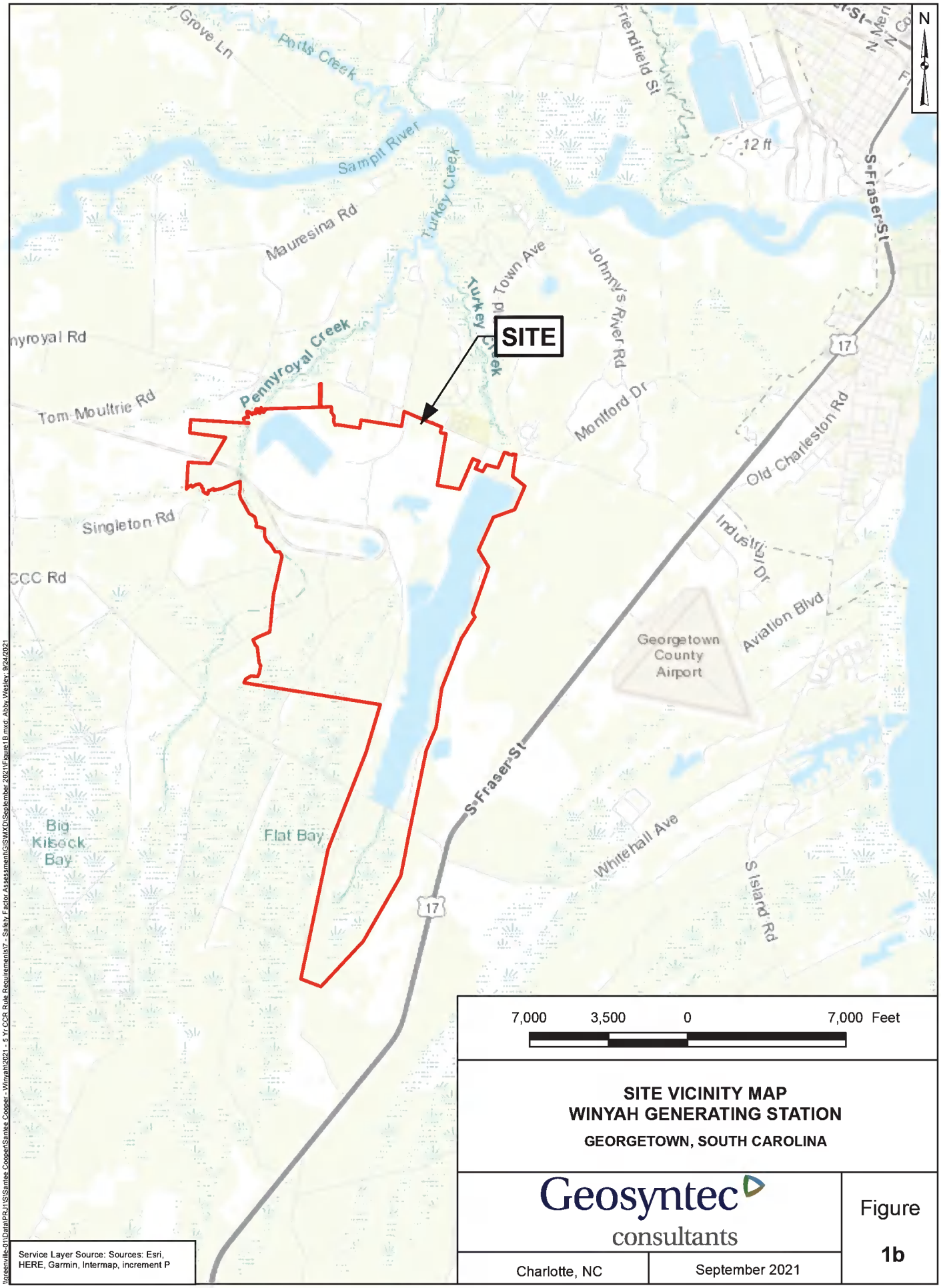
Figure **1a**



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SITE VICINITY MAP
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

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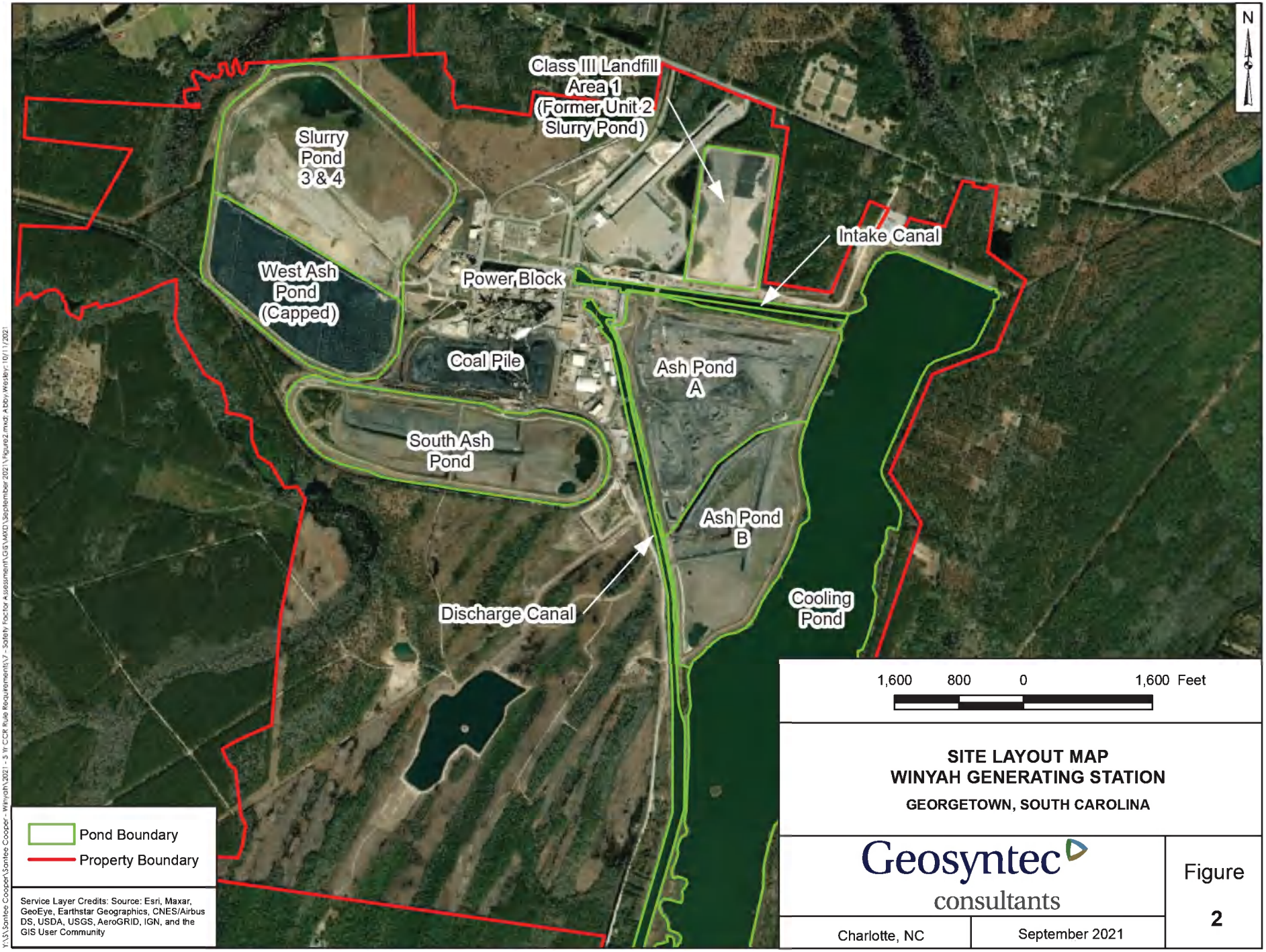
Figure **1b**



SITE LAYOUT MAP
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

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Figure **2**

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