Prepared for

Santee Cooper
One Riverwood Drive
Moncks Corner, SC 29461

2021 PERIODIC STRUCTURAL STABILITY ASSESSMENT
ASH POND B

WINYAH GENERATING STATION
Georgetown, South Carolina

Prepared by

Geosyntec consultants

Geosyntec Consultants, Inc.
1300 South Mint Street, Suite 300
Charlotte, North Carolina 28203

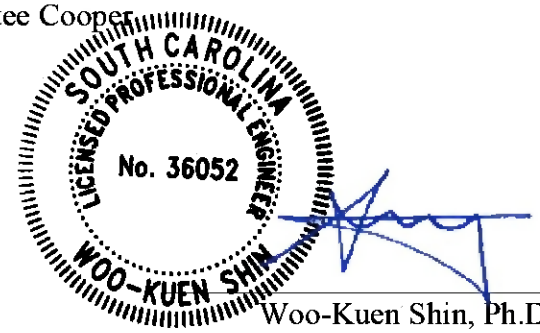
Project No. GC8100

TABLE OF CONTENTS

LIST OF FIGURES

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

10/14/2021
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.

Ash Pond B is situated southeast of the power block and west of the Site's Cooling Pond. (Figure 2). Ash Pond B 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: Ash Pond B* (2021 Assessment) on behalf of Santee Cooper to demonstrate that Ash Pond B 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

Ash Pond B spans approximately 65 acres. This unlined surface impoundment was commissioned in 1975 and was designated for the disposal of fly ash, bottom ash, boiler slag, decanted sluice water, low volume wastewater, and stormwater from Ash Pond A. Ash Pond B is bounded by the divider dike and Ash Pond A to the north, the Discharge Canal to the west, and the Cooling Pond to the south and east. Ash Ponds A and B were constructed simultaneously and are separated by a recompacted, earthen divider dike spanning west to east from the Discharge Canal to the Cooling Pond.

Ash Pond B was constructed by recompacting excavated soils from the impoundment interior to form the perimeter dikes and a divider dike. The Ash Pond B perimeter dikes are approximately 12 ft to 15 ft in height adjacent to the Discharge Canal and approximately 20 ft to 24.5 ft in height along the east and south sides adjacent to the

Cooling Pond (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 Ash Pond B dike crest was originally constructed in the early 1970s with a 12- to 15-ft width and an elevation of 34.5 ft National Geodetic Vertical Datum of 1929 (NGVD29), which was approximately 7 ft lower than the Ash Pond A perimeter and divider dikes. The Ash Pond B dike crest was raised to a design elevation of 41.0 ft NGVD29 in 1997 using downstream construction methods. The crest of Ash Pond B is currently at an elevation between 39.7 ft and 41.4 ft NGVD29 (Thomas and Hutton, 2012; Thomas and Hutton, 2016).

Ash Pond B historically decanted ash sluice water, low volume wastewater, and former Unit 2 Slurry Pond stormwater from Ash Pond A. Ash Pond B now only receives stormwater inflows from the pond area, and process water inflow has been halted to the pond. Ash Pond A does not have an outfall structure but routes water southward through rim ditches and culverts to Ash Pond B. Ash Ponds A and B are hydraulically connected through a 30-in diameter corrugated metal pipe (CMP), a 48-in diameter smooth steel pipe, and a 42-in diameter smooth steel pipe (Thomas and Hutton, 2012; Thomas and Hutton, 2016). After the 2016 Assessment, an emergency spillway was constructed between Ash Ponds A and B to provide capacity for larger storm events between the two surface impoundments. Free water within Ash Pond B accumulates in the south corner of the surface impoundment and the free water elevation is managed by a concrete riser structure, which discharges into the Discharge Canal through a 24-in diameter, smooth interior, corrugated HDPE pipe.

Santee Cooper personnel indicated that no changes were made for the Ash Pond B 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) and the topographic survey used in the 2016 Assessment indicated that CCR have been moved to the west side of the surface impoundment (i.e., adjacent to discharge canal) and that insignificant changes in the CCR surface were observed on the east side of the surface impoundment (top of CCR surface in the east side of Ash Pond B is similar to the observed surface in 2016). The volume of CCR impounded within the surface impoundment has not changed significantly since the last assessment.

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

- The structural stability assessment of the Ash Pond B 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 Ash Pond B, 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 Ash Pond B. During the inspection, Geosyntec observed the condition of the upstream slopes, downstream slopes, stormwater features, pond appurtenances, and pipe penetrations through the dikes of Ash Pond B. 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), Ash Pond B 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 Ash Pond B 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 has a minimum elevation of 34.9 ft NGVD29, a significant volume of ponded water is unable to be drawn down rapidly within Ash Pond B. Thus, the Ash Pond B 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 Ash Pond B 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 Ash Pond B 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: Ash Pond B* (H&H Analyses) (Geosyntec, 2021c) and observations made during the site visit (Geosyntec, 2021a), hydraulic structures in Ash Pond B 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."

Ash Pond B is located adjacent to the Cooling Pond for WGS and the free water within the Cooling Pond is maintained by a concrete riser structure and emergency spillway. As generating activities are reliant on a minimum water level for process water cooling, sudden drawdown or structural stability during the low pool was not considered a potential failure mechanism and 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, Ash Pond B 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: Ash Pond B," 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: Ash Pond B," Project No. GC8100.

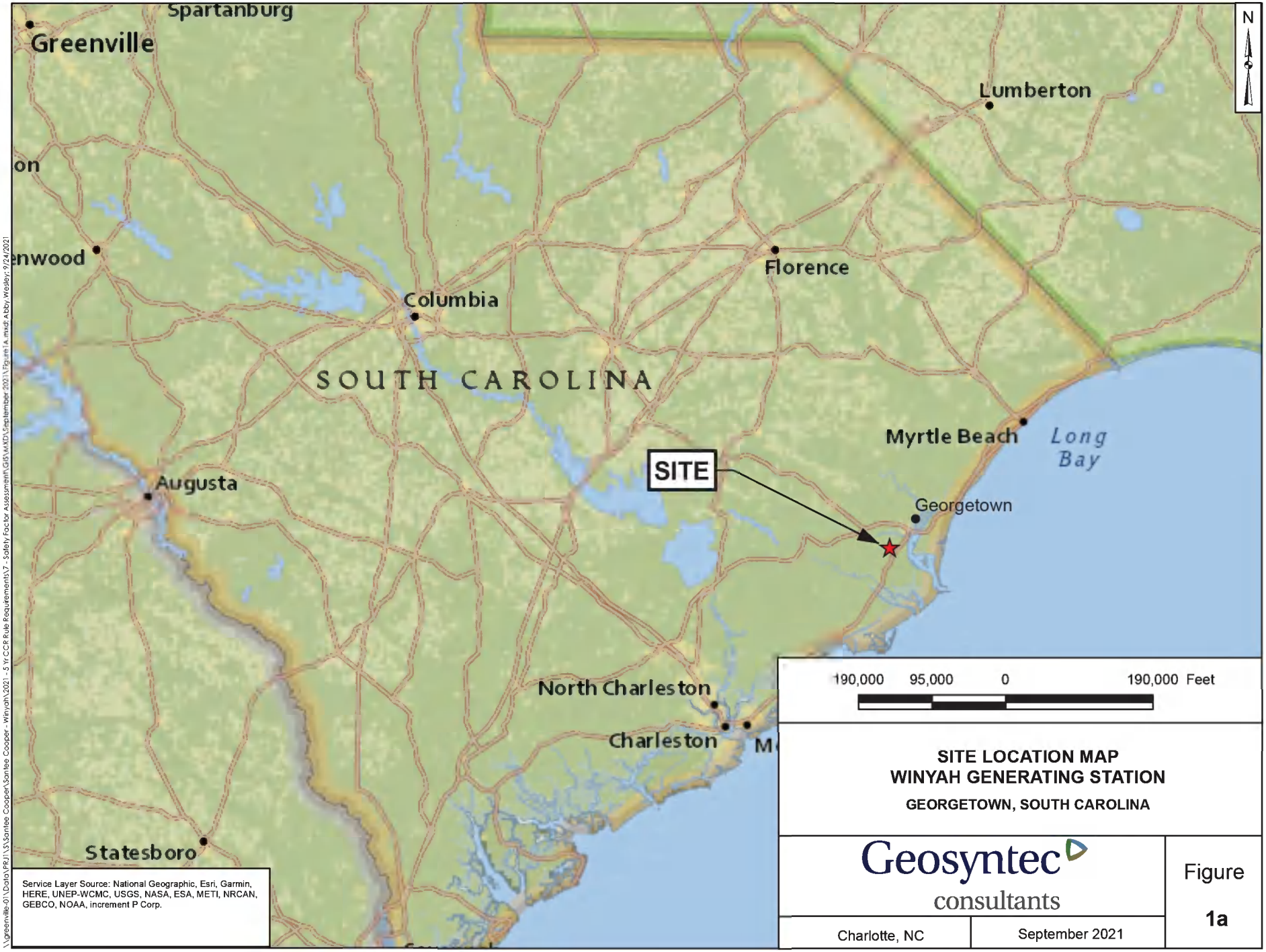
Geosyntec Consultants, Inc. (2021c), "Inflow Design Flood Control System Plan: Ash Pond B," Project No. GC8100.

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.

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

FIGURES



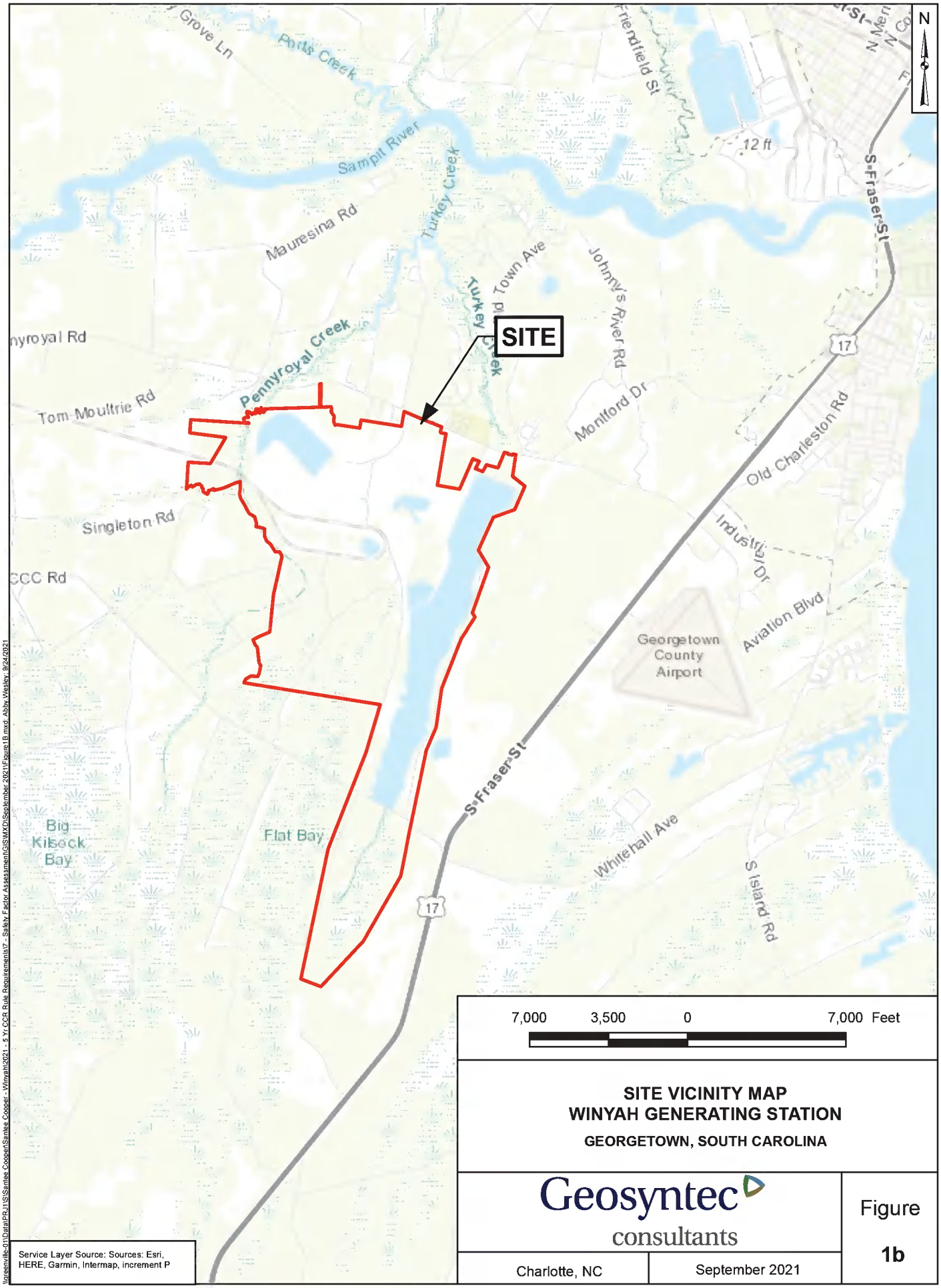
\\greenville-01\Data\PRJ\S\Santee Cooper\Santee Cooper - Winyah\2021 - 5 Yr CCR Rule Requirements\7 - Safety Factor Assessment\GIS\MXD\September 2021\Figure1A.mxd; Abby.Wesley; 9/24/2021

SITE LOCATION MAP
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

Geosyntec consultants

Charlotte, NC | September 2021

Figure **1a**



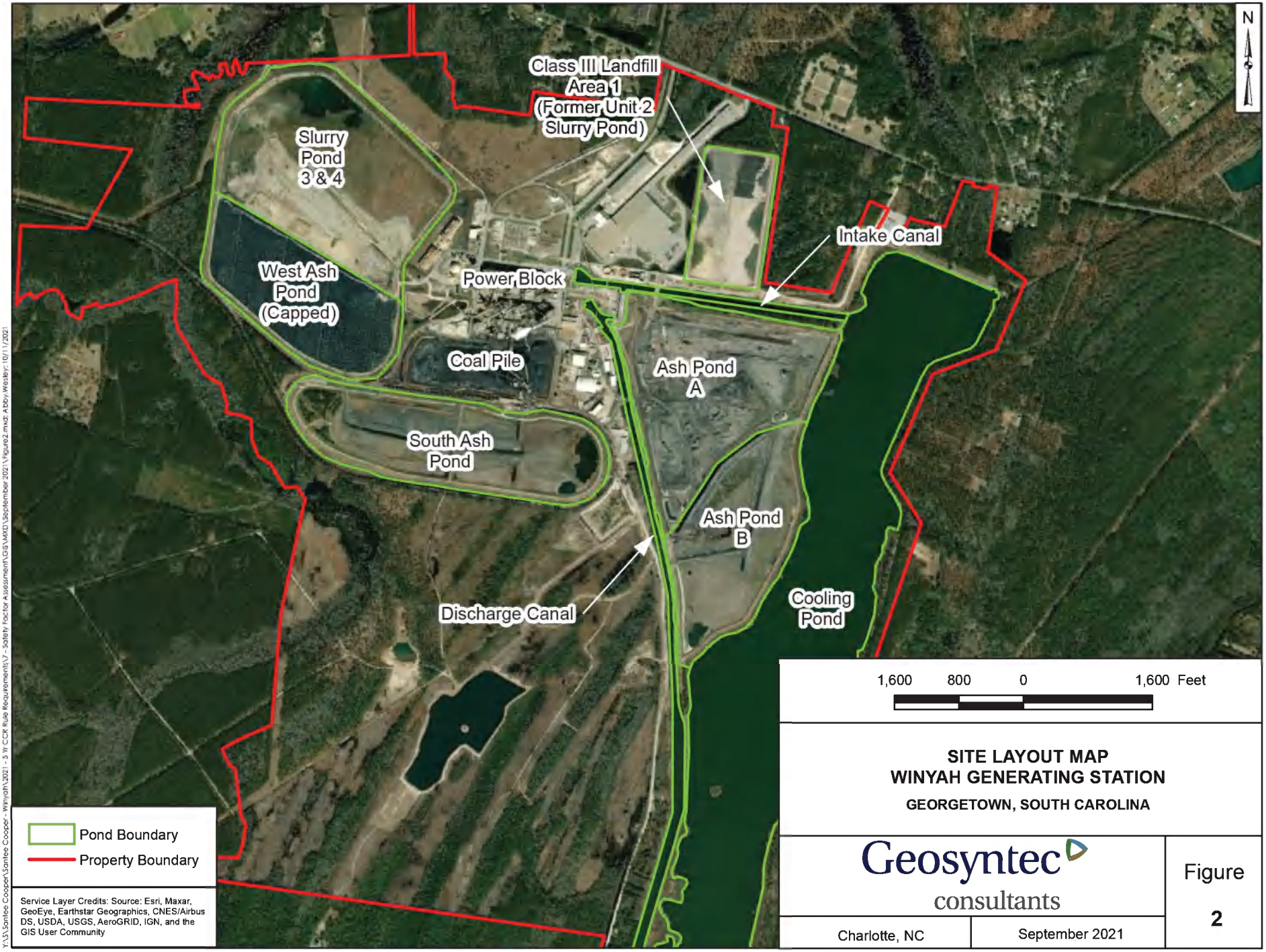
\\greenville-011\Data\PRJ1\S\Santee Cooper\Santee Cooper - Winyah\2021 - 5 Yr CCR Rule Requirements\7 - Safety Factor Assessment\GIS\MXD\September 2021\Figure1B.mxd, Abby.Wesley, 9/24/2021

SITE VICINITY MAP
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

Geosyntec consultants

Charlotte, NC | September 2021

Figure **1b**



SITE LAYOUT MAP
WINYAH GENERATING STATION
GEORGETOWN, SOUTH CAROLINA

Geosyntec consultants

Charlotte, NC | September 2021

Figure **2**

Y:\S\Santee Cooper\Santee Cooper - Winyah\2021 - 5 Yr CCR Rule Requirement\V - Safety Factor Assessment\GIS\MXD\September 2021\Figure2.mxd: Abby.Wesley: 10/11/2021