Prepared for

Santee Cooper
One Riverwood Drive
Moncks Corner, SC 29461

HISTORY OF CONSTRUCTION REPORT – ASH POND A

WINYAH GENERATING STATION

Prepared by

Geosyntec consultants

engineers | scientists | innovators

104 South Main Street, Suite 115
Greenville, SC 29601

Project Number: GSC5242

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EXECUTIVE SUMMARY

Winyah Generating Station (WGS) is a 1,260 megawatt coal-fired steam electric generating facility owned and operated by South Carolina Public Service Authority (Santee Cooper). The Site is situated between Pennyroyal and Turkey Creeks and is located at 661 Steam Plant Drive in Georgetown, South Carolina. Coal combustion residuals (CCR) generated at WGS have been historically managed in existing CCR surface impoundments.

On April 17, 2015 the United States Environment Protection Agency (EPA) published the Final Rule for the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (CCR Rule). CCR Rule section §257.73(c)(1) requires the owner of existing CCR surface impoundments to compile a history of construction containing available information pertaining to the location, purpose, design, construction, and maintenance of the unit.

The purpose of this report is to provide a detailed history of construction record for Ash Pond A at WGS. Ash Pond A is a 90 acre, unlined CCR surface impoundment, located within the Sampit River Watershed. Ash Pond A receives fly ash, boiler slag, bottom ash, and low volume wastewater. Ash Pond A provides treatment for solids removal from wastewater by gravity settling. Although Ash Pond A foundation materials are variable, foundation materials and dike fill soils primarily consist of poorly graded to silty sands. Original drawings depict the design geometry of Ash Pond A dikes and appurtenances. A topographic survey conducted in 2011 reveals the height of Ash Pond A perimeter dikes to range from 20 to 24.5 ft to the east, and 12 ft to 15 t to the north. Ash Pond A does not have an outfall structure and discharges to Ash Pond B through rim ditches and culverts. A Staff gauge installed in the principal outlet of Ash Pond B provides information on the water surface elevation in the unit. Facility personnel utilize the perimeter and intermediate dikes for periodic pond surveillance and maintenance.

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1. INTRODUCTION

In response to the recently published Coal Combustion Residual (CCR) Rule (40 Code of Federal Regulations (CFR) Part 257), Santee Cooper retained Geosyntec Consultants, Inc. (Geosyntec) to prepare required documentation for existing surface impoundments (SI) at Winyah Generating Station (WGS or the Site), located southwest of Georgetown, South Carolina. Four coal-fired generating units are operated at WGS with a total generating capacity of 1,260 megawatts.

Section §257.73(c)(1) of the CCR Rule states that *"No later than October 17, 2016, the owner or operator of the CCR unit must compile a history of construction, which shall contain, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xii) of this section."*

This History of Construction Report (Report) is intended to meet the requirements of Part 257.73 (c)(1)(i–xii) of the CCR Rule for Ash Pond A at WGS, by documenting dike geometry, engineering properties, material parameters, instrumentation, and other required information. The remaining sections of this Report are organized to satisfy specific requirements of the CCR Rule as follows:

Report Section	Regulatory Citation
Section 2 - provides owner and CCR unit information	*40 CFR §257.73(c)(1)(i)*
Section 3 - provides the location of the CCR unit	*40 CFR §257.73(c)(1)(ii)*
Section 4 - describes the purpose of the CCR unit	*40 CFR §257.73(c)(1)(iii)*
Section 5 - describes the contributing watersheds	*40 CFR §257.73(c)(1)(iv)*
Section 6 - describes the physical and engineering properties of foundation materials	*40 CFR §257.73)(c)(1)(v)*
Section 7 - presents construction methods and dates, and physical and engineering properties of	*40 CFR §257.73(c)(1)(vi)*
Section 8 - provides dimensional drawings	*40 CFR §257.73(c)(1)(vii)*
Section 9 - describes the existing instrumentation	*40 CFR §257.73(c)(1)(viii)*
Section 10 - presents the area-capacity curves	*40 CFR §257.73(c)(1)(ix)*
Section 11 - describes spillway and diversion features	*40 CFR §257.73(c)(1)(x)*
Section 12 - discusses surveillance, maintenance and repair provisions	*40 CFR §257.73(c)(1)(xi)*
Section 13 - discusses any record or knowledge of instability	*40 CFR §257.73(c)(1)(xii)*
Section 14 - provides the sources referenced within this Report	

2. OWNER AND CCR UNIT INFORMATION

Section §257.73(c)(1)(i) of the CCR Rule requires *"The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and identification number of the CCR unit if one has been assigned by the state."*

WGS is a coal-fired steam electric generating facility owned and operated by Santee Cooper. Santee Cooper's corporate offices are located at One Riverwood Drive, Moncks Corner, SC 29461. The Site is situated between Pennyroyal and Turkey Creeks and is located approximately four miles southwest of Georgetown, SC. WGS is located at 661 Steam Plant Drive in Georgetown, SC 29440.

Ash Pond A at WGS is a 90 acre surface impoundment (SI) which is regulated as a wastewater impoundment by the South Carolina Department of Health and Environmental Control (SCDHEC) Bureau of Water. Ash Pond A is exempt from the state's dam program and has not been assigned an identification number.

3. UNIT LOCATION

Section §257.73(c)(1)(ii) of the CCR Rule requires *"The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7 ½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available."*

A map depicting the location of Ash Pond A identified on a United States Geologic Survey (USGS) 7 ½ minute topographic quadrangle map (USGS, 2014) is presented as **Figure 1.** CCR SI boundaries at WGS are provided in **Figure 2**.

Ash Pond A is bounded by the intake canal to the north, the Cooling Pond to the east, Ash Pond B to the south, and the discharge canal to the west. Ash Pond A is separated from Ash Pond B by an intermediate dike which is generally aligned from west to east.

4. PURPOSE

Section §257.73(c)(1)(iii) of the CCR Rule requires *"A statement of purpose for which the CCR unit is being used."*

Ash Pond A currently receives fly ash, bottom ash, low volume wastewater, and boiler slag from the existing coal–fired electric generating units as well as contact stormwater from the Unit 2 Slurry Pond (an inactive SI). The purpose of Ash Pond A is to contain CCR and treat process wastewater and stormwater to remove solids by gravity settling.

5. WATERSHED DESCRIPTIONS

Section §257.73(c)(1)(iv) of the CCR Rule requires *"The name and size in acres of the watershed within which the CCR unit is located."*

Ash Pond A is located in the Sampit River Watershed (ID: 03040207-01). The Sampit River Watershed encompasses 105,260 acres (ac) in the Lower Coastal Plain and Coastal Zone regions of South Carolina and consists primarily of the Sampit River and its tributaries (SCDHEC, 2015).

6. FOUNDATION MATERIALS

Section §257.73(c)(1)(v) of the CCR Rule requires *"A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed."*

6.1 Regional Geology

Georgetown County is located in the Atlantic Coastal Plain physiographic province, which is characterized by Quaternary terrace deposits produced by fluctuating sea levels. Coastal plain sediments are underlain by Tertiary and late Cretaceous sediments to a depth of approximately 2,200 ft below ground surface (bgs) in the Georgetown area. Descriptions of geologic units of interest in the area were provided in a paper by Campbell and Coes, 2010. The thickness of each unit was estimated based on information from several borings referenced in Campbell and Coes (2010). Specifically, these borings include: 1) CHN-0820, which is located approximately 12 miles to the south of WGS, 2) GEO-0088, which is located approximately 7 miles to the southeast of WGS, and 3) GEO-0185, which is located less than 1.5 miles to the northwest of WGS. General information about the regional geologic units is summarized below, from the top unit to the bottom unit:

- Undifferentiated Quaternary Sediments: this geologic unit consists of yellowish-brown and reddish-orange poorly sorted, very fine to very coarse, clayey sand and gravel. Accessory minerals include opaque heavy minerals, mica, and feldspar. The Undifferentiated Quaternary sediments thickness ranges between 20 and 42 ft in the area.

- The Williamsburg Formation (Williamsburg): this geologic unit consists of gray to black interbedded clay and coarse quartz sand overlying shelly clay and calcareous clay. The Williamsburg can include sandy shale, fuller's earth, fossiliferous clayey sand (Lower Bridge Member), and fossiliferous clayey sand and mollusk-rich, bioclastic limestones (Chicora Member). The thickness of the Williamsburg in the vicinity of the site ranges between 30 and 90 ft.

- The Lang Syne Formation: As described in the literature by Muthig and Colquhoun (1988), this geologic unit consists of red and yellow (where weathered) or white, gray, and black (where freshly exposed) interbedded sand, silt, and clay and thin beds of silicified shell debris. Opaline clay stone is the most characteristic lithology of the Lang Syne Formation.

- The Rhems Formation: This geologic unit consists of light-gray to black shale interlaminated with thin seams of fine-grained sand and mica.

- The Peedee Formation: this geologic unit consists of a dark-green to gray, fossiliferous, glauconitic clayey sand and silt. The combined thickness of the Lang Syne, Rhems, and Peedee Formations ranges between 185 and 378 ft in the vicinity of WGS.

Additional late Cretaceous Formations are present to a depth of approximately 2,200 ft bgs in the area. These formations, in descending order, include: Donoho Creek, Bladen, Coachman, Cane Acre, Caddin, Sheppard Grove, Pleasant Creek, Cape Fear and undifferentiated Cretaceous sediments.

6.2 Foundation Materials

Soil test borings and Cone Penetrometer Test (CPT) soundings (Geosyntec, 2016) advanced within the vicinity of Ash Pond A perimeter dikes were evaluated. The foundation material properties are described below.

Foundation materials were observed to be variable across the Ash Pond A footprint but consisted primarily of poorly graded to silty sands with shells and few isolated seams of clayey sand or high plasticity clay. Uncorrected Standard Penetration test (SPT) blow counts within sandy foundations ranged from 0 to 61 blows per foot with tip resistances from 25 to 300 tons per square foot (tsf) (Geosyntec, 2016). Isolated pockets of soft clay were encountered in the northeast corner of the surface impoundment and were found to have uncorrected blow counts of 0 (i.e., weight of hammer) and 1 blow per foot, and CPT resistances below 20 tsf (Geosyntec, 2016). In isolated areas, the foundation materials were relatively poorly graded clean sands (< 10% fines). The poorly graded and silty sands were composed typically of 60% to 90% sand sized material with 10% to 25% fines (Geosyntec, 2016). Some samples, described historically as "shell hash", contained predominantly shells and fine gravel constituting 15% to 24% of the sample by weight (Geosyntec, 2016). Atterberg limits tests on the clay foundation soils beneath perimeter dike resulted in plasticity indices between 55 and 91 (75% of the samples being between 55 and 58) (Geosyntec, 2016).

The effective friction angle of foundation sands computed using the correlation developed by Hatanaka and Uchida (1996) typically ranged from 28° to 36° (Geosyntec, 2016). The effective friction angle was observed to vary significantly up to the underlying stiff cemented Chicora Member where it ranged from 45° to 55° (Geosyntec, 2016). Sandy and sandy clay foundation soils were found typically to have unit weights between 105 and 115 pounds per cubic foot (pcf). Unit weights of soft clayey foundation soils were found to range between 90 and 100 pcf (Geosyntec, 2016).

7. PHYSICAL AND ENGINEERING MATERIAL PROPERTIES AND CONSTRUCTION METHODS AND DATES

Section §257.73(c)(1)(vi) of the CCR Rule requires *"A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit."*

This section provides a description of the construction materials, site preparation and construction methods, and dates for Ash Pond A. Burns and Roe, prepared the original design, while Lockwood-Greene prepared the civil construction drawings. All available drawings are included in **Appendix A**.

In 1975, Burns and Roe, completed the design and construction of the unlined Ash Pond A to manage CCR. Ash Ponds A and B are separated by a divider dike, which is generally aligned from west to east from the Discharge Canal to the Cooling Pond. A high-pressure gas pipeline is located immediately north of the Ash Ponds A and B intermediate dike. It crosses Ash Pond A from the west to the east. The construction timeline, precise depth, construction methodology, and other construction information for this pipeline are not available (Drawing CV-504). The original design also shows two drawdown structures (i.e., Drawdown Structure I and II) in the southwest corner of Ash Pond A near the intersection of the perimeter dike with the divider dike (Drawings CV-511 and CV-508).

In 2011, Dewberry and Davis performed a site visit to assess the condition of the CCR impoundments at WGS as a part of USEPA's programmatic survey of coal-fired power plants. During the site visit, evidence of a corroded 18-in diameter corrugated metal pipe (CMP) was observed at the outlet of Drawdown Structure II which differed from the construction drawings that indicated a concrete discharge pipe. It was mentioned in discussion during the site visit that Drawdown Structure I was "abandoned in-place" and Drawdown Structure II was "bladder plugged and abandoned" (Dewberry and Davis, 2011). An available record drawing (Santee Cooper, 2011) indicates that Controlled Low Strength Material (CLSM) was used to abandon a 24- inch pipe from Drawdown Structure II. The drawing also indicates that the concrete drainage structure was filled above the pipe crown with CLSM, and the remainder of the structure was filled using random fill composed mostly of CCR found in Ash Pond A. Additionally, the excavation caused by the removal of the CMP was backfilled using the same soil that was removed. The record drawing is attached in **Appendix B**.

The current ponded ash level within this area of the Ash Pond is approximately 39.0 ft National Geodetic Vertical Datum of 1929 (NGVD 29).

In 2013, geotechnical investigations were conducted at 54 locations within Ash Ponds A and B (Geosyntec, 2014). Three investigation campaigns were completed from February to December 2013, which included soil borings and CPT soundings (Geosyntec, 2016) advanced within the vicinity of Ash Pond A perimeter dikes. Collected data, supplemented with boring logs, and design cross sections for Ash Pond A (Lockwood Greene, 1972) and Ash Pond B (PCRA,1993) was used to develop a triangular-irregular-network (TIN) surface of the pond bottom using AutoCAD® Civil 3D based on interpolation between available data points.

In September 2016, Santee Cooper submitted a permit application to construct a spillway between the existing outlet pipes on the divider dike between Ash Pond A and Ash Pond B. The spillway with a base width of 100 ft., 10H:1V side slopes, and an invert elevation of 37 ft. NGVD29, will be constructed as soon as approval is received. This work is expected to be completed in October, 2016.

Dike fill soils for Ash Pond A perimeter dikes were observed to be medium dense to very dense, poorly graded to silty sands. Uncorrected SPT blow counts ranged from 7 to 66 blows per foot, while CPT tip resistances ranged from 100 to 450 tsf (Geosyntec, 2016). Grain size distribution testing indicated that the dike fill soils typically consist of 72% to 87% sand sized (smaller than No. 4 sieve but greater than No. 200 sieve) and 6% to 28% silt and clay sized material, with most samples containing less than 15% fines (Geosyntec, 2016). The effective friction angle for sandy soils within the dike fill structure was computed using the correlation developed by Hatanaka and Uchida (1996), and was found to range from 33° to 55° (Geosyntec, 2016). Based on the estimated pond bottom, the volume of material in Ash Pond A is 1,692 acre-ft (Geosyntec, 2014, and Thomas and Hutton, 2011).

8. DIMENSIONAL DRAWINGS

Section §257.73(c)(1)(vii) of the CCR Rule states *"At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation."*

This section of the Report documents information related to the design, construction, operation, and maintenance of Ash Pond A on dimensional drawings, to the extent this information is available.

Available original design drawings, are presented in Appendix A. Original design documents for the construction of Ash Pond A are limited to a grading plan (CV-504 (Rev. 12)) prepared by Lockwood-Greene (1972). Drawing CV-504 (Rev. 12) indicates that the Ash Pond A dikes were designed with a crest elevation of 41.5 ft NGVD 29 with 3:1 horizontal to vertical (H:V) downstream and 2H:1V upstream side slopes. The divider dike was constructed similar to the perimeter dikes with 3H:1V downstream side slopes toward Ash Pond B and 2H:1V side slopes toward the interior of Ash Pond A. Drawing CV-504 (Rev. 12) also shows the presence of an underground gas line and prohibited contractor grading activities at the intersection with the perimeter dikes, suggesting that Ash Ponds A and B were constructed over the existing gas line. Signage has been provided by the pipeline owner to delineate the approximate pipeline alignment, and the gas line can be visibly observed where it crosses the Discharge Canal. Drawing CV-504 references Drawings CV- 511 and CV-508 for the design cross sections for Drawdown Structures I and II respectively. Drawdown Structure I was designed with a top elevation of 39.0 ft NGVD 29 and discharged through the divider dike to Ash Pond B with an 18-inch (in) diameter concrete pipe of at an invert elevation of 20.5 ft NGVD 29 (Drawing CV-511). Drawdown Structure II was located approximately 200-ft north of Drawdown Structure I and discharged to the Discharge Canal through a 24-in diameter concrete pipe with an invert elevation of 21.0 ft NGVD 29 (Drawing CV-508).

The original drawdown structures in Ash Pond A have reportedly been abandoned. Currently, water is routed southward from interior rim ditches through two (2) pipes in the southeast corner of Ash Pond A to Ash Pond B. One is a 30-in diameter CMP with upstream and downstream inverts of 37.50 ft NGVD 29 and 36.52 ft NGVD 29 respectively, while the other is a 48–in steel pipe with upstream and downstream inverts of 35.49 ft and 35.28 ft NGVD 29, respectively (Thomas and Hutton, 2016).

Heights of the perimeter dikes typically ranged from 12 ft to 15 ft to the north and 20- to 24.5-ft to the east. Crest elevations range between 38.8 and 44 ft NGVD 29 (Thomas and Hutton, 2011).

Based on the available information, a dimensional site plan delineating the layout and grading of Ash Pond A is provided in **Figure 3**. Normal and maximum operating pool elevations, and depth of the CCR unit, is depicted in the cross sections provided in **Figure 4.** Locations of instrumentation are provided in **Figure 5.** Maximum operating pool elevation was calculated based on a 100 yr., 72-hr storm event.

9. EXISTING INSTRUMENTATION

Section §257.73(c)(1)(viii) of the rule states *"A description of the type, purpose, and location of existing instrumentation."*

Staff gauges have been installed at WGS to monitor surface water in the vicinity of CCR impoundments and the Cooling Pond.

Ash Pond A does not have an outfall structure but discharges to Ash Pond B through culverts. As shown on **Figure 5**, a staff gauge has been installed in Ash Pond B (W-SW-APB) to monitor the water surface elevation.

10. AREA-CAPACITY CURVES

Section §257.73(c)(1)(ix) of the rule states *"Area-Capacity curves for the CCR unit."*

Topographic (2-ft contour interval) and bathymetric data was utilized to create an existing conditions TIN surface in AutoCAD® to represent the top of ash (Thomas and Hutton, 2011). The surface area of each contour within Ash Pond A was measured and tabulated. The storage capacity in each depth increment was calculated by averaging the surface area of the upper and lower contour and multiplying by the change in elevation between each contour. Surface area and pond capacity by elevation is presented in **Table 1**. The area-capacity curve is provided in **Figure 6**.

11. SPILLWAY AND DIVERSION FEATURES

Section §257.73(c)(1)(x) of the rule states *"A description of each spillway and diversion design features and capacities and calculations used in their determination."*

A spillway with a base width of 100 ft, side slopes of 10H:1V, and invert elevation 37 ft NGVD29 will be constructed in the divider dike between Ash Ponds A and B. Once constructed, Ash Pond A will not be overtopped by the 100 yr, 72 hour storm event. Operational Plans are in place in case the design storm event occurs before the construction of the spillway is completed. An emergency spillway for overtopping flows was not originally provided for Ash Pond A.

12. SURVEILLANCE, MAINTENANCE, AND REPAIR PROVISIONS

Section §257.73(c)(1)(xi) of the rule states *"The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit."*

Santee Cooper conducts periodic surveillance and maintenance of Ash Pond A. Santee Cooper engineers inspect Ash Pond A dikes in accordance with dike inspection procedures that are presented in **Appendix C**. Site personnel conduct weekly and annual inspections of the ash pond embankments. Personnel performing inspections are required to undergo an initial inspector training as well as refresher training every 3 years. Santee Cooper engineers accompanied by Site personnel conduct annual inspections. Weekly observations and routine inspections are documented on Inspection Checklists (**Appendix C**).

Maintenance of dikes and culverts at Ash Pond A are conducted as needed, as determined by routine observations conducted by facility personnel. Vegetation on the dike slopes and crest is cut or inspected every day by Site personnel using a long reach excavator with a 60" rotary cutter head and a flat tractor with a 15' batwing mower.

13. RECORD OF STRUCTURAL INSTABILITY

Section §257.73(c)(1)(xii) of the rule states *"Any record of knowledge of structural instability of the CCR unit."*

There are no records or knowledge of structural instability associated with Ash Pond A.

14. REFERENCES

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TABLES

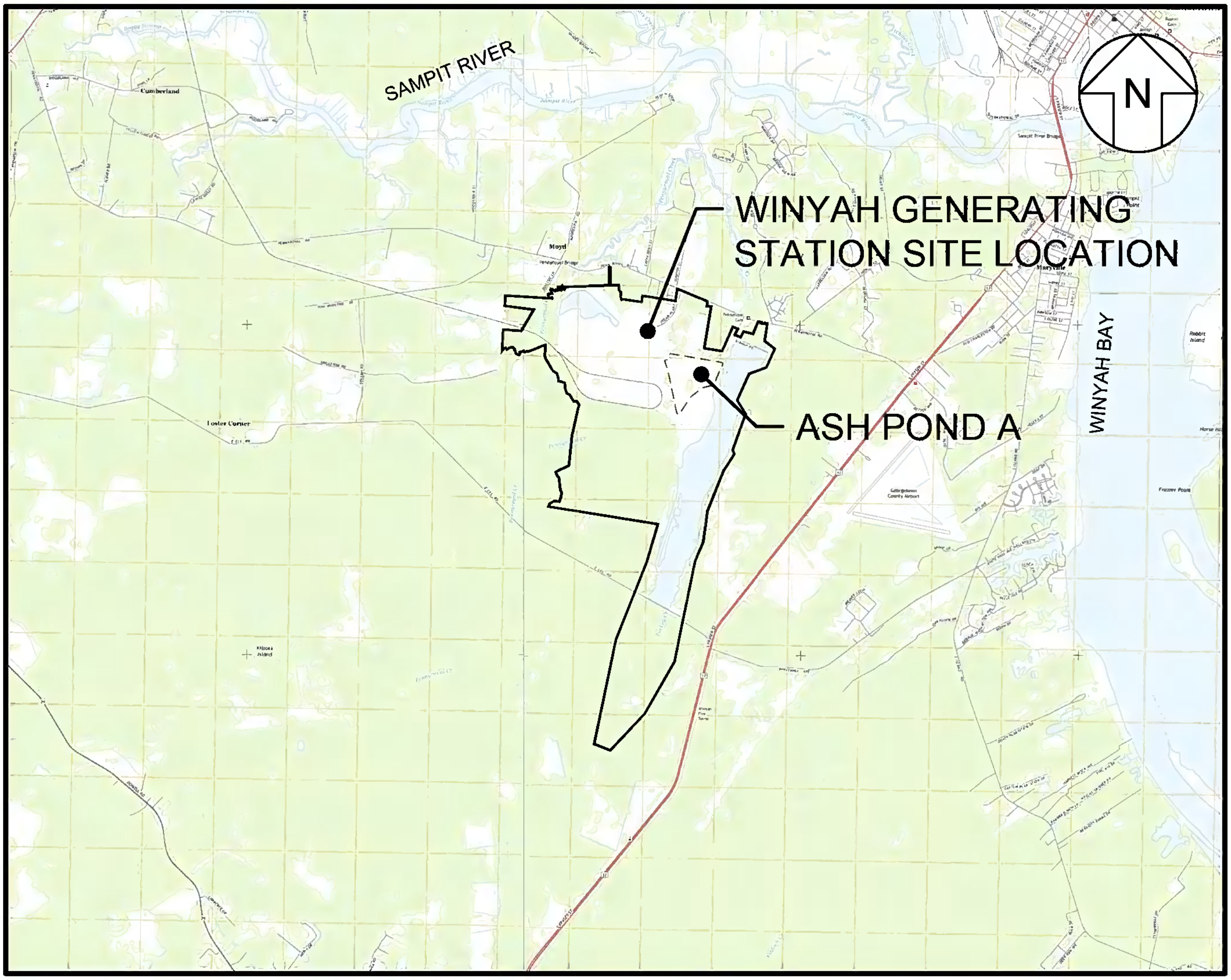
Table 1. Area-Capacity Table for Ash Pond A

Elevation (ft)	Area (ac.)	Volume (ac-ft)
38.8	8.432	13.66
38	3.293	8.97
36	1.525	4.15
34	0.869	1.75
32	0.273	0.61
30	0.162	0.18
28	0.015	0.00

Notes:

1. Elevations are provided in ft NGVD 29.
2. Δ Volume (ac-ft) computed as the average surface area × the difference in elevation (ft).

FIGURES



LEGEND

APPROXIMATE PROPERTY LINE

APPROXIMATE LIMIT OF POND

NOTES:

1. SOURCE OF USGS TOPOGRAPHIC MAP: https//store.usgs.gov, PUBLISHED BY THE US GEOLOGICAL SURVEY, GEORGETOWN SOUTH QUADRANGLE, DATE 2014, AND KILSOCK ISLAND QUADRANGLE, DATE 2014, 7.5 MINUTE SERIES.

2. THE WGS INCLUDES 2,527.47 ACRES ZONED AS HEAVY INDUSTRIAL.

3. WGS BOUNDARY SHOWN PROVIDED BY THOMAS & HUTTON DATED 10 JANUARY 2014.

0 8,000'

SCALE IN FEET

ASH POND A LOCATION MAP
SANTEE COOPER
WINYAH GENERATING STATION

Geosyntec consultants

FIGURE 1

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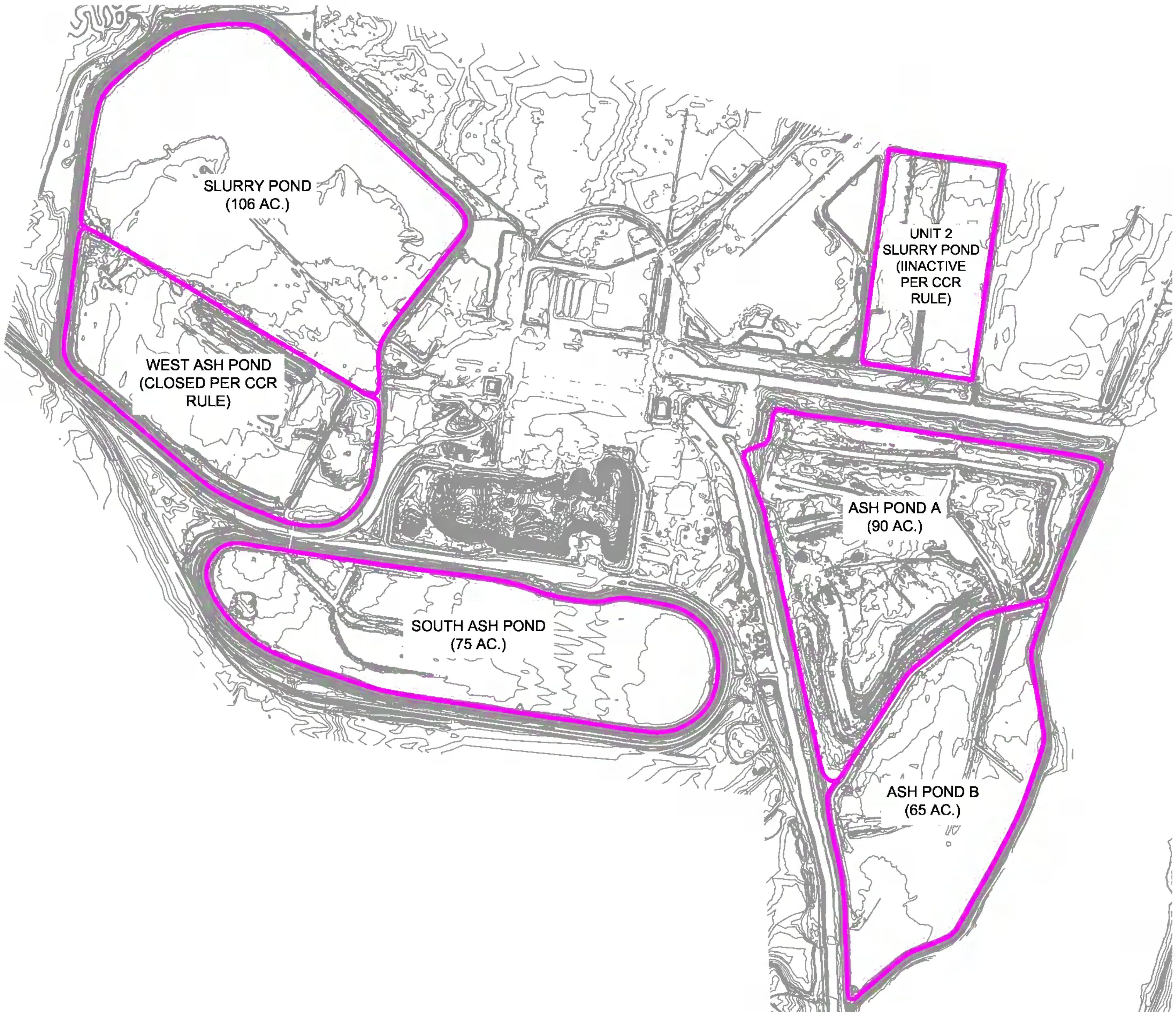

LEGEND

SURFACE IMPOUNDMENT DRAINAGE AREA BOUNDARY

NOTES:

1. TOPOGRAPHIC SURVEY PROVIDED BY THOMAS AND HUTTON (2011).
2. SURFACE IMPOUNDMENT AREAS ESTIMATED BY GEOSYNTEC (2015).

N

0 800'
SCALE IN FEET

SURFACE IMPOUNDMENT BOUNDARIES

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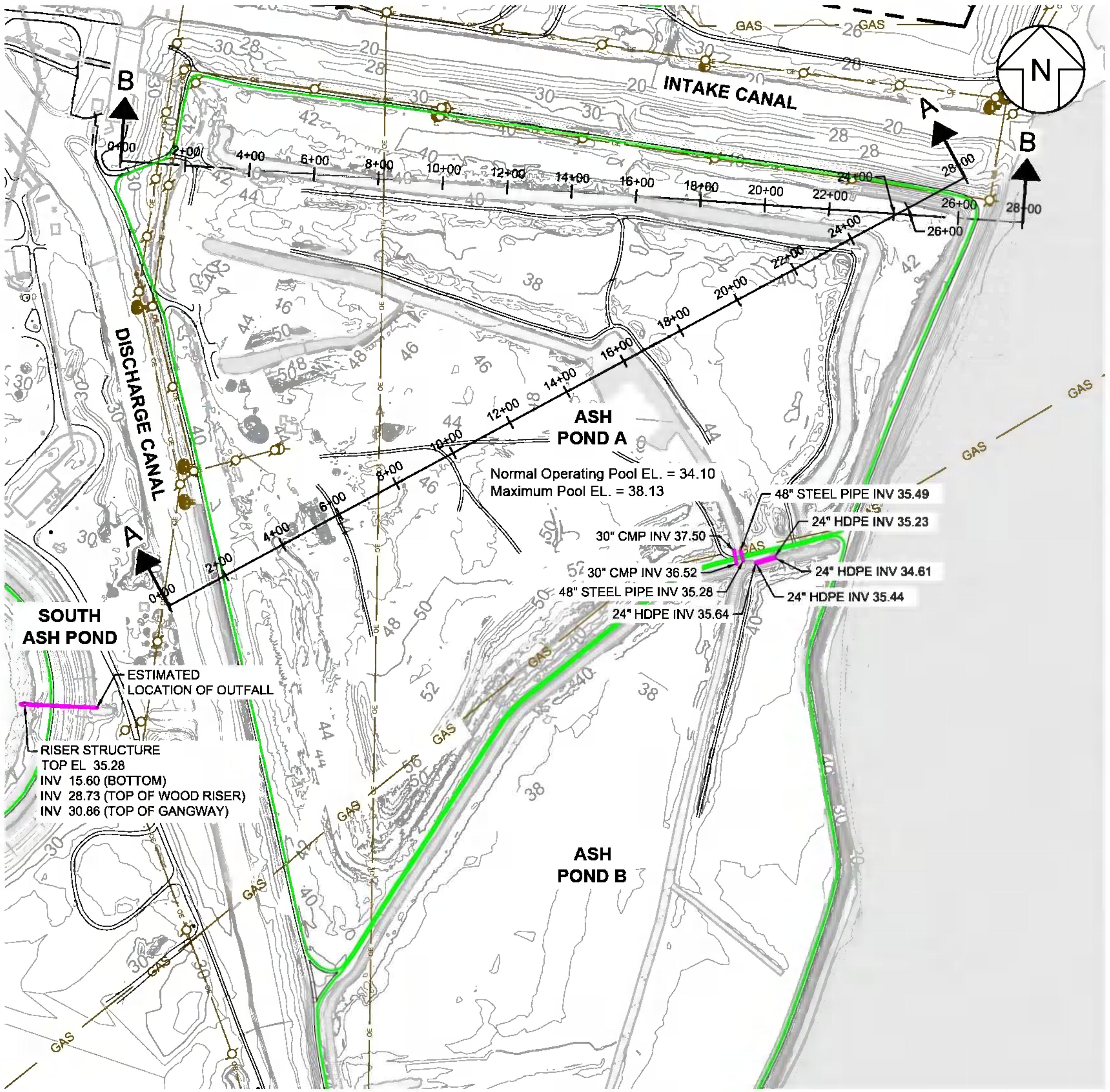
FIGURE 2

M:\S\SANTEE COOPER\SANTEE COOPER-WINYAH\0029-CONSTRUCTION HISTORY REPORT\FIGURES\W-0-SC-585-00-F0029-007



LEGEND

- APPROXIMATE LIMIT OF ASH PONDS
- DIRT/GRAVEL ROAD
- EXISTING GRADES (4)
- GAS LINE (GAS)
- OUTFALL PIPE AND STRUCTURE
- OVERHEAD ELECTRIC LINE (OE)
- RAILROAD
- WATER

NOTES:

1. TOPOGRAPHIC SURVEY PROVIDED BY THOMAS & HUTTON DATED 06/29/11 AND REVISED ON 01/14/12.
2. OUTFALL STRUCTURES AND PIPES SOURCE: THOMAS AND HUTTON SURVEY, RECEIVED FILE ON 2/5/2016. FILE NAME: 23021T12_DikeCrests.dwg
3. PROPERTY BOUNDARY LINE PROVIDED BY THOMAS & HUTTON, DRAWING TITLED "PLAT OF THE BOUNDARY AND COMBINATION OF VARIOUS PARCELS CONTAINING 2527.47 ACRES TOTAL COMPRISING WINYAH GENERATING STATION AND THE SUBDIVISION TO CREATE TRACT A AND TRACT B", PLAT DATE 11/25/13.
4. COORDINATES AND DIRECTIONS SHOWN ON THIS DRAWING ARE BASED ON SOUTH CAROLINA STATE PLANE COORDINATE SYSTEM (NAD83) (CORS) (INT'L FT). DISTANCES SHOWN ARE GROUND DISTANCES, NOT GRID DISTANCES.
5. ELEVATIONS ON THIS SURVEY ARE REFERENCED TO NGVD 1929 DATUM AS DERIVED FROM NGS MONUMENT PID#DD1957.
6. SECTIONS WERE CUT TO PASS THROUGH LOWEST POINT ON DIKE CREST.
7. MAXIMUM POOL EL. ESTIMATED BASED ON A 100 YR, 72-HR STORM EVENT.

0 400'

SCALE IN FEET

SANTEE COOPER
WINYAH GENERATING STATION
ASH POND A SITE PLAN

Geosyntec consultants

FIGURE 3

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JULY 2016

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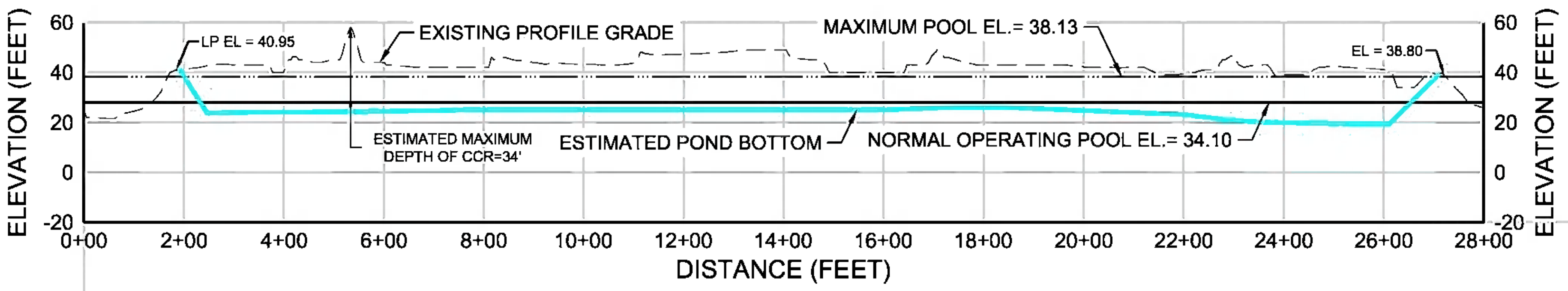
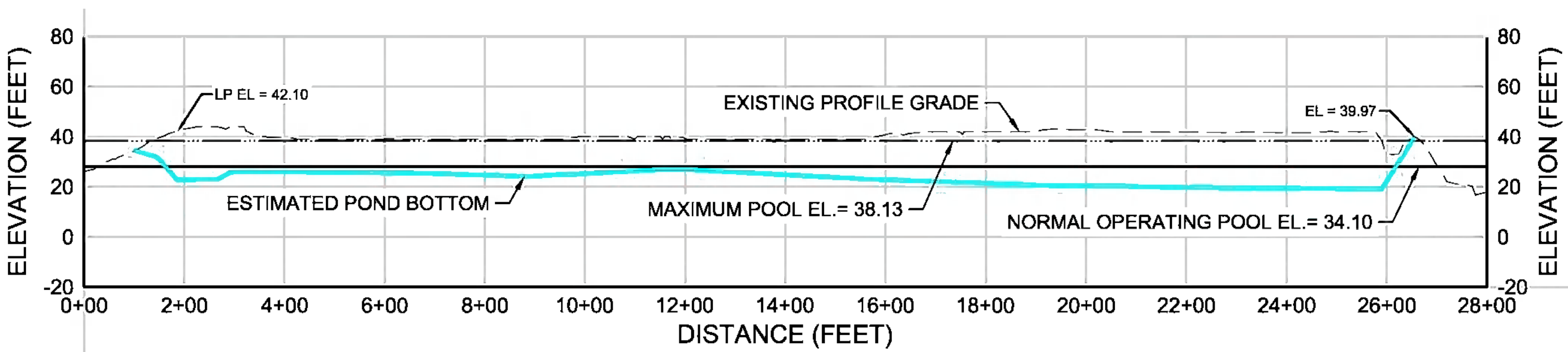


A / 3 PROFILE

SECTION AT DIKE CREST LOW POINT

SCALE: 1"=300' (HORIZONTAL); 1"=60' (VERTICAL)



B / 3 PROFILE

SECTION AT DIKE CREST LOW POINT

SCALE: 1"=300' (HORIZONTAL); 1"=60' (VERTICAL)

LEGEND

- ESTIMATED POND BOTTOM
- EXISTING PROFILE GRADE
- MAXIMUM POOL ELEVATION
- NORMAL OPERATING POOL ELEVATION

NOTE:

1. POND BOTTOM WAS ESTIMATED FROM HISTORICAL BORINGS AND FIELD INVESTIGATIONS PERFORMED BY GEOSYNTEC IN 2013 AND 2014.

0 300'
HORIZONTAL SCALE IN FEET

0 300'
VERTICAL SCALE IN FEET

SANTEE COOPER
WINYAH GENERATING STATION
ASH POND A
DIKE LOW POINT SECTIONS

Geosyntec consultants

FIGURE 4

PROJECT NO: GSC5242 | JULY 2016

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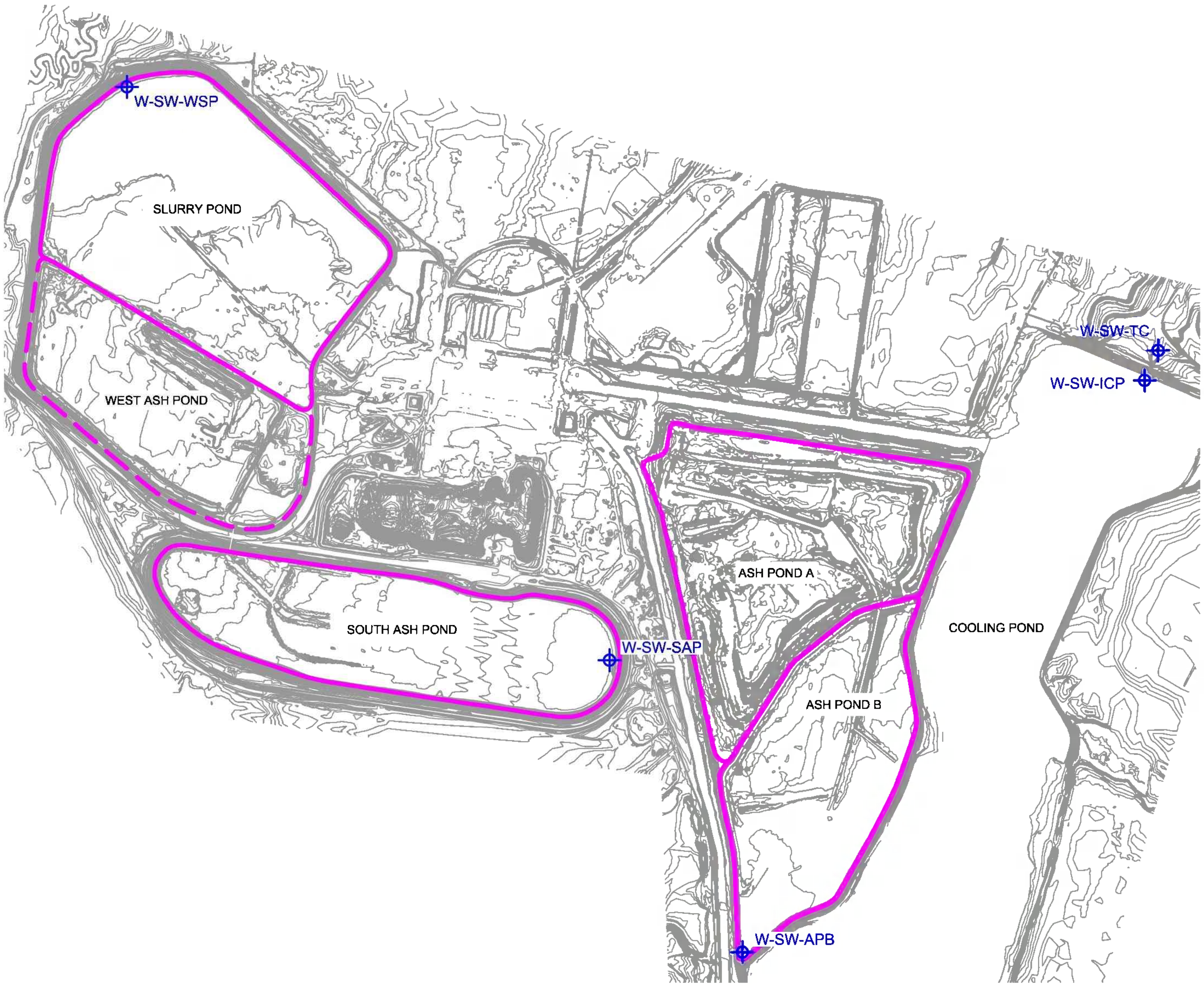

LEGEND

SURFACE IMPOUNDMENT DRAINAGE AREA BOUNDARY

CCR EXEMPT SURFACE IMPOUNDMENT WITH AREA DRAINAGE TO EXISTING SURFACE IMPOUNDMENT

NOTE:

1. TOPOGRAPHIC SURVEY PROVIDED BY THOMAS AND HUTTON (2011).

STAFF GAUGE LOCATIONS

Geosyntec consultants

FIGURE 5

PROJECT NO: GSC5242 | JULY 2016

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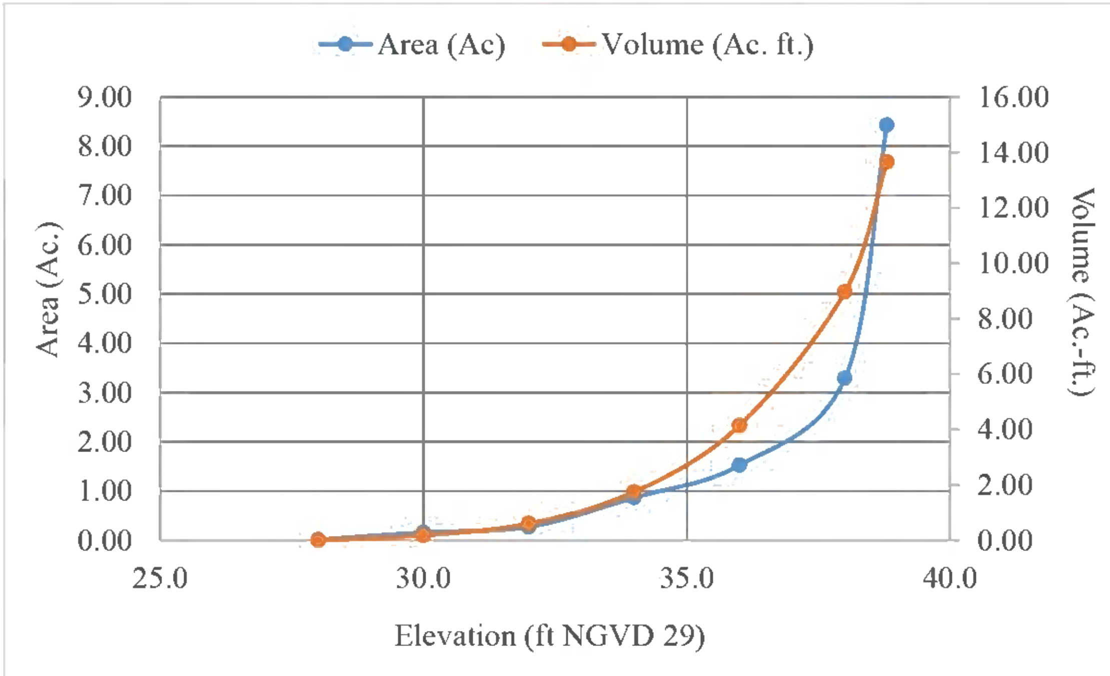


Figure 6. Area- Capacity Curve for Ash Pond A

Notes:

1. Elevations are provided in ft NGVD 29.
2. Δ Volume (ac-ft) computed as the average surface area × the difference in elevation (ft).

APPENDIX A

Lockwood-Greene Design Drawings


DETAIL OF EMERGENCY OVERFLOW IN ASH POND DIKE I
NO SCALE
TOP OF DIKE @ EL. 41.5
INSTALL AIR VALVE AT HIGH POINTS IN LINE AND BETWEEN DROPS
DETAIL AIR VALVE
NO SCALE
CRISPIN PRESS. AIR VALVE OR APPROVED EQ.
DELETED SECTIONS
DISCHARGE PIPE SEE DWG. CV-509
INTAKE STRUCTURE SEE DWG. # C-530
PLANT SERVICE DRIVE
S.C. STATE NORTH
PLANT COORDINATE NORTH
CONCRETE MONUMENT
WELL NO. 1 DISCHARGE STRUCTURE SEE DWG. # C-533
INTAKE
CANAL (EXIST.)
WELL NO. 2
DRAWDOWN STRUCTURE
CANAL
PIPE SUPPORTS BY CONTRACTOR PILES BY OTHERS, SEE SPECS.
ASH DISPOSAL POND I
WATER SURFACE ELEVATION 32.0
ASH DISPOSAL POND II
DISCHARGE
EMERGENCY OVERFLOW
REMOVE EXISTING 30" C.M.P. AND EXCAVATE CANAL ENTRANCE
RELOCATED SCPSA POWER LINE 12 K.V. (BY OTHERS)
R = 1000' T = 166.50'
R = 1000' T = 100.21'
SOIL BORING (TYPICAL)
COOLING IMPOUNDMENT
OVERFLOW AND DRAINAGE CANAL
ENERGY DISSIPATOR
TURKEY CREEK BRIDGE (EXISTING) SEE DETAIL THIS DWG.
PIPE SUPPORTS BY CONTRACTOR PILES BY OTHERS SEE SPECS.
DITCH INVERT EL. 13.0
DRAINAGE DITCH
RELOCATED SCPSA POWER LINE 34.5 KV (BY OTHERS)
EXISTING BRIDGE
IMPROVED GRADE LINE
DETAIL OF CHANNEL IMPROVEMENTS AT EXISTING TURKEY CREEK BRIDGE
LOOKING NORTH
NO SCALE
PRINTED
12 ADDED AS BUILT INFO.
11 REVISED AIR VALVE DETAIL CONTRACT S-2862-61
10 ADDED SERVICE WATER LINE
8 REVISED ROAD AROUND PLANT
6 REVISED DIKES TRANSITIONS
5 REVISED DRAWDOWN STRUCTURE
5 RELOCATED DIKE
4 REVISED DISCHARGE CANAL ALIGNMENT
REVISION
BURNS AND ROE, INC.
ENGINEERS AND CONSTRUCTORS
ORADELL, N.J. HEMPSTEAD, N.Y. LOS ANGELES, CALIF.
ATLANTA
NEW YORK
LOCKWOOD GREENE
ARCHITECTS · ENGINEERS
SPARTANBURG, S.C.
SITE PLAN
COOLING POND
SHEET NO. 1
SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
GEORGETOWN GENERATING STATION
GEORGETOWN, SOUTH CAROLINA
L-G JOB NO. 71029
B&R W.O. NO. 2862-02
DWG. NO. CV-504
rev. no. 12

NOTICE OF REVISION

REVISIONS AS NOTED ON THIS DRAWING MAY CONSTITUTE A CHANGE TO ORIGINAL CONTRACT. IF CHANGES AFFECT THE CONTRACT PRICE, CONTRACTOR SHALL SUBMIT A DETAILED ESTIMATE OF THESE CHANGES TO THE ENGINEER WITHIN 15 DAYS OF RECEIPT OF THIS DRAWING. NO WORK SHALL COMMENCE UNTIL THIS PRICE CHANGE IS AGREED UPON. SEE GENERAL CONDITIONS, PARAGRAPH 3.0.

MAR 1974 PRINTED

BURNS AND ROE, INC.
ENGINEERS AND CONSTRUCTORS
ORADELL, N. J. HEMPSTEAD, N. Y. LOS ANGELES, CALIF.

no	date	REVISION	by	ck.	appr.
4	6-26-72	ADJUSTED BM'S GT-8 AND GT-9	C.T.	E.K.	
3	3/23/72	ISSUED FOR CONSTRUCTION, CONTRACT NO S 2862-18	EK	CRT.	OCJ
2	3/10/72	ADDED LOCATION OF BORINGS	EK		
1	3/17/72	ISSUED FOR BIDS ON CONTRACT NO S 2862-18	EK		OCJ
0	2/24/72	ISSUED FOR REVIEW	EK		
5	2-26-74	EXTENDED PIPE FOR DRAWDOWN STRUC. II + III CONTRACT # S 2862-62	TW	DRD	JHR

drawn by	E. KNABENHANS
dept. ck.	W. K. DUKES
dept. appr.	J. R. MORRIS
coord. ck.	W. K DUKES
p.m. appr.	[signature]
B&R appr.	[signature]

ATLANTA — NEW YORK
LOCKWOOD GREENE
ARCHITECTS · ENGINEERS
SPARTANBURG, S.C.

sheet title: INTAKE CANAL PLAN AND PROFILE

job name: SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
GEORGETOWN GENERATING STATION
GEORGETOWN SOUTH CAROLINA

scale: AS NOTED
date: 2-17-72
L-G JOB NO. 71029
B&R W.O. NO. 2862-02
DWG. NO. CV-508
rev. no. 5

APPENDIX B

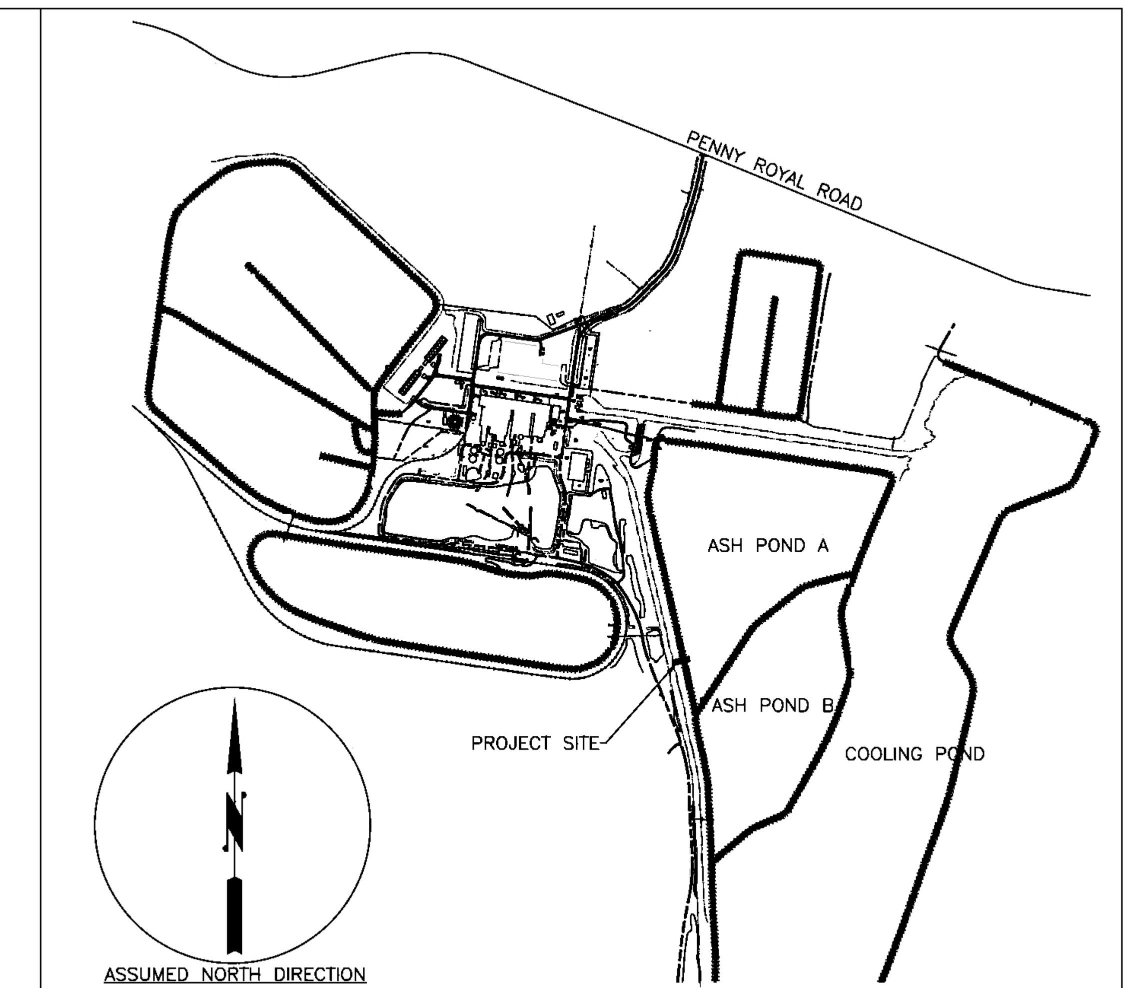
Record Drawing – Abandon Existing Drainage Structure along Discharge Canal

GENERAL NOTES:

1. Work completed in January of 2011 by Santee Cooper – Construction Services.
2. Twenty–four (24) inch RCP was cleaned and inspected prior to being abandoned. Work was performed by Palmetto Industrial Services, Inc. (888–725–6388). A DVD of the camera inspection is in the project file.
3. The approximate location of the existing concrete drainage structure was determined by a handheld Global Positioning System (GPS) in May of 2011.
4. Controlled Low Strength Material (CLSM) was used to the abandon the twenty–four (24) inch RCP. CLSM is a self–compacting cementitious material commonly referred to as flow–fill. Santee Cooper specified type I/II Portland cement based on the chemical properties of the Coal Combustion Residuals (CCR).
5. The existing concrete drainage structure was filled above the pipe crown with CLSM. The remainder of the structure was filled using random fill composed mostly of CCR found in Ash Pond A.
6. The excavation caused by the removal of the existing twenty–four (24) inch corrugated metal pipe was backfilled using the same soil that was removed. No soil tests were performed on the material during placement.
7. This drawing is based on a combination of the original design drawings and information collected in the field. It has been completed using the best available information. If changes are made in the future to this area of the Ash Pond A dike, please note that this drawing should be updated accordingly.

BILL OF MATERIALS

ITEM	QUANTITY	UNIT
Controlled Low Strength Material (See General Note 4)	~20	Cubic Yards



VICINITY MAP OF WINYAH GENERATING STATION
(NTS)

santee cooper®

Construction Services	WGS – Ash Pond A
Civil Projects	Record Drawing Abandon Existing Drainage Structure Along Discharge Canal
DRAFTER: RGB	
ENGINEER: RGB CHECKED: BMC	
DATE 10–17–11 AUTH.NO. SCALE:NTS	SHEET 1 OF 1 DWG.NO. 4046–D09–0003

APPENDIX C

Dike Inspection Procedures and Inspection Checklist

4.10.2. The individual inspecting the dike(s) should inspect the crest, the slopes, and the area downstream, and complete the form, noting issues as follows:

Leaks

Any leaks on the dry side of the dike should be described such as the approximate quantity of flow, whether the water is discolored and the exact location of the leak. If a leak is found, Generation Technical Services should be notified immediately so that the appropriate steps to control the situation, and notify agencies if necessary, can be taken.

Seepage

Seepage on the dry side of the dike can be an indication of changes or shifts in the dike structure and possible future leaks. Any seepage should be described in the report.

Wet Spots

The dikes should be inspected when it has been dry for a period of time. Any areas on the dikes where the soil appears damp compared to the surrounding soil should be noted. This could be evidence of seepage.

Aquatic Weed Growth

Any aquatic weeds or wetland weeds, such as cattails, mosses, and algae, seen around the dry side of dikes could signify seepage from the ponds. If wetlands are downstream of the toe on the dry side of the dike, then the aquatic weed growth will not necessarily be a sign of dike seepage and does not need to be included in the report.

Trees and Woody Vegetation

Trees and woody vegetation can obscure problems, provide habitat for burrowing animals, and prevent growth of a protective grass cover. Trees growing along the downstream slope and near the toe of the downstream slope are a special concern and should be noted so maintenance or repair can be made.

Erosion

Any signs of erosion should be included in the report.

Depressions or Ruts

Depressions and ruts can hold water and make maintenance mowing more difficult or can weaken the soil and cause localized sloughing of the slope. These should be filled and graded to drain. Re-establish vegetation if needed.

Water Level in the Pond
Pond levels should be inspected and recorded to be sure freeboard is adequate and the dikes will not be overtopped.

Overall Condition
The overall condition of the dike should be described. The back of the report form can be used to continue any comments or descriptions.

Excessive Sediment Buildup
Stormwater ponds shall be inspected for excessive sediment buildup. Buildup shall be periodically cleaned out of stormwater ponds and properly disposed of.

Discharges and Pipe Crossings
All outlets of hydraulic structures which pass through a dike or abutment or underneath the base of a surface impoundment should be inspected for abnormal discoloration, flow, or discharge of debris or sediment which could indicate a leak. In addition, all pipe crossings, whether through, under, or over a dike, should be inspected.

4.10.3. Driving Inspections should involve a view of both sides of the dike and around the toe of the dike exterior looking up whenever possible. The inspector should walk to evaluate pipe crossings, the area around discharge structures, wet areas, or areas demonstrating erosion.

4.10.4. Inspections by Qualified Dam Safety Engineer shall include participation by station personnel. Documentation shall be as appropriate and shall be provided for station files. When noted, inspections should include internal inspections of principal outlet structures. Consideration should be given to performing the annual walking inspection coincidentally with the Dam Safety Engineer's inspection when required annually.

4.10.5. If any issues are noted, a map or drawing of the dike/pond(s) inspected should be attached to the report form. Sketches of the ponds at each station are available in Appendix E, FORMS. Significant issues shall be immediately communicated to supervision.

4.10.6. Work orders should be written to address any problems noted on the reports. The person performing the inspections is responsible for the writing and follow-up on the work request.

4.10.7. The completed report forms should be reviewed by management, and reviewed and approved by the Station Manager. Copies should be kept in the station's files and sent to Generation Technical Services.

GENERATION - TECHNICAL SERVICES
IMPOUNDMENT INSPECTION REPORT: CCR
WINYAH STATION

ASH POND A (Unit 1 & 2)

DATE: ______________
INSPECTOR: ______________ **SIGNATURE:** ______________
REVIEWED BY: Station Manager **SIGNATURE:** ______________

FEATURE	OK √	LOCATION & COMMENTS
1. Crest		
Alignment (H)		
Settlement (V)		
Cracks (Measure Dimensions)		
Excessive Vegetation		
Burrows or Ruts		
2. Slopes		
Seepage (Flow, lush grass, clarity)		
Erosion gullies		
Slides (cracks, bulges, scarps)		
Vegetation (trees present, no grass)		Vegetated slopes not to exceed 6 inches
Animal burrows		
Rip-rap displacement		
Freeboard Adequate		
Settlement/Depression		
3. Area Downstream		
Seepage (Flow, lush grass, clarity)		
Boils		
Drainage Ditches		
Drainage Pipes		
Vegetation (trees present, no grass)		
4. Outlet Works		
Inspect Plastic, Concrete, Metal, and Wood		
Flowing as expected from outlet?		
No abnormal flow, discoloration, debris, or sediment?		
5. Crossings		
No flow, settlement, erosion, voids, or sediment loss visible at pipe crossings (Both sides of dike and crest)		View line crossing from cooling tower area (northwest corner) and line route around perimeter of pond. View discharge to Ash Pond B.
6. Overall Condition		
Note any other issues		New pipes?
7. Instrumentation		
Staff gauge reading as expected?		Record reading if applicable

NOTE: SHOW LOCATION OF PROBLEM AREAS ON AN ATTACHED DRAWING and DESCRIBE DEFICIENCY
S I M P L E - Sketch, Inspect, Measure, Photograph, Locate, Engage a Qualified Engineer if necessary

Copies: Station Files (original)
Operating Record - ECM
Generation Technical Services - Tim Swicord

Revised 9/30/2015