CONSTRUCTION QUALITY ASSURANCE PLAN

R6 CCR LANDFILL
PLANT YATES
COWETA COUNTY, GEORGIA

FOR

Georgia Power

November 2018

ATLANTIC COAST CONSULTING, INC.

Atlantic Coast Consulting, Inc.
630 Colonial Park, Suite 110, Roswell, GA.,
p. 770-594-5998, f. 770-594-5967

TABLE OF CONTENTS

1. GENERAL

The R6 CCR Landfill closure construction is broken into 3 phases. Closure construction for Phase 1 and 2 which encompasses approximately 68 acres has been completed in accordance with the Solid Waste Handling Permit # 038-011D (LI). Due to multiple CCR unit closures near R6 and the need to accommodate shared stormwater infrastructure, the remaining 14 acres will be closed in Phase 3.

This Construction Quality Assurance (CQA) Plan describes the quality assurance activities that will be undertaken during the in-place closure of the remaining 14 acres of the R6 CCR Landfill. The purpose of this document is to define the scope, formal organization, and procedures necessary to perform quality assurance tasks such that the construction elements of the closure of the R6 CCR Landfill comply with the design as shown in this CQA Plan and Closure Plan.

Parties involved in the CQA program:

1. PURCHASER, OWNER, OPERATOR: Georgia Power Company (Georgia Power).

2. CONTRACTOR: The entity awarded the contract to furnish the materials and perform the work as described herein and as specified in the Closure Plan.

3. CONSTRUCTION SITE MANAGER (CSM): The on-site manager of the project or his designated representative. He is the authorized representative at the site for the Purchaser.

4. DESIGN ENGINEER: The company or companies hired by the owner/operator to furnish the design, drawings, plans, and specifications for the facility. The DESIGN ENGINEER will be a registered professional engineer licensed in Georgia.

5. CQA ENGINEER, CQA FIRM, and CQA INSPECTOR: Responsible for implementing the construction quality assurance requirements as stated in the project plans, technical specifications, this CQA Plan, and the project objectives; verifying basic data as reasonable and complete; outlining procedures to process data; developing statistical procedures for the analysis of test data; and preparing quality assurance memoranda and quality assurance reports. The CQA Engineer will report to Georgia Power. The CQA Engineer will be a registered professional engineer licensed in Georgia. Reference to the CQA Engineer, for the purpose of this document, will include the CQA Engineer and his/her designated representatives.

6. CQC ENGINEER/TECHNICIAN: Refer to the third party firm responsible for construction quality control monitoring, testing and documentation for all work performed during the construction at the facility. The CQC Engineer/technician will be a registered professional engineer and licensed in Georgia.

7. AS BUILT SURVEYOR: As-built certification surveys will be performed by a registered professional land surveyor licensed in Georgia on the components identified in the CQA Plan.

2. CCR EXCAVATION

In the context of this CQA Plan, “CCR removal” refers to the process of verifying and documenting that CCR has been removed. CCR has been encountered within a shared stormwater infrastructure between R6 and

the Ash Management Area (AMA), which is permitted under separate cover. The CCR in this area will be excavated until native soils are encountered indicating that the CCR has been removed. In addition, a six-inch layer of soil will be removed below the verified CCR/soil interface. The CCR excavation and removal criteria are described below:

Visual Verification of CCR Removal Procedure:

GPC will engage the services of a Construction Quality Assurance (CQA) firm to monitor and document CCR removal according to the following procedure:

1. The CQA Engineer will prepare an ash pond map using a 100-ft grid spacing. Grid points will be assigned a unique alphanumeric label for reference and documentation of CCR removal.
2. CCR will be excavated until there is no visible CCR present. This surface will be referred to as the CCR/soil interface.
3. CQA personnel will observe the CCR/soil interface at the working face to confirm that visible CCR has been removed. Observations will be made with reference to the ash pond grid map. Observations will include, but not be limited to, taking photographs, and describing soil color. CQC personnel will document observations in field logs or reports.
4. The CCR/soil interface surface will be surveyed.
5. The excavation will continue to a minimum 6-inches below the CCR/soil interface. This surface will be referred to as the bottom of excavation. Excavated soil will be disposed of at an off-site permitted landfill.
6. The bottom of excavation surface will be surveyed and confirmed to be a minimum of 6” below the CCR/soil interface.

3. GRADING

The CQC Engineer will observe and document all earthwork grading (excavation/fill placement) activities, test the compaction of in-situ materials and of structural fill. The CQA Engineer is responsible for certifying that the materials and construction of the earthworks are in accordance with the plans, technical specifications, and this CQA Plan.

3.1 Subgrades

During closure construction, conformance and performance testing of the subgrade soil materials will be performed by the CQC Engineer. The CQC Engineer will monitor and document proof-rolling of areas that are cut to achieve grade. Material placed to achieve grades indicated on the plans will be tested by the CQC Engineer in accordance with the test methods and frequencies listed herein to verify that the compacted fill materials used by the Contractor comply with this CQA Plan. Areas of proof-rolling or compacted fill that do not conform to this CQA Plan will be delineated and reported to the Contractor. The CQC Engineer will document that these areas are reworked by the Contractor and retested until passing results are achieved.

3.2 Conformance Testing

The CQC Engineer will observe and test the structural fill soils to confirm that they are uniform and meet or exceed the requirements of this CQA Plan. For soil materials obtained from on-site or off-site borrow areas, the CQC Engineer will perform visual inspections and conformance tests prior to the materials being used.

CQC personnel will observe structural fill materials to ensure they are free of deleterious materials, (e.g., roots, stumps, rocks, and large objects). When necessary, the Visual Manual procedure for the description and identification of soils will be conducted by the CQC Engineer in accordance with test method ASTM D2488.

Prior to receiving structural earth fill or ash fill, the foundation area will be scarified by harrowing or other suitable means. Structural earth fill materials will be placed in uniform layers of eight inches, nominal thickness, loose measurement, for one foot beyond the full width of the fill on each side. The thickness of each layer will be kept uniform with the necessary grading equipment. Upon completion of compaction, the slopes will be cut back to the final slope. Particular care will be used to obtain the required compaction along the edges of the fill slopes.

All testing will be conducted in accordance with the CQA Plan. The field-testing methods used to evaluate the suitability of soils during their installation, will be performed by the CQC Engineer in accordance with current ASTM test procedures indicated in the table below.

4. STRUCTURAL EARTH FILL

4.1 Material

Structural fill is soil material placed and compacted to achieve final grades. Structural fill will consist of on-site soils that meet the project specifications. Soils may be imported from off-site if needed. The structural fill will be constructed and compacted to meet the requirements outlined in this Section. Each structural fill material source will be approved in advance by the Engineer through the submittal process. Soil imported from off-site and on-site soils from outside the CCR surface impoundment will be evaluated per project specification requirements to confirm they are not impacted. The approximate 6-inch thick surficial soil layer will be capable of supporting vegetation and will be evaluated through agronomic testing per the project specifications requirements and amended as necessary. The CQC Engineer/technician will monitor and document structural earth fill according to the following requirements.

4.2 Lift Thickness and Compaction Requirements

4.2.1 The CQC Engineer/technician will document and confirm that the structural fill is placed in accordance with the requirements shown in Table 4.1 of this section. Areas failing to meet the requirements in Table 4.1 below will be reworked, or removed and replaced by the Contractor and retested by the CQC Engineer.

4.2.2 The CQC Engineer will document and confirm that each lift is compacted prior to placement of succeeding lifts. The CQC Engineer will document and verify compaction in confined areas where mechanical equipment, suitable for small areas and capable of achieving the density requirements is used.

4.2.3 The CQC Engineer will document and confirm that lift compaction is performed with an appropriately heavy, properly ballasted, penetrating-foot or smooth-drum vibratory/non-vibratory compactor depending on the soil type.

Table 4.1 - Required Structural Fill Properties

Item	Required % Compaction Standard Proctor (ASTM D698)	Required % of Optimum Moisture, Standard Proctor (ASTM D698)	Maximum Lift Thickness (Loose) (inches)
Structural Fill	95	-3 to +3	8

4.3 Observations

Prior to structural fill placement, the CQC Engineer/technician will observe and document the condition of the base surface or surface of the previous lift. The CQC Engineer/technician will monitor the soils to confirm that the soils are free of deleterious materials and that they meet the project specification requirements. During structural fill placement, the CQC Engineer/technician will observe and document the lift thicknesses and the uniform mixing of soils.

4.4 Testing

Structural fill testing will consist of both in-place and laboratory testing described as follows.

4.4.1 Laboratory Testing (Conformance Testing)

For laboratory testing, The CQC Engineer/technician will obtain a bulk sample of the structural fill soils for conformance testing as described below. The CQC Engineer/technician may modify the number of bulk samples needed for laboratory testing depending on the variability of the soils being placed. Laboratory testing will include, but not be limited, to the following tests.

Table – 4.2 Structural Fill Laboratory Testing Requirements

TEST	METHOD	MINIMUM FREQUENCY
Water (Moisture) Content	ASTM D2216	One (1) test per 50,000 cubic yards
Particle Size	ASTM D422	
Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D4318	
Standard Proctor Compaction Characteristics	ASTM D698	

4.4.2 In-Place Testing (Record Testing)

The CQC Engineer/technician will perform in-place field density and moisture content tests as shown in Table 4.3. Where multiple test methods are listed, only one test method need be used.

Table – 4.3 Structural Fill In-Place Field Density Testing Requirements

TEST	METHOD	MINIMUM FREQUENCY
Field Density and Moisture Content	Sand Cone (ASTM D1556) OR Nuclear Gauge (ASTM D6938)	One (1) test per acre per lift
Confirmatory Field Density and Moisture Content for Nuclear Gauge Testing	Drive Cylinder (ASTM D2937)[1] Field Moisture (ASTM D2216)	One (1) per day

[1] Required when a nuclear gauge is used for testing

Required field density and moisture content tests will be completed before the overlying lift is placed.

If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layers, it will be loosened by harrowing or other means, before the succeeding layer is placed. When moisture content is too low, the moisture content will be adjusted to within the above limits prior to compaction. Moisture adjustment will be achieved by sprinkling and disking sufficiently to bring the moisture content within the specified range. Sprinkling and harrowing of the layer will be done after deposition, but before compaction. If the moisture content is too high, the CCR will be disked in place or stockpiled and disked to promote drying to bring it back within the allowable moisture range.

5. LOW PERMEABILITY SOIL LAYER FOR FINAL COVER SYSTEM

5.1 Material

The R6 CCR Landfill will be closed with a low-permeability compacted soil cover. The low permeability soil layer material will consist of cohesive soils capable of being place and compacted to meet the permeability criterion of $k \leq 1x10^{-5}$ cm/sec.

5.2 Pre-Construction Material Evaluation

5.2.1 All material to be used to construct the low-permeability soil layer will be sampled and tested by the CQC Engineer/technician in advance of being placed. Such testing can be performed during excavation of the borrow area or from existing stockpiles.

5.2.2 The procedure for pre-construction testing of material to be used for low-permeability soil layer is outlined below:

A. Five representative samples will be obtained from each five-acre section of the proposed borrow source.

B. The following tests will be performed:

- Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487
- Standard Test Method for Particle-Size Analysis of Soils, ASTM D422 (Mechanical Sieve Method Only).
- Standard Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D2216.
- Test Method for Liquid Limit, and Plasticity Index of Soils, ASTM D4318.
- Standard Test Method for laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D698.
- Standard Test Methods for Measurement of Hydraulic Conductivity of Saturate Porous Materials Using a Flexible Wall Permeameter, ASTM D5084.

5.3 Construction

5.3.1 Only soil from a source previously sampled, tested and confirmed to meet the requirements of this CQA Plan will be used in construction of the low-permeability soil layer. The CQC Engineer/technician will notify the Contractor when material does not meet the requirements of the technical specification, and will document that this material is not used for low-permeability soil layer construction.

5.3.2 The CQC Engineer/technician will complete all required field density and moisture content tests before the overlying lift of low-permeability soil is placed.

5.3.3 The CQC Engineer/technician will observe and document that the Contractor completes all prior lift surface preparation (e.g., wetting, drying, scarification, etc.) before placement of subsequent lifts.

5.3.4 The CQC Engineer/technician will observe and document that loose lift thicknesses do not exceed 8 inches (unless otherwise required in the technical specifications).

5.3.5 The CQC Engineer/technician will check each lift visually for particle sizes or clods that exceed the technical specifications, rocks, debris, plant materials, and other foreign material. The CQC Engineer/technician will inform the Contractor, if such materials are found, and will document their removal.

5.3.6 The CQC Engineer/technician will observe and document that the exposed surface of the low permeability soil layer is rolled with a smooth drum roller or equivalent at the end of each work day or when required to protect the compacted soil from adverse weather conditions.

5.3.7 The CQC Engineer/technician will observe and document that the exposed surface of the low permeability soil layer is reasonably free of rock, rock fragments, or loose materials.

5.3.8 As-built certification surveys will be performed on the low-permeability soil layer prior to installing the overlying materials. Due to settlement and consolidation of underlying CCR, which may occur during construction of the final cover system, the as-built

certification points may not accurately provide actual thickness of the low permeability soil layer. In such cases, the CQC Engineer/technician will perform hand augers to confirm that the required thickness of the low-permeability soil layer has been achieved. Results of the thickness confirmation borings will be documented by the CQC Engineer/technician in the CQA Construction Certification Report. All holes will be patched with sodium bentonite pellets, mixed with low-permeability soils in the holes, hydrated and compacted.

5.3.9 The CQC Engineer/technician will inspect the low-permeability soil layer and certify that it is constructed in accordance with the approved permit, the technical specifications and approved plans.

5.4 Testing

Construction Quality Assurance sampling and testing will meet the minimum requirements indicated in the Table below. The CQC Engineer/technician or his /her representative will randomly determine the location of each test. All holes will be patched with a mixture of low-permeability soil and sodium bentonite pellets hydrated and compacted in the holes.

Table 5.1 Required Low Permeability Soil Fill Properties

Item	Required % Compaction Standard Proctor (ASTM D698)	Required % of Optimum Moisture, Standard Proctor (ASTM D698)	Maximum Lift Thickness (Loose) (inches)
Compacted Low Permeability Soil Fill	95	+2 to +5	8

Table 5.2 Low Permeability Soil Testing Requirements

TEST	METHOD	MINIMUM FREQUENCY
Water (Moisture) Content	ASTM D2216	One (1) test per 5,000 cubic yards or change in material
Particle Size	ASTM D422	
Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D4318	
Standard Proctor Compaction Characteristics	ASTM D698	

Table 5.3 Low Permeability Soil In-Place Field Density Testing Requirements

TEST	METHOD	MINIMUM FREQUENCY
Field Density and Moisture Content	Sand Cone (ASTM D1556) OR Nuclear Gauge (ASTM D6938)	One (1) test per 10,000 sf
	Field Moisture (ASTM D2216)	
Field Density and Moisture Content	Drive Cylinder (ASTM D2937)[1] Field Moisture (ASTM D2216)[1]	One (1) per day
Hydraulic Conductivity	ASTM D5084	One test per 40,000 sf

[1] Required when a nuclear gauge is used for testing

The CQC Engineer/technician will follow this procedure in the event of a density or permeability test failure. If the density does not meet minimum requirements of the CQA Plan, recompaction of the failed area (minimum 100' x 100') will be performed and retested until the area meets or exceeds requirements outlined in the CQA Plan. If a permeability sample fails to meet the minimum hydraulic conductivity requirements outlined in the CQA Plan, the area of failing permeability (minimum 40,000 sf) will be reconstructed. Optionally, at least four (4) replicate samples will be obtained in the immediate vicinity of the failed test. Should the replicate samples confirm the failure of the low permeability soil layer to meet CQA Plan, the area of failure will be localized according to the results of the replicate samples and reconstructed in accordance with the CQA Plan. All areas of reconstruction will be retested as outlined in the plan.

6. GENERAL SITE WORK

6.1 Introduction

The CQA Firm and the CQC Engineer/technician will monitor the activities that are to be performed for various general site work items including, but not limited to installation of riprap, erosion and sediment control measures, culverts, outfall weirs, pipes, vegetative cover, topsoil, and vegetation for compliance with the Design Documents.

6.2 Conformance

Conformance of materials and construction techniques to verify compliance with the Design Documents will be performed by the CQC Engineer/technician. If non-conformances or other deficiencies are found by the CQC Engineer/technician in the materials or completed work, they will be reported to the Contractor and Construction Site Manager. The CQC Engineer/technician will observe the repairs or replacements of any non-compliant items.

7. CERTIFICATION

The installation of the final cover system for the closed areas will be certified by the CQA Engineer as being performed in accordance with the Georgia Environmental Protection Division's State CCR Rule 391-3-4-.10. This certification and closure construction report will be prepared by a professional engineer registered in the State of Georgia and submitted to GA EPD.