

CLOSURE PLAN

PLANT MCINTOSH EXISTING COAL COMBUSTION RESIDUALS (CCR) LANDFILL NO. 4 EFFINGHAM COUNTY, GEORGIA

FOR



Georgia Power

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1. CLOSURE PLAN

This Closure Plan fulfills the requirements for a written Closure Plan of the Plant McIntosh Landfill No. 4, in accordance with Rule 391-3-4-.10(7) and 391-3-4-.10(9)(c)3.(iv). This plan incorporates the closure requirements for an existing landfill and includes a description of the final cover system, how the final cover will be constructed, how the final cover system meets the applicable performance standards contained in Rule 391-3-4-.10, includes an estimate of the maximum inventory of CCR, an estimate of the maximum open area that would require closure at one time, and a generalized schedule.

GPC shall close this site in a manner that minimizes the need for further maintenance and minimizes the potential of post-closure releases to the ground or surface waters. The Closure Plan considers closure of the CCR landfill at any point throughout the active life of the facility. Facility phasing drawings provide guidance on closure at the end of any cell or phase construction. Should intermediate closure be required, all components of this plan should be followed.

The closure construction activities for Cell 1 occurred between June 2015 and July 2016. Cell 1 was closed in accordance with 391-3-4-.10(7). A Closure Certification Report, prepared and sealed by a qualified professional engineer registered in the state of Georgia, was submitted to the Georgia EPD in March 2018. A description of the final cover system and closure methods is provided herein.

1.1 Notification of Intent to Close

No later than the date GPC initiates closure of the CCR Landfill, GPC shall prepare a notification of the intent to close the unit after receipt of the final load of waste. This notification shall include the certification by a professional engineer registered in Georgia for the design of the final cover system as required in Rule 391-3-4-.10(9)(c)3.(iv) and 40 CFR 257.102(d)(3)(iii). Closure activities must commence within no later than 30 days after the date on which the landfill receives the known final receipt of waste or removes the known final volume of CCR from the CCR unit for the purpose of beneficial use of CCR. GPC will complete all closure activities of each CCR unit in accordance with this Closure Plan within 180 days following the beginning of closure.

1.2 Certification and Notification of Closure

Upon completion of closure activities, a professional engineer registered in the state of Georgia shall prepare and submit a closure report to the Georgia EPD Director. The closure report will be completed on forms provided by Georgia EPD. The closure report shall include an as-built plan of the final grades at the time of closure.

Concurrent with the submission of the Closure Certification Report to the Director, GPC must submit confirmation to the Director that a notation on the property deed has been recorded. This recording must in perpetuity notify any potential purchaser of the property that the land has been used as a CCR Landfill and that its use is restricted under the post closure care requirements of Georgia Rules of Solid Waste Management 391-3-4.10. Within 30 days of completing this deed notification, the owner or operator must prepare a notification and place in the facility's operating record.

Within 30 days of completion of closure, the owner or operator shall prepare a notification of closure which shall include certification from a professional engineer registered in the State of Georgia verifying that closure has been completed in accordance with this Closure Plan. GPC has completed the notification when it has been placed in the plant's operating record.

1.3 Written Closure Plan

GPC filed an Initial Written Closure Plan for the McIntosh Landfill to the Georgia Power CCR Compliance Website on October 17, 2017. All cells will be closed by leaving CCR in place and installing a final cover system. In accordance with 40 CFR 257.102(b)(3), the written closure plan will be amended if there is a change in operation that would substantially affect the written closure plan in effect and/or if there are unanticipated events that necessitate a revision of the closure plan.

Active Cell 2A was permitted and constructed with a composite liner system consisting of a minimum 24-inch compacted clay layer with a maximum hydraulic conductivity of 1×10^{-7} cm/s. and a 60-mil high-density polyethylene (HDPE) geomembrane. The leachate collection and removal system are immediately above the liner system and consists of a geocomposite drainage layer and a 24-inch thick sand drainage/protection layer.

The ash subgrade for the final cover for active Cell 2A will be graded to create a stable subgrade for the final cover system. In accordance with 40 CFR 257.102(d), the final cover will be constructed to control, minimize, or eliminate, to the maximum extent feasible, post closure infiltration of liquids into the waste and potential releases of CCR from the unit. This will be prevented by providing sufficient grades and slopes to:

- Preclude the probability of future impoundment of water, sediment, or slurry;
- Ensure slope and cover system stability;
- Minimize the need for further maintenance; and
- Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

A detailed description of the final cover system is provided in Section 1.5 of this plan.

1.4 Survey Control

Sheet 2 of the Permit Drawings Set shows the site boundary and the 200-foot offset from the site boundary. Sheet 3 shows the general site development and ash cell layout. This drawing also shows the final ash limits in relation to the perimeter fence. The horizontal coordinates shown are Georgia State Plane – East Zone, North American Datum 1983 (NAD83). All elevations are shown in North American Vertical Datum 1988 (NAVD88). All areas within which CCR has been disposed shall be located to the best of the owner's ability and surveyed by a Registered Surveyor who shall provide a legal description of the CCR management boundaries.

Filling and closure activities shall be confined to within the limits indicated on the permit drawings. An "as-built" topographic survey shall be conducted indicating the extent and final topography of the CCR disposal facility. Other topographic surveys shall be conducted as specified in the Construction Quality Assurance Plan (CQA Plan). Site horizontal and vertical survey control will be provided by a permanent concrete monument. Standard survey practices will be used to establish vertical and horizontal controls during closure.

1.4.1 Plat and Legal Description

A copy of the Plat and Legal Description of the Permit Boundary is included in Part A, Subpart 10, Closure Drawings, of this Permit Application.

1.5 Final Cover Grading

Landfill No. 4, Cell 1 was closed in 2016. A Closure Certification Report was submitted to the Georgia EPD on April 30, 2018.

Landfill No. 4 Cell 2A is designed to be filled in nominal 20-foot thick lifts of CCR placed across the cell. The CCR will be placed, graded, and compacted to reduce the potential for dust generation and limit storm water erosion. After the 20-foot lift of CCR is completed, a 1-foot-thick intermediate soil cover layer will be placed over the CCR for dust control and storm water management. A 4-foot high perimeter berm with a 30-foot crest width, 2.5 horizontal to 1 vertical (2.5H:1V) inside slope, and 3H:1V outside slope will be constructed. The perimeter berm forms terraces in the final waste grades, facilitates continued access into each cell, and helps control storm water.

Final cover contours have been designed to minimize leachate generation by directing storm water off the final cover. The top portion of the landfill and the terraces are designed to be graded to 3 to 6 percent slopes to direct storm water to down drains on the 3H:1V slope to outlet on the next lower terrace. The terraces are then graded to low points to collect storm water at the next series of down drains. The perimeter slopes 3H:1V for about 60 feet to a 30-foot-wide bench. The bench is sloped at 3 percent to the outside crest where it again slopes downward at 3H:1V. The result is a benched final cover slope, where the benches allow for the installation of storm water management features such as diversion dikes, runoff channels and down chute flumes, to control and management storm water runoff.

If it becomes necessary to close Landfill No. 4 prematurely, the top of the CCR will be graded to a 3 to 6 percent slope, draining to the completed portion of 3H:1V perimeter slopes. The final peak elevation will be reduced compared to the proposed final grading plan, and the cover will be constructed.

1.5.1 Cell 1 Final Cover Design

Cell 1 of Landfill No. 4 has been closed in accordance with the approved Closure Plan and in compliance with the requirements of Rule 391-3-4-.10(7). Landfill No. 4, Cell 1 was constructed over the natural clay subsoils of low hydraulic conductivity. The Cell 1 base liner did not include a geomembrane. The Cell 1 final cover consisted of the following from bottom to top:

- Prepared ash surface
- Minimum 18-inch Infiltration Barrier Layer, maximum hydraulic conductivity of 1×10^{-5} centimeters per second (cm/sec).
- Topsoil layer (6-inches)

Documentation of the Cell 1 final cover construction is provided by the Closure Certification report submitted to the Georgia EPD on April 30, 2018. The Report is available in the Plant McIntosh permanent operating record.

1.5.2 Cell 2A Final Cover Design

Cell 2A was constructed in 2015 and placed into operation in 2017. The cell was constructed with a composite base liner system, consisting of 2 feet of compacted clay with a maximum hydraulic conductivity of 1×10^{-7} cm/sec, a 60-mil HDPE geomembrane, a geocomposite drainage layer, and a 24-inch thick protective soil cover layer. Based on the design of Cell 2A liner system, the Cell 2A final cover system will require the incorporation of a geomembrane barrier layer. The approved final cover system design for Cell 2A consists of the following from bottom to top:

- Prepared ash surface
- Geomembrane cover (40-mil textured flexible [LLDPE])
- Geocomposite drainage layer
- Protective soil cover layer (18-inches thick)
- Topsoil layer (6-inches thick)

An alternative cover equivalency demonstration is provided in the Engineering Report, located in Part B, Supporting Documents.

The Design and Operations Plan describe the minimum sediment and erosion control measures that are to be used during closure construction to minimize erosion of soil. The erosion and sediment controls are to be in accordance with the latest Manual for Erosion and Sediment Control in Georgia by the Georgia Soil and Water Conservation Commission and meet the standards, requirements and provisions of the Georgia Erosion and Sedimentation Act and General National Pollutant Discharge Elimination System Permit No. GAR100001 for Storm Water Discharges Associated with Construction Associated with Construction Activity for Stand Alone Construction Projects.

Minimum sediment and erosion control measures will be provided in the project documents and details regarding utilization/maintenance will be in the Operations Plan. Additional measures will be taken as required to minimize erosion of soil and/or ash. During this project, the Contractor will plan and coordinate their work to minimize the amount of suspended soil particles leaving the work site or entering natural drainage ways.

The final ash surface will meet final waste grades and be compacted with a smooth drum roller to provide support for the installation of the final cover system. The finished surface will be smooth, unyielding, without abrupt elevation changes, voids, cracks, ice, or standing water. All particles protruding from the surface greater than 1/4-inch will be removed to prevent damage to the geomembrane cover.

The geomembrane component of the final cover system will be a 40-mil textured LLDPE geomembrane. The LLDPE geomembrane has been selected to provide flexibility of the final cover system to accommodate some settling and subsidence.

A geocomposite drainage layer and an 18-inch protective soil layer will be installed above the geomembrane. The geocomposite drainage layer will be installed to aid in the removal of storm water infiltration and will provide for stability of the final cover system as well as protection for the geomembrane.

The protective soil layer will be installed to support vegetative growth and will provide additional protection for the geomembrane. The protective soil layer will consist of granular or fine-grained soils with a maximum particle size less than 3 inches.

Topsoil with a demonstrated capacity of sustaining vegetative growth will be placed and spread into a uniform loose lift thickness of 6 inches. The topsoil will be fertilized, seeded, and mulched. Temporary mulch blankets will be used on all slopes greater than 10 percent to limit erosion and protect the seed prior to the establishment of vegetation.

The final cover will be seeded with grass seed mix following Georgia Department of Transportation (GADOT) specifications to promote evapotranspiration and prevent erosion. The vegetation will be maintained by fertilizing and periodic mowing to stimulate root growth and prevent the establishment of woody vegetation.

1.6 Vegetative Plan

Vegetative cover should be established within two weeks after any final cover construction and for all areas disturbed by construction activities. Permanent covers which are slow to establish shall receive temporary seeding. The operator will submit soil samples to the County Extension Agent for analysis and determination of proper soil conditioners. This analysis will become part of the operating record. Planting dates, fertilizer rates, and seeding rates shall meet the requirements in the Manual for Erosion and Sediment Control in Georgia.

The erosion control measures shall remain in place until a satisfactory stand of grass is growing. A satisfactory stand of grass is defined as a full cover: 100 percent of the soil surface is uniformly covered in permanent vegetation with a density of 70 percent or greater.

1.7 Site Equipment Needed

The final cover construction will utilize typical earthwork construction equipment, materials, and personnel to perform a mass grading project. The installation of the geomembrane liner system and geocomposite drainage layer is typically performed by a geosynthetic installation contractor that has the necessary equipment, expertise and trained personnel to install geosynthetics in accordance with the manufacturer's recommendations. GPC and the selected contractors/installers will have adequate equipment available to ensure that closure requirements are executed correctly and efficiently. Back up equipment may be obtained from equipment suppliers and rental companies, if necessary.

1.8 Erosion and Sediment Control

Upon closure, all ditches, diversion berms, culverts, rip-rap and other drainage structures serving disturbed areas, but not already built, shall be constructed and placed into service according to the Design and Operations Plan. In addition, the existing storm water management features will be inspected, and accumulated sediment shall be removed from drop inlets, drainage pipes, diversion ditches, other drainage structures, and the storm water management ponds.

1.9 Estimate of Maximum Inventory of CCR On-Site

The total constructed capacity of Landfill No. 4 (Cell 1 and Cell 2A) is 707,878 cubic yards. Table 1.1 – Landfill No. 4 Airspace Summary, shows the design airspace, remaining airspace, and final cover area of Landfill No. 4. Based on the annual landfill inspection dated November 13, 2017 the remaining airspace in Cell 2A is approximately 338,570 cubic yards.

Table 1.1 Landfill No. 4 Airspace Summary

Cell	Design Airspace (cubic yards)	Constructed Airspace (cubic yards)	Remaining Permitted Airspace January 2018 (cubic yards)	3D Final Cover Area (acres)
1	356,108	356,108	0	7.35
2A	351,770	351,770	338,570	10.26
2B	496,002	Not Constructed	496,002	8.35
3	1,252,958	Not Constructed	1,252,958	19.72
4	1,306,383	Not Constructed	1,306,383	20.86
Total	3,763,221	707,878	3,763,221	63.40

1.10 Estimate of Largest Area for Closure

The present open area requiring a final cover is the entirety of Cell 2A (10.26 acres). Assuming no additional cells are constructed, this is the largest area that will be open and require future closure.

1.11 Closure Cost Estimate

The closure cost estimate is provided in Table 1.2 – Landfill No. 4 Closure Cost Estimate.

Table 1.2 Landfill No. 4 Closure Cost Estimate

No.	Item	Quantity	UOM	Unit Price	Total
Engineering Plans and Specifications					
1	Engineering Plans and Specifications	1.00	LS	\$25,000	\$25,000
Final Cover Construction					
2	Mobilization, Mgmt., Site Prep, Demobilization	1.00	LS	\$150,000	\$150,000
3	Final Grading	10.26	Acres	\$20,000	\$205,200
4	60-mil Textured HDPE Geomembrane	49,658	SY	\$7.65	\$379,887
5	Geocomposite Drainage Layer	49,658	SY	\$11.25	\$558,657
6	Anchor Trench Excavation and Backfilling	2,200	LF	\$4.50	\$9,900
7	18-inch Soil Cover	24,829	CY	\$7.50	\$186,219
8	6-inch Topsoil Layer	8,276	CY	\$20.00	\$165,528
9	Access Ramp 3' Protective Clay Layer	6,667	CY	\$7.50	\$50,000
10	Access Ramp 8" Gravel Surface	1,481	CY	\$20.00	\$29,630
11	Stormwater Management Down Drains	10	EA	\$2,500	\$25,000
12	Restoration, Seed, Mulch, Fertilizer, Lime	10.26	Acre	\$6,410	\$65,767
CQA, Survey Documentation, and Oversight					
14	CQA Documentation and Testing	10.26	Acre	\$20,000	\$205,200
15	QA/QC Survey Documentation	7	EA	\$7,500	\$52,500
16	Construction Management	1	LS	\$100,000	\$100,000
Subtotal Closure Cost Estimate					\$1,950,787
<i>Contingency (10%)</i>					<i>\$195,079</i>
Total Post-Closure Cost					\$2,145,866

1.12 Financial Assurance

Rule 391-3-4-.10(10)(a) requires financial assurance for all CCR units be provided in accordance with Rule 391-3-4-.13. Per 391-3-4-.13, financial responsibility shall be required for any solid waste handling facility and shall provide adequate financial responsibility to ensure the satisfactory maintenance, closure and post-closure care of such facility or to carry out any corrective action which may be required as a condition of permit.

Georgia Power will submit the financial assurance mechanism for closure on forms as provided or in a format as prescribed by the Director, Georgia EPD. Georgia Power will provide a demonstration of financial assurance upon approval of closure cost estimates by Georgia EPD.

1.13 Closure Schedule, Notifications, and Submittals

Once the decision has been made to close the landfill, Georgia Power will submit a notification in writing to the Georgia EPD Regional Administrator at least 60 days prior to beginning a phase of closure, describing the area to be closed and including applicable construction drawings, technical specifications, and the CQA Plan.

All construction activities for each phase of closure will be completed within 6 months following the beginning of construction. The proposed final cover system uses readily available equipment and materials, so each phase of closure can easily be completed in the prescribed timeframe. Once the decision has been made by the owner to final close the CCR landfill, the following schedule shall be followed:

- Prepare accurate legal description of final CCR management (permitted) boundary.
- Final waste grading and subgrade preparation.
- Install final cover system.
- Initiate vegetative plan.
- Remove all accumulated sediments from ponds, ditches and other drainage structures.
- Construct all erosion and sediment control systems serving disturbed areas, but not previously built.
- Provide the Closure Report to the Georgia EPD Director. The report shall be prepared by a professional engineer registered in the state Georgia.
- Submit to the Georgia EPD Director confirmation that on all deeds of real property, which have been used for landfilling, include notice of landfill operations, the date the landfill operation commenced and terminated, an accurate legal description of the actual location of the CCR landfill and a description of the type of CCR which have been deposited in the landfill has been noticed on the property deed.

Upon completion of closure construction, in accordance with 40 CFR 257.102 a professional engineer registered in Georgia will prepare and Georgia Power will submit a certification report documenting closure of the landfill to Georgia EPD. Pursuant to State CCR Rule 391-3-4-.10(7)(e). The closure report will be completed on forms provided by Georgia EPD. In addition, Georgia Power, as required by EPD, will

submit confirmation that a notation on the property deed has been recorded in accordance with State CCR Rule 391-3-4-.10(7)(f).

Within 30 days of completing closure construction, Georgia Power will prepare a notification of closure of Landfill 4 in compliance with 40 CFR 257.102(h) and place it in the facility's operating record as required by 40 CFR 257.105(i)(8).

1.14 Recordkeeping/Notification/Internet Requirements

Georgia Power will comply with all recordkeeping, notification, and posting of information on the internet in accordance with 391-3-4-.10(8)(a). The quality control records of inspection and testing will be compiled and maintained by Georgia Power. These records provide the background data necessary for the certification of the Landfill No. 4 final cover. All records will be forwarded to the Plant McIntosh's permanent operating record to be retained as a permanent record of the project.

Georgia Power shall also comply with all recordkeeping requirements of 40 CFR 257.105(i), closure notification requirements specified in 40 CFR 257.106(i) and closure internet requirements in 40 CFR 257.107(i).