Permit No.	Date	DIN
18-12	**December 28, 2009**	**9103**

RECEIVED
December 18, 2009
Solid Waste Section
Asheville Regional Office

MEMORANDUM

TO: Attendees

CC: None

FROM: Ken Daly, Will Harrison, S&ME, Inc.

DATE: 12/18/2009

SUBJECT: **12/15/2009 Meeting – Discussion Item Summary**
Permit To Construct (PTC) Application – Project Overview
S&ME Project No. 1356-08-122

MEETING ATTENDEES:

Duke Energy: Carlton Allred; Donna Burrell; Ed Sullivan; Andy Tinsley; Darrell Wolfe

S&ME: Kyle Baucom; Ken Daly; Will Harrison

NCDENR: Larry Frost; Ed Mussler

The meeting was held at Marshall Steam Station from approximately 2:30 PM - 4:30 PM.

This discussion item summary is intended to provide a general summary of the subject meeting. This discussion item summary is based on the notes and memory of the authors. This is not intended to be a rigorous and complete record of the meeting.

DISCUSSION ITEM SUMMARY:

1. **Level 1 Safety/ Introduction:**
   1.1 The meeting began at approximately 2:30 PM.
   1.2 Donna Burrell conducted a level 1 safety assessment.
   1.3 Donna Burrell described the different areas at Marshall receiving coal combustion byproducts, including the structural fill and the Flue Gas Desulfurization (FGD) Landfill as well as recently closed landfill units located at Marshall, including the Asbestos and Construction and Demolition (C&D) Landfills.

2. **PTC Application Overview Presentation:**
   2.1 Site/Project Overview: Ken Daly provided a site and project overview working from a Power Point presentation including figures and illustrations (attached).
      2.1.1 Ken Daly explained that the proposed landfill is organized in 5, approximately 5-year phases, for an estimated lifetime of approximately 25 years. The total landfill limit of waste will cover approximately 102

acres. Phase 1 will cover approximately 35 acres. Phase 1 consists of 4 cells, where Cells 1 and 2 will be constructed prior to Cells 3 and 4.

2.1.2 Referencing an aerial photograph, Ken Daly explained the location of relevant site features and the proposed landfill development. He noted the location of the existing ash basin, the location of the inactive ash basin, and noted that the proposed landfill development is located partially over the inactive ash basin and partially over native ground.

2.1.3 Ken Daly explained that Phase 1 subgrade elevations will be reached by earthworks filling and excavation and that the proposed fill areas will be constructed of structural fill placed in accordance with solid waste .1700 Rules.

2.1.4 Ed Mussler asked how far the landfill limit of waste (LOW) was set back from the property line. Will Harrison responded that it was around 150 feet. [post meeting clarification: the distance from the property line along Island Point Road to the limit of waste is 180 feet.]

2.2 Engineering and Facility Plan Summary: Ken Daly provided a general overview of the Engineering and Facility Plan. He explained that the Permit to Construct application includes detailed design for Phase 1, the initial 5-year phase, as well as overall design consideration for the Facility Plan, addressing the whole landfill development.

2.2.1 Double Liner System: Ken Daly explained that the proposed landfill includes a double-liner system and summarized the individual liner system components.

2.2.2 Leachate Collection System (LCS):

2.2.2.1. Cell Geometry: Ken Daly noted that cell geometry is long and slender with a center leachate collection system corridor. The long and slender layout does not require LCS lateral pipes and supports the overall landfill footprint (generally rectangular) without the need for LCS laterals.

2.2.2.2. Transmissivity: The LCS geocomposite is designed and specified to meet the transmissivity (flow capacity) requirement during initial operations when no waste is in place when leachate generation is estimated to be at its highest. Ed Mussler asked about the conformance testing parameters for the geocomposite. Ken Daly explained that the design specifies conformance testing including a 100 hour seat time; boundary conditions representative of actual conditions (i.e. geomembrane and/or soil); and representative normal loads. Ed Mussler asked what the maximum landfill height/load will be and Ken Daly responded that it would be around 200-ft.

2.2.2.3. LCS Corridor: Ken Daly explained the LCS corridor detail and that it is covered with a sand filter layer over a geotextile filter designed to filter sediment and ash from getting into the LCS corridor. Additionally, the corridor will be covered with a sacrificial geomembrane prior to operations.

2.2.3 Leak Detection System (LDS): The LDS geocomposite is designed and specified to meet the unconfined flow capacity requirement for a 500 gallon per acre per day (gpad) action leakage rate. Similar to Plant Allen, a 300 gpad initial response leakage rate is proposed. The LDS geocomposite transmissivity requirements are specified as a function of the material thickness.

2.2.4 Slope Stability: Ken Daly explained that slope stability was evaluated for Phase 1 and the overall landfill development including global and liner system slope stability.

2.2.4.1. Global slope stability analyses were performed through the sequence of landfill development from interim (construction) to final conditions for static and pseudo-static (earthquake) loading conditions. Analyses results indicate that recommended factors of safety were met and/or exceeded through various stages of development.

2.2.4.2. Liner system slope stability analyses were conducted on representative cross sections by back-calculating minimum interface shear strengths from recommended factors of safety through various stages of development subject to static and pseudo-static (earthquake) loading conditions. Analyses results indicate that interface shear strengths required are readily achieved by ordinary liner system materials.

2.2.5 Liquefaction Potential: Ken Daly explained that liquefaction potential was evaluated using cone penetration test (CPT) data. Results of evaluations indicate that there are discrete liquefiable zones located within the inactive ash basin. Ken Daly noted that engineering measures to mitigate liquefaction potential including adding overburden surcharge and lowering the water table were evaluated. Results indicate that these measures can mitigate liquefaction potential. He noted that a small portion of the Phase 1 footprint was over the inactive ash basin and that proposed fill provides adequate surcharge to mitigate liquefaction. He noted that more detailed design will be needed for future phase development to mitigate liquefaction potential.

2.2.6 Settlement: Ken Daly summarized that Phase 1 liner system settlement was evaluated under final landfill waste loads at locations at point of interest (exploratory boring locations) and along LCS corridor alignments. The results of analyses indicate post-settlement slopes greater than 2.0 percent through points of interest and along LCS corridor alignments. Ed Mussler asked how much settlement is expected. Will Harrison responded that up to five feet of settlement was anticipated. [post-meeting clarification: estimated settlement along the LCS corridor within Phase 1 ranges from 0.1 feet to 4.1 feet. 4.1 feet of settlement occurs at the upslope side (west end) of Cell 2.]

2.3 Operations Plan: Ken Daly explained that the Operations Plan is generally consistent with the recently approved Operations Plan for the Plant Allen RAB Ash Landfill. He explained that the responses to NCDENR comments on the Plant Allen Operations Plan have been included in the Marshall Operations Plan.

2.3.1 Response Action Plan: He explained that a leak detection system action leakage rate of 500 gpad and initial response leakage rate of 300 gpad are proposed. In addition the plan includes a similar response action plan.

2.3.2 an Emergency Action Plan (EAP) is provided as an attachment with the Operations Plan.

2.3.3 Operations construction quality assurance monitoring is not proposed during landfill operations and is not included in the Operations Plan.

2.3.4 Ken explained that the proposed operational filling sequence is outlined in the Operations Plan. The proposed sequence intends to leave the sump area exposed until later stages of filling operations to promote draining leachate and contact water into the LCS system.

2.4 Closure / Post-Closure Plan: Ken Daly summarized the Closure/Post-Closure Plan.

2.4.1 The final cover system cross section detail was presented and the components were described.

2.4.2 He explained that the final cover slopes were a three horizontal to one vertical (3H:1V) from the bottom to the top with stormwater management features built into the slope.

2.4.3 Stormwater Management: Stormwater conveyance measures have been designed for the 50-year storm event, per Duke Energy's request for more robust system design.

2.4.4 Observation checklists for post-closure operations and maintenance are included with the plan.

2.5 Ken Daly mentioned that Duke Energy's goal is to permit, build, and have at least Cell 1 operational by the end of 2010. He explained that Duke Energy is currently in the bid process for Cells 1 and 2 construction. The group discussed the permitting process and the role that the Dam Safety group would have in the permit process. Ed Mussler indicated that the Dam Safety group's consideration would be required prior to issuing the permit to construct. It was discussed and generally agreed that a meeting to review the permit to construct application with the Dam Safety group would promote NCDENR permit review.

3. Site Tour:

3.1 With the exception of Andy Tinsley and Darrell Wolfe, the group toured the Phase 1 landfill area and also the existing FGD landfill.

3.2 The group observed the Phase 1 fill area from the south side, from the end of the existing ash haul road. From that location the group walked to the southwest corner of future cell 2 along an existing stormwater channel.

3.3 Ed Mussler and Larry Frost noted that the road to the north (Island Point Road) was visible from the landfill area. They asked if fencing was proposed for the project. Ken Daly responded that fencing is planned in the future but that he was uncertain if it was planned to be installed with Cell 1 and 2 construction.

3.4 Ken Daly pointed out to Carlton Allred that the south slope of the .1700 Rules structural fill had erosion rills. Ken stated that these areas will need to be reworked and recompacted.

3.5 Will Harrison noted to Carlton Allred that there is erosion within the stormwater channel along the southern slope of the structural fill. Ken Daly, Will Harrison, and Carlton Allred discussed appropriate repairs and it was generally agreed that adding check dams would be an appropriate repair.

Attachments:

1. Electronic Copy of referenced Power point presentation.

Marshall Steam Station
Industrial Landfill No. 1
Permit To Construct (PTC) Application Review Presentation

Tuesday December 15, 2009

Prepared for Duke Energy and NCDENR

By S&ME, Inc.

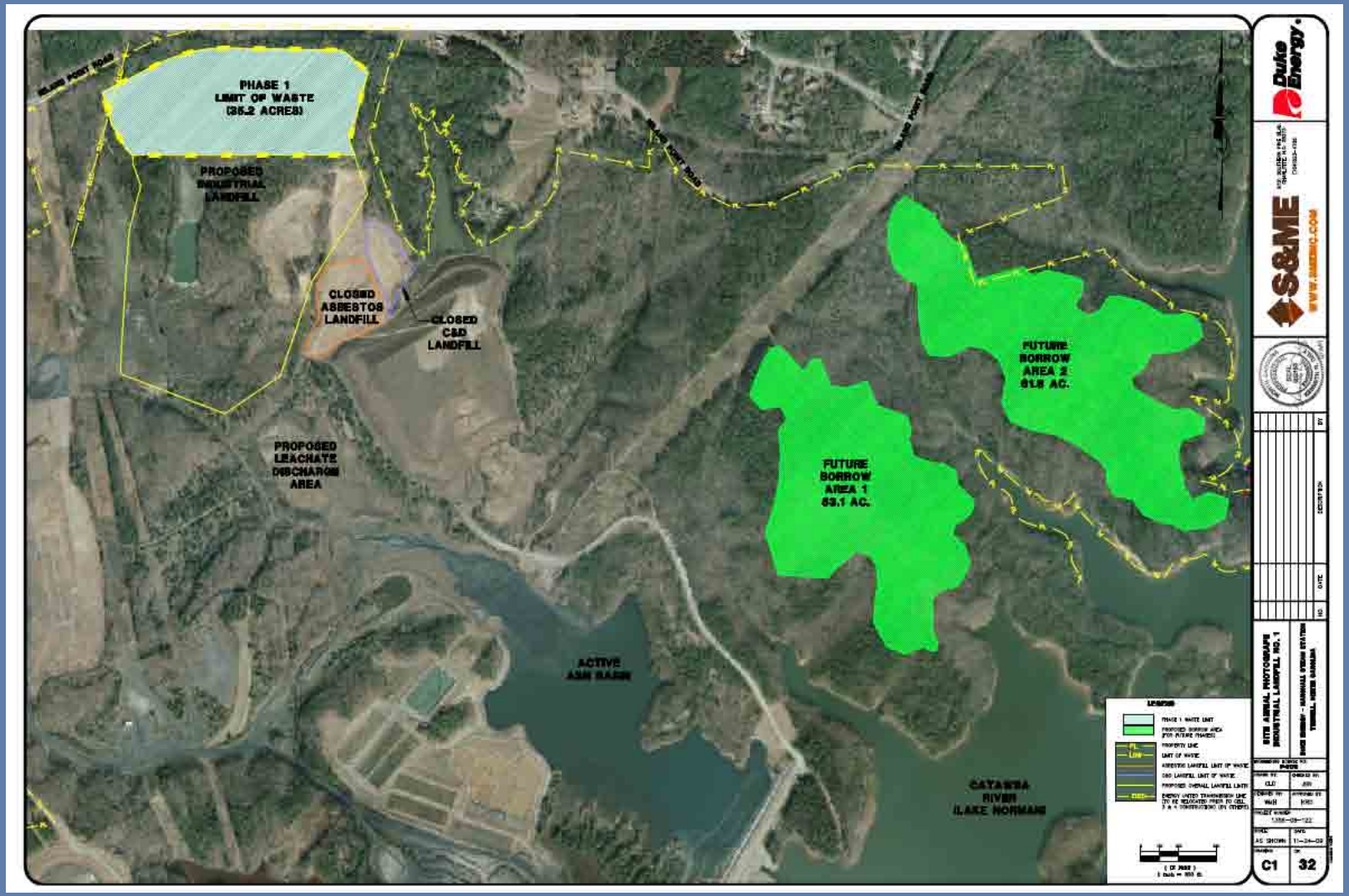
Presentation Outline

- Site Overview
- Engineering and Facility Plan Key Points
- Operations Plan Key Points
- Closure/Post-Closure Plan Key Points

Site Overview

- Developed over ~25 Years in 5, ~5-year-capacity Phases
- Limit of Waste (LOW) ~102 acres
- Phase 1 LOW ~35 acres
- Phase 1 will be built, in part, upon structural fill placed in accordance with .1700 rules
- Phase 1 will be developed in 4 Cells
  - Cells 1 and 2 ~ 20 acres
  - Cells 3 and 4 ~ 15 acres

Aerial Photography



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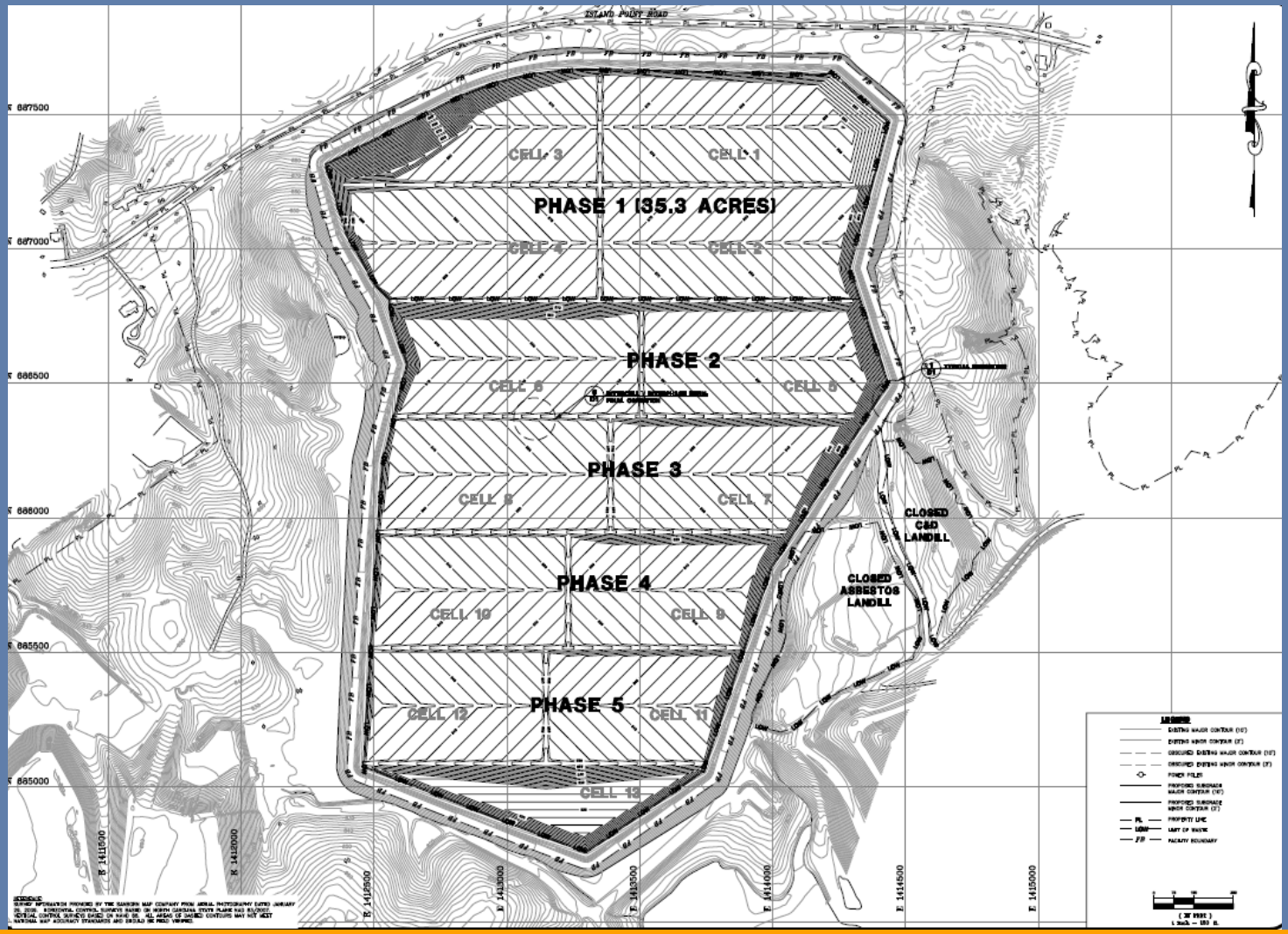
5 Phases



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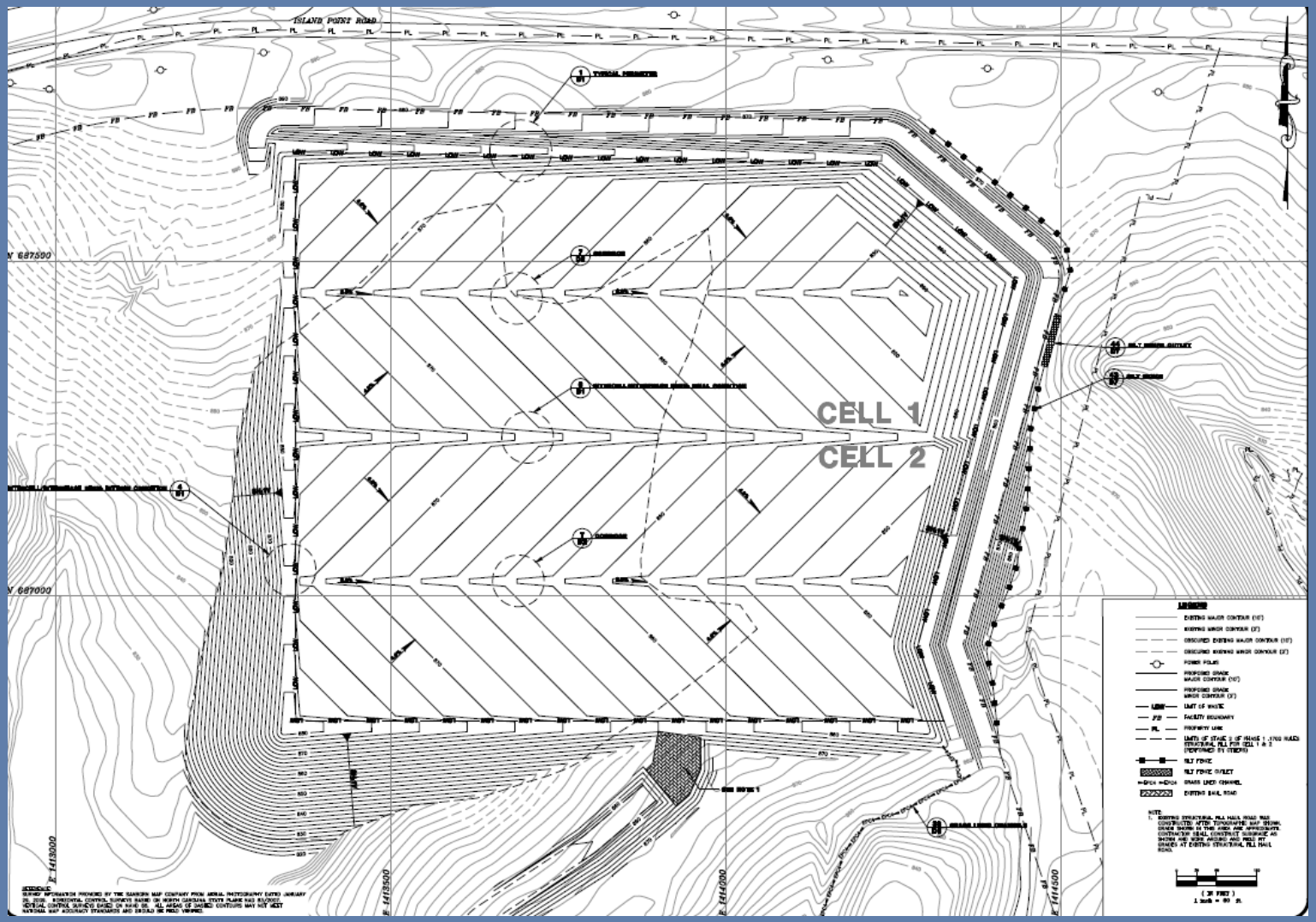
Cells 1 and 2 of Phase 1



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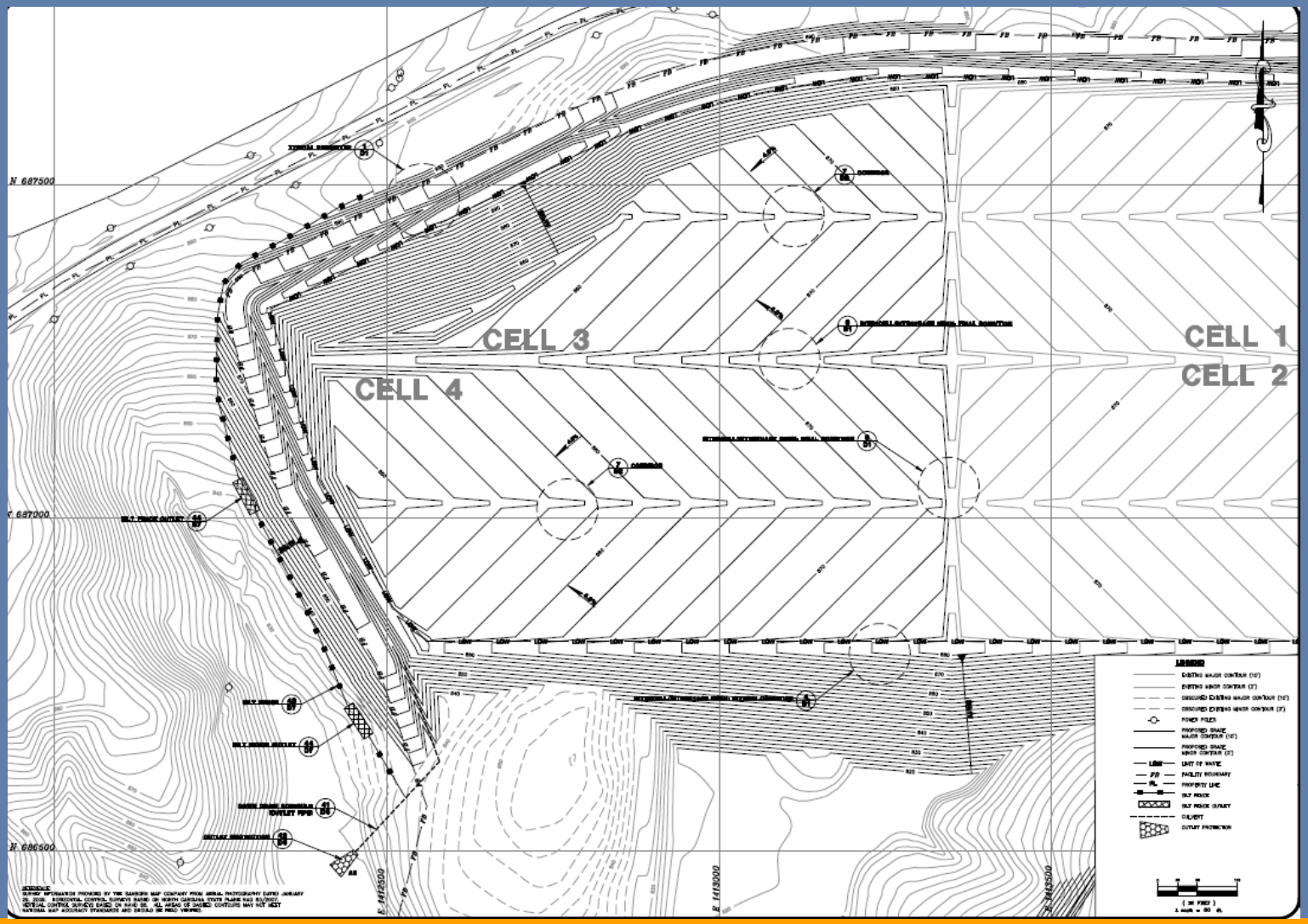
Cells 3 and 4 of Phase 1

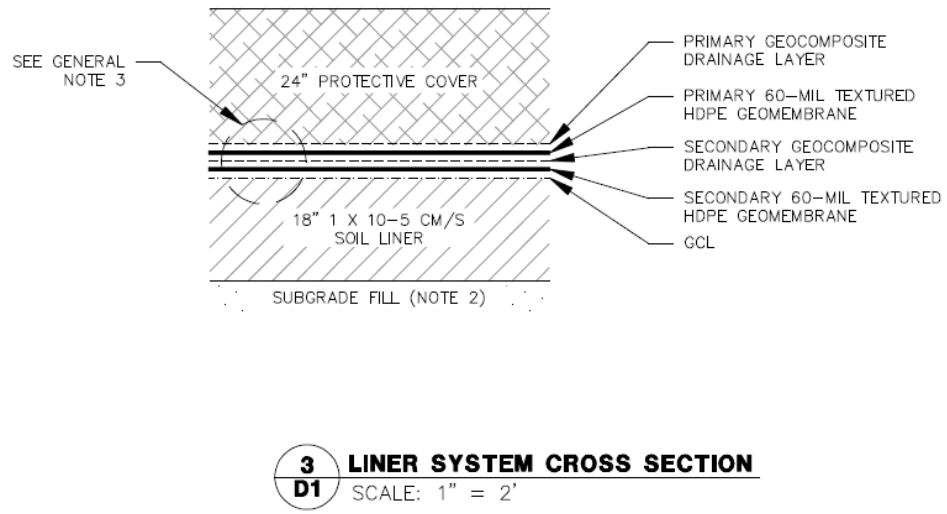


Engineering and Facility Plan

- Double Liner System
- Robust Leachate Collection and Leak Detection
- Slope Stability (Final and Interim Conditions)
- Liquefaction Potential Evaluation
- Settlement

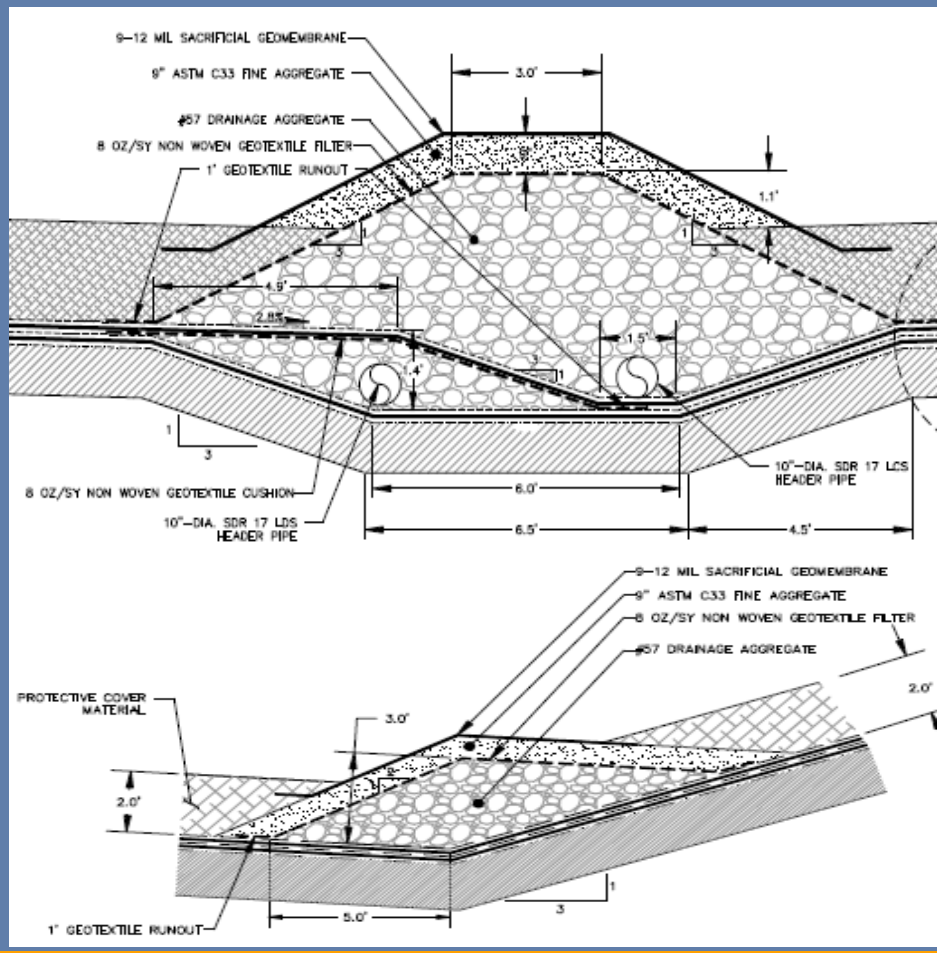
Double Liner System

- **Liner System Description**
  - 1.5 ft of $1x10^{-5}$ cm/s Soil Liner
  - GCL
  - Secondary GM
  - Secondary GCDL
  - Primary GM
  - Primary GCDL
  - 2 ft Protective Cover



Leachate Collection System (LCS)

- **Transmissivity Considerations:**
  - **Conservatively based GCDL transmissivity requirement on 1 x 10^{-3} cm/s protective cover material**
  - **User modified HELP input to replicate 25-yr, 24-hr storm event (5.82 in/day)**
  - **Conservative transmissivity testing regime requires transmissivity for no-waste case be met under normal load equivalent to 80-ft waste thickness**
- **Clogging Considerations:**
  - **LCS/LDS Corridor covered with 9" ASTM C33 Fine Aggregate and 8oz nonwoven geotextile for filtration – sacrificial geomembrane will cover corridor prior to operation of unit**
  - **LCS GCDL nonwoven geotextile designed to filter site-specific soils.**
- **Drainage Blanket placed along interior toe of slope to promote drainage to the sump**



Leak Detection System (LDS)

- **LDS transmissivity requirement based on providing enough flow capacity to warrant 500 gpad Action Leakage Rate while maintaining 'unconfined' flow conditions.**
- **LDS designed with low time of travel**
- **In accordance with State recommendations for Plant Allen RAB Ash Landfill, the Marshall Industrial Landfill No. 1 Response Action Plan incorporates 300 gpad Initial Response Leakage Rate (IRLR). (see Operations Plan)**

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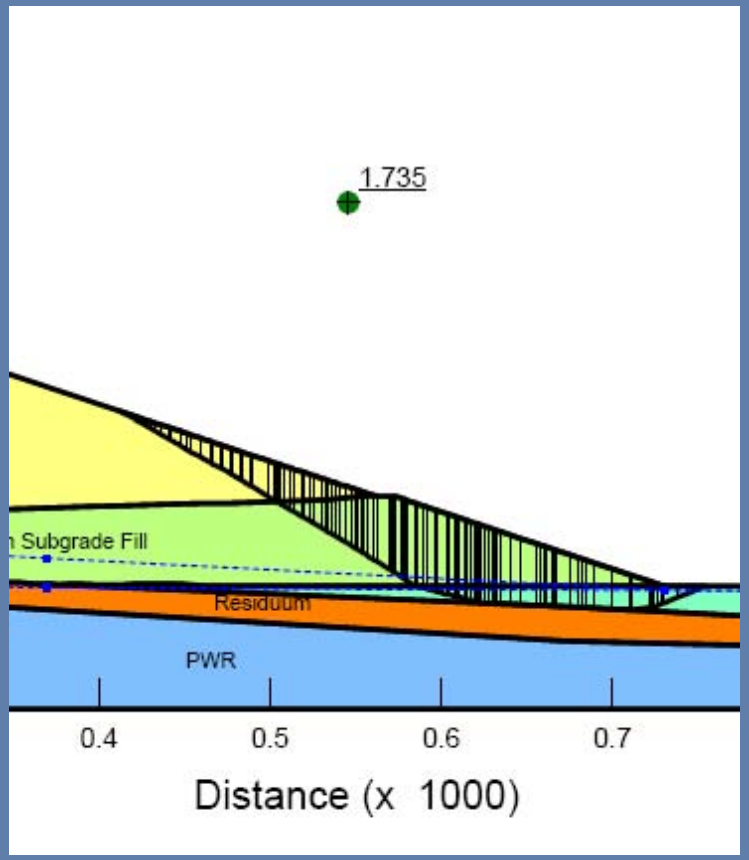
Slope Stability

- **Global and Liner Interface Slope Stability Analyses**
  - **8 cross-sections, including portions of the five landfill phases, as well as portions founded on residuum and the inactive ash basin**
- **Analysis Approach**
  - **Global: For anticipated material parameters and seismic coefficient, the safety factor was calculated**
  - **Liner Interface: For assumed safety factor and estimated seismic coefficient, material parameters required for liner system stability were calculated**



Liquefaction Potential

- **CPT-based liquefaction potential evaluation of Phases 1-5**
- **Surcharge and/or lowering of water table recommendations for potentially liquefiable zones within Phases 1-5.**
- **Surcharge requirements met for potentially liquefiable zones within Phase 1 footprint.**

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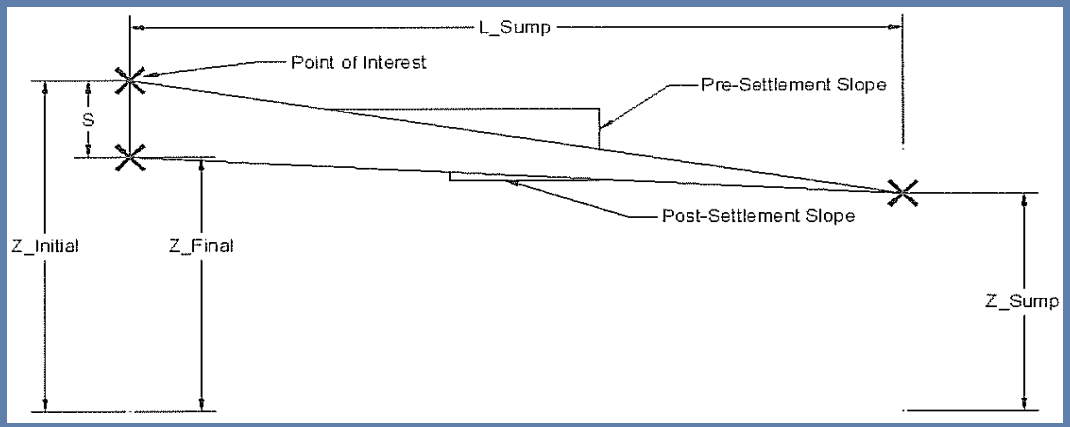
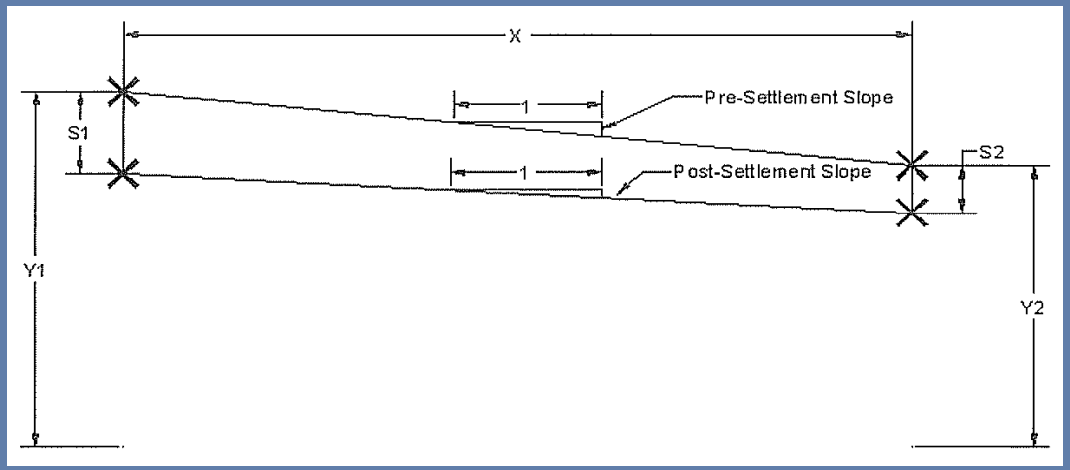
Settlement

- **Phase 1 base grades evaluated under final landfill overburden pressures:**
  - **Settlement evaluated at points of interest and along the corridor**
  - **Results indicate post-settlement grades greater than 2.0%.**





Operations Plan

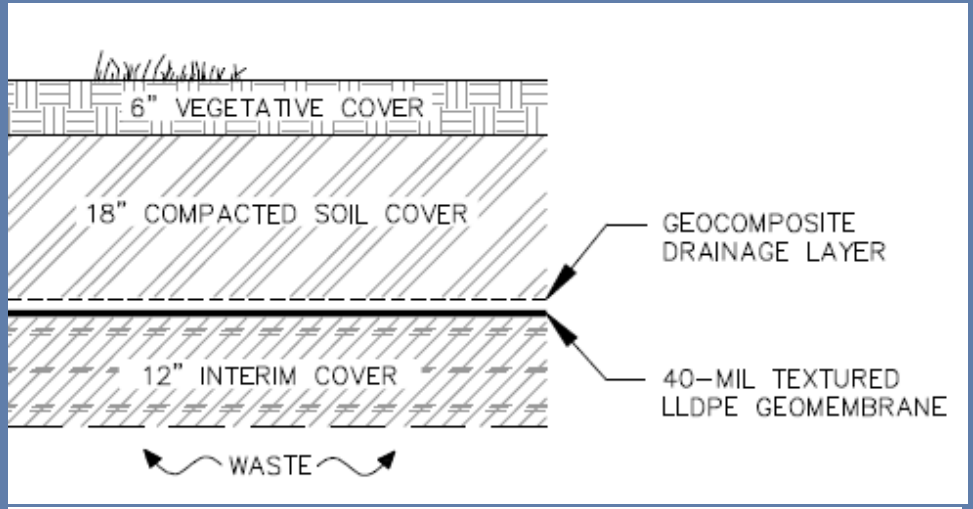
- Operations Plan developed proactively to address State recommendations for the Plant Allen RAB Ash Landfill
- Incorporates ALR = 500 gpad
- preceded in magnitude by an IRLR = 300 gpad
- Incorporates Emergency Action Plan (EAP) similar to that developed cooperatively between Duke Energy and State permitting personnel for the Plant Allen RAB Ash Landfill
- Compliance monitoring of operations fill is not proposed

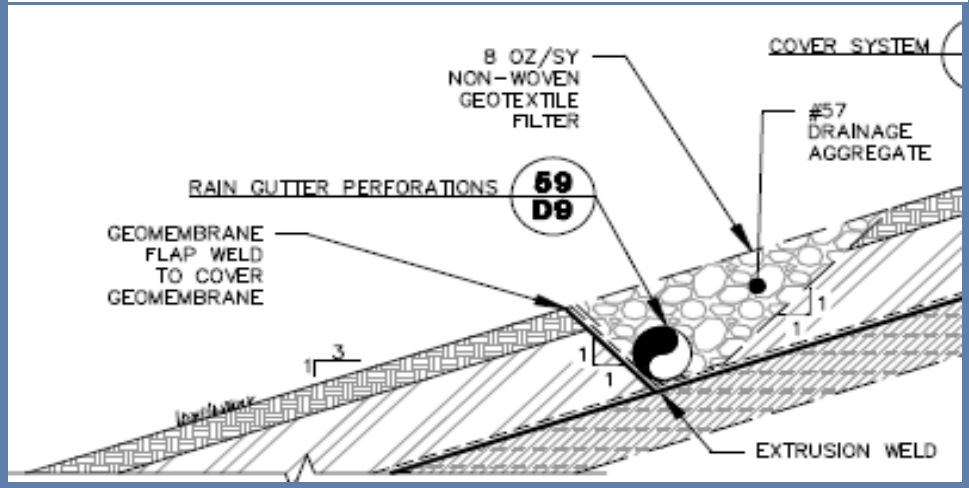
Operations Plan

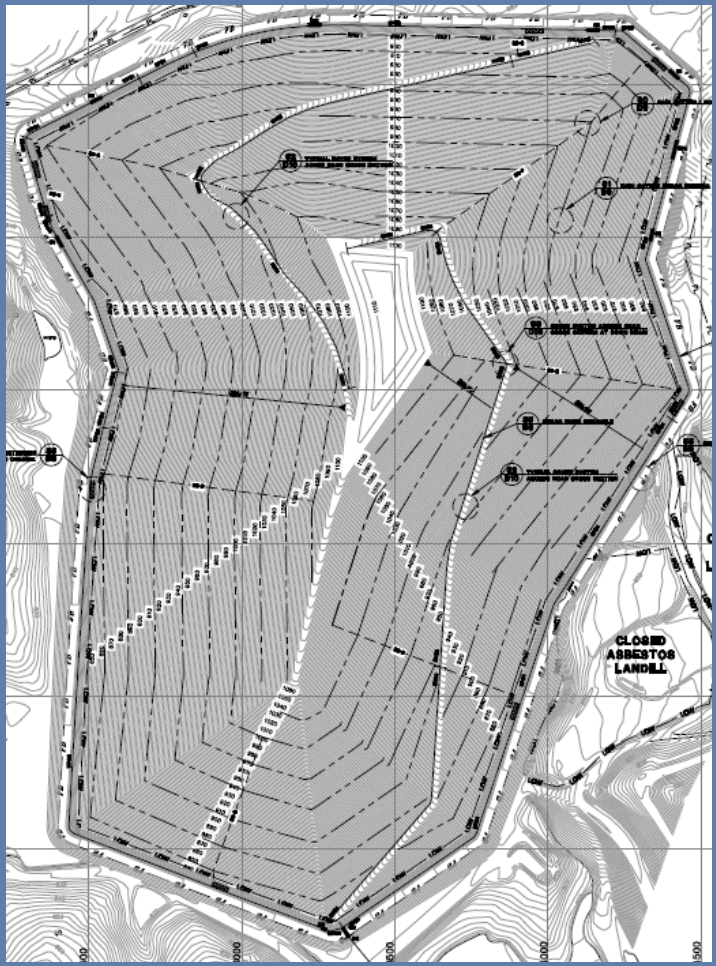
- Operations Plan filling sequence:
  - Sump left accessible until final filling sequence (promotes ease of access to LCS sump should maintenance be required). (see Operations Plan Figures)
  - Contact-water (leachate) minimized through use of interim cover soils. (see Operations Plan Figures)

Closure/Post-Closure Plan

- Final Cover System Description (actually part of EFP but also discussed in CP):
  - 1' Interim Cover
  - Cover System GM
  - 1.5' Compacted Soil Cover
  - 0.5' Vegetative Cover
  - Stormwater conveyance measures include rain gutters, down drains, and perimeter channels
  - Conveyance measures designed for 50-yr storm event





Closure/Post-Closure Plan

- CP discusses maintenance and monitoring activities and includes proposed Post-Closure Monitoring Form