



June 26, 2008

Mr. Allen Gaither
Environmental Engineer
NC DENR - Division of Waste Management
2090 U.S. Highway 70
Swannanoa, NC 28778

**Re: Transition Application
Avery County Landfill
(Solid Waste Permit No. 06-03)
Ingalls, North Carolina**

Dear Mr. Gaither:

On behalf of the Avery County C&D Landfill, Richardson Smith Gardner & Associates (RSGA) would like to submit for your review information required for continued operations of the Avery County C&D Landfill (Avery) in accordance with 15A NCAC 13B .0547 for existing landfills as of January 1, 2007. As outlined in the aforementioned rule, the following must be submitted to the department by July 1, 2008:

1. Closure and Post-Closure Plan {.0547 (2)(a)}
2. Financial Responsibility {.0547 (2)(b)}

Each of these requirements are further described below:

Closure and Post-Closure Plan

Avery intends to apply the prescriptive closure criteria in accordance with .0543(c)(1)(A), a closure cap system consisting of an 18 inch thick low permeability (no greater than 1×10^{-5} cm/sec) layer with an overlying 18 inch thick layer of vegetative support soil as shown in the figures provided as **Attachment A**.

A Closure and Post-Closure Plan has been prepared in accordance with .0543(d) and is provided as **Attachment B**. The current Permit Drawings¹ make reference to the final cover section and details which are affected by this rule. Therefore, revisions have been made to the set as necessary to conform to the new closure requirements. The revised figures are included as **Attachment A**. In order to address construction methods and procedures during closure activities, we have included additional specifications and quality assurance procedures in **Attachment C**, as follows:

¹ Grading Plan for Future Solid Waste Handling and Transfer Facility, Owner: The County of Avery, N.C. dated October 1995 prepared by Municipal Engineering Services Company, P.A.

- Section 02250 Soil Liner (Final Cover);
- Section 02258 Vegetative Soil Layer; and
- Soil Liner CQA

Financial Responsibility

A Closure and Post-Closure Estimate has been prepared and is included in the Plan (above) and is as follows:

Closure Cost	\$297,250
Post-Closure Cost	\$445,500 (for 30 year period)
Total (5.1 AC)	\$742,750 (2008\$)

Avery intends to satisfy this requirement by financial test for Phases 1 and 2. The Engineer's Closure and Post-Closure Cost Estimates are included in **Attachment D**.

Request for Extension

Avery County requests an extension from closure activities until a remediation plan can be agreed upon for recent boundary exceedance².

Should you have any questions or require clarification, please contact me at (919) 828-0577 ext. 127 or by email below.

Sincerely,
Richardson Smith Gardner & Associates, Inc.


Bryan D. Johnson, E.I.
Staff Engineer
bryan@rsgengineers.com


Stacey A. Smith, P.E.
Project Manager
stacey@rsgengineers.com

Att.

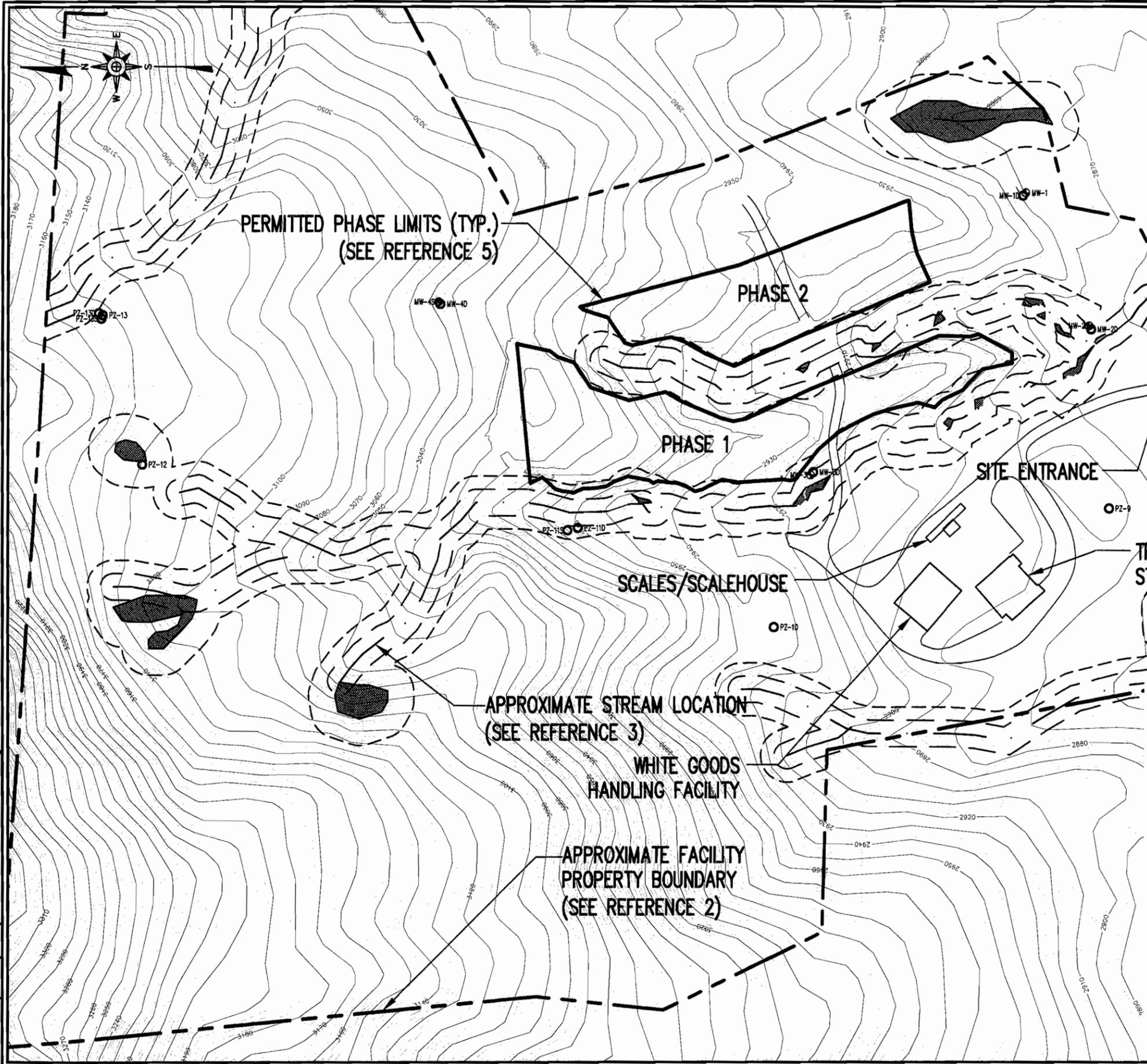
Cc: Buddy Norris, Avery County Solid Waste
Ed Mussler, NCDENR
Bill Wagner, NCDENR
File

² Notice of Waste Boundary Exceedance to NC DENR dated April 8, 2008 prepared by County of Avery.

Attachment A

Figures

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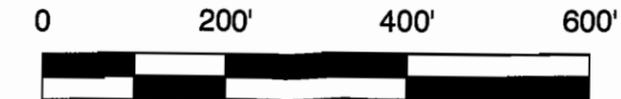


LEGEND

-  EXISTING 10' CONTOUR (SEE REFERENCE 1)
-  EXISTING 2' CONTOUR
-  PROPERTY LINE (SEE REFERENCE 2)
-  APPROX. STREAM LOCATION (SEE REFERENCES 3, 4)
-  50-FOOT STREAM AND WETLAND BUFFER
-  25-FOOT TROUT STREAM BUFFER
-  WETLANDS (SEE REFERENCES 3, 4)
-  MONITORING WELL
-  PIEZOMETER

REFERENCES

1. OVERALL SITE TOPOGRAPHY FROM NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, DATA GENERATED FROM LIDAR DATED MARCH 2005, TOPO IN AREAS IN AND SURROUNDING PHASES 1 AND 2 FROM FIELD SURVEY DATED 9/07, BY SURVEYING SOLUTIONS, P.C.
2. SITE PROPERTY LINE AND MONITORING WELLS FROM FIELD SURVEYS DATED 9/07 AND 1/14/08, BY SURVEYING SOLUTIONS, P.C.
3. STREAM AND WETLAND LOCATIONS IN NORTHERN SECTOR OF SITE OBTAINED FROM GPS FIELD SURVEY DATED 4/07, BY CAROLINA ECOSYSTEMS, INC.
4. STREAMS AND WETLANDS NEAR PHASE 1 AND 2 FROM FIELD SURVEY DATED 2/18/08 BY SURVEYING SOLUTIONS, P.C.
5. C&D PERMIT AREAS FROM DRAWING "EROSION CONTROL SITE PLAN" BY MUNICIPAL ENGINEERING SERVICES CO., P.A. CONSULTING ENGINEERS, DATED 5-22-96.

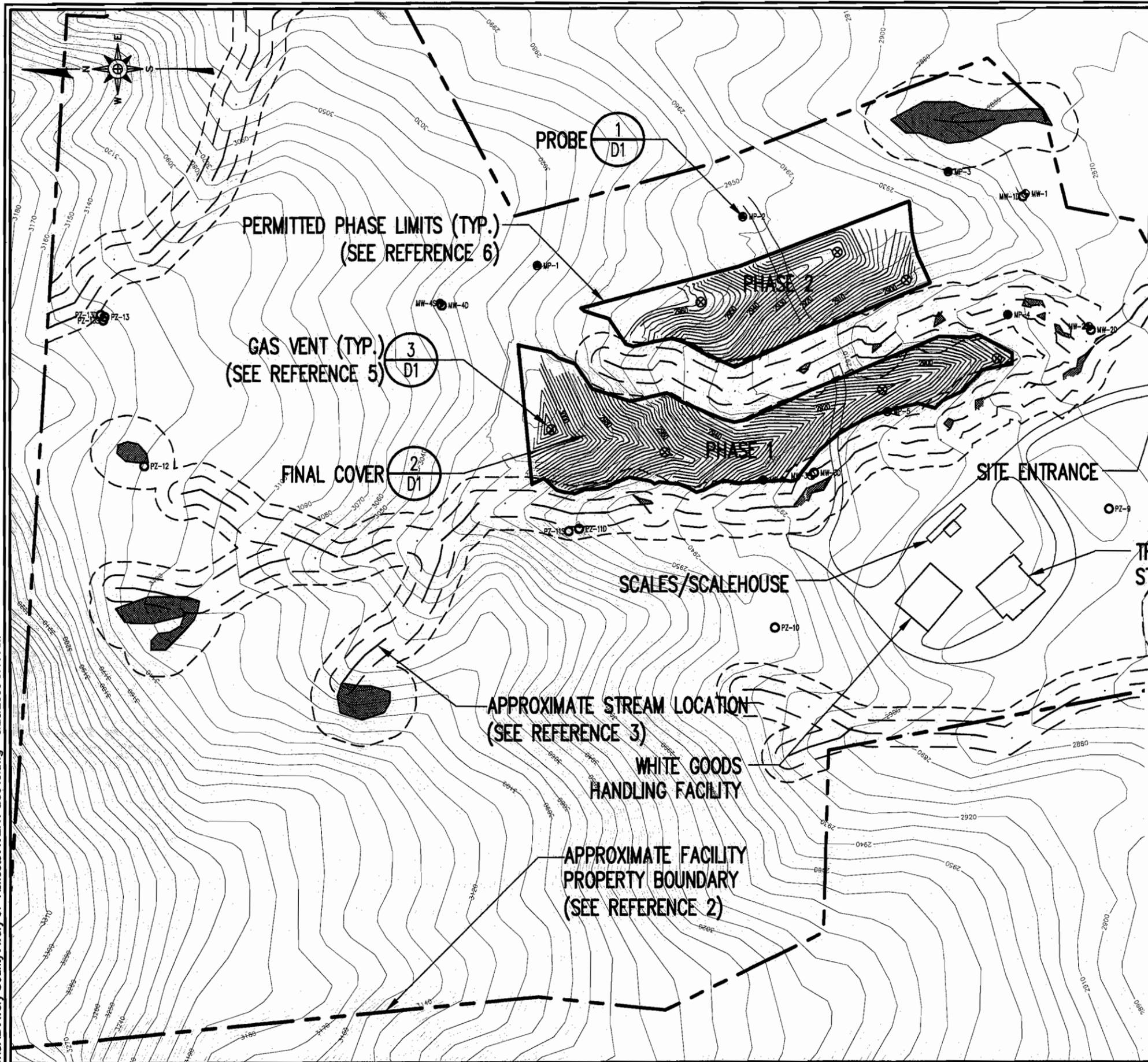


RICHARDSON SMITH GARDNER & ASSOCIATES
 14 N. Boylan Ave. Raleigh, N.C. 27603
 PH: 919-828-4577 FAX: 919-828-3899
 www.rsga.com

FIGURE NO.	1	FILE NAME	AVERY-B0039
SCALE:	AS SHOWN	PROJECT NO.	AVERY 07-1
CHECKED BY:	SM	DATE:	Jun. 2008
DRAWN BY:	J.A.L.		

TITLE:
 AVERY COUNTY
 SOLID WASTE DEPARTMENT
 AVERY COUNTY C&D LANDFILL
 EXSITING CONDITIONS

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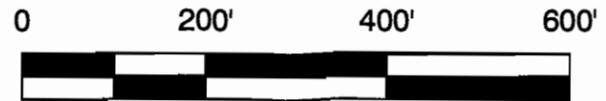


LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- PROPERTY LINE (SEE REFERENCE 2)
- APPROX. STREAM LOCATION (SEE REFERENCES 3, 4)
- 50-FOOT STREAM AND WETLAND BUFFER
- 25-FOOT TROUT STREAM BUFFER
- WETLANDS (SEE REFERENCES 3, 4)
- MONITORING WELL
- PIEZOMETER
- METHANE GAS MONITORING PROBE
- GAS VENT

REFERENCES

1. OVERALL SITE TOPOGRAPHY FROM NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, DATA GENERATED FROM LIDAR DATED MARCH 2005, TOPO IN AREAS IN AND SURROUNDING PHASES 1 AND 2 FROM FIELD SURVEY DATED 9/07, BY SURVEYING SOLUTIONS, P.C.
2. SITE PROPERTY LINE AND MONITORING WELLS FROM FIELD SURVEYS DATED 9/07 AND 1/14/08, BY SURVEYING SOLUTIONS, P.C.
3. STREAM AND WETLAND LOCATIONS IN NORTHERN SECTOR OF SITE OBTAINED FROM GPS FIELD SURVEY DATED 4/07, BY CAROLINA ECOSYSTEMS, INC.
4. STREAMS AND WETLANDS NEAR PHASE 1 AND 2 FROM FIELD SURVEY DATED 2/18/08 BY SURVEYING SOLUTIONS, P.C.
5. METHANE GAS MONITORING PROBE LOCATIONS AND GAS VENT LOCATIONS FROM DRAWING "PROPOSED METHANE PLAN" BY MUNICIPAL ENGINEERING SERVICES CO., PA, DATED JULY 12, 1996.
6. FINAL GRADES FOR C&D PHASES 1 AND 2 AND C&D PERMIT AREAS FROM DRAWING "EROSION CONTROL SITE PLAN" BY MUNICIPAL ENGINEERING SERVICES CO., P.A. CONSULTING ENGINEERS, DATED 5-22-96.

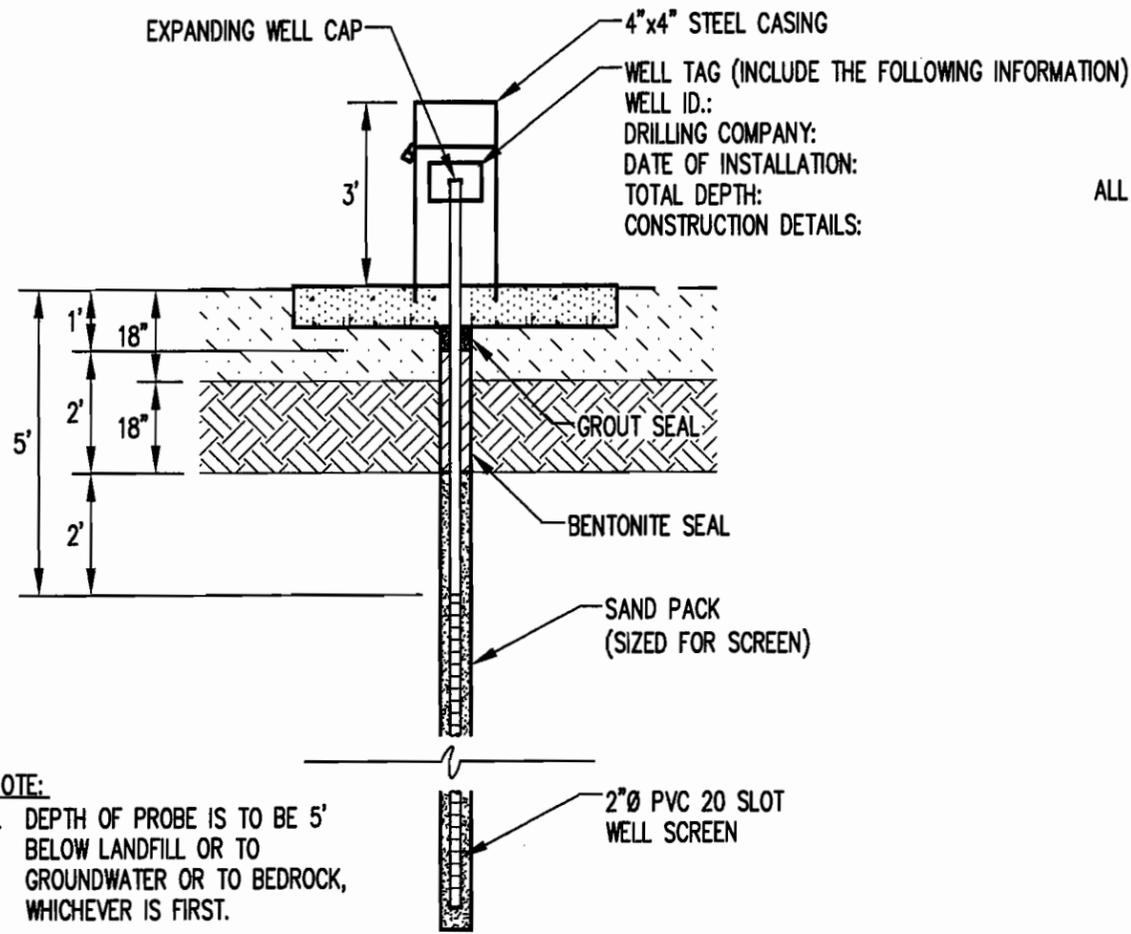


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FIGURE NO.	2	FILE NAME	AVERY-B0040
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DRAWN BY:	J.A.L.		

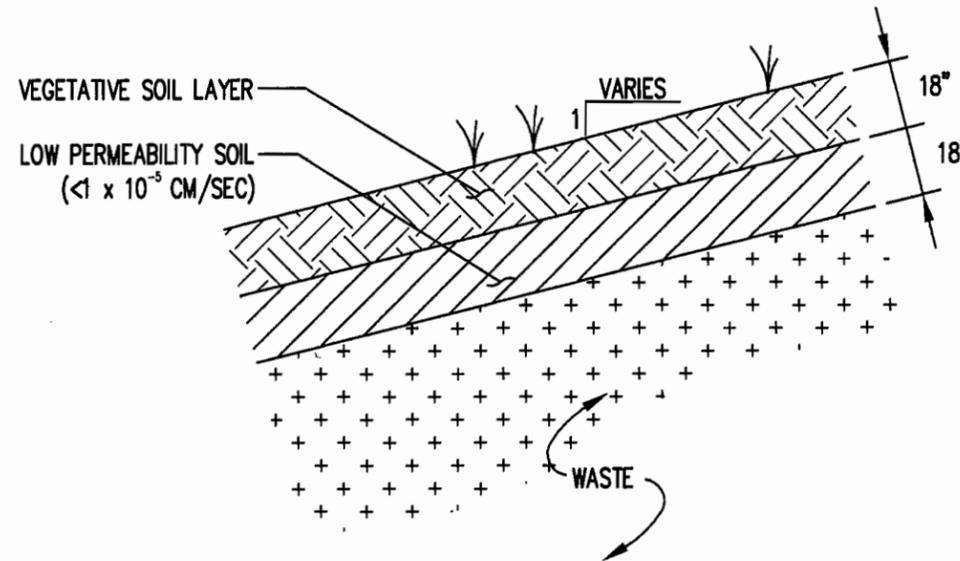
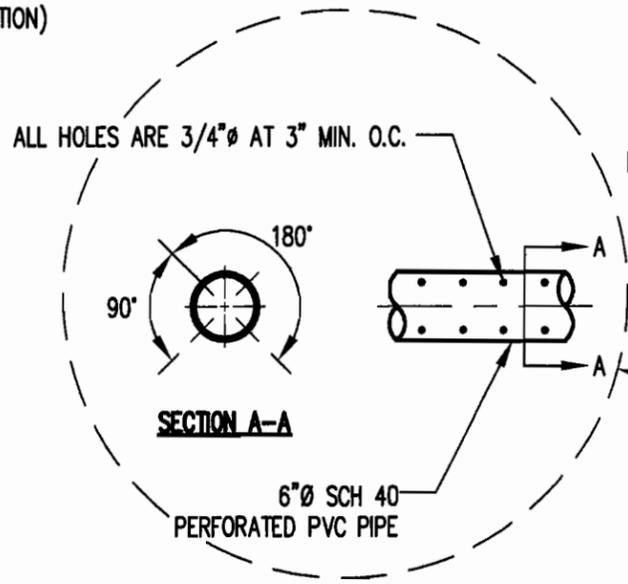
AVERY COUNTY
SOLID WASTE DEPARTMENT
AVERY COUNTY C&D LANDFILL
FINAL GRADING PLAN

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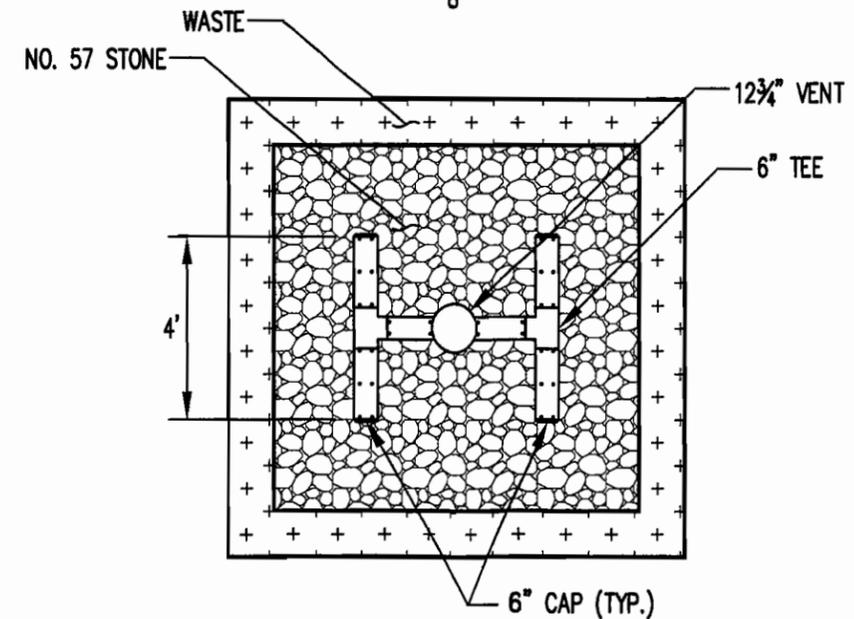
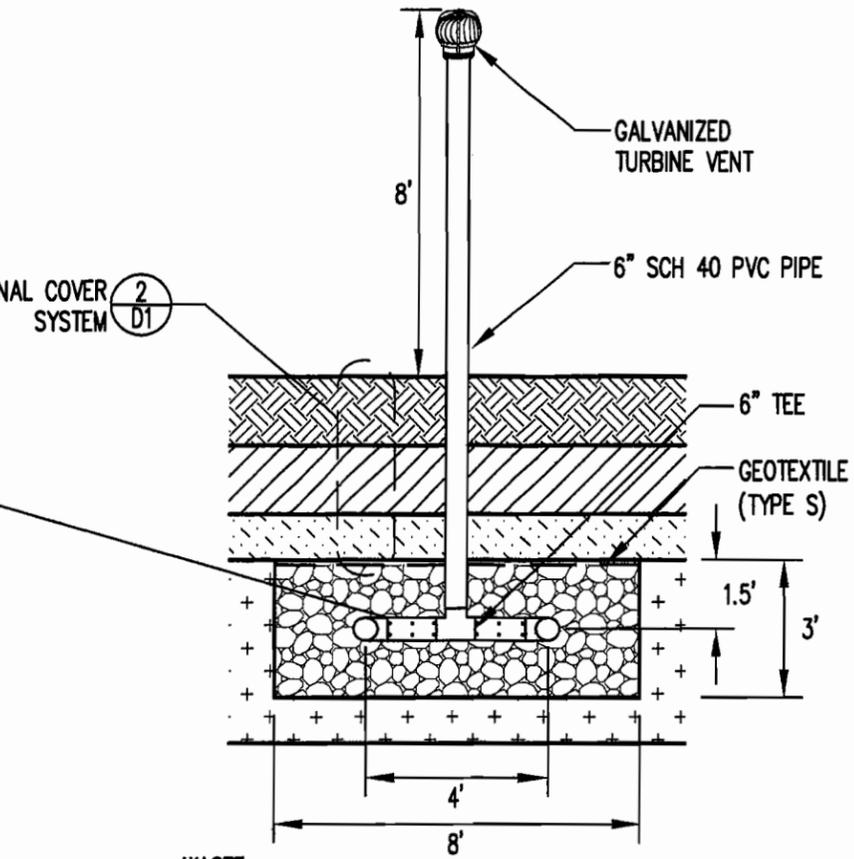


NOTE:
1. DEPTH OF PROBE IS TO BE 5' BELOW LANDFILL OR TO GROUNDWATER OR TO BEDROCK, WHICHEVER IS FIRST.

GAS PROBE
DETAIL 1
SCALE: NOT TO SCALE **D1**



FINAL COVER SYSTEM
DETAIL 2
SCALE: NOT TO SCALE **D1**



GAS VENT
DETAIL 3
SCALE: NOT TO SCALE **D1**

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FIGURE NO.	3	FILE NAME	AVERY-B0041
SCALE:	AS SHOWN	PROJECT NO.	AVERY 07-1
CHECKED BY:	S.A.S.	DATE:	Jun. 2008
DRAWN BY:	J.A.L.		

AVERY COUNTY
SOLID WASTE DEPARTMENT
AVERY COUNTY C&D LANDFILL
DETAILS

Attachment B

Closure Plan

Closure And Post-Closure Plan

**Avery County C&D Landfill
Ingalls, North Carolina
NC Solid Waste Permit No. 06-03**

Prepared for:



**Avery County
175 Linville Street
Newland, North Carolina 28657**

June 2008

PERMIT ISSUE DOCUMENTS

Prepared by:



Closure and Post-Closure Plan

Avery County
C&D Landfill
(NC Solid Waste Permit No. 06-03)
Ingalls, North Carolina

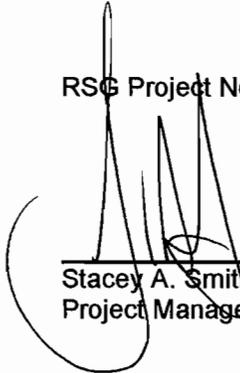
Prepared for:



Avery County
175 Linville Street
Newland, North Carolina

To the Attention of:
Mr. Buddy Norris
Avery County Solid Waste

RS& Project No. AVERY-07-1


Stacey A. Smith, P.E.
Project Manager



June 2008

**AVERY COUNTY
C&D LANDFILL**

CLOSURE AND POST-CLOSURE PLAN

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SECTION 1.0 CLOSURE PLAN

1.1 OVERVIEW

This plan is intended to serve as a guide for the proposed closure of the Avery County C&D Landfill. A formalized Closure Plan for Phase 1 or 2 (or incremental portion thereof) will be submitted to the Solid Waste Section of the North Carolina Department of Environment and Natural Resources Division of Waste Management (DWM) for approval prior to beginning closure construction.

1.2 MAXIMUM CLOSURE AREA AND WASTE CAPACITY

A Final Cover Grading Plan (**Figure No. 2**) is provided in **Attachment A** of this Plan as modified from the permit¹ drawings in accordance with 15A NCAC 13B .0543. for the Avery County C&D Landfill. The following are the estimated areas and capacity for each landfill unit to be closed under this plan.

Phase	Area (Ac.)	Operating Capacity	
		Gross (CY) ¹	Tons ²
1	3.0	28,007	8,400
2	2.1	29,034	8,710
Total:	5.1	57,041	17,110

Notes:

1. Gross capacity is based on calculations performed in current permit application¹.
2. Tons calculated by converting pounds per cubic yards to tons per cubic yards and multiplying by the gross capacity given in current permit application¹.

1.3 FINAL COVER SYSTEM

The final cover system will consist of the following components (top-down):

- a 18-inch thick vegetative soil layer (including 6 inches of topsoil)
- a 18-inch thick layer of low permeability material (1×10^{-5} cm/sec); and
- a 12-inch thick intermediate cover layer.

¹ Permit Application, Avery County C&D Landfill & LCID Landfill dated October 1995 prepared by Municipal Engineering Services Company, P.A.

The final cover system will be placed on prepared intermediate cover at a maximum slope of 3H:1V as approved in the current Permit Application². It is noted that the facility is near capacity and has relative shallow waste placement, providing a safe configuration. A landfill gas (LFG) control (venting) system (as shown in **Detail 3** on **Figure No. 3**) and surface water control devices will also be incorporated into the final cover. The final cover surface will be vegetated upon completion of the final cover installation according to the project seeding specifications.

Technical specifications and construction quality assurance requirements for final cover system components can be found in **Attachment C**. Final cover system details are shown on **Figure No. 3** (Details) as modified from the original permit drawings.

Placement of the low permeability soil layer shall be closely monitored for moisture and density to achieve the minimum requirements set forth in the specifications. The vegetative soil layer should receive no compaction other than that provided by the dozer tracks. Pans or other heavy equipment should not operate on the vegetative soil layer.

1.4 LANDFILL GAS SYSTEM

A landfill gas control (venting) system is provided in the final cover system. This system includes a system of collection wells or trenches placed within the waste immediately below the cover to capture the gas passively. The collection wells should be placed before any low permeability soils are placed. The location of gas system components are shown on **Figure No. 2** (Final Grading Plan).

1.5 SURFACE WATER SYSTEMS

Precipitation falling on the cover will infiltrate into the cover or run off the cover. Short-term the stormwater (run-off) flows down the surface of the intermediate cover. Long-term the run-off is controlled by silt fences surrounding the landfill until such time that vegetation is established. Flow is routed from the base of the landfill to the site sediment basin or sediment traps.

1.5.1 Incremental Operation

During much of the life of the landfill, surface run-off will be handled by the intermediate cover system. Operations must strive to provide operational grading that encourages run-off from the intermediate cover to drain to the basin and traps. Corrugated polyethylene (CPE) piping and temporary soil berms must be installed if required to accomplish this run-off routing.

² Permit Application, Avery County C&D Landfill & LCID Landfill dated October 1995 prepared by Municipal Engineering Services Company, P.A.

1.5.2 Required Maintenance

The surface water systems must be inspected annually and immediately after every major storm. Sediment build-up in the drainage features/devices must be cleaned out on a regular basis to promote run-off. Sediments removed can be used as daily or intermediate cover.

1.6 CLOSURE SCHEDULE

Closure activities must begin on the following schedule:

- C No later than 30 days after the date on which the C&D landfill (unit) last receives waste (known final receipt of wastes);
- C No later than 30 days after the date that a ten (10) acre or greater area of waste, is within 15 feet of final design grades; and
- C No later than one (1) year after the most recent receipt of wastes, if the C&D landfill (unit) has remaining capacity.

All closure activities shall be completed within 180 days. Exemptions and extensions may be approved by the DWM.

1.7 CLOSURE VERIFICATION

The following procedures will be implemented following closure:

- A Construction Quality Assurance (CQA) report will be submitted to the DWM. This report will describe the observations and tests used before, during, and upon completion of construction to ensure that the construction materials meet the final cover design specifications and the construction and certification requirements. The CQA report will contain as-built drawings.
- A signed certification from a registered Professional Engineer verifying that closure has been completed in accordance with the closure plan will be submitted to the DWM.
- Following final receipt of waste and full facility closure, at least one sign notifying all persons of the closing of the landfill (or incremental portions thereof) and that wastes are no longer accepted will be posted. Suitable barriers will be installed as necessary at former access points to prevent new waste from being deposited.
- Within 90 days, a survey plat, prepared by a registered Professional Land Surveyor, indicating the location and dimensions of landfill disposal areas, will be prepared.

- A notation will be recorded on the deed notifying any potential purchaser of the property that the land has been used as a landfill facility and that future use is restricted under the approved closure plan. A copy of the deed notation as recorded will be filed with the operating record.

SECTION 2.0 POST-CLOSURE PLAN

2.1 OVERVIEW

This Post-Closure Plan has been developed to outline steps to be taken to ensure the integrity of the landfill during its post-closure care period. The post-closure care period will last at least 30 years after final closure and, at a minimum, will consist of the following:

- Maintaining the integrity and effectiveness of final cover system;
- Performing groundwater and surface water monitoring;
- Maintaining and operating a gas monitoring system; and
- Maintaining run-on/run-off controls.

No wastes will remain exposed after closure of the landfill. Access to the closed site by the public will not pose a health hazard.

2.2 POST-CLOSURE CONTACT

All correspondence and questions concerning the post-closure care of the unit should be directed to:

Mr. Buddy Norris (Owner)
Avery County Solid Waste (Office)
175 Linville Street
Newland, North Carolina 28657
Phone: (828) 737-5420

2.3 POST-CLOSURE USE

After filling operations cease at the landfill and the landfill is officially closed in accordance with the Closure Plan, the landfill will be maintained as a grassy hill. Avery County Landfill will maintain control of the property and prevent public access to it during the post-closure period.

There may be (an) access road(s) on the final cover to allow proper maintenance during post-closure. Precise location of the access road(s) will be determined as a part of operations. Low ground pressure and rubber tire vehicles will be used for maintenance.

2.4 MAINTENANCE

2.4.1 Repair of Security Control Devices

All security control devices will be inspected and maintained as necessary to ensure access to the site is controlled. Locks, vehicular gates, and fencing will be replaced if functioning improperly. Warning signs will be kept legible at all times and will be replaced if damaged by inclement weather or vandalism.

2.4.2 Erosion Damage Repair

If erosion of the final cover occurs during post-closure, the affected area will be repaired and reseeded as necessary. If necessary, rolled erosion control products (RECPs) will be used to expedite rapid revegetation of slopes and to secure topsoil in place.

2.4.3 Correction of Settlement, Subsidence, and Displacement

Minimum slopes of 5 percent will be maintained after settlement in order to prevent ponding and allow for proper drainage without infiltration. If vertical or horizontal displacement occurs due to differential settlement, cracks will be filled with appropriate material and final cover will be reestablished. Excessive vertical displacement is not anticipated.

2.4.4 Repair of Run-On/Run-Off Control Structures

All drainage swales, ditches, and perimeter channels will be repaired, cleaned, or realigned in order to maintain their original condition. Any culverts that are damaged will be repaired or replaced.

2.4.5 Landfill Gas Control System

The landfill gas control (venting) system will be maintained by Avery County Landfill. Proper operation of the system is verified through periodic testing of the subsurface monitoring wells around the perimeter of the landfill.

If landfill gas vents do not function as a result of irregular settlement, accumulation of liquids (condensate, leachate, water), binding or corrosion, additional and/or replacement wells/vents can be installed if necessary as shown on the Permit Drawings.

Monitoring shall be performed to identify (if any) subsurface migration of landfill gas at explosive levels are present in on-site structures and/or at the property boundary in accordance with **Table 2.1**. Methane or other explosive gas concentrations shall not exceed 25 percent of the lower explosive limit (LEL) (1.25% of CH₄) in on-site structures, such as scale houses, or 100% of the LEL (5% of CH₄) at the facility property boundary. Subsurface methane monitoring wells are installed between the landfill perimeter and the property line, and are spaced approximately 500 feet apart. Additional

wells will be installed as necessary and consistent with landfill expansion.

If landfill gas levels exceed these limits, the following must be performed:

- C Immediately take all steps necessary for the protection of personnel, staff, or neighboring properties and notify the DWM;
- C Within seven (7) days, place in the operating record a description of events taken following the detection event; and
- C Within 60 days, implement a remediation plan for the explosive gas releases, place a copy in the operating record, and notify the DWM that the plan has been implemented

2.4.6 Groundwater Monitoring Wells

Procedures outlined in the current Water Quality Monitoring (WQM) Plan or subsequent revision will take precedence; however, a brief description follows. All groundwater monitoring wells have been installed with concrete pads and protective casings to prevent accidental damage by vehicles and equipment. The wells are also equipped with a locking cap to discourage vandalism. Groundwater wells will be inspected regularly (at the time of sampling) to ensure integrity. Persons inspecting a well should look at the overall condition of the well, for signs of well tampering, and cracking or degradation of the concrete pad. Should a well require replacement, the defective well should be abandoned in accordance with specifications provided in the WQM Plan and a new well installed at a location that is approved by the DWM.

2.5 MONITORING PLAN

The closed unit will be monitored for a minimum of 30 years. A series of inspections will be scheduled to ensure the integrity and effectiveness of the final cover system, surface water systems, groundwater monitoring system, landfill gas system, and to protect human health and the environment.

2.5.1 Inspection Frequencies

Inspections to be conducted during the post-closure care period will occur regularly as shown in **Table 2.1**.

2.5.2 Quarterly Inspections

Quarterly inspections of the closed site will be conducted by Avery County Landfill. These inspections will include examination of the security control devices for signs of deterioration or vandalism to ensure access to the site is limited to authorized persons. Each disposal area will be checked to ensure the integrity of the final cover system is maintained, erosion damage is repaired, vegetative cover persists, and that cover

settlement, subsidence, and displacement are minimal. Drainage swales and channels will be cleared of litter and debris and benchmark integrity will be noted and maintained.

2.5.3 Semi-Annual Inspections

Semi-annual inspections of the site during the post-closure period will be conducted by Avery County Landfill with attention paid to integrity and drainage of the final cover system and condition of the groundwater and gas monitoring systems.

A report of findings will be made to the responsible party, including recommendations for actions deemed necessary to ensure the site continues to meet the closure performance standard.

2.6 ENGINEERING CERTIFICATION

Based on Avery County Landfill's monitoring reports, annual certifications by a registered engineer will be placed in the operating record. They will certify that the closure plan has been followed, noting discrepancies along with the corrective actions undertaken. At the end of the post closure period, the individual certifications will be compiled into a final document and forwarded to the DWM.

TABLE 2.1: POST-CLOSURE INSPECTION FREQUENCIES

INSPECTION ACTIVITY	YEAR 1	YEARS 2-30
Security Control Devices	Quarterly	Quarterly
Vegetative Cover Condition	Quarterly ¹	Quarterly
Surface Water Systems	Quarterly ¹	Quarterly
Erosion Damage	Quarterly ¹	Quarterly
Cover Drainage System	Quarterly ¹	Semi-Annually
Cover Settlement, Subsidence, and Displacement	Quarterly ¹	Semi-Annually
Leachate Management System	Quarterly	Semi-Annually
Landfill Gas Control System	Quarterly ³	Semi-Annually ³
Groundwater Monitoring System	Semi-Annually	Semi-Annually ²
Benchmark Integrity	Annually	Annually

Notes:

1. These items will be inspected after each large storm event (i.e. ≥ 1 inch in any 24 hours).
2. Or in accordance with groundwater monitoring schedule described in the current Water Quality Monitoring Plan.
3. Or in accordance with the current Landfill Gas Management Plan.

SECTION 3.0 CLOSURE/POST-CLOSURE COST ANALYSIS

3.1 OVERVIEW

The purpose of this section is to provide a written estimate in current dollars of all activities and costs associated with all activities specified in the written closure and post-closure plans which have been developed for the Avery County Landfill.

3.2 ESTIMATED CLOSURE COSTS

Table 3.1 summarizes the estimated costs for complete closure of Phases 1 and 2 (the current maximum area to be closed). This cost estimate is based on a third party providing the necessary services and includes labor in the unit prices given. The estimated closure costs will be reviewed and updated as required to reflect adjustments for inflation, rising costs of anticipated closure care, increased costs in construction or materials, or any other adjustments to the Closure Plan.

3.3 ESTIMATED POST-CLOSURE COSTS

Table 3.2 summarizes the estimated costs for the post-closure care maintenance activities. This cost estimate is based on a third party providing the necessary services and includes labor in the unit prices given. The estimated post-closure costs will be reviewed and updated as required to reflect adjustments for inflation, rising costs of anticipated post-closure care, or any other adjustments to the Post-Closure Plan.

Attachment C

Specifications

SECTION 02250

SOIL LINER (FINAL COVER)

Soil Liner: The Soil Liner serves as a hydraulic containment barrier in the final cover system.

A. DESCRIPTION

1. General:

- a. The Contractor shall furnish all labor, material, and equipment to complete installation of the Soil Liner including borrowing, hauling, screening, mixing, stockpiling, discing, compacting, drying or wetting, removal of surface water, removal of all previously placed material affected by adverse weather conditions or construction disturbance, final grading and sealing, and all necessary and incidental items as detailed or required to complete the Soil Liner, all in accordance with the Contract Drawings and these Specifications.
- b. The Contractor shall provide suitable soil from an on-site or off-site borrow site that meets all requirements outlined in these Specifications for Soil Liner.

Off-site borrow sources shall be approved in advance by the Engineer. The Contractor shall be responsible for all submittals required for Engineer approval of off-site borrow sources.

2. Related Work:

Related Contract Work is described in the following sections of the Specifications:

<u>Work</u>	<u>Section</u>
Vegetative Soil Layer	02258

3. Reference Standards:

The latest revision of the following standards of the American Society of Testing and Materials (ASTM) are hereby made a part of these Specifications.

ASTM D 422	Standard Test Method for Particle Size Analysis of Soils.
ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³).

ASTM D 1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
ASTM D 2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
ASTM D 2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
ASTM D 2937	Standard Test Method for Density of Soil in Place by the Drive Cylinder Method.
ASTM D 4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
ASTM D 4643	Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.
ASTM D 4959	Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating Method.
ASTM D 5084	Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
ASTM D 6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

4. Quality Assurance:

Quality Assurance during placement of Soil Liner will be provided by the Owner.

B. MATERIALS

All material for Soil Liner shall conform to the requirements shown in Table 1 of this section.

C. SUBMITTALS

The Contractor shall submit the following to the CQA Engineer:

1. Before approval is given to proceed with test fill construction, the Contractor shall submit descriptive information on compaction equipment to be used for construction of the Soil Liner.
2. Off-Site Borrow Sources (If Applicable):
 - a. For each off-site borrow source for Soil Liner soils, the Contractor shall provide the following information at least four weeks prior to placement of the Soil Liner:
 - (1) The name, location, and owner of proposed borrow site, including a topographic map and location map of the site.
 - (2) A certification submitted by an independent Registered Professional Engineer that the proposed borrow site contains a minimum of double the in-place volume of Soil Liner required to complete the work.
 - (3) A certification submitted by an independent Registered Professional Engineer that the proposed borrow soils meet the requirements for Soil Liner outlined in these Specifications. Certification shall include the following minimum testing and test frequency:

<u>Test</u>	<u>Min. Number of Tests</u>
Atterberg Limits (ASTM D 4318)	10
Grain Size (with Hydrometer) (ASTM D 422)	10
Standard Proctor (ASTM D 698)	5
Natural Moisture Content (ASTM D 2216)	10
Hydraulic Conductivity (Lab Remolded) (ASTM D 5084)	5

Testing samples for certification shall be obtained from well distributed locations within the proposed borrow area. All test data shall be submitted with the soil certification.

- b. The Contractor shall be responsible for maintaining quality of the Soil Liner borrow source throughout construction and shall ensure that the borrow soil meets the project criteria outlined in these Specifications. The Contractor shall cooperate with the CQA Engineer so that the CQA Engineer has unlimited access to the borrow area during construction for the purposes of sampling and testing borrow soil.

- c. If the borrow source does not meet the requirements outlined in these Specifications, the Contractor shall be responsible for providing an alternative borrow source at no cost to the Owner.

D. CONSTRUCTION

1. General:

- a. All placement and compaction of Soil Liner shall be performed only when the CQA Engineer is informed by the Contractor of intent to perform such work.
- b. The Contractor shall place and compact the Soil Liner to the lines and grades shown on the Contract Drawings with the exception that a 0.15 foot overbuild at the Contractor's expense is allowed. Thickness requirements are minimum values. The Contractor will perform all surveys necessary to establish and verify lines and grades for all Soil Liner.

2. Borrow Soils:

- a. The Contractor may haul borrow soil to an on-site stockpile area. Unless otherwise allowed by the Engineer, borrow soil cannot be hauled directly to the containment area for placement and compaction unless each load is monitored and approved by the CQA Engineer prior to loading at the borrow site.
- b. Any borrow soil not meeting the requirements for Soil Liner shall be rejected and removed from the project site by the Contractor at no cost to the Owner.

3. Test Fill Construction:

The Contractor shall construct a test fill prior to construction of Soil Liner. The test fill shall be at least 20 feet wide by 50 feet long and shall be compacted in lifts to the full design thickness. The Contractor shall use materials and equipment for test fill construction that the Contractor intends to use during construction.

No Soil Liner construction may be performed until the test fill construction is confirmed to be adequate in accordance with the Project CQA Manual.

The Contractor shall amend construction techniques or equipment in order to meet all criteria outlined for Soil Liner in these Specifications at no cost to the Owner.

4. Subgrade Preparation:

- a. The CQA Engineer shall inspect the exposed subgrade prior to placement of Soil Liner to assure that all rocks, topsoil, vegetation, roots, debris, or other deleterious materials have been removed.
- b. Prior to placement of Soil Liner, the exposed subgrade shall be proofrolled using a static smooth-drum roller, loaded tandem axle dump truck, or other suitable equipment in the presence of the CQA Engineer. Any soft or unsuitable subgrade materials revealed before or during the in-place compaction shall be removed as directed by the CQA Engineer and replaced with Soil Liner.

5. Placement and Compaction:

- a. All Soil Liner shall be placed in loose lifts no greater than the height of the feet on compaction equipment to be used. The loose Soil Liner shall be free from clods or rocks which exceed the sizes in Table 1. Where excessive sized clods do occur, the Contractor shall break up the clods using methods approved by the CQA Engineer.
- b. Lift compaction shall be performed with an appropriately heavy, properly ballasted, penetrating-foot compactor. Compaction equipment shall be the same as used in the test fill, unless otherwise approved by the Engineer.

Each lift shall be compacted prior to placement of succeeding lifts. The maximum lift thickness shall be as shown in Table 2. In confined areas, mechanical equipment, suitable for small areas and capable of achieving the density requirements, shall be required.

- c. The exposed surface of Soil Liner shall be protected from adverse weather conditions or desiccation of the soil. This is commonly done by rolling the surface of the Soil Liner with a smooth-drum roller at the end of each work day. Alternative means of protecting the Soil Liner may be employed by the Contractor.
- d. The in-place Soil Liner shall conform to the requirements shown in Table 2 of this section. If Soil Liner does not meet the specified requirements, the Contractor shall rework the material, as may be necessary and continue compaction to achieve these requirements, or remove and replace the material to achieve the specified requirements, at Contractor's expense.
- e. Any Soil Liner surface which is smooth, has a moisture content outside of the specified moisture content range, as defined by ASTM D 698, or exhibits evidence of desiccation cracking ½ inch deep or greater, shall be scarified to a depth of 1 to 3 inches and brought to a proper moisture content prior to placement of a subsequent lift. This includes any Soil Liner surface that was previously seal rolled for protection.

- f. No Soil Liner shall be placed or compacted when soil temperatures are so low as to produce ice lenses in the Soil Liner borrow soil.
- g. Soil Liner placed on side slopes shall be placed and compacted in lifts which are parallel to the slope. Lift criteria shall be as described herein.
- h. Locations of control stakes, in-place density tests, thickness checks, or other samples in the Soil Liner shall be patched with compacted Soil Liner or sodium bentonite compacted and hydrated in the holes.

6. Surveying:

After completion of a segment of Soil Liner, but before installation of subsequent layers, the Soil Liner shall be surveyed (by test pit or hand auger) on a 100 foot grid to ensure the minimum specified thickness of Soil Liner has been achieved.

TABLE 1: SOIL LINER MATERIAL REQUIREMENTS

PROPERTY	TEST METHOD	VALUE
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Visual Classification	ASTM D 2488	Clean natural fine-grained soil free from organics, debris, or other detrimental material. Soil type as required to achieve the hydraulic conductivity criteria.
Clod Size	-----	Maximum = ¾ inch (or less if required to achieve hydraulic conductivity criteria)
Gradation	ASTM D 422	Max. = 1½ inches
Atterberg Limits	ASTM D 4318	As required based on soil type.
Hydraulic Conductivity (Lab Remolded) (Compacted Soil Barrier)	ASTM D 5084 ³	# 1 x 10 ⁻⁵ cm/s at a density of \$ 95% maximum standard dry density and a moisture content ≥ optimum moisture content ⁴

TABLE 2: IN-PLACE SOIL LINER REQUIREMENTS

PROPERTY	TEST METHOD	VALUE
-----------------	--------------------	--------------

Density	ASTM D 6938 ¹	§ 95% maximum standard dry density ⁴
Moisture Content	ASTM D 6938 ²	≥ optimum moisture content ⁴
Maximum Lift Thickness (Compacted): (Compacted Soil Barrier)	-----	9 inches
Hydraulic Conductivity (Shelby Tube): (Compacted Soil Barrier)	ASTM D 5084 ³	# 1 x 10 ⁻⁵ cm/s
Completed Thickness: (Compacted Soil Barrier)	Survey	18 inches minimum

Notes:

1. Optionally use ASTM D 1556, ASTM D 2167, or ASTM D 2937.
2. Optionally use ASTM D 2216, ASTM D 4643, or ASTM D 4959.
3. Maximum effective confining pressure and maximum hydraulic gradient as follows.
Backpressure as recommended by ASTM D 5084. Modifications of the maximum hydraulic gradient may be allowed by the Engineer depending on actual hydraulic conductivity values.

Material	Maximum Effective Confining Pressure (psi)	Maximum Hydraulic Gradient
Compacted Soil Barrier (k # 1 x 10 ⁻⁵ cm/s)	5	15

4. Or as otherwise determined by remolded samples to achieve hydraulic conductivity criteria.

END OF SECTION

SECTION 02258

VEGETATIVE SOIL LAYER

Vegetative Soil Layer (VSL): The Vegetative Soil Layer (VSL) is placed in the final cover system in order to support permanent vegetative cover.

A. DESCRIPTION

1. General:

The Contractor shall furnish all labor, material, and equipment to complete installation of the VSL for the landfill cover, including borrowing, hauling, spreading, and final grading and all necessary and incidental items as detailed or required to complete the VSL, all in accordance with the Contract Drawings and these Specifications.

2. Related Work:

Related Contract Work is described in the following sections of the Specifications:

<u>Work</u>	<u>Section</u>
Soil Liner	02250
Revegetation	02930

3. Quality Assurance:

Quality Assurance during placement of Vegetative Soil Layer will be provided by the Owner.

B. MATERIALS

Soil that meets all of the following requirements shall be classified as select soil fill for use in construction of the VSL.

1. Soil materials used in the VSL shall be reasonably free of gypsum, ferrous, and/or calcareous concretions and nodules, refuse, roots, or other deleterious substances.
2. The VSL shall be uniform, smooth, and free of debris, rock, plant materials, and other foreign material larger than 3 inches in diameter. The material should contain no sharp edges. This material must be capable of supporting growth of vegetative cover.

C. SUBMITTALS

The Contractor shall submit the following to the CQA Engineer:

1. Before approval is given to proceed, the Contractor shall submit descriptive information on placement equipment to be used in construction of the VSL.

D. CONSTRUCTION

1. All placement and compaction of VSL shall be performed only when the CQA Engineer is informed by the Contractor of intent to perform such work.
2. VSL shall be placed as specified below:
 - a. The VSL, including topsoil, shall be placed and spread using tracked equipment. The CQA Engineer shall approve the equipment used to place the VSL.
 - b. VSL shall be placed and compacted to the lines and grades shown on the Contract Drawings with the exception that a 0.15 foot overbuild at Contractor's expense is allowed. The Contractor will perform all surveys necessary to establish and verify lines and grades for all VSL.
 - c. VSL shall be compacted by tracking the final lift with tracked equipment.
3. After the specified thickness has been achieved and verified, the Contractor shall proceed immediately with seeding.
4. Surveying:

After completion of a segment of VSL, the VSL shall be surveyed (by test pit or hand auger) on a 100 foot grid to ensure the minimum specified thickness of VSL has been achieved.

END OF SECTION

SOIL LINER CQA

1.0 INTRODUCTION

This information addresses the soil liner component of the final cover system and outlines the soils construction quality assurance (CQA) program to be implemented with regard to material approval, subgrade approval, test fill construction, field and laboratory control and record tests, and resolution of problems.

2.0 SOIL LINER MATERIAL APPROVAL

All material to be used as soil liner shall be approved in advance by the CQA Engineer. Approval is based upon successful completion of CQA control testing outlined below. Such testing can be performed either during excavation and stockpiling or from existing stockpiles prior to use.

2.1 Control Tests

The procedure for CQA testing during excavation and stockpiling (including existing stockpiles) is outlined below.

Each load of soil will be examined either at the borrow source or the stockpile area. Any unsuitable material will be rejected or routed to separate stockpiles consistent with its end use. Appropriate entries will be made in the daily log.

During stockpiling operations, control tests, as shown on **Table 1**, will be performed by the CQA Engineer prior to placement of any soil liner material.

3.0 SUBGRADE APPROVAL

The CQA Engineer will verify that the soil liner subgrade is constructed in accordance with the project specifications.

4.0 TEST FILL CONSTRUCTION

A test fill meeting the requirements of the project specifications will be constructed using the same construction methods, equipment, and material to be used for the soil liner component. The test fill construction will be conducted prior to or coincide with the beginning of construction of the soil liner component.

Construction equipment and methods will be reviewed by the CQA Engineer prior to test fill placement.

4.1 Control Tests

The control tests, as shown on **Table 2**, will be performed by the CQA Engineer prior to placement of soil liner material in the test fill.

4.2 Record Tests

The record tests, as shown on **Table 2**, will be performed by the CQA Engineer during placement of soil liner material in the test fill.

4.3 Test Fill Completion

The test fill program is completed when the Contractor has shown that the soil liner constructed using the same construction methods, equipment, and material to be used in construction of the soil liner will satisfy project specifications. No soil liner can be placed until the test fill program is completed.

5.0 SOIL LINER CONSTRUCTION

5.1 Construction Monitoring

- A. Soil liner shall be placed as described in the applicable section(s) of the project specifications using the construction methods, equipment, and material demonstrated in the test fill construction.
- B. Only soil previously approved by the CQA Engineer (see **Section 2.0**) shall be used in construction of the soil liner. Unsuitable material will be removed prior to acceptance by the CQA Engineer.
- C. All required field density and moisture content tests shall be completed before the overlying lift of soil is placed. The surface preparation (e.g. wetting, drying, scarification, etc.) shall be completed before the CQA Engineer will allow placement of subsequent lifts.
- D. The CQA Engineer will monitor protection of the soil liner during and after construction.
- E. The liner surface shall be sprinkled with water as needed to prevent desiccation. Should desiccation occur, the last lift shall be reconstructed in accordance with the project specifications. Standing water should not be present on the soil liner.
- F. Frost heave or other damage due to freezing shall require lift reconstruction in accordance with the project specifications.
- G. The CQA Engineer will inspect the soil liner and certify that it is in accordance with the project specifications and approved plans prior to the Contractor beginning installation of overlying geosynthetics.

- H. The finished soil liner shall be free of all rock protrusions. All cracks and voids shall be filled and the surface made uniform. This shall be accomplished by final dressing of the soil liner with smooth-drum rollers and hand raking. No rubber tired vehicles are permitted on the final dressed surface unless authorized by the CQA Engineer.

5.2 Control Tests

The control tests, as shown on **Table 3**, will be performed by the CQA Engineer prior to placement of soil liner material.

5.3 Record Tests

The record tests, as shown on **Table 3** and as described below, will be performed by the CQA Engineer during placement of soil liner material.

- A. Each lift will be checked visually for soil clods, rocks, debris, plant materials and other foreign material. Any such material which does not meet specified requirements shall be identified and removed prior to and during the compaction process.
- B. The thickness of the loose lift will be measured at random locations after spreading and leveling is completed. Loose lift thickness should not exceed the depth of penetration of the compaction feet.
- C. Moisture content will be monitored by the CQA Engineer prior to compaction. If the soil is drier than the specified minimum moisture content, water will be added and the lift will be disced to distribute the moisture evenly.

Results of testing will be certified within 7 days of soil liner placement.

5.3.1 Record Test Failure

The following procedures shall be used in the event of density or hydraulic conductivity test failure:

- A. Failed Density Test: Recompaction of the failed area shall be performed and retested until the area meets or exceeds requirements outlined in the specifications.
- B. Failed Hydraulic Conductivity Test: The area of failure shall be localized and reconstructed in accordance with the project specifications. This area will be retested as outlined within the plan by the CQA Engineer. Optionally, at least five replicate samples shall be obtained and tested by the Contractor in the immediate vicinity of the failed test. If all five samples pass, then the initial failing test will be discounted. However,

should the replicate samples confirm the failure of the soil liner to meet specifications, the area of failure shall be localized, reconstructed, and retested as described above.

5.4 Judgmental Testing

During construction, the frequency of control and/or record testing may be increased at the discretion of the CQA Engineer when visual observations of construction performance indicate a potential problem. Additional testing for suspected areas will be considered when:

- the rollers slip during rolling operation;
- the lift thickness is greater than specified;
- the fill material is at an improper moisture content;
- fewer than the specified number of roller passes are made;
- dirt-clogged rollers are used to compact the material;
- the rollers may not have used optimum ballast;
- the fill materials differ substantially from those specified; or
- the degree of compaction is doubtful.

5.5 Perforations In Soil Liner

All holes shall be patched with compacted soil liner or sodium bentonite compacted and hydrated in the holes.

6.0 DEFICIENCIES

The CQA Engineer will immediately determine the extent and nature of all defects and deficiencies and report them to the Owner and Engineer. All defects and deficiencies will be documented by the CQA Engineer. The Contractor shall correct defects and deficiencies to the satisfaction of the CQA Engineer. The CQA Engineer will observe all retests on repaired defects.

TABLE 1: CQA TESTING PROGRAM FOR SOIL LINER MATERIAL APPROVAL

PROPERTY	TEST METHOD	MINIMUM TEST FREQUENCY
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CONTROL TESTS:		
Visual Classification	ASTM D 2488	Each Soil
Moisture Content	ASTM D 2216	2,000 CY per Each Soil
Grain Size Analysis	ASTM D 422	2,000 CY per Each Soil
Atterberg Limits	ASTM D 4318	2,000 CY per Each Soil
Moisture-Density Relationship	ASTM D 698	5,000 CY per Each Soil
Hydraulic Conductivity - Lab Remolded	ASTM D 5084 ³	10,000 CY per Each Soil

TABLE 2: CQA TESTING PROGRAM FOR SOIL LINER TEST FILL

PROPERTY	TEST METHOD	MINIMUM TEST FREQUENCY
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CONTROL TESTS: (See Table 1)		
Moisture-Density Relationship	ASTM D 698 ⁴	1 per lift
Hydraulic Conductivity - Lab Remolded	ASTM D 5084 ^{3,4}	1 per lift
RECORD TESTS:		
Lift Thickness	-----	Each Lift
Atterberg Limits	ASTM D 4318	1 per lift
Grain Size Analysis	ASTM D 422	1 per lift
In-Place Density	ASTM D 2922 ¹	3 per lift
Moisture Content	ASTM D 6938 ²	3 per lift
Hydraulic Conductivity - Undisturbed (Shelby Tube)	ASTM D 6938 ³	1 per lift

TABLE 3: CQA TESTING PROGRAM FOR SOIL LINER

PROPERTY	TEST METHOD	MINIMUM TEST FREQUENCY
-----------------	--------------------	-------------------------------

CONTROL TESTS: (See Table 1)		
RECORD TESTS:		
Lift Thickness	-----	Each Lift
In-Place Density	ASTM D 6938 ¹	10,000 ft ² per lift
Moisture Content	ASTM D 6938 ²	10,000 ft ² per lift
Hydraulic Conductivity - Undisturbed (Shelby Tube)	ASTM D 5084 ³	80,000 ft ² per lift

Notes:

1. Optionally use ASTM D 1556, ASTM D 2167, or ASTM D 2937. For every 10 nuclear density tests perform at least 1 density test by ASTM D 1556, ASTM D 2167, or ASTM D 2937 as a verification of the accuracy of the nuclear testing device.
2. Optionally use ASTM D 2216, ASTM D 4643, or ASTM D 4959. For every 10 nuclear moisture tests perform at least 1 moisture test by ASTM D 2216, ASTM D 4643, or ASTM D 4959 as a verification of the accuracy of the nuclear testing device.
3. Maximum effective confining pressure and hydraulic gradient as required by the project specifications. Backpressure as recommended by ASTM D 5084.
4. These tests performed on the test fill may count toward the minimum frequencies established in **Table 1**.

Attachment D

Cost Estimates



DATE: 26-Jun-08
BY: SAS

Avery County C&D Landfill (NC SW Permit No. 06-03)
Engineer's Closure Construction Cost Estimate

Item No.	Item Description	Unit	Contractor			Comments
			Quantity	Unit Price	Total Price	
Closure Area (Horizontal Plan) ---->		AC	5			
1.0	Pre-Construction			Subtotal	\$17,500.00	
1.1	Construction Documents & Bidding	AC	5	\$15k + \$500/AC	\$17,500.00	RSG Estimate
2.0	Construction				\$239,250.00	References 1 and 2.
2.1	Surveys and Layout	AC	5	\$1,000.00	\$5,000.00	RSG Historical Estimate
2.2	Mobilization	AC	5	\$2,500.00	\$12,500.00	~4% of Construction Cost
2.3	Site Preparation (repairs to intermediate cover layer)	AC	5	\$500.00	\$2,500.00	Assumed estimate for repair of erosion rills.
2.4	18" On-site Low Permeability Soil	CY	12,100	\$8.00	\$96,800.00	RSG Estimate
2.5	18" Vegetative Support Layer	CY	12,100	\$4.50	\$54,450.00	RSG Estimate
2.6	Landfill Gas Venting System	AC	5	\$3,500.00	\$17,500.00	RSG Estimate
2.7	Cap Drainage Structures (berms, piping, etc.)	AC	5	\$7,500.00	\$37,500.00	RSG Historical Estimate
2.8	Erosion & Sediment Control (grading, silt fence, maintenance, etc.)	AC	5	\$800.00	\$4,000.00	RSG Historical Estimate
2.9	Revegetation	AC	5	\$1,800.00	\$9,000.00	Site Historical Estimate
3.0	Quality Assurance, Certification, & Deed Notation				\$34,250.00	
3.1	Field Monitoring	AC	5	\$3,000.00	\$15,000.00	RSG Estimate
3.2	Laboratory Testing	AC	5	\$2,500.00	\$12,500.00	RSG Estimate
3.3	Engineering Certification	AC	5	\$5k + \$250/AC	\$6,250.00	RSG Estimate
3.4	Surveying and Deed Notation	AC	5	\$100.00	\$500.00	RSG Historical Estimate
4.0	Miscellaneous Costs to Close				\$6,250.00	
4.1	Erosion and Stormwater Control (outside landfill footprint)	AC	5	\$1,000.00	\$5,000.00	RSG Historical Estimate
4.2	Engineering and Reporting	AC	5	\$250.00	\$1,250.00	RSG Historical Estimate
5.0	Total Closure Costs					
Construction Estimate ---->					\$297,250	
Cost per Acre ---->					\$59,450	
Total Estimate ---->					\$297,250 (2008\$) (See Note 1)	

Notes:

- All costs are presented in current dollars and should be increased at an inflation rate of 1.5% if additional review is not performed annually.
- This ESTIMATE has been prepared for financial assurance purposes only and shall not be considered a replacement for an actual bid from a licensed contractor and is considered acceptable within a +/- 10% of the Total Estimate value.

References:

- Avery County Construction and Demolition Landfill and Land Clearing and Inert Debris Landfill Permit Application by Municipal Engineering Services Company dated October 1995.

Denotes values calculated in spreadsheet.



DATE: 26-Jun-08
BY: SAS

**Avery County C&D Landfill (NC SW Permit No. 06-03)
Engineer's Post Closure Estimate**

Item	Quantity	Unit	Comments
Groundwater Monitoring			
Monitoring wells	4	wells	Reference 1
Surface water point	0	points	Reference 1
Sampling frequency	2	events	Reference 1
Field sampling, collection, and shipping	\$900	per event	RSG estimate
Laboratory Analysis	\$300	per well	RSG estimate
Data review, statistics, and reporting	\$1,500	per event	RSG estimate
Maintenance and repair	\$100	per well	RSG historical estimate
Subtotal Cost	\$7,400	per year	
Landfill Gas Management			
Control System Vents	7	vents	Per Ref. 1
Sub-Surface Monitoring Probes	6	probes	Per Ref. 1
Control system monitoring, maintenance and repair	\$50	per vent per year	RSG estimate
Semi-Annual Perimeter Monitoring	\$50	per probe per year	RSG estimate
Subtotal Cost	\$650	per year	Averaged over post-closure period
Final Cover Management			
Area of maintenance	5	acres	Extends to area immediately around landfill.
Mowing	\$100	per acre	Site historical estimate
Erosion and sediment control maintenance	\$200	per acre	Site historical estimate
Topdressing (seed & fertilizer)	\$150	per acre	Site historical estimate
Vector and rodent control	\$10	per acre	Site historical estimate
Maintenance mobilization	\$1,000	per year	Site historical estimate
Subtotal Cost	\$3,300	per year	
Administration, Inspections, and Reporting			
Administration and record keeping	\$1,000	per year	Site historical estimate
Inspection	\$1,000	per year	Site historical estimate
Miscellaneous engineering	\$1,500	per year	Site historical estimate
Subtotal Cost	\$3,500	per year	
Total Post-Closure Costs			
Estimated Average Annual Costs	\$14,850	per year (2008\$)	
Number of Years for Post-Closure	30	years (see Note 1)	
Total Post Closure Costs	\$445,500	(2008\$) (See Note 2)	

Notes:

- All costs are presented in current dollars and should be increased at an inflation rate of 1.5% if additional review is not performed annually.
- This ESTIMATE has been prepared for financial assurance purposes only and shall not be considered a replacement for an actual bid from a licensed contractor and is considered acceptable within a +/- 10% of the Total Estimate value.

References:

- Avery County Construction and Demolition Landfill and Land Clearing and Inert Debris Landfill Permit Application by Municipal Engineering Services Company dated October 1995.

Denotes values calculated in spreadsheet.