

Permit No.	Date	Document ID No.
98-09	December 15, 2010	12432

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Solid Waste Section  
Raleigh Central Office

# Permit Amendment Application

## Wilson County Westside C&D Landfill (Permit 98-09) Continued Operations Wilson County, North Carolina



*County of Wilson  
North Carolina*

Prepared For:

**Wilson County Solid Waste Management Department  
113 E. Nash Street  
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Prepared By:

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**January 2010  
Revised December 2010**



**BLACKROCK ENGINEERS, INC.**

P.O. Box 58  
Wilmington, NC 28402

December 14, 2010

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Mr. Ming-Tai Chao, P.E.  
NC DENR – Solid Waste Section  
1646 Mail Service Center  
Raleigh, North Carolina 27699-1646

RECEIVED  
**December 15, 2010 via a FedEx**  
Solid Waste Section  
Raleigh Central Office

RE: Response to Comments on Permit Amendment Application  
Wilson County Westside Construction and Demolition Debris Landfill (C&DLF)  
Wilson County, North Carolina  
Permit No. 98-09

The following response is provided to your comment letter (Doc ID 11305) regarding the subject permit amendment application. This letter includes your comments as numbered subtext following **our bold formatted response**. Attached are the revisions and addenda as noted in this correspondence for your review and permit decision.

### **Executive Summary**

***Response 1. The Executive Summary and other report attachments have been revised to clarify the average annual disposal rate of 20,000 tons per year according to Comment 1(i).***

1. (Executive Summary, Table 1 in Facility & Engineering Plan, Section 1.1 of Operations Plan)  
Please address the following concerns pertaining to waste disposal rate:
  - i. The disposal rate of 20,000 ton per year (tpy) was determined in the 4 November 2002 Resolution and approved by the Wilson County Board of Commissioners. Therefore, the calculation of life expectancy for the C&DLF shall use the approved disposal rate of 20,000 tpy,

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not 22,000 tpy. Consequently, the estimated remaining service life, approximately 6.4 years, of the C&DLF is not correct. Please make the necessary corrections by using the correct disposal rate of 20,000 tpy throughout the entire permit application document and provide the revised service life of the landfill.

- ii. The reported average disposal rate from October 4, 2004 to April 15, 2010 is 22,018 tpy, which is more than ten percent of the approved disposal rate of 20,000 tpy. This variance is considered as a substantial change in accordance with N.C.G.S. 130A-294(b1)(1). If Wilson County intends to adopt this average disposal rate of 22,000 tpy as the new disposal rate in the future waste management and planning, please submit a substantial permit amendment application in accordance with Solid Waste Management Rule (Rule) .0535(c).

***Response 2. The Executive Summary has been revised to incorporate the additional language in Comment 2.***

2. (Executive Summary, the fourth paragraph) Wilson County proposes that "if the permit requirements remain unchanged from this submittal, the approved plan documents incorporated herein shall be sufficient to continue operations to pre-final cover grade for closure implementation." This proposal may be acceptable if the site and operational conditions for the future phases are the same as those described in the approved plans for Phase 2 development. The future site and operational conditions include, but are not limited to, the facility plan, the operations plan (acceptable waste streams and other solid waste activities in addition to C&DLF), and environmental media monitoring conditions (water quality monitoring and landfill gas monitoring). Please incorporate the aforementioned requirements to this paragraph.

**Attachment A - Facility and Engineering Plan**

***Response 3. The historic mulch operation at the Wilson County Landfill originally approved under SW Permit 98-01, includes two separate components. The primary purpose of wood waste processing is to recover a majority of the waste as wood chips to be reused as biomass fuel, also commonly known as "hog fuel," for commercial power boilers. The residuals from the recovery operation are composted with segregated yard trash to produce a mulch compost product. Attachment I has been revised to include a new Section 3.0 to define the wood processing and mulch compost operations. The compost area that receives yard trash shall be separate from the wood processing operation and shall be limited***

***in area to less than 2 Acres. The Facility site plan has been revised to include aerial photography and separate delineation of the processing and compost areas. Furthermore, a letter from the Wilson County Planning Director is attached to document zoning approval of the wood processing and compost operations.***

3. There is an approximately 5-acre mulch area, on the south side of the 2-acre Yard Waste Area as shown on Figure 3. Please address the following concerns:
  - i. Please describe this mulch area and operation activities at this area in the Facility Plan (Attachment A) and Solid Waste Management Facilities (Attachment I).
  - ii. During the July 15, 2010 site visit, Wilson County acknowledged that this “mulch area” would be an area for stockpiling mulch/composting products; therefore, the DWM considers this “mulch area” is a portion of the Yard Waste Area. Because the yard waste composting facility encompasses a total area of approximately 7 acres, the facility is not a Small Type 1 facility but a Large Type 1 facility as defined in the Rule .1402(f)(7). Wilson County must reclassify the yard waste composting facility and submit supplemental information to the permit application in accordance with Rule .1400 et seq. for operating this composting facility.

***Response 4. Wilson County intends to formally close the inactive trench disposal area originally approved under SW Permit 98-01. Any asbestos waste approved for receipt at the facility shall be landfilled in a discrete area of the C&D unit as described in the revised Operations Plan.***

4. (Section 2.1) Please add Asbestos Trench Disposal Area to the list of “Facility Services” contained in this section and also note the status (active or inactive/closed unit) of this asbestos wastes disposal area.

#### **Attachment D - Operations Plan**

***Response 5. Figure 3 has been replaced by Dwg S1 – Facility Site Plan illustrating the current waste management activities and areas on-site. The referenced Asbestos Trench Disposal Area is a historic site originally included in SW Permit 98-01. The asbestos area was reportedly operated to establish a minimum of 2-ft of vegetated soil cover over the asbestos material upon placement. While this asbestos disposal area is a discrete unit, separate from the***

***closed MSWLF, it is on property recorded under SW Permit 98-01. Verification of closure and post-closure conditions and plans shall be coordinated with the SWS in separate documentation and conforming to 15A NCAC 13B .0500 and 40 CFR 61.154.***

5. (Section 1.4.1, on Page 2) During the July 15, 2010 site visit, a Wilson County representative said that the County planned to close the existing Asbestos Trench Disposal Area as shown on Figure No. 3, which would be subject to approval granted by the Wilson County Board of Commissioners. The Asbestos Trench Disposal Area does not currently meet existing landfill buffer requirements and the asbestos disposal area was also cited in the March 11, 2010 DWM Facility Compliance Audit Report as being an “inactive waste disposal site” in accordance with 40 CFR 61.141. Therefore, the DWM strongly recommends that Wilson County permanently close the Asbestos Trench Disposal Area. Upon receiving approval of closing this unit from the Wilson County Board of Commissioners, Wilson County needs to conduct the tasks described below which can be appended to the revised Permit Amendment Application:
  - i. Submit to DWM the closure plan and post-closure care plan that must be prepared in accordance with the requirements stated in 40 CFR 61.151 and .154.
  - ii. In the closure plan, please briefly describe the history of this waste unit including the starting and final dates receiving wastes, areal and vertical limits (including width and depth of trench sizes below ground surface and the final grades), documented total of the in-place waste quantities (in cubic yard and/or tonnage), record-keeping, etc.
  - iii. In the post-closure care plan, please describe the completion of deed recordation of this closed unit, install a warning sign for no disturbance of the closed area, install waste edge markers, and schedule inspections and maintenances according to 40 CFR 61 subpart M.

***Response 6. Pertinent requirements are included in new Section 1.13 of the revised Operation Plan to receive asbestos in a discrete area of the C&D unit.***

6. According to the Operations Plan, Wilson County plans to dispose of asbestos waste inside the C&DLF on a project specific basis. Please address the waste acceptance and disposal requirements according to Rule .0542(c)(2) and 40 CFR 61.

**Response 7. Wooden pallets have been added to Section 1.4.2 as excluded waste, with the exceptions as noted in comments for C&D generation and practical separation to the wood processing area.**

7. (Section 1.4.1) Wooden pallets are banned from disposal as defined in the NCGS Article 9, Chapter 130A-290(44a), effective October 1, 2009. Only pallets generated in C&D activities may be disposed of in a C&DLF, not pallets generated in industrial or commercial activities. Because all pallets may be recycled or ground for mulch or boiler fuel, such uses may be added to the waste streams of the on-site yard waste compost unit. Please incorporate the above-mentioned rule requirements or suggestions for the management of wooden pallets in the revised Operations Plan.

**Response 8. Any reference to the Operator is in accordance with G.S. 130A-290 (21) where: "Operator" means any person, including the owner, who is principally engaged in, and is in charge of, the actual operation, supervision, and maintenance of a solid waste management facility and includes the person in charge of a shift or periods of operation during any part of the day. The Operator shall be adequately trained through a qualified program conducted by solid waste management professionals. The operator may train other staff to perform specific duties. Additional subitems are addressed as follows.**

8. (Section 1.4.3) Please address the following concerns related to waste screening:

**i. Simple random sampling is incorporated in the revised screening plan.**

- i. This sub-section proposes that "the operator shall monitor loads periodically (at least monthly) to identify non-conforming waste...." Because the March 11, 2010 DWM Facility Compliance Audit Report indicates that the County needs to increase the screening frequency, the Solid Waste Section requests the County demonstrate that the proposed waste screening frequency is sufficient and adequate to serve the purpose of the waste screening program. The reviewer recommends that the waste screening frequency be based on the number of waste loads received, the general principal of statistical random sampling, and the frequency adopted in the waste industries. Please clarify.

**ii. Section 2.5 of the Facility Plan has deleted the inconsistency.**

- ii. This sub-section proposes that "if a suspect load is identified, an inspection will be conducted in an area prepared near the working face." This approach is inconsistent with that described in Section 2.5 of the Facility and Engineering Plan (Attachment A). Please clarify.

**iii. Typical waste screening/inspection form is attached to Operation Plan.**

iii. Please provide the typical waste screening/inspection forms appended to the Operations Plan.

**iv. The Operator shall determine the necessary frequency of training.**

iv. (Personnel Training and Preparation) Please describe how often the facility personnel are receiving the described training.

**v. A copy of the paint filter test is attached to the Operation Plan, performed by the Operator.**

v. (Identify Excluded Wastes) Please provide the paint filter liquid test (EPA SW-846 Method 9095) document appended to the Operations Plan, and describe who will be responsible for conducting this test.

**vi. As described in the Operations plan, all fire and police emergencies are routed via 911 calls.**

vi. (Key Personnel) Please add the contact information of the local fire department and sheriff's department.

**vii. Contact personnel updated as noted.**

vii. (Key Personnel) According to Wilson County's web site, Gordon W. Deno is the contact of the Wilson County Emergency Management. Ben Barnes' phone number is 919-621-3680 or 919-508-8400 for the DWM. Please make necessary corrections.

**viii. See Response 8.**

viii. (Procedures for Hauling Excluded Wastes) The tasks, which were described in the last paragraph on page 5 and the first paragraph on Page 6 must be conducted by a person or persons who have been properly trained in accordance with federal and state rules and regulations. "The operator" must be properly defined. Please clarify.

**ix. See Response 8iii.**

ix. (Procedures for Hauling Excluded Wastes) Please provide example copies of the inspection forms.

**Response 9. Section 1.5 has been revised to address the following comments.**

9. (Section 1.5) Please address the following concerns:

i. Provide the information related to cover thickness if the condition that is described in Rule .0542(f)(2) is encountered.

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- ii. The minimum frequency for inspection of potential leachate breakout.
- iii. Add the inspection area including the perimeter of the entire landfill, working faces of the daily cell, and the previously patched areas.
- iv. The person who will be responsible for conducting the inspection.

**Response 10. This plan was written prior to adoption of the .0540 CDLF Rules, and incorporated secure access standards for the closed MSWLF. As requested, we have made relevant changes for CDLF.**

10. (Sections 1.9 & 1.10) Please change MSWLF to CDLF throughout the sections.
11. (Section 1.10) Please address the following concerns:

***i. We added the text “(noted above)” to reference the contingency plans for accidental fires already described.***

- i. Please provide the mentioned contingency plans which were not provided in the permit application document.

***ii-iv. The following revisions are incorporated for items ii, iii, and iv.***

- ii. Regarding open burning requirements please add:
  - Notation of approval date and the name of the DWM personnel who approved the type of the open burning, and
  - The new requirement (in italic format) to the end of sentence in item (b) “*The Division of Air Quality and local fire department must approve the activity prior to burning.*”
- iii. Please describe what kinds of equipment, tools, and/or resources are available on site on a daily basis (such as piles of dirt adjacent to the working face, fire extinguishers, etc.)
- iv. Please describe the written notification for fire or explosion event [Rule .0542(i)(4)].

### **Attachment E – Closure and Post-closure Plan**

***Response 12. The gross capacity as quantified by CAD analysis between the base grade and final grade is 433,560 cubic yards, as reported in the revised Engineering Plan and original Closure Plan.***

12. (Section 1.2) The information on the landfill unit and gross capacity provided in the table of this section is inconsistent with those stated in the Facility and Engineering Plan. Please clarify.

### **Attachment G – Permit Amendment Drawings**

**Figure 3 is replaced by new Drawing S1-Facility Site Plan illustrating the Wilson County property and local area for pertinent site characterization. Drawing LFG1 for explosive gas monitoring is added to the set.**

***Response 13. Figure 4 – Westside CDLF Cross Sections has been revised to clarify surfaces in the sections and reference grading plans.***

13. The information of the Phase 1 fill grade provided on Figure 5 is inconsistent with that on Figure 4. Please clarify.

***Response 14. Figure 5 – Inert Debris Cross Sections has been revised to include a note for final cover and reference to Dwg C4 for Grading Plan (which also provides the grading plan for the Inert Debris Unit).***

14. Please define the “Proposed Final Cover” on Figure 5.

### **Attachment H – Monitoring Plan**

***Response 15. Attachment H has been revised to include Dwg LFG1, with proposed explosive gas monitoring locations inside the PNG gas line (along the northern property boundary). Three probes are located at least every 500 feet for explosive gas monitoring, conforming to equipment manufacturer’s and current SWS guidance, and permit conditions. Notation for explosive gas monitoring is included in drawing LFG1.***

15. A technical review letter dated April 12, 2010 was sent to the facility by the SWS hydrogeologist with comments on the original 2004 Water Quality Monitoring Plan. The letter requested a number

of additional items which were not provided in the revised Monitoring Plan dated June 2010. The April 12, 2010 letter requested the facility to develop and submit a landfill gas monitoring plan and a plan was not submitted, only a figure showing the location of one landfill gas probe. Please submit a detailed landfill gas monitoring plan in accordance with the SWS guidance on landfill gas monitoring plan which was provided to you in the April 12, 2010 technical review letter. The placement of the landfill gas monitoring points relative to the Piedmont Gas line north of the landfill is of particular importance as the pipeline can be considered a preferential pathway for the migration of gas. In the event that gas is detected in the vicinity of the pipeline, it would be necessary to determine whether gas was originating from the pipeline or from the landfill. Another important consideration for the development of an adequate landfill gas monitoring plan is the number and spacing of landfill gas monitoring points. Landfill gas monitoring points are to be located around the perimeter of the landfill with spacing between monitoring points of 500 feet or less. Another copy of the SWS Landfill Gas Monitoring guidance document is provided for your convenience.

***Response 16. Under direction from the SWS, the parameter list had been revised since the 2004 PTC. Section 1.4.6 has been revised for these new comments, including THF; subsequent pagination noted R1.***

16. The 2004 Water Quality Monitoring Plan included 16 inorganic constituents while the June 2010 Monitoring Plan included only 8 of those inorganic constituents. Please add the 8 inorganic constituents omitted in the June 2010 Monitoring Plan. Additionally, please add the constituent tetrahydrofuran (THF) to your parameter list. A memorandum was sent out on June 15, 2010 from the NC Solid Waste Section to every C&D landfill owner and operator in North Carolina requiring groundwater and surface water samples collected after January 1, 2011 to be analyzed for THF. A copy of the memorandum is attached.

***Response 17. No changes to existing documents necessary.***

17. After conducting a site visit to the facility on July 15, 2010, it is agreed that surface water monitoring is not feasible at this time.

**Attachment I – Solid Waste Management Facilities**

***Response 18. Section 2 has been added specifically for details on Used Tires.***

18. (Section 1.2) Please address the following concerns related to scrap/used tire collection area inside the Convenience Center.
- i. Please provide the site-specific detail for the used/scrap tire operation and management plan according to Rule .1107.
  - ii. The March 11, 2010 DWM Facility Compliance Audit Report stated that the used tires are currently stockpiled on the ground surface. To be in compliance, Wilson County proposed to store the collected tires in trailers prior to off-site transportation. If so, please describe how many trailers will be staged at the landfill facility at any given day and the contractor's contact info, such as company name, phone number, address, a the tire hauler or recycler registration number.

***Response 19. MSW (non-C&D) from the convenience center is hauled to Black Creek Road Transfer Facility, SW Permit #98-08T.***

19. (Section 1.2) Please provide the "permit facilities" information (MSWLF or MSW Transfer Facility Name, Permit Number) which will be receiving the household non-C&D wastes disposed at the Convenience Center by residents in Wilson County.

***Response 20. Section 1 has been revised to clarify the processing and recovery of wood wastes and yard trash in separate areas. Section 3 has been added for wood processing and composting operations, including general delineation of process areas. The maximum design operating capacity of all wood waste and yard trash is less than 6,000 raw cubic yards per quarter. Reference Attachment G, Dwg S1 for facility site plan features. Again, fire fighting contact information is provided in the Landfill Site Operations plan. Copies of the Erosion and Sedimentation Plans by Bartlett Engineering are included in Attachment G.***

20. (Section 1.3) Please address the following concerns of operation and management of Yard Waste Facility – Large Type 1 facility according to Rules 1400 et seq. At a minimum the following concerns must be properly addressed in Section 1.3:
- i. Describe the waste stream which can be accepted in this unit (such as yard trash as defined in NCGS 130A-290(a)(45), land-clearing debris as defined in NCGS 130A-290(a)(15), wooden pallet as defined in NCGS 130A-290(a)(44a), and clean unpainted and untreated wood etc.)
  - ii. What BMPs or physical structures will be established or constructed to divert surface water or

- runoff from the operational, compost curing, and storage areas [Rules .1404 (a)(9) & (c)(2)]?
- iii. What provisions are there to contain and treat leachate that generated from the composting processes [Rule .1406(4)]?
  - iv. What are the provisions to ensure the requirements stated in Rule .1404(10) can be satisfied? This unit is not covered by any established groundwater monitoring networks (C&DLF and MSWLF).
  - v. Please describe what kind of fire fighting equipment and resources [water and/or piles of dirt] are available on site [Rule .1406(7)]?
  - vi. Please describe the operating practice to prevent fire or facilitate fire fighting (such as the internal and external reporting and notification procedures if a fire occurs and maintaining a minimum distance of 25 feet between the wastes stockpiles and 25 feet distance between stockpile and any other physical structures and the maximum sizes – high and base of each waste stockpile) [Rules .1406(7) & .1404(a)(8)].
  - vii. Has the fire fighting arrangement between the landfill and local fire department been established? If so, please provide the point contact information (name and phone number) of the local fire department, sheriff department and any other parties/agencies needs to report in this Section. The point contact information must be posted on site.
  - viii. Will there be any treatment and process activities (such sorting, screening, grinding, etc.) conducted at this area? If so, please provide the equipment and machinery to be used for the tasks.

***Response 21. Section 1.6 has been revised to include these comments for the Inert Debris Area.***

21. (Section 1.5) Please address the following concerns of operation and management of the Inert Debris Area:
- i. Please provide the minimum thickness of the soil cover described in the item (4).
  - ii. The wastes may be ultimately disposed at the designated area according to item (4); therefore, the permanent marker shall be installed along the waste footprints. Please add this requirement to the Section 1.5.

BlackRock Response to Comments #98-09

December 14, 2010

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If you have any questions, or require further clarification, please contact me at your earliest convenience. We are available to meet with you to discuss the details of this application.

Sincerely,

**BlackRock Engineers, Inc.**

A handwritten signature in blue ink, appearing to read "Gary W. Ahlberg". The signature is fluid and cursive, with a large, stylized initial "G".

Gary W. Ahlberg, P.E.

cc: Andy Davis, Wilson County

Pieter Sheer, P.E.

w/ Attachments

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# PERMIT AMENDMENT APPLICATION

**Wilson County  
Westside C&D Landfill  
Wilson, North Carolina**

Prepared for:  
**Wilson County Solid Waste Management Department  
Wilson, North Carolina**

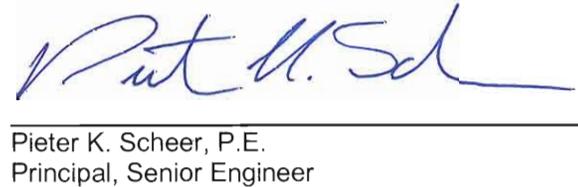
RSG Project No. WESTSIDE-08-1

Statement of Compliance with Engineering Plan Requirements:

The engineering elements of this Permit Application have been prepared by the undersigned Professional Engineer licensed to practice engineering in accordance with NCGS 89C and the Administrative Rules developed thereunder. It is my opinion that the design described in the application meets the intent of the 15A NCAC 13B.0531 et seq. of the Solid Waste Management Rules.

  
\_\_\_\_\_  
Gary W. Ahlberg, P.E.  
Consulting Engineer



  
\_\_\_\_\_  
Pieter K. Scheer, P.E.  
Principal, Senior Engineer



**January 2010**

  
**BlackRock Engineers, Inc.**  
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Wilmington, NC 28402  
NC LIC. NO. C-2919 (ENGINEERING)

  
**RICHARDSON SMITH GARDNER**  
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**WESTSIDE C&D LANDFILL  
PERMIT AMENDMENT  
EXECUTIVE SUMMARY**

**OVERVIEW**

The following is a Permit Amendment Application submitted on behalf of Wilson County for continued operations of the County's Westside construction and demolition debris (C&D) Landfill. This submittal follows the 2004 Construction Plan Application prepared by Gary W. Ahlberg, P.E.<sup>1</sup> and incorporates the Closure and Post Closure Plan from the July 2008 Continued Operations submittal. All pertinent siting and facility criteria are defined in the existing permit record for SW Permit 98-09 Westside C&D Landfill. No expansion to the constructed footprint is proposed in this Permit Amendment; Phase delineation is updated for the Permit to Operate.

The Westside C&D Landfill, which has 3 contiguous cells over approximately 10.5 acres, has already been built to its maximum extent laterally. At the projected gate rate of 20,000 tons/year, the landfill has approximately 7 years of remaining volume (from the April 2010 survey) to designed final contours. The Operation Plan for Phase 2, continues landfill disposal to an estimated peak elevation for 5-years of permitted capacity (100,000 tons). The estimated closure date for this unit is 2017.

Partial final cover is expected to be deployed over the perimeter slopes during Phase 2 Operations. As approved by the SWS (October 2009) the components of the final cover system will consist of the following components (top-down):

Regulatory Final Cover System (.0543 (c) (1)):

- an 18-inch thick vegetative soil layer; and
- an 18-inch thick soil liner with a permeability of no more than  $1 \times 10^{-5}$  cm/sec (“compacted soil barrier”).

An update to the Operation Plan for Phase 3 is planned prior to Closure. The permit plans will be updated for any applicable new requirements as specified in the Permit Conditions. If the permit requirements and site and operational conditions remain unchanged from this submittal, the approved plan documents incorporated herein shall be sufficient to continue operations to pre-final cover grades for Closure implementation. Future site and operational conditions include, but may not be limited to, the facility plan, the operations plan (acceptable waste streams and other solid waste activities in addition to C&DLF), and environmental media monitoring conditions (water quality monitoring and landfill gas monitoring).

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<sup>1</sup> Gary W. Ahlberg, P.E. (2004), “Construction Plan Application for Wilson County Westside C&D Landfill Facility, Wilson, North Carolina”, dated August 2004 (revised September 2004), approved by NC DWM in September 2004.

As requested by the SWS, other waste management activities at the Wilson County Landfill Site and associated with the Westside C&D Landfill are included in this submittal as components of the facility's approved plan. All the activities included in this submittal are existing services previously approved in permit decisions, and are updated for relocation and new regulatory requirements. Additionally, the Water Quality Monitoring Plan approved in the Permit to Construct is reproduced in a separate attachment.

## **REGULATORY REFERENCES**

This submittal has been prepared in accordance with the requirements of the North Carolina Solid Waste Management Rules (15A NCAC 13B 0.5000 et. seq.) and the North Carolina Sedimentation Control Rules (15A NCAC 4) which are enforced by the Division of Waste Management (DWM) and the Division of Land Quality, respectively, of the North Carolina Department of Environment and Natural Resources.

## **PERMIT DOCUMENTS**

The existing permit record documents are amended to include the following attachments, including any drawings and figures there in:

- Facility and Engineering Plan;
- Technical Specifications;
- Construction Quality Assurance (CQA) Manual;
- Operation Plan;
- Closure and Post-Closure Plan;
- Erosion and Sedimentation Control Plan\*;
- Permit Amendment Drawings;
- Water Quality Monitoring Plan; and
- Solid Waste Management Facilities.

*\* No changes are proposed for these documents from the approved 2004 submittal.*

**Attachment A  
Facility and Engineering Plan**

**Wilson County Westside C&D Landfill  
Wilson County, North Carolina**

Prepared for:  
**Wilson County Solid Waste Management Dept.**  
Wilson, North Carolina

**June 2010  
Revised Dec 2010**



**BlackRock Engineers, Inc.**  
PO Box 58  
Wilmington, NC 28402



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**WILSON COUNTY WESTSIDE C&D LANDFILL**

**FACILITY AND ENGINEERING PLAN**

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# WILSON COUNTY WESTSIDE C&D LANDFILL

## FACILITY AND ENGINEERING PLAN

### 1.0 OVERVIEW

Wilson County, North Carolina currently owns and operates a solid waste management facility located between US Highway 264 and NC Highway 42 near Wilson. The facility can be accessed both from the south (off of Landfill Road) and from the north (NC Highway 42). The main access to the facility is from NC Highway 42, where the County recently constructed a new scale house and convenience center. As a component of the Wilson County facility, the active Westside landfill site is permitted under NC Permit 98-09 for the disposal of construction and demolition debris (C&D) waste. The County also conducts several other solid waste management activities at the facility. Refer to **Section 2.1 and Attachment I**, which describes facility services.

The County has operated the Westside C&D Landfill under the current permit since October 4, 2004. This plan presents information describing the continued operations of the Westside C&D Landfill.

### 2.0 FACILITY SERVICES AND WASTE STREAM

#### 2.1 Facility Services

Currently, the following activities or services are provided at the Wilson County Landfill facility, as delineated in the **S1 Facility Site Plan** drawing in **Attachment G** and described in **Attachment I**:

- Scales and office/scale house building
- Convenience Center
- Maintenance Building
- C&D landfill and Inert Debris Area
- White goods and scrap metal storage Area
- Wood waste processing Area.
- Compost Area

#### 2.2 Types of Waste

C&D waste and inert debris are accepted at the Wilson County Westside Landfill facility. Wastes are routed to the landfill or other areas as appropriate.

#### 2.3 Disposal Rate and Anticipated Variances

Based on actual waste disposed from the start of operations (10/4/2004) through the most recent survey (April 2010), the total capacity utilized is 187,000 cubic yards containing approximately 136,000 tons. The Westside landfill unit is

permitted to receive an average of approximately 20,000 tons per year of C&D waste from Wilson County over its active life. Actual annual and daily amounts of C&D waste are expected to vary.

## **2.4 Service Area**

The landfill facility currently serves the population of Wilson County.

## **2.5 Procedures for Waste Segregation**

The scalehouse weighmaster directs acceptable solid wastes to the designated facilities at the Wilson County Landfill. Waste screening is fully defined in **Attachment D- Operations Plan**. A brief description of procedures for waste segregation is as follows.

Wastes are primarily segregated at the scale. The weighmaster is trained and supervised by the Operator to classify and segregate the waste stream to specific facilities. C&D waste and oversized land clearing stumps and logs (too large for grinding) are directed to the landfill. Asbestos waste is managed at the designated area within the C&D landfill unit. Inert debris is segregated in a stockpile for storage and reclamation. . Wood wastes and yard wastes are directed toward the wood waste storage and processing area. Yard trash is directed to the composting area. White Goods are directed to the storage area for recycling. All other solid wastes not permitted at the facility are rejected and directed to the convenience center (residential MSW, tires, recycling) or the MSW transfer facility, SW Permit 98-09 Black Creek Road Transfer Facility.

## **2.6 Equipment Requirements**

The County will maintain on-site equipment required to perform the necessary landfill activities. The County currently uses a Terex 375E compactor, Komatsu D39 bulldozer, Komatsu WA200-5 loader, and Bobcat T-300 in their day to day operation of the C&D landfill unit. Periodic maintenance of all landfilling equipment, and minor and major repair work will be performed in the landfill's maintenance building.

## **3.0 LANDFILL CAPACITY**

### **3.1 Total Operating Capacity and Life Expectancy**

**Drawing C3 (Attachment G)**, identifies the final configurations for the C&D landfill. The exterior side slopes will be at a 4H to 1V slope and the top elevation will be at approximately 150 feet. **Drawing C4** provides final grades for Phase 2 of landfill operations, based on the April 2010 topography, 100,000 tons and maintained AUF = 0.725.

The estimated total gross operating capacity, net capacity (accounts for periodic and final cover), disposal area, and life expectancy for the landfill are shown in **Table 1** and the attached **Capacity and Service Life calculation**. Total site capacity from CAD volumetric analysis is 433,560 cubic yards.

Based on the April 2010 survey, the Phase 2 grading plan provides approximately five (5) years of operating capacity. An additional two (2) years of capacity remains for Phase 3 to reach final grades for closure.

### **3.2 Airspace Utilization Factor**

The capacities obtained above were based on site conditions surveyed on August 26, 2008 and tonnage reports for the operating period. The airspace utilization factor includes waste and cover soils placed in a surveyed volume. The AUF for the Westside site is currently 0.725 tons/cy; an estimated waste density of 1,631 pounds per cubic yard (0.82 tons/cy) is based on an assumed 8:1 soil volume. These values were based on an evaluation of a survey of the landfill performed on August 26, 2008. More recent survey analysis (April 2010) indicates that the 0.725 AUF is accurate for remaining capacity planning calculations.

## **4.0 AVAILABLE SOIL RESOURCES AND REQUIRED SOIL QUANTITIES**

The soils required to construct the proposed landfill will be removed from on-site borrow sources identified in the Site Plan and containing in excess of 200,000 cubic yards.

### **4.1 Periodic Cover**

Assuming the previously mentioned waste to cover soil ratio of 8:1, the estimated quantity of soil that will be required for use as periodic cover during C&D landfill operations is shown in **Table 2**.

### **4.2 Final Cover Soil**

On the basis of an average 3 foot thickness, the estimated in-place volumes of the compacted soil barrier (18-inch minimum thickness) and vegetative soil layer (18-inch minimum thickness) components of the final cover system are shown in **Table 2**.

### **4.3 Soil Summary**

The above soil quantities are summarized in **Table 2**. Available on-site borrow

sources are anticipated to have an adequate supply of soil to meet the expected needs. See Operations Plan for soil resources available.

## **5.0 FACILITY DESIGN CRITERIA**

The Wilson County C&D landfill is designed and operates in accordance with Section .0542 of the North Carolina Administrative Code, Title 15A, Chapter 13, Subchapter 13B including the following requirements.

### **5.1 Horizontal Separation Requirements**

The horizontal separation requirement between the disposal boundary (edge of waste) and the property lines is a more than 50 feet (as required for existing facilities) (for this site, the minimum buffer exceeds 200 feet), the minimum buffer between private residences and wells and the disposal boundary is 500 feet, and the minimum buffer between any surface water (stream, river, creek) and the disposal boundary is 50 feet.

### **5.2 Vertical Separation Requirements**

The landfill subgrade elevations have been designed (and constructed) to meet the minimum requirement of four feet (post-settlement) above the seasonal high groundwater table and bedrock.

## **6.0 CONTAINMENT AND ENVIRONMENTAL CONTROL SYSTEMS**

Technical specifications and a project construction quality assurance (CQA) manual for the following materials can be found in **Attachments B and C**, respectively.

### **6.1 Landfill Subgrade**

The subgrade for the landfill has previously been completed.

### **6.2 Final Cover System**

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

#### Regulatory Final Cover System (.0543 (c) (1)):

- An 18-inch thick vegetative soil layer; and
- an 18-inch thick soil liner with a permeability of no more than  $1 \times 10^{-5}$  cm/sec (compacted soil barrier).

The final cover system will be placed on prepared intermediate cover at a maximum slope of 4H:1V. Top slopes will be approximately 12.5%. A landfill gas (LFG) control system 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.

### **6.3 Erosion and Sedimentation Control**

The Erosion and Sedimentation Control measures have been designed and maintained to manage the run-off generated by the 24-hour, 25-year storm event, and conform to the requirements of the Sedimentation Pollution Control Law (15A, NCAC, 4) (see **Attachment F**).

### **6.4 Landfill Gas Control**

Landfill gas control will consist of 10 passive wells/vents as shown on **Figure 1 (Attachment G)**. Due to a number of factors (the limited depth to groundwater, the distance to site structures, and the existence of wetlands around much of the property), perimeter monitoring of gas from the C&D landfill is limited to the northern site boundary. See LFG 1 for proposed monitoring location.

### **6.5 Access and Roadways**

The new scalehouse and site entrance on NC 42 will be used as the primary access to the Westside unit. The site roads will provide for all-weather access to the Westside unit, and other waste management facilities. Access roads will be maintained to site monitoring locations.

## **7.0 SLOPE STABILITY AND SETTLEMENT**

Both the slope stability of the waste mass and settlement of the landfill subgrade were previously addressed in the 2004 Construction Plan Application. The results of these analyses indicate that the final C&D landfill configuration is stable and that the required vertical separation beneath the landfill will be maintained after settlement.

**TABLE 1  
SUMMARY OF LANDFILL CAPACITY AND LIFE EXPECTANCY**

<b>Unit</b>	<b>Area (Ac.)</b>	<b>Capacity (CY)</b>	<b>Life Expectancy</b>
Phase 1	10.5	187,000	----
Phase 2	-----	134,600	5 years
Phase 3	-----	61,160	2.1 years
Final Cover	-----	50,800	----
<b>Total Gross</b>	-----	<b>433,560</b>	<b>7.1 years</b>

Notes:

1. The capacity is based on an AUF = 0.725 Tons/CY, including cover soil.
2. Life expectancy is based on an assumed average disposal rate of 20,000 tons/year and is projected from April 15, 2010 (date of most recent survey). See attached Service Life calculation.

**TABLE 2  
SOIL SUMMARY**

<b>Material</b>	<b>Quantity (CY)</b>
Periodic Cover	(25,257)
Final Cover Soil	
Compacted Soil Barrier	(25,410)
Vegetative Soil Layer	(25,410)
<b>Total:</b>	<b>(76,077)</b>

Notes:

1. Volumes estimated from August 26, 2008.
2. Available on-site soil resources exceed 200,000 CY.



## **Technical Specifications**

**Wilson County Westside C&D Landfill  
Wilson County, North Carolina**

Prepared for:

**Wilson County Solid Waste Management Dept.**  
Wilson, North Carolina

**January 2010**



14 N. BOYLAN AVENUE  
RALEIGH, NORTH CAROLINA 27603  
NC LIC. NO. C-0828 (ENGINEERING)

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**WILSON COUNTY WESTSIDE C&D LANDFILL**

**TECHNICAL SPECIFICATIONS**

**TABLE OF CONTENTS**

<u>Section No.</u>	<u>Specification</u>
02222	Excavation
02223	Embankment
02250	Soil Liner
02258	Vegetative Soil Layer
02930	Revegetation

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**SECTION 02222**

**EXCAVATION**

Excavation: Excavation includes excavating, sealing, hauling, scraping, undercutting, removal of accumulated surface water or ground water, stockpiling, and all necessary and incidental items as required for bringing the landfill and related structures to the specified lines and grades.

A. DESCRIPTION

1. General:

The Contractor shall furnish all labor, material, and equipment required to complete Excavation of the project area 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>
Embankment CQA Manual	02223 Attached

3. Quality Assurance:

Quality Assurance during Excavation will be provided by the Owner as described in the accompanying Project CQA Manual.

4. Definitions:

a. Excavation: shall consist of the removal and satisfactory disposal and/or stockpiling of materials located within the limits of construction including widening cuts and shaping of slopes necessary for the preparation of roadbeds, landfill slope areas, cutting of any ditches, channels, waterways, entrances, and other work incidental thereto.

b. Borrow: shall consist of approved on-site material required for the construction of embankments/fills or for other portions of the work.

- c. Select Borrow: shall consist of approved off-site material required for the construction of embankments/fills, roadway subgrade, backfilling, or for other portions of the work as shown on Contract Drawings or in these Specifications. The Contractor shall make his own arrangements for obtaining select borrow and pay all costs involved.
- d. Unsuitable Material: is any in-place or excavated material which contains undesirable materials, or is in a state which is not appropriate; in the opinion of the CQA Engineer, for the intended use or support of planned structures, embankment, or excavation. This may include but not be limited to organic material, waste/refuse, soft, or wet material not meeting required specifications, etc.
- e. Unsuitable Materials Excavation (Overexcavation): shall consist of the removal and satisfactory disposal of all unsuitable material located within the limits of construction. Where excavation to the finished grade section shown results in a subgrade or slopes of unsuitable material, the Contractor shall overexcavate such material to below the grade shown on the Contract Drawings or as directed by the Engineer and CQA Engineer.

B. MATERIALS

Excavation shall include the removal of all soil, weathered rock, boulders, conduits, pipe, and all other obstacles encountered and shown on the Contract Drawings or specified herein.

C. SUBMITTALS

The Contractor shall submit the following to the CQA Engineer before approval is given to proceed:

- 1. Descriptive information on Excavation equipment to be used.

D. CONSTRUCTION

- 1. The Contractor shall conduct Excavation activities in such a manner that erosion of disturbed areas and off site sedimentation is absolutely minimized.
- 2. The Contractor shall excavate to the lines and grades shown on the Contract Drawings and stockpile all suitable excavated materials. As the excavation is made, the materials will be examined and identified to the CQA Engineer.

The Contractor will perform all surveys necessary to establish and verify lines and grades for all Excavation, including pipe excavations, soil overexcavation, and anchor trenches.

3. Stockpiling:

The Contractor shall stockpile the materials in appropriate stockpiles as approved by the CQA Engineer.

Stockpiles shall be properly sloped and the surfaces sealed by the Contractor at the end of each working day, or during the day in the event of heavy rain, to the satisfaction of the Engineer.

4. The Contractor shall protect all existing facilities and structures including, but not limited to, existing utilities, monitoring wells, signs, grade stakes, etc. during the grading and stockpiling operations.
5. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such sheeting, timbering, pumping, and drainage as may be required.
6. The Contractor shall be responsible for the control of surface and subsurface water when necessary.
7. Excavation slopes shall be flat enough to avoid sloughs and slides that will cause disturbance of the subgrade or damage of adjacent areas. Slides and overbreaks which occur due to negligence, carelessness, or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as directed by the Engineer at no additional cost to the Owner.
8. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded. All protruding roots and other vegetation shall be removed from slopes.
9. The bottom of all excavations for structures and pipes shall be examined by the CQA Engineer for bearing value and the presence of unsuitable material. If, in the opinion of the CQA Engineer, additional Excavation is required due to the low bearing value of the subgrade material, or if the in-place materials are soft, yielding, pumping and wet, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted structural fill, or material directed by the CQA Engineer. No payment will be made for subgrade disturbance caused by inadequate Dewatering or improper construction methods.
10. Any areas excavated below design subgrade elevations by the Contractor, unless directed by the CQA Engineer, shall be brought back to design elevations at no cost to the Owner. The Contractor shall place and compact such material in accordance with Section 02223, Embankment, of these Specifications.

11. The Contractor shall dispose of excess or unsuitable excavation materials on-site at location(s) approved by the Owner.
12. The Contractor shall properly level-off bottoms of all excavations. Proof-rolling shall be conducted with appropriate equipment.
13. Upon reaching subgrade elevations shown in excavation areas, the Contractor shall scarify subgrade soils to a minimum depth of 6" and obtain the CQA Engineer's approval of quality. If unsuitable materials are encountered at the subgrade elevation, perform additional excavations as approved by the CQA Engineer to remove unsuitable materials.

14. Overexcavation and Backfill:

Where subgrade materials are determined to be unsuitable, such materials shall be removed by the Contractor to the lengths, widths and depths approved by the CQA Engineer and backfilled with suitable material in accordance with Section 02223, Embankment, of these Specifications unless further excavation or earthwork is required. No additional payment will be made for such excavation and backfill 1 foot or less than the finished subgrade. Unsuitable material excavation greater than 1 foot beneath the finished subgrade shall be made on a unit price basis for excavation and backfill, only as approved by the Engineer and CQA Engineer prior to the work. Unit price for overexcavation and backfill greater than 1 foot in depth shall include disposal of unsuitable materials.

15. All cuts shall be brought to the grade and cross section shown on the Contract Drawings, or established by the Engineer, prior to final inspection.

16. The Contractor shall protect finished lines and grades of completed excavation against excessive erosion, damage from trafficking, or other causes and shall repair any damage at no additional cost to the Owner.

17. Trench Excavation:

- a. All pipe Excavation and trenching shall be done in strict accordance with these Specifications, all applicable parts of the OSHA Regulations, 29 CFR 1926, Subpart P, and other applicable regulations. In the event of any conflicts in this information, safe working conditions as established by the appropriate OSHA guidelines shall govern.
- b. The minimum trench widths shall be as indicated on the Contract Drawings. Enlargements of the trench shall be made as needed to give ample space for operations at pipe joints. The width of the trench shall be limited to the maximum dimensions shown on the Contract Drawings,

except where a wider trench is needed for the installation of and work within sheeting and bracing.

- c. Except where otherwise specified, excavation slopes shall be flat enough to avoid slides which will cause disturbance of the subgrade, damage to adjacent areas, or endanger the lives or safety of persons in the vicinity.
- d. Hand excavation shall be employed wherever, in the opinion of the Engineer, it is necessary for the protection of existing utilities, poles, trees, pavements, obstructions, or structures.
- e. No greater length of trench in any location shall be left open, in advance of pipe laying, than shall be authorized or directed by the Engineer and, in general, such length shall be limited to approximately one hundred (100) feet.
- f. Pipe Bedding: All pipe bedding shall be as shown on the Contract Drawings, unless otherwise specified herein.

18. Sheeting and Bracing:

- a. The Contractor shall furnish, place, and maintain such sheeting and bracing which may be required to support sides of Excavation or to protect pipes and structures from possible damage and to provide safe working conditions in accordance with current OSHA requirements. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports put in at the sole expense of the Contractor. The Contractor shall be responsible for the adequacy of all sheeting and bracing used and for all damage resulting from sheeting and bracing failure or from placing, maintaining, and removing it.
- b. The Contractor shall exercise caution in the installation and removal of sheeting to insure that excessive or unusual loadings are not transmitted to any new or existing structure. The Contractor shall promptly repair at his expense any and all damage that can be reasonably attributed to sheeting installation or removal.
- c. All sheeting and bracing shall be removed upon completion of the work.

19. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed at the Contractor's sole expense.

END OF SECTION

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## SECTION 02223

### EMBANKMENT

Embankment: Embankment is the on-site compacted fill that provides the foundation and the berms for the containment area, the subgrade for some access roadways and structures, and backfill around structures and piping.

#### A. DESCRIPTION

##### 1. General:

The Contractor shall furnish all labor, material, and equipment to complete Embankment including borrowing, hauling, screening, discing, drying, compaction, control of surface and subsurface water, final grading, sealing, and all necessary and incidental items as detailed or required to complete the Embankment, 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>
Excavation	02222
CQA Manual	Attached

##### 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 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> ).
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 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 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 Embankment will be provided by the Owner as described in the accompanying Project CQA Manual.

5. Definitions:

- a. Embankment: Shall include construction of all site earthwork including roadways, subgrade, perimeter berm embankments, including preparation of the areas upon which materials are to be placed. Embankment may also be referred to as structural and/or controlled fill. All Embankment materials may be either (off-site) Select Borrow or (on-site) Borrow unless otherwise noted on Contract Drawings or specified by the Engineer.
- b. Prepared Subgrade: The ground surface after clearing, grubbing, stripping, excavation, scarification, and/or compaction, and/or proof rolling to the satisfaction of the CQA Engineer.
- c. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes. Well-graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters. Well-graded is used to define a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

- d. Unclassified Fill: The nature of materials to be used is not identified or described herein but must be approved by the Engineer prior to use.

B. MATERIALS

1. Embankment materials shall consist of clean well-graded natural soil classified as SW, SM, SM-SC, SC, ML, CL-ML, or CL (ASTM D 2488) containing no topsoil or other deleterious material. Other material classifications may be approved by the Engineer.
2. Stones or rock fragments shall not exceed one half the maximum lift thickness as compacted in any dimension. Isolated rocks shall be a maximum of 24-inches in any dimension.

C. SUBMITTALS

The Contractor shall submit the following to the CQA Engineer before approval is given to proceed:

1. Descriptive information on compaction equipment to be used for construction of Embankment.
2. Descriptive information on the location and source of any off-site borrow material to be used for Embankment, where applicable. Information shall include Standard Proctor curves (ASTM D698) for each borrow material.

D. CONSTRUCTION

1. The Contractor shall conduct Embankment activities in such a manner that erosion of disturbed areas and off-site sedimentation is absolutely minimized.
2. All placement and compaction of Embankment shall be performed only when the CQA Engineer is informed by the Contractor of intent to perform such work.
3. Embankment shall be placed and compacted to the lines and grades shown on the Contract Drawings. Placement of Embankment outside the construction limits shall occur only as directed and approved by the Engineer.

The Contractor will perform all surveys necessary to establish and verify lines and grades for all Embankment.

4. The Contractor shall protect all existing facilities including, but not limited to, utilities and monitoring wells.

5. Subgrade Preparation:

- a. The CQA Engineer shall inspect the exposed subgrade prior to placement of Embankment to assure that all rocks, topsoil, vegetation, roots, debris, or other deleterious materials have been removed.
- b. Prior to placement of Embankment, 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 materials revealed before or during the in-place compaction shall be removed as directed by the CQA Engineer and replaced with suitable Embankment.

6. Surfaces on which Embankment is to be placed, shall be scarified or stepped in a manner which will permit bonding of the Embankment with the existing surface.

7. The Contractor shall be responsible for preparing the materials for the Embankment, including but not limited to, in-place drying or wetting of the soil necessary to achieve the compaction criteria of these Specifications.

8. The Contractor shall be responsible for the control of surface and subsurface water, when necessary.

9. Embankment materials shall be placed in a manner permitting drainage and in continuous, approximately horizontal layers.

10. Compaction Requirements:

- a. The Contractor shall compact Embankment in accordance with the requirements shown in Table 1 of this section. If Embankment 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.
- b. Each lift shall be compacted prior to placement of succeeding lifts. In confined areas, mechanical equipment, suitable for small areas and capable of achieving the density requirements, shall be required.
- c. Lift compaction shall be performed with an appropriately heavy, properly ballasted, penetrating-foot or smooth-drum vibratory compactor depending on soil type. Compaction equipment shall be subject to approval by the CQA Engineer.

11. Embankment that becomes excessively eroded, soft, or otherwise unsuitable shall be removed or repaired by the Contractor as directed by the CQA Engineer, at no cost to the Owner.
12. The exposed surface of Embankment shall be rolled with a smooth-drum roller at the end of each work day to protect from adverse weather conditions.
13. Where Embankment is to be placed and compacted on slopes that are steeper than 3:1, the subgrade shall be benched to a minimum depth of 6 inches and the Embankment shall be placed in horizontal lifts.
14. Backfilling for Structures and Piping:
  - a. All structures, including manholes and pipes shall be backfilled with Embankment as shown in the Contract Drawings and as described in these Specifications.
  - b. Where sheeting is used, the Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when sheeting is removed. If significant volumes of soil cannot be prevented from clinging to the extracted sheets, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth below subgrade that sheeting will be driven in similar soil conditions or employ other appropriate means to prevent loss of support.
  - c. When backfilling around structures, do not backfill until concrete has sufficiently cured (as determined by the CQA Engineer) and is properly supported. Place backfill in a manner to avoid displacement or damage of structures.

**TABLE 1: REQUIRED EMBANKMENT PROPERTIES**

ITEM	Required % Standard Proctor (ASTM D698) <sup>2</sup>	Required Moisture Content <sup>3</sup>	Maximum Lift Thickness (Compacted) (inches)
Embankment	95	As Required for Compaction	8
Embankment Beneath Structures and Roads <sup>1</sup>	98		8
Backfill Around Structures	95		8
Backfill in Pipe Trenches	95		6
Unclassified Fill	N/A	N/A	N/A

Notes:

1. Embankment beneath structures shall be considered to include a zone 10 feet out from the foundation of the structure extending down to the natural ground on a 45° slope. Embankment beneath roads shall be considered to include all embankment placed within 2 vertical feet of the final wearing surface and shall also include shoulders.
2. Determine field density using ASTM D 6938, ASTM D 1556, ASTM D 2167, or ASTM D 2937.
3. Determine field moisture content using ASTM D 6938, ASTM D 2216, ASTM D 4643, or ASTM D 4959.
4. The Engineer may allow exceptions to the above criteria for areas outside of the containment area which are not subject to significant long-term loads.

END OF SECTION

## SECTION 02250

### SOIL LINER

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 <sup>3</sup> ).
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**

<b>PROPERTY</b>	<b>TEST METHOD</b>	<b>VALUE</b>
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 <sup>3</sup>	$\leq 1 \times 10^{-5}$ cm/s at a density of $\geq 95\%$ maximum standard dry density and a moisture content $\geq$ optimum moisture content <sup>4</sup>

**TABLE 2: IN-PLACE SOIL LINER REQUIREMENTS**

<b>PROPERTY</b>	<b>TEST METHOD</b>	<b>VALUE</b>
Density	ASTM D 6938 <sup>1</sup>	≥ 95% maximum standard dry density <sup>4</sup>
Moisture Content	ASTM D 6938 <sup>2</sup>	≥ optimum moisture content <sup>4</sup>
Maximum Lift Thickness (Compacted):  (Compacted Soil Barrier)	-----	9 inches
Hydraulic Conductivity (Shelby Tube):  (Compacted Soil Barrier)	ASTM D 5084 <sup>3</sup>	≤ 1 x 10 <sup>-5</sup> 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.

<b>Material</b>	<b>Maximum Effective Confining Pressure (psi)</b>	<b>Maximum Hydraulic Gradient</b>
Compacted Soil Barrier ( $k \leq 1 \times 10^{-5}$ 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

##### 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

SECTION 02930

REVEGETATION

Revegetation: Revegetation includes permanent Revegetation of all site areas disturbed by the Contractor whether inside the Contract Limits or not.

A. DESCRIPTION

1. General:

The Contractor shall furnish all labor, material, and equipment to complete Revegetation 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>
Vegetative Soil Layer	02258

3. Warranty:

The Contractor shall be responsible for the satisfactory establishment and growth of a permanent stand of vegetation for a period of one year following the final seeding as judged by the Engineer. During this period, the Contractor shall be responsible for the maintenance items described in Paragraph D.4 (Maintenance) of this Specification.

B. MATERIALS

1. Limestone: Unless otherwise defined by specific soil tests, supply agricultural grade ground limestone conforming to the current "Rules, Regulations, and Standards of the Fertilizer Board of Control."

2. Fertilizer: Unless otherwise defined by specific soil tests, supply commercial fertilizer of 10-10-10 analysis, meeting applicable requirements of State and Federal law. Do not use cyanamic compounds of hydrated lime. Deliver fertilizer in original containers labeled with content analysis.

3. Grass Seed: Supply fresh, clean, new-crop seed as specified in Table 1 of this section. Do not use seed which is wet, moldy, or otherwise damaged. Deliver

seed in standard sealed containers labeled with producer's name and seed analysis, and in accord with US Department of Agriculture Rules and Regulations under Federal Seed Act.

4. Mulch: Supply clean, seed-free, threshed straw of oats, wheat, barley, rye, beans, or other locally available mulch material.
  - a. Do not use mulch containing a quantity of matured, noxious weed seeds or other species that will be detrimental to seeding, or provide a menace to surrounding land.
  - b. Do not use mulch material which is fresh or excessively brittle, or which is decomposed and will smother or retard growth of grass.
5. Binder: Supply emulsified asphalt or synthetic binder.
6. Water: Supply potable, free of substances harmful to growth.

C. SUBMITTALS

The Contractor shall submit the following to the Engineer:

1. Results of soil tests performed and proposed modifications, if any, to the specified requirements.
2. Certificates for each grass seed mixture, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed. Certify that each container of seed delivered is fully labeled in accordance with Federal Seed Act and equals or exceeds specification requirements.
3. Copies of invoices for fertilizer, showing grade furnished and total quantity applied.

D. CONSTRUCTION

1. The Contractor shall establish a smooth, healthy, uniform, close stand of grass from the specified seed. Prior to Revegetation, the Contractor shall adequately test the soils to be revegetated to ensure the adequacy of the specified requirements. Any modifications to these requirements deemed necessary after the review of soil test results, shall be at the Contractor's sole expense. The Engineer will perform the observations to determine when successful Revegetation is achieved.

2. Soil Preparation:

- a. Limit preparation to areas which will be planted soon after preparation.
- b. Loosen surface to minimum depth of four (4) inches.
- c. Remove stones, sticks, roots, rubbish and other extraneous matter over three (3) inches in any dimension.
- d. Spread lime uniformly over designated areas at the rate specified in Table 1 of this section.
- e. After application of lime, prior to applying fertilizer, loosen areas to be seeded with double disc or other suitable device if soil has become hard or compacted. Correct any surface irregularities in order to prevent pocket or low areas which will allow water to stand.
- f. Distribute fertilizer uniformly over areas to be seeded at the rate specified in Table 1 of this section.
  - (1) Use suitable distributor.
  - (2) Incorporate fertilizer into soil to depth of a least two (2) inches.
  - (3) Remove stones or other substances which will interfere with turf development or subsequent mowing.
- g. Grade seeded areas to smooth, even surface with loose, uniformly fine texture.
  - (1) Roll and rake, remove ridges and fill depressions, as required to meet finish grades.
  - (2) Fine grade just prior to planting.

3. Seeding:

- a. Use approved mechanical power driven drills or seeders, mechanical hand seeders, or other approved equipment.
- b. Distribute seed evenly over entire area at the rate specified in Table 1 of this section.

- c. Stop work when work extends beyond most favorable planting season for species designated, or when satisfactory results cannot be obtained because of drought, high winds, excessive moisture, or other factors.
- d. Resume work only when favorable condition develops, or as directed by the Engineer.
- e. Lightly rake seed into soil followed by light rolling or cultipacking.
- f. Immediately protect seeded areas against erosion by mulching or placing rolled erosion control products, where applicable.
  - (1) Spread mulch in a continuous blanket at the rate specified in Table 1 of this section.
  - (2) Immediately following spreading mulch, secure with evenly distributed binder at the rate specified in Table 1 of this section.

4. Maintenance:

The Contractor shall be responsible for maintaining all seeded areas through the end of his warranty period. The Contractor shall provide, at his expense, protection of all seeded areas against damage at all times until acceptance of the work. Maintenance shall include, but not be limited to, the following items:

- a. Regrade and revegetate all eroded areas until adequately stabilized by grass.
- b. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.
- c. Replant bare areas using same materials specified.

**TABLE 1: SEEDING SCHEDULE**

MATERIAL	SEED TYPE	APPLICATION RATE <sup>1</sup>
Lime	----	4,000 lbs/acre
Fertilizer	----	1,000 lbs/acre
Seed		
Permanent:	Tall Fescue	80 lbs/acre
	Pensacola Bahiagrass	50 lbs/acre
	Sericea Lespedeza <sup>2</sup>	30 lbs/acre
	Kobe Lespedeza	10 lbs/acre
	Seasonal Nurse Crop	See Note 3
Temporary:	See Note 4	See Note 4
Mulch	----	4,000 - 5,000 lbs/acre
Binder	----	150 gallons/acre

Notes:

1. Application rates and/or chemical analysis shall be confirmed or established by a soil test(s).
2. From Sept. 1 - March 1, use unscarified Sericea seed.
3. Use seasonal nurse crop in accordance with seeding dates as stated below:

April 15 - August 15	10 lbs/acre German Millet or 15 lbs/acre Sudangrass
August 16 - April 14	25 lbs/acre Rye (grain).
4. For temporary seeding, follow the guidelines of the NC Erosion and Sediment Control Planning and Design Manual.

END OF SECTION

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# **Construction Quality Assurance Manual**

**Wilson County Westside C&D Landfill  
Wilson County, North Carolina**

Prepared for:

**Wilson County Solid Waste Management Dept.  
Wilson, North Carolina**

**January 2010**



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RALEIGH, NORTH CAROLINA 27603  
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**WILSON COUNTY WESTSIDE C&D LANDFILL**  
**CONSTRUCTION QUALITY ASSURANCE MANUAL**

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## **SECTION 1.0 GENERAL**

### **1.1 INTRODUCTION**

This Construction Quality Assurance (CQA) Manual has been prepared to provide the Owner, (Design) Engineer, and CQA Engineer the means to govern the construction quality and to satisfy landfill certification requirements under current solid waste management regulations.

More specifically, this CQA Manual addresses the soils components of the final cover system. The final cover system consists of a landfill gas (LFG) system, compacted soil barrier, and overlying vegetative soil layer.

The CQA Manual is divided into the following sections:

- Section 1.0      General
- Section 2.0      CQA Documentation
- Section 3.0      Earthwork CQA
- Section 4.0      Soil Liner CQA
- Section 5.0      Final Cover System CQA

### **1.2 DEFINITIONS RELATING TO CONSTRUCTION QUALITY**

#### **1.2.1 Construction Quality Assurance (CQA)**

In the context of this Manual, Construction Quality Assurance is defined as a planned and systematic program employed by the Owner to assure conformity of the final cover system installation with the project drawings and the project specifications. CQA is provided by the CQA Engineer as a representative of the Owner and is independent from the Contractor and all manufacturers. The CQA program is designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service.

#### **1.2.2 Construction Quality Control (CQC)**

Construction Quality Control refers to actions taken by manufacturers, fabricators, installers, and/or the Contractor to ensure that the materials and the workmanship meet the requirements of the project drawings and the project specifications.

#### **1.2.3 CQA Certification Document**

At the completion of construction, a certification document will be prepared by the CQA Engineer and submitted to State Solid Waste Regulators. The certification report will include all CQA testing performed by the CQA Engineer.

#### **1.2.4 Discrepancies Between Documents**

The Contractor is instructed to bring discrepancies to the attention of the CQA Engineer who shall then notify the Engineer for resolution. The Engineer has the sole authority to determine resolution of discrepancies existing within the Contract Documents (this may also require the approval of State Solid Waste Regulators). Unless otherwise determined by the Engineer, the more stringent requirement shall be the controlling resolution.

### **1.3 PARTIES TO CONSTRUCTION QUALITY ASSURANCE**

#### **1.3.1 Description of the Parties**

The parties to Construction Quality Assurance and Quality Control include the Owner, Engineer, Contractor, CQA Engineer, and Soils CQA Laboratory.

##### **1.3.1.1 Owner**

The Owner is Wilson County, who owns and/or is responsible for the facility.

##### **1.3.1.2 Engineer**

The Engineer is responsible for the engineering design, drawings, and project specifications for the final cover system. The Engineer is an official representative of the Owner. The Engineer serves as communications coordinator for the project, initiating the meetings outlined in **Section 1.7**. The Engineer will also be responsible for proper resolution of all quality issues that arise during construction. The Engineers are BlackRock Engineers and Richardson Smith Gardner & Associates, Inc.

##### **1.3.1.3 Contractor**

The Contractor is responsible for the construction of the final cover system. The Contractor is responsible for the overall CQC on the project and coordination of submittals to the CQA Engineer. Additional responsibilities of the Contractor are defined by the project specifications.

##### **1.3.1.4 CQA Engineer**

The CQA Engineer is a representative of the Owner, is independent from the Contractor, and is responsible for observing, testing, and documenting activities related to the CQA of the earthworks at the site and the installation of the soil component of the final cover system. The CQA Engineer may make field observations and review submittals for the Engineer and is responsible for notifying the Owner and Engineer of all quality issues that arise during construction. The

CQA Engineer is also responsible for issuing a facility certification report, sealed by a Professional Engineer registered in The State of North Carolina.

#### 1.3.1.5 Soils CQA Laboratory

The Soils CQA Laboratory is a party, independent from the Owner, that is responsible for conducting geotechnical tests on conformance samples of soils and aggregates used in structural fills and the final cover system. The services of the Soils CQA Laboratory are coordinated by the CQA Engineer and are paid for by the Owner.

### 1.3.2 **Qualifications of the Parties**

The following qualifications are required of all parties involved with the installation and CQA of all materials for the final cover system. Where applicable, these qualifications must be submitted by the Contractor to the Owner and Engineer for review and approval.

#### 1.3.2.1 Contractor

Qualifications of the Contractor are specific to the construction contract and independent of this CQA Manual.

#### 1.3.2.2 CQA Engineer

The CQA Engineer will act as the Owner's Quality Assurance Representative. The CQA Engineer will perform CQA testing to satisfy the requirements of this CQA Manual and will prepare the CQA certification document. The CQA Engineer will have experience in the CQA aspects of the construction and testing of final cover system, and be familiar with ASTM and other related industry standards. The activities of the CQA Engineer will be performed under the supervision of a Registered Professional Engineer.

#### 1.3.2.3 Soils CQA Laboratory

The Soils CQA Laboratory will have experience in testing structural fills, soil liners, and aggregates, and be familiar with ASTM and other applicable test standards. The Soils CQA Laboratory will be capable of providing test results within 24 hours or a reasonable time after receipt of samples depending on the test(s) to be conducted, as agreed to at the outset of the project by affected parties, and will maintain that standard throughout the installation.

## **1.4 SCOPE OF CONSTRUCTION QUALITY ASSURANCE MANUAL**

The scope of this CQA Manual includes the CQA of the soils components of the final cover system for the subject facility. The CQA for the selection, evaluation, and placement of the soils is included in the scope.

## **1.5 UNITS**

In this CQA Manual, all properties and dimensions are expressed in U.S. units.

## **1.6 REFERENCES**

The CQA Manual includes references to the most recent version of the test procedures of the American Society of Testing and Materials (ASTM). **Appendix A** contains a list of these procedures.

## **1.7 CQA MEETINGS**

To facilitate the specified degree of quality during installation, clear, open channels of communication are essential. To that end, meetings are critical.

### **1.7.1 Soil Liner CQA Meeting**

Prior to the start of the soil liner system construction a CQA Meeting will be held. This meeting will include all parties then involved, including the Engineer, the CQA Engineer, and the Contractor.

The purpose of this meeting is to begin planning for coordination of tasks, anticipate any problems which might cause difficulties and delays in construction, and, above all, review the CQA Manual to all of the parties involved. It is very important that the rules regarding testing, repair, etc., be known and accepted by all.

This meeting should include all of the activities referenced in the project specifications.

The meeting will be documented by the Engineer and minutes will be transmitted to all parties.

### **1.7.2 CQA Progress Meetings**

Progress meetings will be held between the Engineer, the CQA Engineer, the Contractor, and representatives from any other involved parties at the frequency dictated in the project specifications or, at a minimum, once per month during active construction. These meetings will discuss current progress, planned activities for the next week, and any new business or revisions to the work. The CQA Engineer will log any problems, decisions, or questions arising at this meeting in his daily or periodic reports. Any matter requiring

action which is raised in this meeting will be reported to the appropriate parties. These meetings will be documented by the Engineer and minutes will be transmitted to affected parties.

### **1.7.3 Problem or Work Deficiency Meetings**

A special meeting will be held when and if a problem or deficiency is present or likely to occur. At a minimum, the meeting will be attended by the Engineer, the CQA Engineer, the Contractor, and representatives from any other involved parties. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- define and discuss the problem or deficiency;
- review alternative solutions; and
- implement an action plan to resolve the problem or deficiency.

The meeting will be documented by the Engineer and minutes will be transmitted to affected parties.

## **1.8 CONTROL VERSUS RECORD TESTING**

### **1.8.1 Control Testing**

In the context of this CQA Manual, Control Tests are those tests performed on a material prior to its actual use in construction to demonstrate that it can meet the requirements of the project plans and specifications. Control Test data may be used by the Engineer as the basis for approving alternative material sources.

### **1.8.2 Record Testing**

Record Tests are those tests performed during the actual placement of a material to demonstrate that its in-place properties meet or exceed the requirements of the project drawings and specifications.

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## **SECTION 2.0 CQA DOCUMENTATION**

### **2.1 DOCUMENTATION**

An effective CQA plan depends largely on recognition of construction activities that should be monitored and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The CQA Engineer will document that quality assurance requirements have been addressed and satisfied.

The CQA Engineer will provide the Owner and Engineer with his daily and weekly progress reports including signed descriptive remarks, data sheets, and logs to verify that required CQA activities have been carried out. These reports will also identify potential quality assurance problems. The CQA Engineer will also maintain at the job site a complete file of project drawings, reports, project specifications, a CQA Manual, checklists, test procedures, daily logs, and other pertinent documents.

### **2.2 DAILY CQA REPORT**

The CQA Engineer's reporting procedures will include preparation of a daily report which, at a minimum, will include the following information, where applicable:

- a unique identifying sheet number for cross referencing and document control;
- date, project name, location, and other identification;
- data on weather conditions;
- a reduced-scale Site Plan showing all proposed work areas and test locations;
- descriptions and locations of ongoing construction;
- descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- locations where tests and samples were taken;
- a summary of test results;
- calibrations or recalibrations of test equipment, and actions taken as a result of recalibration;
- off-site materials received, including quality verification documentation;

- decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality;
- summaries of pertinent discussions with the Contractor; and
- the CQA Engineer's signature.

The daily report must be completed at the end of each CQA Engineer's shift, prior to leaving the site. This information will be submitted weekly to and reviewed by the Owner and Engineer.

### **2.3 CQA PROGRESS REPORTS**

The CQA Engineer will prepare a summary progress report each week, or at time intervals established at the pre-construction meeting. As a minimum, this report will include the following information, where applicable:

- a unique identifying sheet number for cross-referencing and document control;
- the date, project name, location, and other information;
- a summary of work activities during the progress reporting period;
- a summary of construction situations, deficiencies, and/or defects occurring during the progress reporting period;
- summary of all test results, failures and retests, and
- signature of the CQA Engineer.

The CQA Engineer's progress reports must summarize the major events that occurred during that week. Critical problems that occur shall be communicated verbally to the Engineer immediately as well as being included in the weekly reports. The CQA Engineer's weekly report must be submitted to the Owner and Engineer no later than the Monday following the week reported.

### **2.4 CQA PHOTOGRAPHIC REPORTING**

Photographs will be taken by the CQA Engineer at regular intervals during the construction process and in all areas deemed critical by the CQA Engineer.

These photographs will serve as a pictorial record of work progress, problems, and mitigation activities. These records will be presented to the Engineer upon completion of the project.

In lieu of photographic documentation, videotaping may be used to record work progress, problems, and mitigation activities. The Engineer may require that a portion of the

documentation be recorded by photographic means in conjunction with videotaping.

## **2.5 DEFICIENCIES**

The Owner and Engineer will be made aware of any significant recurring nonconformance with the project specifications. The Engineer will then determine the cause of the non-conformance and recommend appropriate changes in procedures or specification. When this type of evaluation is made, the results will be documented, and any revision to procedures or project specifications will be approved by the Owner and Engineer.

## **2.6 DESIGN AND/OR PROJECT TECHNICAL SPECIFICATION CHANGES**

Design and/or project specification changes may be required during construction. In such cases, the CQA Engineer will notify the Engineer. The Engineer will then notify the appropriate agency, if necessary.

Design and/or project specification changes will be made only with the written agreement of the Engineer, and will take the form of an addendum to the project specifications. All design changes will include a detail (if necessary) and state which detail it replaces in the plans.

## **2.7 FINAL CQA REPORT**

At the completion of each major construction activity at the landfill unit, the CQA Engineer will certify all required forms, observation logs, field and laboratory testing data sheets including sample location plans, etc. The CQA Engineer will also provide a final report which will certify that the work has been performed in compliance with the plans and project technical specifications, and that the supporting documents provide the necessary information.

The CQA Engineer will also provide summaries of all the data listed above with the report. The Record Drawings will include scale drawings depicting the location of the construction and details pertaining to the extent of construction (e.g., depths, plan dimensions, elevations, soil component thicknesses, etc.). All surveying and base maps required for development of the Record Drawings will be done by the Contractor's Construction Surveyor. These documents will be certified by the Contractor and delivered to the CQA Engineer and included as part of the final CQA (Certification) report.

It may be necessary to prepare interim certifications, as allowed by the regulatory agency to expedite completion and review.

At a minimum, the items shown in **Table 2.1** will be included in the Final CQA Report. Note that some items may not be applicable to all projects.

## 2.8 STORAGE OF RECORDS

All handwritten data sheet originals, especially those containing signatures, will be stored by the CQA Engineer in a safe repository on site. Other reports may be stored by any standard method which will allow for easy access. All written documents will become property of the Owner.

**TABLE 2.1: FINAL CQA REPORT GENERAL OUTLINE (FINAL COVER SYSTEM)**

- 1.0 Introduction
- 2.0 Project Description
- 3.0 CQA Program
  - 3.1 Scope of Services
  - 3.2 Personnel
- 4.0 Earthwork CQA
- 5.0 Final Cover System CQA
- 6.0 Soil Liner CQA
- 7.0 Summary and Conclusions
- 8.0 Project Certification

### Appendices

- Appendix A Design Clarifications/Modifications
- Appendix B Photographic Documentation
- Appendix C CQA Reporting
  - C1. CQA Reports
  - C2. CQA Meeting Minutes
- Appendix D Earthwork CQA Data
  - D1. CQA Test Results - Control Tests
  - D2. CQA Test Results - Record Tests
- Appendix E Final Cover System CQA Data
  - E1. CQA Test Results - Vegetative Soil Layer
- Appendix F Soil Liner CQA Data
  - F1. CQA Test Results - Control Tests
  - F2. CQA Test Results - Record Tests
- Appendix G Record Drawings
  - G1. Compacted Soil Liner As-Built
  - G2. Vegetative Soil Layer As-Built

## SECTION 3.0 EARTHWORK CQA

### 3.1 INTRODUCTION

This section of the CQA Manual addresses earthwork (excavation and embankment) and outlines the soils CQA program to be implemented with regard to material approval, subgrade approval, field control and record tests, and resolution of problems.

### 3.2 EMBANKMENT MATERIAL APPROVAL

All material to be used as compacted embankment 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.

#### 3.2.1 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 3.1**, will be performed by the CQA Engineer prior to placement of any compacted embankment.

### 3.3 SUBGRADE APPROVAL

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

### 3.4 EARTHWORK CONSTRUCTION

#### 3.4.1 Construction Monitoring

- A. Earthwork shall be performed as described in the project specifications.
- B. Only soil previously approved by the CQA Engineer (see **Section 3.2**) shall be used in construction of the compacted embankment. 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 earthwork during and after construction.

### **3.4.2 Control Tests**

The control tests, as shown on **Table 3.2**, will be performed by the CQA Engineer prior to placement of compacted embankment.

### **3.4.3 Record Tests**

The record tests, as shown on **Table 3.2**, will be performed by the CQA Engineer during placement of compacted embankment.

#### **3.4.3.1 Record Test Failure**

Recompaction of the failed area shall be performed and retested until the area meets or exceeds requirements outlined in the specifications.

### **3.4.4 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.

## **3.5 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 3.1: CQA TESTING PROGRAM FOR EMBANKMENT  
MATERIAL APPROVAL**

PROPERTY	TEST METHOD	MINIMUM TEST FREQUENCY
<b>CONTROL TESTS:</b>		
Visual Classification	ASTM D 2488	Each Soil
Moisture-Density Relationship	ASTM D 698	5,000 CY per Each Soil

**TABLE 3.2: CQA TESTING PROGRAM FOR COMPACTED EMBANKMENT**

PROPERTY	TEST METHOD	MINIMUM TEST FREQUENCY
<b>CONTROL TESTS: (See Table 3.1)</b>		
<b>RECORD TESTS:</b>		
Lift Thickness	-----	Each Lift
In-Place Density	ASTM D 6938 <sup>1</sup>	20,000 ft <sup>2</sup> per lift & 1 per 500 LF/lift of Berms (< 200 ft. base width)
Moisture Content	ASTM D 6938 <sup>2</sup>	20,000 ft <sup>2</sup> per lift & 1 per 500 LF/lift of Berms (< 200 ft. base width)

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.

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## **SECTION 4.0 SOIL LINER CQA**

### **4.1 INTRODUCTION**

This section of the CQA Manual addresses the soil liner component of the final cover system and outlines the soils 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.

### **4.2 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.

#### **4.2.1 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 4.1**, will be performed by the CQA Engineer prior to placement of any soil liner material.

### **4.3 SUBGRADE APPROVAL**

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

### **4.4 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.

#### **4.4.1 Control Tests**

The control tests, as shown on **Table 4.2**, will be performed by the CQA Engineer prior to placement of soil liner material in the test fill.

#### **4.4.2 Record Tests**

The record tests, as shown on **Table 4.2**, will be performed by the CQA Engineer during placement of soil liner material in the test fill.

#### **4.4.3 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.

### **4.5 SOIL LINER CONSTRUCTION**

#### **4.5.1 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 4.2**) 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. 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.

#### **4.5.2 Control Tests**

The control tests, as shown on **Table 4.3**, will be performed by the CQA Engineer prior to placement of soil liner material.

#### **4.5.3 Record Tests**

The record tests, as shown on **Table 4.3** 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.

##### **4.5.3.1 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.

#### **4.5.4 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.

#### **4.5.5 Perforations In Soil Liner**

All holes shall be patched with compacted soil liner (if allowed by the project specifications) or sodium bentonite compacted and hydrated in the holes.

### **4.6 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 4.1: CQA TESTING PROGRAM FOR SOIL LINER MATERIAL APPROVAL**

<b>PROPERTY</b>	<b>TEST METHOD</b>	<b>MINIMUM TEST FREQUENCY</b>
<b>CONTROL TESTS:</b>		
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 <sup>3</sup>	10,000 CY per Each Soil

**TABLE 4.2: CQA TESTING PROGRAM FOR SOIL LINER TEST FILL**

PROPERTY	TEST METHOD	MINIMUM TEST FREQUENCY
<b>CONTROL TESTS: (See Table 4.1)</b>		
Moisture-Density Relationship	ASTM D 698 <sup>4</sup>	1 per lift
Hydraulic Conductivity - Lab Remolded	ASTM D 5084 <sup>3,4</sup>	1 per lift
<b>RECORD TESTS:</b>		
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 <sup>1</sup>	3 per lift
Moisture Content	ASTM D 6938 <sup>2</sup>	3 per lift
Hydraulic Conductivity - Undisturbed (Shelby Tube)	ASTM D 6938 <sup>3</sup>	1 per lift

**TABLE 4.3: CQA TESTING PROGRAM FOR SOIL LINER**

PROPERTY	TEST METHOD	MINIMUM TEST FREQUENCY
<b>CONTROL TESTS:</b> (See Table 4.1)		
<b>RECORD TESTS:</b>		
Lift Thickness	-----	Each Lift
In-Place Density	ASTM D 6938 <sup>1</sup>	10,000 ft <sup>2</sup> per lift
Moisture Content	ASTM D 6938 <sup>2</sup>	10,000 ft <sup>2</sup> per lift
Hydraulic Conductivity - Undisturbed (Shelby Tube)	ASTM D 5084 <sup>3</sup>	40,000 ft <sup>2</sup> 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 4.1**.

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## SECTION 5.0 FINAL COVER SYSTEM CQA

### 5.1 INTRODUCTION

This section of the CQA Manual addresses the landfill gas (LFG) system and the vegetative soil layer of the final cover system. By reference to **Section 4.0** of this CQA Manual, this section also addresses the compacted soil barrier that is included in the final cover system. This section outlines the CQA program to be implemented with regard to material approval, construction monitoring, and resolution of problems.

### 5.2 FINAL COVER SYSTEM MATERIAL APPROVAL

The CQA Engineer shall verify that the following are provided and installed in accordance with the project drawings, specifications, and this CQA Manual.

#### 5.2.1 LFG System Components

- A. Receipt of Contractor's submittals on LFG system components.
- B. Review of submittals for LFG system components for conformity to the project specifications.

#### 5.2.2 Compacted Soil Barrier

The CQA program for compacted soil barrier is presented in **Section 4.0** of this CQA Manual.

#### 5.2.3 Vegetative Soil Layer

- A. Review the proposed source of vegetative soil layer for conformance with the project specifications.
- B. Conduct material control tests in accordance with **Table 5.1**.

### 5.3 FINAL COVER SYSTEM INSTALLATION

The CQA Engineer will monitor and document the construction of all final cover system components for compliance with the project specifications. Monitoring the construction work for the components of the final cover system includes the following:

- verify location and depth of LFG wells; and
- verify location of all piping.

## 5.4 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 5.1: CQA TESTING PROGRAM FOR FINAL COVER SYSTEM**

<b>COMPONENT</b>	<b>PROPERTY</b>	<b>TEST METHOD</b>	<b>MINIMUM TEST FREQUENCY</b>
<b>CONTROL TESTS:</b>			
<b>Vegetative Soil Layer:</b>	Visual Classification	ASTM D 2488	Each Load
	Grain Size Analysis	ASTM D 422	5,000 CY
	Atterberg Limits	ASTM D 4318	5,000 CY

## **Appendix A**

### **Reference List of Test Methods**

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**CQA MANUAL**  
**APPENDIX A: REFERENCE LIST OF TEST METHODS**

**American Society American Society of Testing and Materials (ASTM):**

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 <sup>3</sup> ).
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).

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**Attachment D  
Operation Plan**

**Wilson County Westside C&D Landfill  
Wilson County, North Carolina**

Prepared for:  
**Wilson County Solid Waste Management Dept.**  
Wilson, North Carolina

**December 2010**



**BlackRock Engineers, Inc.**  
PO Box 58  
Wilmington, NC 28402

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## **1.0 OPERATION PLAN**

This Section provides a detailed plan for operation of the CDLF. All operations shall be in compliance with 15A NCAC 13B Rule .0542.

### **1.1 PHASES OF OPERATION**

In general, the landfill will be constructed in 10-foot lifts, with the intermediate slopes following the current topography. At an annual disposal rate of 20,000 tons/year and a waste:soil ratio = 8:1, the peak intermediate fill elevation will be 132 msl under the Phase 2 Operation Plan included in the Permit Drawings. The peak elevation may be adjusted for variation in Airspace Utilization Factors containing an estimated 100,000 tons for the 5-year Phase 2 period.

### **1.2 BASE EMBANKMENT**

In addition to the base soil layer, construction of the initial landfill lift shall include a perimeter embankment or toe dike. The peak elevation of the toe dike is approximately 5 feet. Waste placement shall be at least 3 feet below the top of the dike to allow for stormwater control during operations and final cover construction at closure. Final cover will tie-in to this toe dike.

### **1.3 ROUTINE OPERATIONS**

Following completion of the base lift, routine waste placement and compaction operations shall be practiced. Lift progression shall establish a maximum side slope at 4:1, and the top grade should follow the planned 1-2% surface grade, sloped from the center to the lower perimeter. The waste shall be adequately compacted with a compactor.

### **1.4 WASTE ACCEPTANCE**

#### *1.4.1 Approved Waste Types*

Wastes typically generated by construction and demolition activities shall be accepted at the CDLF. Other waste types categorically approved by the Division

for C&D landfills, will also be accepted for disposal. Specific approval must be received from the Division for other waste types that Wilson County may want to accept for disposal; typically, this will require a demonstration to the Division that the waste type is "Inert Debris". The Inert Debris evaluation may require chemical analysis to document that potential leaching from the material will not exceed 15A NCAC 2L Groundwater Standards. Asbestos waste is received on a project specific basis and is directed for separate burial in the Asbestos Trench Disposal Area adjacent to the MSWLF, as delineated in the Site Plan (Figure 3).

#### *1.4.2 Waste Exclusions*

As specified in .0542(e) Waste Exclusions, the following wastes must not be disposed of in a C&DLF unit:

- (1) Containers such as tubes, drums, barrels, tanks, cans, and bottles unless they are empty and perforated to ensure that no liquid, hazardous or municipal solid waste is contained therein,
- (2) Garbage as defined in G.S. 130A-290(a)(7),
- (3) Hazardous waste as defined in G.S. 130A-290(a)(8), to also include hazardous waste from conditionally exempt small quantity generators,
- (4) Industrial solid waste unless a demonstration has been made and approved by the Division that the landfill meets the requirements of Rule .0503(2)(d)(ii)(A),
- (5) Liquid wastes,
- (6) Medical waste as defined in G.S. 130A-290(a)(18),
- (7) Municipal solid waste as defined in G.S. 130A-290(a)(18a),
- (8) Polychlorinated biphenyls (PCB) wastes as defined in 40 CFR 761,
- (9) Radioactive waste as defined in G.S. 104E-5(14),
- (10) Septage as defined in G.S. 130A-290(a)(32),
- (11) Sludge as defined in G.S. 130A-290(a)(34),
- (12) Special wastes as defined in G.S. 130A-290(a)(40),
- (13) White goods as defined in G.S. 130A-290(a)(44), and

- (14) Yard trash as defined in G.S. 130A-290(a)(45),
- (15) The following wastes cannot be received if separate from C&DLF waste: lamps or bulbs including but not limited to halogen, incandescent, neon or fluorescent; lighting ballast or fixtures; thermostats and light switches; batteries including but not limited to those from exit and emergency lights and smoke detectors; lead pipes; lead roof flashing; transformers; capacitors; and copper chrome arsenate (CCA) and creosote treated woods.
- (16) Waste accepted for disposal in a C&DLF unit must be readily identifiable as C&D waste and must not have been shredded, pulverized, or processed to such an extent that the composition of the original waste cannot be readily ascertained except as specified in Subparagraph (17) of this Paragraph.
- (17) C&D waste that has been shredded, pulverized or otherwise processed may be accepted for disposal from a facility that has received a permit from an authorized regulatory authority which specifies such activities are inspected by the authority, and whose primary purpose is recycling and reuse of the C&D material. A waste screening plan and waste acceptance plan must be made available to the Division upon request.
- (18) The owner or operator of a C&DLF must not knowingly dispose any type or form of C&D waste that is generated within the boundaries of a unit of local government that by ordinance:
- (A) Prohibits generators or collectors of C&D waste from disposing that type or form of C&D waste.
- (B) Requires generators or collectors of C&D waste to recycle that type or form of C&D waste.
- (19) Wooden Pallets. Only pallets generated in C&D activities may be disposed of in a C&DLF, not pallets generated in industrial or commercial

activities. When practical, pallets included in C&D loads shall be separated and removed to the wood processing area.

#### *1.4.3 Waste Screening*

In addition to C&D waste, the Wilson County Landfill receives other waste types at the facility entrance. The Weighmaster directs specific waste types, such as Land Clearing and Inert Debris, asbestos, and yard waste to specific management areas. The solid waste management areas are identified with signs. Signs will be posted for routing of C&D waste to the Westside facility.

A waste screening program similar to the current program shall be maintained for C&D operations. The facility shall only accept those solid wastes which it is permitted to receive. The operator shall monitor loads periodically (simple random sampling at least one load every two weeks) to identify non-conforming wastes, including municipal solid waste, industrial waste, and hazardous waste. In simple random sampling, the operator shall determine the day for inspection based on management needs for the week. On the day of the random inspection, the operator will determine the truck number or time of day for the inspection. The Operator may select a replacement if a common driver or hauling company is selected more than twice a year for random sampling. A typical load inspection form is attached to the Operation Plan.

If a suspect load is identified, an inspection will be conducted in an area prepared near the working face. This staging area will be graded to contain and segregate the wastes if necessary.

#### *Personnel Training and Preparation*

The following facility personnel shall receive Awareness Level Training by a qualified consultant to identify non-conforming wastes: Weighmaster, Compactor Operators, and the Heavy Equipment Supervisor. The Supervisor will lead waste

inspections and ensure that the staging area is properly prepared, inspectors are outfitted with the appropriate Personal Protective Equipment, and records are properly maintained.

### *Identifying Excluded Wastes*

When conducting waste inspections, personnel should look for municipal waste, and industrial containers with hazard labels, liquids, powders and dusts, sludges, bright or unusual colors, and be aware of chemical odors. No liquids will be allowed in the landfill. Suspect wastes will be required to perform the paint filter test. Hazardous waste exhibits the following properties:

1. Ignitability           Flash Point of less than 140 degrees Fahrenheit
2. Corrosivity           pH of less than or equal to 2.0 or greater than or equal to 12.5
3. Reactivity           Explosive, reactive with water or corrosive materials
4. Toxicity Exhibits Toxic Chemical Leaching Process (TCLP) constituent above regulatory level.

### *Key Personnel*

The following names and telephone numbers shall be posted in the Scalehouse:

1. County Emergency Management Supervisor – Gordon Deno (252)399-2830
2. SWS Regional Waste Management Specialist - Ben Barnes (919)621-3680 or (919)508-8400.

### *Procedures for Handling Excluded Wastes*

If possible the hauler in violation shall be detained at the site and required to remove the non-conforming wastes from the facility. If wastes are identified and off-loaded from the vehicle, the inspector shall notify the County Emergency Management Supervisor for coordinating containment, temporary storage, and disposal. If waste is temporarily stored on-site, the maximum storage period is dictated by the amount of waste present. The SWS shall be notified within 24

hours of the attempted disposal of unauthorized waste. The following definitions exist for hazardous waste management.

1. CONDITIONALLY EXEMPT SMALL QUANTITY GENERATOR: Generates less than 220 pounds of hazardous waste in any calendar month.
2. SMALL QUANTITY GENERATOR: Generates between 220 and 2200 pounds of hazardous waste in a given calendar month.
3. LARGE QUANTITY GENERATOR: Generates greater than 2200 pounds of hazardous waste in any given calendar month, or greater than 2.2 pounds of acutely hazardous waste in a calendar month.

When possible the operator shall remove non-conforming wastes within 30 days. If the maximum storage period exceeds 90 days, the operator must request approval from the DEHNR Hazardous Waste Section.

Containers holding hazardous waste must be maintained in good condition and clearly labeled with the words "HAZARDOUS WASTE". If a container is not in good condition or begins to leak, the contents must be transferred to a good container. Containers must be constructed or lined with materials which will not react with the waste being stored. Containers holding hazardous waste must always be closed during storage. Containers must not be handled in such a manner which may rupture or damage container. Areas where containers are stored must be inspected on a weekly basis. A log of inspections must be maintained at the facility for a three year period.

### *Recordkeeping*

The following records shall be maintained for waste inspections and haulers that are refused entry:

1. Vehicle and Driver Identification
2. Amount and Source of Waste
3. Date and Time of Inspection

4. Observations of Inspection
5. Required Notifications for Confirmed Waste

### **1.5 COVER REQUIREMENTS**

Due to the non-putrescible nature of the waste, the working lift shall be typically covered on a weekly basis. The uncovered working area shall not exceed one-half acre. The top portion of the lift shall receive a minimum cover of six inches. As the side slopes are completed, an intermediate 12-inch soil cover shall be placed and compacted. Except as provided in .0542 (f)(3), areas which will not have additional wastes placed on them for three months or more, but where final termination of disposal operations has not occurred, must be covered and stabilized with vegetative ground cover or other stabilizing material.

Regulated asbestos waste approved for receipt in the designated asbestos cell shall be covered immediately with 6-inch soil layer.

The Operator shall maintain a log of cover application, noting the date of cover and any conditions that require repair or additional cover due to the presence of leachate or exposed waste. Identified leachate seeps shall be identified on a map, numbered, and staked in the field for future inspection. At least one foot of additional soil shall be added to patch any isolated leachate seeps. Location of any patched leachate seeps in the perimeter slope should be numbered/flagged for periodic (weekly) inspection, and following storm events greater than 1-inch daily observed. At least once a month, the entire perimeter of the unit shall be inspected for erosion and adequate cover conditions.

### **1.6 COMPACTION REQUIREMENTS**

C&DLF units must restrict solid waste into the smallest area feasible. Solid waste must be compacted as densely as practical into cells. Appropriate methods such as fencing and diking must be provided within the area to confine solid waste which is subject to be blown by the wind. At the conclusion of each

operating day, all windblown material resulting from the operation must be collected and disposed of by the owner and operator.

### **1.7 DISEASE VECTOR CONTROL**

Wilson County must prevent or control on-site populations of disease vectors using techniques appropriate for the protection of human health and the environment. For purposes of this requirement, "disease vectors" means any rodents, flies, mosquitoes, or other animals or insects, capable of transmitting disease to humans. Disease vectors are controlled primarily by application of cover soils, and proper surface grading to eliminate ponding water.

### **1.8 STORMWATER MANAGEMENT**

Management of stormwater and erosion control are integrated concepts for the landfill. Lift progression from upslope to downslope positions simplifies stormwater management for daily operations. Stormwater shall be directed away from the working face of the landfill to the perimeter stormwater berm or a temporary diversion. During operations, multiple temporary downdrains will convey drainage from the intermediate landfill surface to the perimeter channel network. Mulching or temporary seeding shall be utilized as necessary to stabilize the site; areas of the landfill that are not planned to receive additional waste within 90 days shall be stabilized with temporary cover.

### **1.9 ACCESS CONTROL**

The facility is designed to limit access and comply with the following general safety requirements for CDLFs.

- (a) *The CDLF shall be adequately secured by means of gates, chains, berms, fences and other security measures approved by the Division to prevent unauthorized entry.*
- (b) *An attendant shall be on duty at the site at all times while it is open for public use to ensure compliance with operational requirements.*
- (c) *The access road to the site shall be of all-weather construction and*

- maintained in good condition.*
- (d) Dust control measures shall be implemented when necessary.*
  - (e) Signs providing information on dumping procedures, the hours during which the site is open for public use, the permit number and other pertinent information specified in the permit conditions shall be posted at the site entrance.*
  - (f) Signs shall be posted stating that no hazardous or liquid waste can be received.*
  - (g) Traffic signs or markers shall be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.*
  - (h) The removal of solid waste from a sanitary landfill is prohibited unless the owner or operator approves and the removal is not performed on the working face.
    - (i) Barrels and drums shall not be disposed of unless they are empty and perforated sufficiently to ensure that no liquid or hazardous waste is contained therein, except fiber drums containing asbestos (asbestos area).**

#### **1.10 AIR CRITERIA**

The operator has an established relationship with Wilson County Emergency Management and their local Fire Department for controlling accidental fires. Hot loads should be unloaded in an area of the facility with at least 1 foot of soil cover and must be completely cool before transfer to the working face. The weighmaster shall be alert for smoke from disposal vehicles. If a “hot load” is detected, the vehicle shall be directed to a covered portion of the landfill for off-loading. The load shall be monitored and allowed to burn out prior to spreading the waste to cool. The fire department shall be notified (911) to monitor/extinguish the fire.

In addition to contingency plans for accidental fires (noted above), the operator shall comply with the following requirements:

- (a) *Owners or operators of all landfills must ensure that the units do not violate any applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the U.S. EPA Administrator pursuant to Section 110 of the Clean Air Act, as amended.*
- (b) *Open burning of solid waste, except for the infrequent burning of land clearing debris generated on site or debris from emergency clean-up operations, is prohibited at all CDLF units. Any such infrequent burning must be approved by the Division, with notation to the operating record of approval date and the name of the DWM personnel who approved the type of the open burning. The Division of Air Quality and local fire department must approve the activity prior to burning.*
- (c) Equipment shall be provided to control accidental fires or arrangements shall be made with the local fire protection agency to immediately provide fire-fighting services when needed. Landfill equipment shall include fire extinguishers. Cover soil is typically stockpiled near the working face and available for use in smothering a hot spot.
- (d) Fires that occur require verbal notice to the Division within 24 hours and written notification shall be submitted within 15 days. Written notification must include the suspected cause of fire or explosion, the response taken to manage the incident, and the action(s) to be taken to prevent the future occurrence of fire or explosion.

## 1.11 RECORDKEEPING REQUIREMENTS

The Operating Record for the Wilson Westside CDLF shall be maintained at the Director's Office for the Department of Solid Waste Management. The operator shall continue to maintain records for C&D disposal according to the Rules and North Carolina Laws. A copy of all permit documents, plans, and Solid Waste Permits (PTC/PTO) will be placed in the Operating Record, with the following:

- (A) records of random waste inspections, monitoring results, certifications of training, and training procedures required by Rule .0544;
- (B) amounts by weight of solid waste received at the facility to include, consistent with G.S. 130A-309.09D, county of generation;
- (C) any demonstration, certification, finding, monitoring, testing, or analytical data required by Rules .0544 through .0545;
- (D) any closure or post-closure monitoring, testing, or analytical data as required by Rule .0543;
- (E) any cost estimates and financial assurance documentation required by Rule .0546;
- (F) notation of date and time of placement of cover material (Landfill Cover Log) ; and
- (G) all audit records, compliance records and inspection reports.

All information contained in the operating record must be furnished to the Division according to the permit or upon request, or be made available for inspection by the Division.

## **1.12 COVER SOIL INFORMATION**

Soil materials for base fill, temporary, intermediate and final cover applications will be obtained from dedicated off-site borrow sources. In 1996, Wilson County purchased the 226 acre Tucker Farm as a soil borrow site for landfill construction projects. Just recently, Wilson County acquired the 76 acre Mohesky Farm joining the Tucker Farm and the Westside site. The Mohesky site was purchased as a supplemental borrow site for landfill construction. Altogether, approximately 50 acres of borrow area are currently undeveloped and provide adequate soil resources for current and proposed landfill projects. An average excavation of 2 feet will provide over 165,000 cubic yards estimated for base construction, operational cover, and final cover. Typical excavation depths at the Tucker Site are in excess of 5 feet.

In addition to the Tucker and Mohesky sites, Wilson County owns an additional 23 Acres approved by the NC LQS for borrow soil. This borrow site is contiguous and north of the Mohesky site. At a nominal cut of 5 feet this site could yield 185,000 cubic yards of soil for temporary and final cover.

The Westside site was formerly the borrow site for landfill operations. Beginning in 1998, the Tucker Farm provided soils for intermediate cover, clay liner, and vegetative soil layer construction for closure of the MSWLF units. Presently, the Tucker site continues to supply soils for C&D landfill construction at the facility. Located between the Westside and Tucker sites, soils on the Mohesky Farm are typical of the local area. According to the SCS Soil Survey of Wilson County North Carolina, the mapped soil series include Wagram, Gritney, Altavista, and Tarboro Coastal Plain sediments. Several geotechnical investigations have been conducted on the Tucker site to define soil properties for landfill construction.

## 1.13 ASBESTOS DISPOSAL REQUIREMENTS

### 1.13.1 General Conditions

Wilson County may receive asbestos-containing waste materials that have been properly packaged to eliminate dust generation according to the following federal requirements in 40 CFR 61. See Section 1.9 for common access control. See the following sections for definitions, signage, location of the separate disposal area, daily cover, and specific recordkeeping requirements. A typical Asbestos waste generator manifest is attached to this Section.

### 1.13.2 Definitions

*Asbestos-containing waste materials* means mill tailings or any waste that contains commercial asbestos and is generated by a source subject to the provisions of this subpart. This term includes filters from control devices, friable asbestos waste material, and bags or other similar packaging contaminated with commercial asbestos. As applied to demolition and renovation operations, this term also includes regulated asbestos-containing material waste and materials contaminated with asbestos including disposable equipment and clothing.

*Regulated asbestos-containing material (RACM)* means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by this subpart.

### 1.13.3 Signage

The asbestos area shall be marked by signs conforming to the minimum federal requirements, at 100 meter (328 feet) intervals around the area or closer and bend points, conform to the minimum dimensions for 51 cm×36 cm (20&inch;×14&inch;) upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph; and displaying the following warnings :

<b>LEGEND</b>	<b>NOTATION FORMAT</b>
<b>ASBESTOS WASTE DISPOSAL SITE</b>	2.5 cm (1 inch) Sans Serif, Gothic or Block
<b>DO NOT CREATE DUST</b>	1.9 cm ( 3/4 inch) Sans Serif, Gothic or Block
<b>BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH</b>	14 Point Gothic

Spacing between any two lines must be at least equal to the height of the upper of the two lines.

## TYPICAL SIGNAGE FOR ASBESTOS DISPOSAL AREA



### *1.13.4 Disposal Area and Cover*

A map shall be maintained locating the active asbestos fill area within the Westside C&D landfill unit. Location of the asbestos area shall consider future gas vent drilling, and buffer those planned locations.

At the end of each operating day, or at least once every 24-hour period while the site is in continuous operation, the asbestos-containing waste material that has been deposited at the site during the operating day or previous 24-hour period shall be covered with at least 15 centimeters (6 inches) of compacted soil.

### *1.13.5 Asbestos Recordkeeping*

Receipt of asbestos for disposal requires the maintenance of the following records and notifications.

(1) Maintain waste shipment records, using a form similar to the attachment, and include the following information:

- (i) The name, address, and telephone number of the waste generator.
- (ii) The name, address, and telephone number of the transporter(s).
- (iii) The quantity of the asbestos-containing waste material in cubic meters (cubic yards).
- (iv) The presence of improperly enclosed or uncovered waste, or any asbestos-containing waste material not sealed in leak-tight containers. Report in writing to the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the waste generator (identified in the waste shipment record), and, if different, the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the disposal site, by the following working day, the presence of a significant amount of improperly enclosed or uncovered waste. Submit a copy of the waste shipment record along with the report.
- (v) The date of the receipt.

(2) As soon as possible and no longer than 30 days after receipt of the waste, send a copy of the signed waste shipment record to the waste generator.

(3) Upon discovering a discrepancy between the quantity of waste designated on the waste shipment records and the quantity actually received, attempt to reconcile the discrepancy with the waste generator. If the discrepancy is not resolved within 15 days after receiving the waste, immediately report in writing to the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the waste generator (identified in the waste shipment record), and, if different, the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the disposal site. Describe the discrepancy and attempts to reconcile it, and submit a copy of the waste shipment record along with the report.

(4) Retain a copy of all records and reports required by this Section for at least 2 years.

(f) Maintain, until closure, records of the location, depth and area, and quantity in cubic meters (cubic yards) of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area.

g) Upon closure, comply with all the provisions of §61.151.

(h) Submit to the Administrator, upon closure of the facility, a copy of records of asbestos waste disposal locations and quantities.

(i) Furnish upon request, and make available during normal business hours for inspection by the Administrator, all records required under this section.

(j) Notify the Administrator in writing at least 45 days prior to excavating or otherwise disturbing any asbestos-containing waste material that has been deposited at a waste disposal site and is covered. If the excavation will begin on a date other than the one contained in the original notice, notice of the new start date must be provided to the Administrator at least 10 working days before excavation begins and in no event shall excavation begin earlier than the date specified in the original notification. Include the following information in the notice:

(1) Scheduled starting and completion dates.

(2) Reason for disturbing the waste.

(3) Procedures to be used to control emissions during the excavation, storage, transport, and ultimate disposal of the excavated asbestos-containing waste material. If deemed necessary, the Administrator may require changes in the emission control procedures to be used.

(4) Location of any temporary storage site and the final disposal site.

# WASTE SCREENING FORM

Day / Date: \_\_\_\_\_ Time Weighed in: \_\_\_\_\_  
Truck Owner: \_\_\_\_\_ Driver Name: \_\_\_\_\_  
Truck Type: \_\_\_\_\_ Vehicle ID / Tag No: \_\_\_\_\_  
Weight \_\_\_\_\_ Tare: \_\_\_\_\_

Waste Generator / Source: \_\_\_\_\_

Reason Load Inspected: Random Inspection \_\_\_\_\_ Staff Initials \_\_\_\_\_  
Detained at Scales \_\_\_\_\_ Staff Initials \_\_\_\_\_  
Detained by Operating Staff \_\_\_\_\_ Staff Initials \_\_\_\_\_

Inspection Location: \_\_\_\_\_

Approved Waste Determination Form Present? Yes \_\_\_ No \_\_\_ N/A \_\_\_

Description of Load: \_\_\_\_\_

A. Load Accepted (signature) \_\_\_\_\_ Date \_\_\_\_\_  
End of Record to File for Accepted Load

B. Load Not Accepted (signature) \_\_\_\_\_ Date \_\_\_\_\_

Reason Load Not Accepted (complete only if load not accepted)

Description of Suspicious Contents: Color \_\_\_\_\_  
Haz. Waste Markings \_\_\_\_\_  
Texture \_\_\_\_\_

Est. Cu. Yds. Present in Load \_\_\_\_\_ Est. Tons Present in Load \_\_\_\_\_

Wilson County Emergency Management Contacted? Yes \_\_\_ No \_\_\_

Company or Authority Contacted? \_\_\_\_\_

Hazardous Materials Present: \_\_\_\_\_

Hauler Notified (if waste not accepted) \_\_\_\_\_ Phone: \_\_\_\_\_ Time Contacted: \_\_\_\_\_  
Other Observations: \_\_\_\_\_

Final Disposition  
Signed \_\_\_\_\_ Date \_\_\_\_\_  
Waste Screening Inspector or Environmental Officer

Attach related correspondence to this form.  
File completed form in Operating Record.

## METHOD 9095B

### PAINT FILTER LIQUIDS TEST

#### 1.0 SCOPE AND APPLICATION

1.1 This method is used to determine the presence of free liquids in a representative sample of waste.

1.2 The method is used to determine compliance with 40 CFR 264.314 and 265.314.

#### 2.0 SUMMARY OF METHOD

2.1 A predetermined amount of material is placed in a paint filter. If any portion of the material passes through and drops from the filter within the 5-min test period, the material is deemed to contain free liquids.

#### 3.0 INTERFERENCES

3.1 Filter media were observed to separate from the filter cone on exposure to alkaline materials. This development causes no problem if the sample is not disturbed.

3.2 Temperature can affect the test results if the test is performed below the freezing point of any liquid in the sample. Tests must be performed above the freezing point and can, but are not required to, exceed room temperature of 25 °C.

#### 4.0 APPARATUS AND MATERIALS

4.1 Conical paint filter -- Mesh number 60 +/- 5% (fine meshed size). Available at local paint stores such as Sherwin-Williams and Glidden.

4.2 Glass funnel -- If the paint filter, with the waste, cannot sustain its weight on the ring stand, then a fluted glass funnel or glass funnel with a mouth large enough to allow at least 1 in. of the filter mesh to protrude should be used to support the filter. The funnel should be fluted or have a large open mouth in order to support the paint filter yet not interfere with the movement, to the graduated cylinder, of the liquid that passes through the filter mesh.

4.3 Ring stand and ring, or tripod.

4.4 Graduated cylinder or beaker -- 100-mL.

#### 5.0 REAGENTS

5.1 None.

## 6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

A 100-mL or 100-g representative sample is required for the test. If it is not possible to obtain a sample of 100 mL or 100 g that is sufficiently representative of the waste, the analyst may use larger size samples in multiples of 100 mL or 100 g, i.e., 200, 300, 400 mL or g. However, when larger samples are used, analysts shall divide the sample into 100-mL or 100-g portions and test each portion separately. If any portion contains free liquids, the entire sample is considered to have free liquids. If the sample is measured volumetrically, then it should lack major air spaces or voids.

## 7.0 PROCEDURE

7.1 Assemble test apparatus as shown in Figure 1.

7.2 Place sample in the filter. A funnel may be used to provide support for the paint filter. If the sample is of such light bulk density that it overflows the filter, then the sides of the filter can be extended upward by taping filter paper to the inside of the filter and above the mesh. Settling the sample into the paint filter may be facilitated by lightly tapping the side of the filter as it is being filled.

7.3 In order to assure uniformity and standardization of the test, material such as sorbent pads or pillows which do not conform to the shape of the paint filter should be cut into small pieces and poured into the filter. Sample size reduction may be accomplished by cutting the sorbent material with scissors, shears, a knife, or other such device so as to preserve as much of the original integrity of the sorbent fabric as possible. Sorbents enclosed in a fabric should be mixed with the resultant fabric pieces. The particles to be tested should be reduced smaller than 1 cm (i.e., should be capable of passing through a 9.5 mm (0.375 inch) standard sieve). Grinding sorbent materials should be avoided as this may destroy the integrity of the sorbent and produce many "fine particles" which would normally not be present.

7.4 For brittle materials larger than 1 cm that do not conform to the filter, light crushing to reduce oversize particles is acceptable if it is not practical to cut the material. Materials such as clay, silica gel, and some polymers may fall into this category.

7.5 Allow sample to drain for 5 min into the graduated cylinder.

7.6 If any portion of the test material collects in the graduated cylinder in the 5-min period, then the material is deemed to contain free liquids for purposes of 40 CFR 264.314 and 265.314.

## 8.0 QUALITY CONTROL

8.1 Duplicate samples should be analyzed on a routine basis.

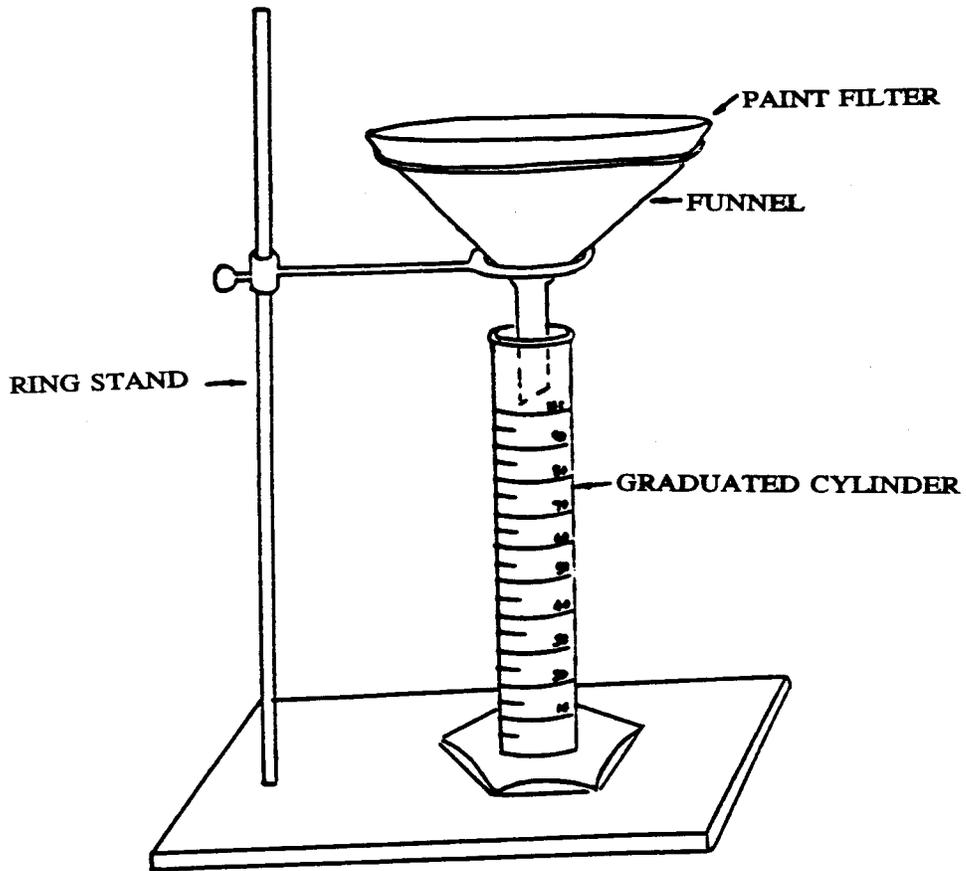
## 9.0 METHOD PERFORMANCE

9.1 No data provided.

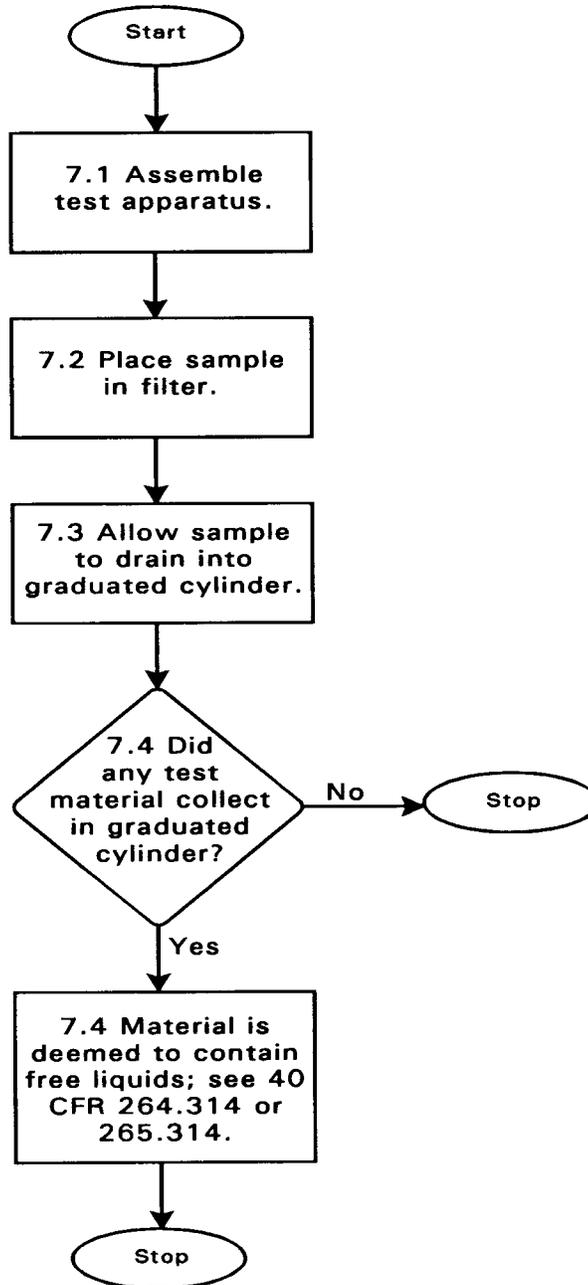
## 10.0 REFERENCES

10.1 None provided.

FIGURE 1  
PAINT FILTER TEST APPARATUS



METHOD 9095B  
PAINT FILTER LIQUIDS TEST



## **Closure and Post-Closure Plan**

**Wilson County Westside C&D Landfill  
Wilson County, North Carolina**

Prepared for:

**Wilson County Solid Waste Management Dept.  
Wilson, North Carolina**

**January 2010**



14 N. BOYLAN AVENUE  
RALEIGH, NORTH CAROLINA 27603  
NC LIC. NO. C-0828 (ENGINEERING)

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# WILSON COUNTY WESTSIDE 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. A formalized Closure Plan for each landfill unit (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

The following are the estimated areas and capacity for each landfill unit to be closed under this plan.

Landfill Unit	Closure Area (Acres) <sup>1</sup>	Gross Capacity (CY) <sup>1</sup>	Net (Waste) Capacity (CY/Tons) <sup>1</sup>
<b>C&amp;D Landfill Unit</b>			
Cells 1-3	10.5	433,560	319,060 CY 215,000 Tons

Notes:

1. Values from approved Construction Plan Application prepared by Gary W. Ahlberg, P.E., dated December 2003. Note that the gross capacity reported is from bottom of waste (top of subgrade) to top of final cover.

### 1.3 FINAL COVER SYSTEM

The final cover systems for the C&D landfill unit will consist of the following components (top-down):

C&D Landfill Units:

- an 18-inch thick vegetative soil layer; and
- an 18-inch thick soil liner with a hydraulic conductivity of no more than  $1 \times 10^{-5}$  cm/sec ("compacted soil barrier").

The final cover system will be placed on prepared intermediate cover at a maximum slope of 4H:1V. Surface water control devices and landfill gas (LFG) components will also be incorporated into the final cover of each landfill unit. The final cover surface will be vegetated upon completion of the final cover installation according to the project seeding specifications.

Refer to the appropriate permit application for a detailed discussion and details related to the design of the final cover system for each landfill unit.

## 1.4 LANDFILL GAS SYSTEM

For the C&D landfill unit, a landfill gas system is provided in the final cover design. This system includes a system of collection wells or vents placed within the waste to capture and passively vent the gas.

Refer to the appropriate permit application for a detailed discussion and details related to the design of the landfill gas system for each landfill unit.

## 1.5 SURFACE WATER SYSTEMS

Precipitation falling on the cover will infiltrate into the cover or run off the cover. Short-term the run-off runs down the surface of the intermediate cover. Long-term the run-off is collected in a series of drainage breaks built into the areas covered by final cover. These drainage breaks are provided along side slopes (rain gutters and/or diversion berms). Water captured by rain gutters or diversion berms is routed toward one of the down pipes. Flow in the down pipes is routed to the base of the landfill and to one of the site sediment basins.

Refer to the appropriate permit application for a detailed discussion and details related to the design of surface water systems for each landfill unit.

### 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 perimeter channels along the perimeter berms or to areas covered by final cover. Corrugated polyethylene (CPE) piping and temporary soil diversion berms must be installed if required to accomplish this run-off routing.

### 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&D Landfill Units (15A NCAC 13B.0543(c)(5)):

- No later than 30 days after the date on which the C&DLF unit receives the known final receipt of wastes;

- No later than 30 days after the date that a 10 acre or greater area of waste, is within in 15 feet of final design grades; or
- No later than one year after the most recent receipt of wastes, if the C&DLF unit has remaining capacity.

Prior to beginning closure of any landfill unit, the County will notify the DWM that a notice of the intent to close the unit has been placed in the operating record.

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.
- 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 (through the County Register of Deed's Office) 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 and notification will be provided to the DWM.

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## **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 landfill should be directed to:

Wilson County Solid Waste Management Department  
Attn: Andy Davis, Director  
P.O. Box 1728  
Wilson, NC 27894  
Phone: (252) 399-2823.

### **2.3 POST-CLOSURE USE**

After filling operations cease at the landfill and the landfill is officially closed in accordance with the Closure Plan, each landfill unit will be maintained as a grassy hill. Wilson County 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. Additionally, the County will maintain access to all site monitoring locations through the post-closure period.

## 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 and Vegetation

If erosion of the final cover occurs during post-closure, the affected area will be repaired and revegetated as necessary. If necessary, rolled erosion control products (RECPs) will be used to expedite rapid revegetation of slopes and to secure topsoil in place. Revegetation (including fertilization and seeding) will be performed in accordance with the most recently approved erosion and sedimentation control plan and the North Carolina Erosion and Sediment Control Planning and Design Manual.

Mowing of the final cover surfaces will occur approximately once per year in order to help maintain a healthy stand of grasses and to cut down saplings and woody-stemmed plants.

### 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. Sediment basins/ponds will be cleaned out when sediment has reached design cleanout levels.

### 2.4.5 Landfill Gas System

While gas production from the waste is expected to be very low, a passive venting system is proposed for final closure. Surrounding groundwater levels and buffer areas minimize the potential for gas migration.

The landfill gas system will be maintained by the County and operated in accordance with any site air quality permits. Proper operation of the system is verified through testing at

the landfill gas monitoring wells.

If gas wells/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.

#### **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.

#### **2.4.7 Leachate Seeps**

If evidence of leachate seeps is observed, the County will take the following actions. Depending on the circumstances, various combinations of actions may be appropriate.

1. If leachate is observed outside of the limits of waste disposal areas, notify the DWM.
2. Contain the flow of leachate using soil berms and/or excavation.
3. Excavate the area of seepage to attempt to allow flow into the underlying waste (i.e. break-up soil layers that may be causing the seep.).
4. For contained leachate that will not flow into underlying waste, a pump may be required to route the leachate to a tanker truck for proper disposal off-site.
5. The use of soil (particularly clay) to plug the seepage may be successful in the case where flows are minor.
6. Remove and dispose of impacted cover soils accordingly.
7. Repair landfill cover as necessary.

### **2.5 MONITORING PLAN**

The closed unit will be monitored for a minimum of 30 years. Inspections of the closed landfill 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 Inspection Activities**

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. Additionally, the condition of the groundwater and gas monitoring systems and permanent benchmarks will be checked.

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.

### **2.5.3 Record Keeping**

Records of inspections and repairs will be kept on file by the County throughout the post-closure period.

## **2.6 ENGINEERING CERTIFICATION**

Following completion of the post-closure care period for each landfill unit, the County will notify the DWM that a certification, signed by a registered professional engineer, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

**TABLE 2.1: POST-CLOSURE INSPECTION FREQUENCIES**

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

Notes:

1. These items will be inspected after each large storm event (i.e.  $\geq 1$  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 and/or air quality permit(s), if applicable.

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## **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 costs associated with all activities specified in the written closure and post-closure plans which have been developed for the C&D landfill unit of the Wilson County Landfill.

### **3.2 ESTIMATED CLOSURE COSTS**

**Table 3.1** summarizes the estimated costs for complete closure of the C&D landfill unit. The 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, 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 for the C&D landfill unit. The 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.

### **3.4 FINANCIAL ASSURANCE MECHANISM**

Wilson County intends to continue to use the Local Government Financial Test to demonstrate financial assurance for this facility.

**TABLE 3.1: C&D UNIT - CLOSURE COST ESTIMATE<sup>1</sup>**

ITEM	QUANTITY	UNITS	UNIT COST	ITEM COST (2010 \$)
Surface Preparation	10.5	Acre	\$2,000	\$21,000
Landfill Gas Wells/Vents	10.5	Acre	\$3,000	\$31,500
Compacted Soil Barrier (18")	25,500	CY	\$7.00	\$178,500
Vegetative Soil Layer (18")	25,500	CY	\$4.00	\$102,000
Erosion Control (Diversion Berms, Down Pipes, Drainage Channels, Etc.)	10.5	Acre	\$5,000	\$52,500
Revegetation	10.5	Acre	\$1,500	\$15,750
Surveying	10.5	Acre	\$2,000	\$21,000
Subtotal:				\$422,250
Bonds, Mobilization, & Insurance	(4% of Subtotal):			\$16,890
Subtotal:				\$439,140
Contingency (10%):				\$43,914
<b>Construction Subtotal:</b>				<b>\$483,054</b>
Engineering	10.5	Acre	\$2,000	\$21,000
CQA	10.5	Acre	\$6,500	\$68,250
<b>TOTAL:</b>				<b>\$572,304</b>

Notes:

1. Assumes closure of 10.5 acres (Cells 1-3).

**TABLE 3.2: C&D UNIT - POST-CLOSURE COST ESTIMATE<sup>1</sup>**

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL (2010 \$)
Site Inspection And Record Keeping	20	HR	\$75	\$1,500
Revegetation (5% Total Area)	0.5	Acre	\$1,500	\$750
Mowing (once per year)	11	Acre	\$100	\$1,100
Erosion Control	1	LS	\$2,000	\$2,000
Gates/Fences/Access	1	LS	\$1,500	\$1,500
Groundwater/Surface Water Monitoring & Reporting (4 Long-Term Wells - Semi-Annual)	4	Each	\$1,200	\$9,600
Methane Monitoring & Reporting (Semi-Annual After Year 1)	2	Each	\$1,500	\$3,000
Subtotal:				\$19,450
Contingency (10%):				\$1,945
<b>ANNUAL TOTAL:</b>				<b>\$21,395</b>
<b>30-YEAR TOTAL:</b>				<b>\$641,850</b>

Notes:

1. Assumes post-closure of Cell 1-3 (10.5 Ac.).

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## ATTACHMENT F

### EROSION AND SEDIMENTATION CONTROL PLAN

**No changes to the Erosion and Sedimentation Control Plan approved as part of the 2004 Construction Plan Application are proposed. Attached is a copy of the approved plan.**

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**EROSION AND SEDIMENTATION CONTROL PLAN**  
**WESTSIDE C&D LANDFILL FACILITY**  
**WILSON COUNTY DEPARTMENT OF SOLID WASTE**  
**WILSON COUNTY, NORTH CAROLINA**

## **1. Purpose**

Wilson County currently operates a landfill for the disposal of construction and demolition debris generated in the County. Located east of Wilson, North Carolina, the proposed Westside Construction and Demolition Landfill Facility (CDLF) is adjacent and generally west of the existing landfill facility. The Westside facility property is 100.00 Acres owned by Wilson County and described as Tract 1 in the attached Recombination Plat for the Wilson County Landfill, prepared by Herring Sutton and Associates; a vicinity map is included in the plat. When originally purchased by the County as a dedicated landfill borrow site in 1990, the site contained 127.98 Acres and was described as the Williamson Borrow Site. While the Williamson Borrow Site was depleted in the mid 1990's, Wilson County has continued to use the property for soil stockpiles and other solid waste management activities. Land disturbing activities were originally approved by the NC Division of Land Resources on March 19, 1990; see attached Letter of Approval. The original Erosion and Sedimentation Control Plan includes permanent structures which continue to operate on the site. This plan evaluates existing conditions and the suitability of existing structures, and specifies new temporary and permanent measures to maintain compliance with the Sedimentation Pollution Control Act of 1973. Pursuant to the North Carolina Sedimentation Pollution Control Act, Wilson County is requesting review and approval of this plan by the North Carolina DENR DLR Land Quality Section.

The proposed Westside waste boundary is 10.5 Acres, and is defined as the landfill footprint. Limited to a portion of the originally disturbed borrow area, the construction limits include perimeter channels and access roads for a total disturbed area of 19.4 Acres. A NC DENR permit fee of \$1,000.00 is attached for plan review, with the Financial Responsibility and Ownership Form completed by Wilson County. The landfill will receive C&D waste and additional wastes compatible with the facility design. The estimated 5-year disposal capacity is approximately 100,000 tons. The calculated total landfill capacity is 215,000 tons yielding an estimated project life of 10 years. No additional borrow activities are proposed on the Westside site.

Prior to landfill operation, a compacted soil layer shall be constructed for the landfill base. The landfill base will be constructed in 3 contiguous cells within the first 5-year operating period. Previous restoration grading activities have established suitable condition to begin Cell 1 (2 Acres) landfill operations. Using existing grassed swales and temporary ditches, all of Cell 1 drainage is directed to the existing West Sediment Basin for control prior to discharge to Buck Branch. Plan approval is necessary for construction of new permanent channels and restoration of the Main Sediment Basin. All cover soils will be imported from Wilson County's dedicated landfill borrow site located to the west of the Westside Facility, identified as the Tucker Borrow Site and approved by the NC DLR in 1995.

## 2. Plan Elements

The S&EC Plan for the borrow site includes narrative descriptions, attachments, and drawings including the following elements:

- Vicinity Map
- Site Development/Existing Conditions Drawing
- Site Erosion and Sedimentation Control Drawings
- Detail Drawings for Specified Practices and S&EC Structures
- Design Calculations and Assumptions
- Vegetation Specifications for Temporary and Permanent Stabilization
- Construction Schedule
- Financial/Ownership Form.

## 3. Site Conditions

### ***3.1. Facility Property***

Attached to this report is a recombination plat of the Wilson County Landfill prepared by the surveyor, defining two tracts for the separate landfill facilities. The plat includes a vicinity map providing the general location of site to the east of the City of Wilson, and accessed via Landfill Road (SR 1503). Tract 2 contains 196.45 Acres and defines the property for the MSW Landfill Facility; this is provided for reference only in this application. By dedication and maintenance of a 50-foot buffer from the MSW Landfill Facility, the Westside CDLF is separate and apart from the MSW Facility.

Tract 1 contains the 100.00 Acres which delineates the Westside C&D landfill site proposed for this permit, and an additional 3.76 Acre buffer property. The site is in Gardners Township of Wilson County and bisected by the extraterritorial jurisdiction (ETJ) of the City of Wilson, North Carolina. The property boundary presented in site drawings and figures for this report is the 100.00 Acres delineated in the recombination plat by the surveyor.

The site's western boundary is established by the center-line run of Buck Branch. The adjoining properties on the west and east are owned by Wilson County. To the west, Wilson County recently purchased the 76.43 Ac property identified as the Mohesky Farm. The Mohesky Farm provides potential future off-site borrow resources for Wilson County landfill projects; NC DLR approval is required prior to development. Continuing upstream along Toisnot Swamp from the Mohesky Farm is the Tucker Borrow Site. The Tucker Borrow Site was purchased by Wilson County in 1995 and is the active borrow site for current landfill projects. The only surrounding property not owned by Wilson County is farmland located upslope and generally north of the site.

### ***3.2. Topographic Mapping and GIS Resources***

Topographic mapping (2-foot contour interval) for the site was included in the 1998 project completed by GeoData Corporation, of Zebulon, North Carolina. The 1998 topography is generally representative of current ground conditions. In order to provide updated mapping for

landfill construction, HSA surveyed the construction limits for the Westside landfill and mapped one-foot contours in July 2003. Floodplain, zoning, subdivision, and local property boundary (plat) data was provided by Wilson County's Mapping/GIS Department.

Topographic relief on the site is gradually sloping north to south, toward Buck Branch and Toisnot Swamp. The slope increases upgradient of the landfill footprint to the northern property boundary. Ditches were constructed with borrow site operation to convey stormwater to an existing sedimentation basins west and south of the footprint.

### **3.3. Soils**

According to the SCS Soil Survey of Wilson County North Carolina, the mapped soil series include Wagram, Gritney, Altavista, and Tarboro Coastal Plain sediments. Within the construction limits, these soils have been removed by borrow operations and mostly clay soils, or sandy clays are exposed at the surface.

### **3.4. Wetlands**

Jurisdictional wetlands are present within the floodplain regions bordering the surface waters on-site. According to a field delineation performed in 1994 and reviewed by the U.S. Army Corps of Engineers, wetlands on-site are contained within the existing woodland areas shown on the drawings. An approximate wetland boundary is illustrated on the map. These wetland areas will not be disturbed by construction activities on the site. According to the irregular relief within the swamp areas, surface water accumulating in the wetland areas likely form runs which drain to the streams.

### **3.5. Surface Waters**

The site contains one stream and one intermittent stream. The site's western boundary is established by the center-line run of Buck Branch. Buck Branch is a named stream on the USGS Quadrangle Map for the area. Along the eastern site boundary, an intermittent stream is present in the vegetated area. This stream is identified as such on the Local Area Map. Both Buck Branch and the intermittent stream feed into Toisnot Swamp. All surface waters in the local area are classified by NC Surface Water Standards as Class C waters. Toisnot Swamp is a major tributary stream and groundwater discharge feature in the area. This site is subject to the Neuse Buffer requirements, which is illustrated on the drawings.

## **4. Design Procedures and Goals**

The sediment and erosion control plan is designed based on the guidelines and procedures set forth in the North Carolina Erosion and Sediment Control Planning and Design Manual (E&SCP&DM) and "Elements of Urban Stormwater Design" (EOUSD), by H. Rooney Malcom, P.E. Drawing No. 2 – Drainage Plan illustrates the features of the S&EC plan for the site. Design calculations and a construction sequence for S&EC measures are attached to this report.

In accordance with the NC Sedimentation Pollution Control Act, all S&EC structures specified for the borrow site are designed for the 10-year storm event. Ditches and channels are oversized to allow for some sediment accumulation during construction. In general, this plan follows the

guidelines established in the North Carolina Erosion and Sediment Control Planning and Design Manual (E&SCP&DM).

Sedimentation and erosion occurs when cleared areas are allowed to remain disturbed for extended periods of time without a vegetative cover being established. Once vegetation has been established on the disturbed areas, the erosion potential is minimized and temporary sedimentation and erosion control measures may be removed. A seeding plan for disturbed areas is specified for permanent borrow area stabilization.

In general, this plan describes the various types of erosion control measures used on the site and specifies the design of channels, velocity controls, temporary sediment trap and permanent basin structures. Both the temporary and permanent erosion and sedimentation control devices employed in this project use a combination of filtration and settling to remove silt/sediment from stormwater.

All stormwater flow volumes are calculated using the Rational Method based on a 10-year storm event. Runoff coefficients for various ground cover conditions are referenced to Table 8.03a in the E&SCP&DM. Rainfall intensities used in the Rational Method are derived from Table 8.03d E&SCP&DM, using times of concentration calculated with the Kirpich Equation. Drainage areas, slope gradients and distances were determined using computer aided design techniques.

#### ***4.1. Phased Development of Landfill***

The landfill base will be constructed in three cells over the initial 4 years of operation. Drainage from Cell 1 and the northwest landfill quadrant is controlled by the existing West Sediment Basin. Prior to construction of Cell 2, the Main Basin requires construction of a new access road for restoration and future maintenance. The embankments for the loop access road create the outboard bank for a perimeter channel loop around the landfill. For constructability, these permanent channels (PC) are constructed with a 7-ft base, and depths of 1-2 feet. Final Grade plans include diversion berms to capture drainage from the top landfill surface and route to the perimeter channels via permanent slope drains.

#### ***4.2. Permanent Structures***

Design calculations are attached for all channels and ditches. Channel lining materials are specified for use according to the manufacturer's properties and recommendations for construction. At locations where temporary downpipes or permanent slope drains and culverts discharge, channel segments are improved with armoured rip rap lining to control flow dynamics. The design utilizes conventional liner materials to stabilize channels. The channels direct run-off to the sediment basins. The design incorporates the two (2) existing basins.

Design for the permanent sediment basins is consistent with E&SCP&DM Section 6.60. The structure provides a volume of 1800 ft<sup>3</sup>/acre of disturbed area and meets the surface area requirements set forth in E&SCP&DM. E&SCP&DM guidelines for permanent basins include riser/barrel principal spillways and emergency weir-type spillways. The principal spillway must be met with one foot of driving head. The crest of the emergency spillway is set one foot above the invert of the riser and must pass the peak run-off from the 10-year storm event with one foot of freeboard to crest of berm. The riser/barrel and emergency spillways were designed using spreadsheet based on methods provided in EOUSD. The riser/barrel assembly must be

constructed with an anchor displacing a buoyant weight of at least 1.1 times the weight of water displaced by the riser. The riser must also be provided with a method of dewatering the basin.

The existing Area A basin provides storage capacity that greatly exceeds the required 1800 ft<sup>3</sup>/acre design volume. This impoundment has been in-place for several decades and the surface features are in excellent condition, with well established vegetation. Based on its performance as an existing, functional structure, no spillway modifications are proposed for its use as a sediment basin. Evidently, when the transmission lines were constructed at this location, a rock trench was installed to drain impounded water through the embankment. The constructed swale under the transmission lines acts as an emergency spillway; however no flow condition has been observed where the water level from the impoundment has breached the swale. Superior vegetation is established in the swale and construction activities would compromise the established growth. If conditions prove otherwise, the S&EC plan would be modified to fit the feature with a standard riser/barrel principal spillway and reinforced emergency spillway.

### **4.3. Temporary Structures**

The design utilizes existing grassed swales and temporary diversion ditching to convey stormwater to permanent channels and the control structures. Ditch design is standardized across the site to establish clear operating requirements for soil borrow operations. Ditch depth allows for sedimentation during construction, with a minimum freeboard of 6 inches. These measures are designed to provide temporary erosion control until permanent vegetative cover is established.

## **5. Maintenance and Sediment Disposal**

All sedimentation and erosion control devices will be inspected at regular intervals and immediately following any significant rainfall event. Repairs will then be made as needed and accumulated sediment removed if necessary. All sediments which are removed during cleaning operations will be located in an area which is isolated from storm drainage and stabilized with vegetative cover.

Design allows for at least 6 inches of sediment to accumulate in channels and ditches. If accumulation exceeds 6 inches, sediment must be removed from channel or ditch. For the sediment basins and traps, sediment/silt will be removed prior to one-half of the basin volume becoming filled with sediment. A level gauge shall be set in each basin for monitoring sediment accumulation.

## **6. Vegetation Plan**

Vegetative cover must be established as soon as possible in inactive areas of the landfill. The landfill will be constructed in 5-10 lifts, which establish intermediate elevations. Areas at intermediate grade are covered with 12 inches of soil and seeded for stabilization. At final grade, a final cover is constructed on the perimeter slopes and top landfill surface. The final cover design is a 2-foot soil layer, with a 6-in topsoil surface, vegetated with native grasses. Temporary seeding may be used when cover is required in a season outside the best dates for permanent seeding. Seeding requirements are included in the project details.

Prior to any seeding operation, the soil shall be limed, fertilized, and disked. Soil testing shall be performed to determine the specific nutrient requirements of the soil. Adequate nutrient inputs are critical to establishing good vegetation in exposed subsoils. Incorporating the appropriate amounts of organic matter into the soil by using composted materials can also help to establish a good seed bed. Mulch or compost shall be used to protect permanent seeding applications.

## 7. GENERAL CONSTRUCTION SCHEDULE

1. Inspect existing West Basin and clean as necessary to limits shown on Drawings.
2. Install TC-2 V ditch and perimeter landfill toe dikes for Cell 1 operation.
3. Evaluate existing swale TC-1 for performance, replace with PC-1 if necessary.
4. Improve main haul road and extend into Cell 1 landfill operation.
5. Construct access roads along west perimeter of Cell 1, PC-1 segments, and RCP1.
6. Extend access roads, PC-1 and PC-2 along west perimeter to access and restore Main Basin ahead of Cell 2 base construction.
7. Restore Main Basin as shown on Drawings.
8. Construct Haul Road and Roadside Ditch as lifts progress.
9. Install access roads and PC-3 along east perimeter to Main Basin.
10. Install temporary downpipes for top landfill surface as lifts progress.
11. Seed intermediate cover areas on landfill.
12. When Phase 1 operations are complete, install partial final cover on completed perimeter slopes.
13. Continue use of temporary measures to convey landfill operational drainage to perimeter channels and basins.
14. When Phase 2 operations are complete, install remaining final cover on perimeter slopes and top landfill surface, including stormwater berms and permanent slope drains.
15. Clean channels and basins, maintain until vegetation is full established through facility post closure plan.

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## ATTACHMENT G

### PERMIT AMENDMENT DRAWINGS

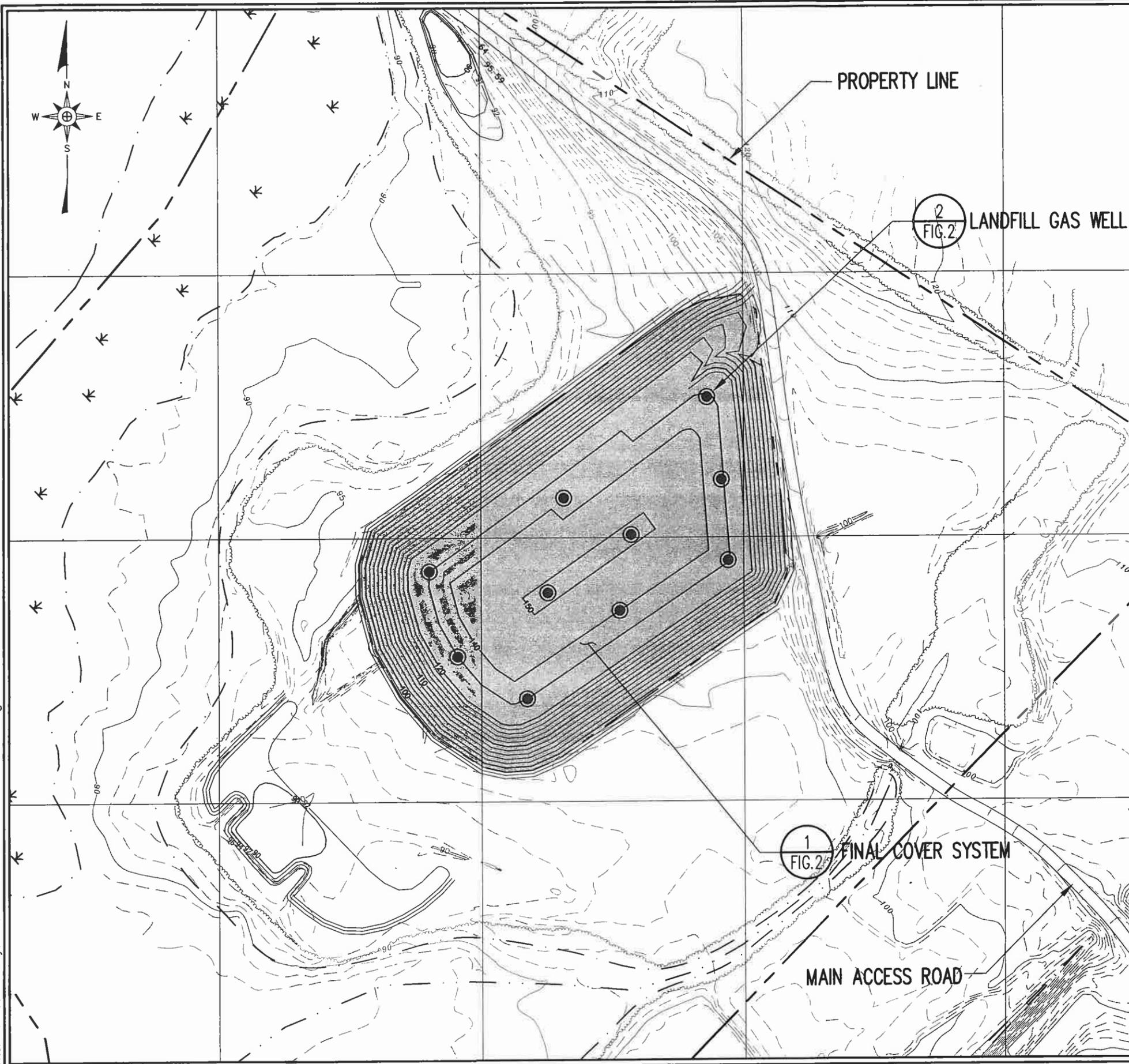
**Revised December 2010**

The only changes to the Permit Drawings approved as part of the 2004 Construction Plan Application relate to the change in the final cover profile and the addition of landfill gas wells/vents (See attached Figures 1 and 2). Also attached are the previously approved permit drawings.

**Additional drawings are included in supplement G-1 for updated C&D landfill mapping and cross sections, operations plan, Facility Site Plan, Landfill Gas Monitoring and T&P Site E&SC (Barlett Plans).**

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**LEGEND**

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- PROPOSED GRADING 10' CONTOUR (SEE REFERENCE 2)
- PROPOSED GRADING 2' CONTOUR
- PROPERTY LINE (SEE REFERENCE 2)
- WETLAND AREA (SEE REFERENCE 2)
- STREAM (SEE REFERENCE 2)
- AREA TO CLOSE (±10.5 AC.)
- PROPOSED LANDFILL GAS WELL OR VENT

**NOTES**

1. THE COUNTY WILL EVALUATE GAS PRESSURES UPON INSTALLATION OF THE FINAL COVER SYSTEM AND WILL INSTALL A NUMBER OF WELLS/VENTS AS NECESSARY TO ADEQUATELY RELIEVE GAS PRESSURE.

**REFERENCES**

1. TOPOGRAPHY FROM DRAWING "FINAL COVER PLAN", DATED 9/1/04, PREPARED BY GARY W. AHLBERG, P.E.
2. SITE PROPERTY LINE, WELLS, FINAL COVER GRADES, WETLAND AREAS, STREAMS AND FEATURES FROM DRAWING "FINAL COVER PLAN", DATED 9/1/04, PREPARED BY GARY W. AHLBERG, P.E.



**BLACKROCK ENGINEERS, INC.**

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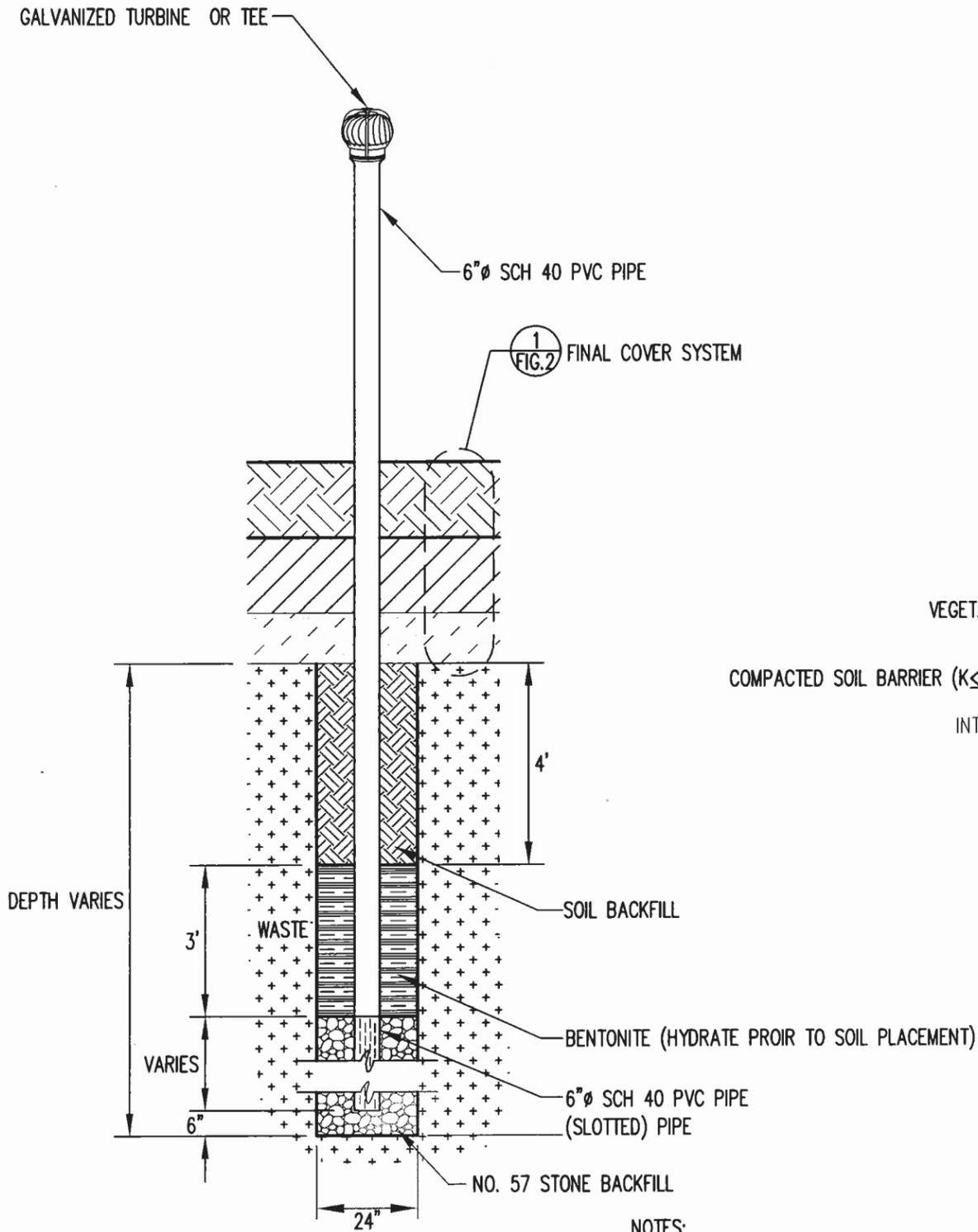


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FIGURE NO.	1	FILE NAME	WESTSIDE-B0001
SCALE:	AS SHOWN	PROJECT NO.	WESTSIDE 08-1
CHECKED BY:		DATE:	Nov. 2009
DRAWN BY:	J.A.L.		

TITLE:  
**WILSON COUNTY  
 WESTSIDE C&D LANDFILL  
 CLOSURE AREA**

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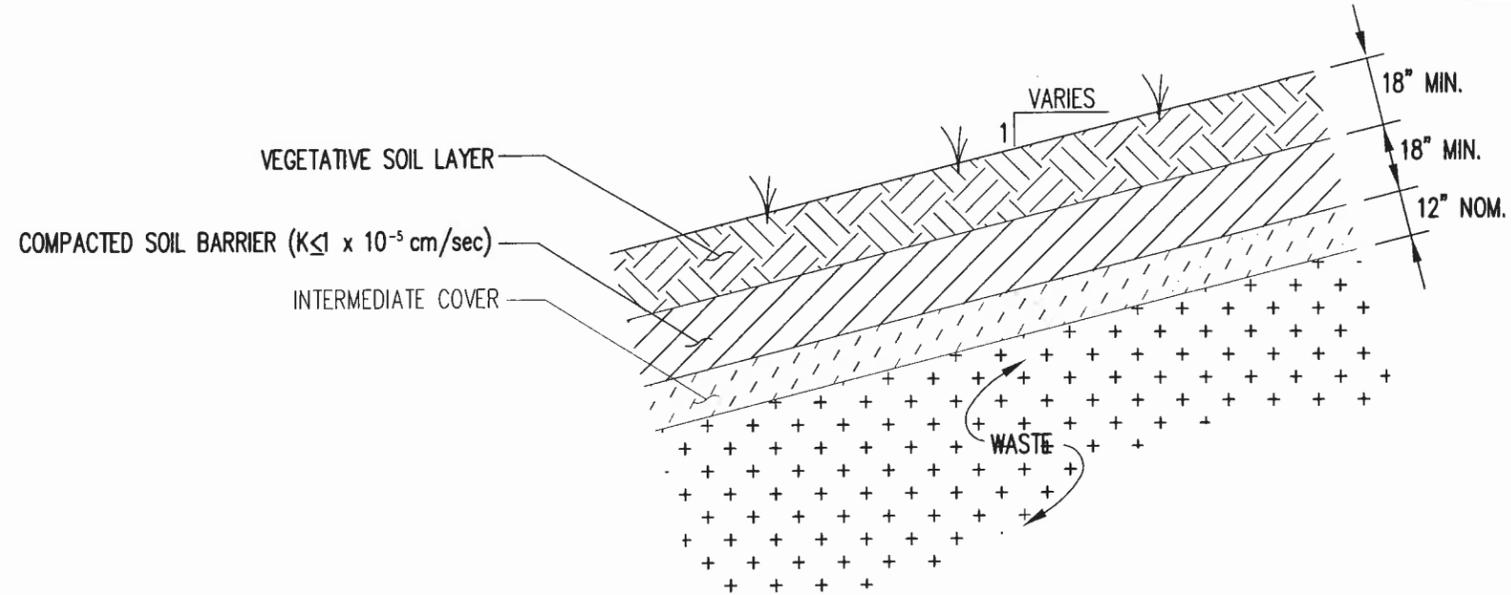


TYPICAL LANDFILL GAS WELL

DETAILS  
NOT TO SCALE

2  
FIG.2

- NOTES:
1. AS AN ALTERNATIVE TO WELLS, GAS COLLECTION TRENCHES MAY BE INSTALLED JUST BELOW THE FINAL COVER. TRENCHES SHALL CONSIST OF PERFORATED PIPE BEDDED IN NO. 57 STONE AND WRAPPED IN A NONWOVEN GEOTEXTILE. TRENCHES SHALL HAVE NOMINAL SIZE OF 6' WIDE x 20' LONG x 2' DEEP.



FINAL COVER SYSTEM

DETAILS  
NOT TO SCALE

1  
FIG.2

**BLACKROCK ENGINEERS, INC.**

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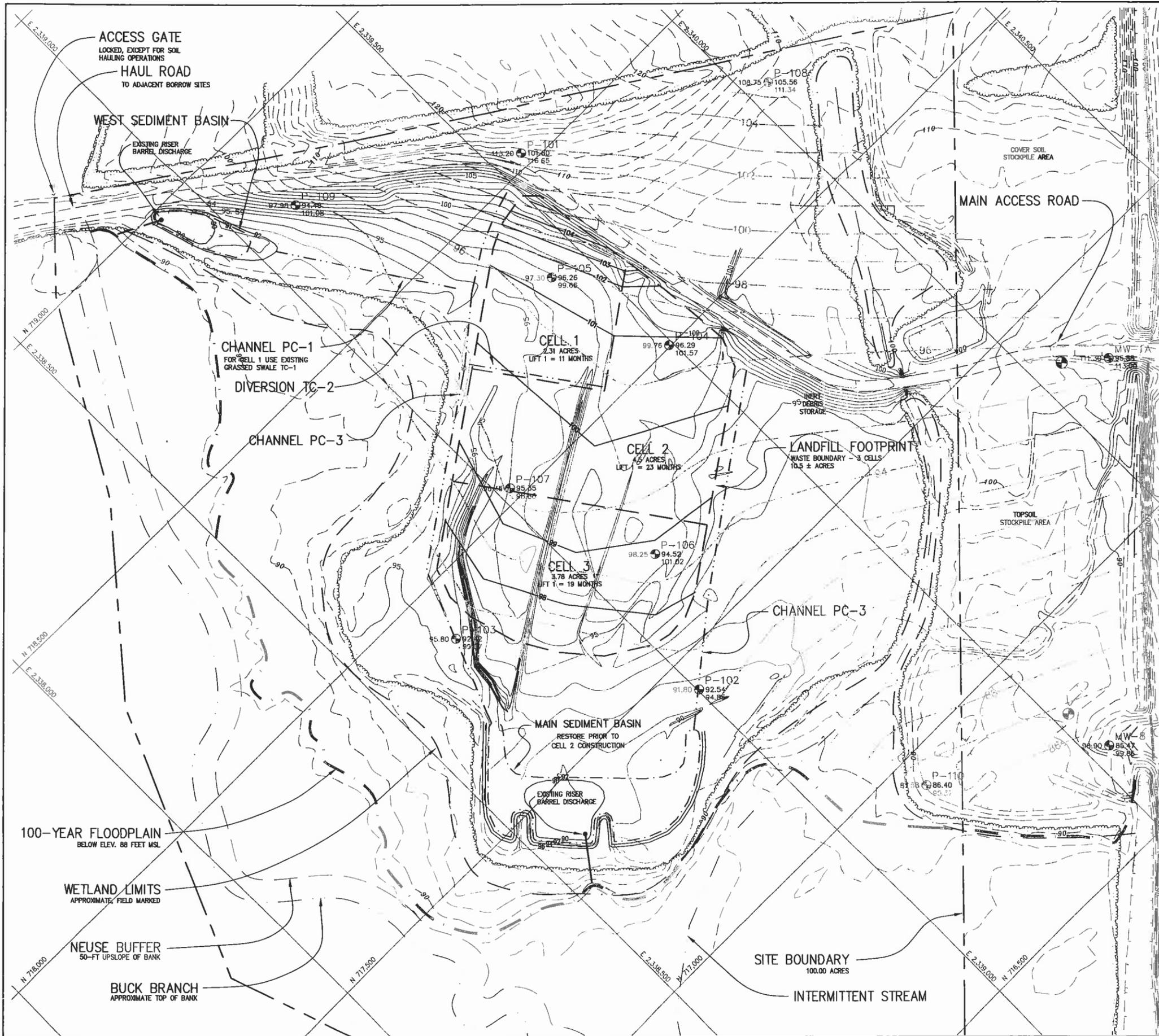


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FIGURE NO.	2	FILE NAME	WESTSIDE-B0002
SCALE:	AS SHOWN	PROJECT NO.	WESTSIDE 08-1
CHECKED BY:		DATE:	Nov. 2009
DRAWN BY:	J.A.L.		

WILSON COUNTY  
WESTSIDE C&D LANDFILL  
DETAILS

TITLE:



**CONSTRUCTION NOTES:**

- PURPOSE:** THIS FACILITY PLAN FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, IS PREPARED FOR A PERMIT TO CONSTRUCT ISSUED BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B.
- BASE GRADE:** AN AVERAGE 2-FOOT LAYER OF COMPACTED SOIL WILL BE ADDED TO THE EXISTING GRADE WITHIN THE FOOTPRINT. UNDER THE INITIAL 5-YEAR PERMIT TO CONSTRUCT, THE COMPACTED SOIL LAYER WILL BE CONSTRUCTED IN THREE TO FOUR LIFTS WITH SOILS APPROVED BY THE ENGINEER. WHERE THE BASE LAYER THICKNESS EXCEEDS 2 FEET, A LEVELING LIFT SHALL BE PLACED PRIOR TO THE THREE LIFTS (8-IN NOMINAL). AT AN AVERAGE LAYER THICKNESS OF 3.0 FEET, THE REQUIRED SOIL VOLUME FOR BASE CONSTRUCTION IS APPROXIMATELY 50,000 CUBIC YARDS.
- CELL 1 EXISTING CONDITIONS:** AS REPRESENTED IN THIS DRAWING AND ACCORDING TO THE DESIGN REQUIREMENTS OF THE ENGINEERING PLAN, BASE GRADE FOR CELL 1 WAS CONSTRUCTED DURING SITE GRADE RESTORATION ACTIVITIES PERFORMED IN SEPTEMBER 2003. GRADES HAVE BEEN VERIFIED BY THE PROJECT NC LICENSED SURVEYOR. BORINGS AND PIEZOMETERS INSTALLED IN THE CELL 1 AREA HAVE BEEN ABANDONED BY A NC LICENSED WELL DRILLER, IN ACCORDANCE WITH PROJECT REQUIREMENTS AND 15A NCAC 2C. UPON INSPECTION BY THE PROJECT ENGINEER AND ISSUANCE OF A PERMIT TO OPERATE BY THE NC SOLID WASTE SECTION, CELL 1 IS APPROVED FOR OPERATION. DOCUMENTATION OF CONSTRUCTION SHALL BE PLACED IN THE OPERATING RECORD AND SEALED BY THE PROJECT ENGINEER.
- GROUNDWATER SEPARATION:** BASE GRADES ARE A MINIMUM OF 4.5 ABOVE THE SEASONAL HIGH GROUNDWATER TABLE.

**LEGEND**

- 101 BASE GRADE 1-FOOT CONTOURS
- POTENTIOMETRIC CONTOUR OBSERVED SEASONAL HIGH LEVEL 11/19/02
- WESTSIDE SITE BOUNDARY
- LANDFILL FOOTPRINT 10.5 ACRES
- EXISTING LANDFILL LIMITS
- 100-YEAR FLOODPLAIN
- NEUSE BUFFER
- SURFACE WATER
- WETLAND BOUNDARY
- 2003 TOPOGRAPHY 1-FT CONTOUR WITHIN CONSTRUCTION LIMITS
- 1998 TOPOGRAPHY 2-FT CONTOUR SITE PERIMETER AREA
- DRAINAGE CHANNEL
- GMW-4 GROUNDWATER MONITORING WELL

**PERMIT ISSUE**  
NOT FOR CONSTRUCTION

**GRAPHIC SCALE**  
( IN FEET )  
1 inch = 100 FT

NO.	DESCRIPTION	DATE
REVISIONS		

**BASE GRADE PLAN**

SCALE: 1"=100'  
DATE: 9/01/04  
DRN. BY: GWA  
CHECKED BY: CWA

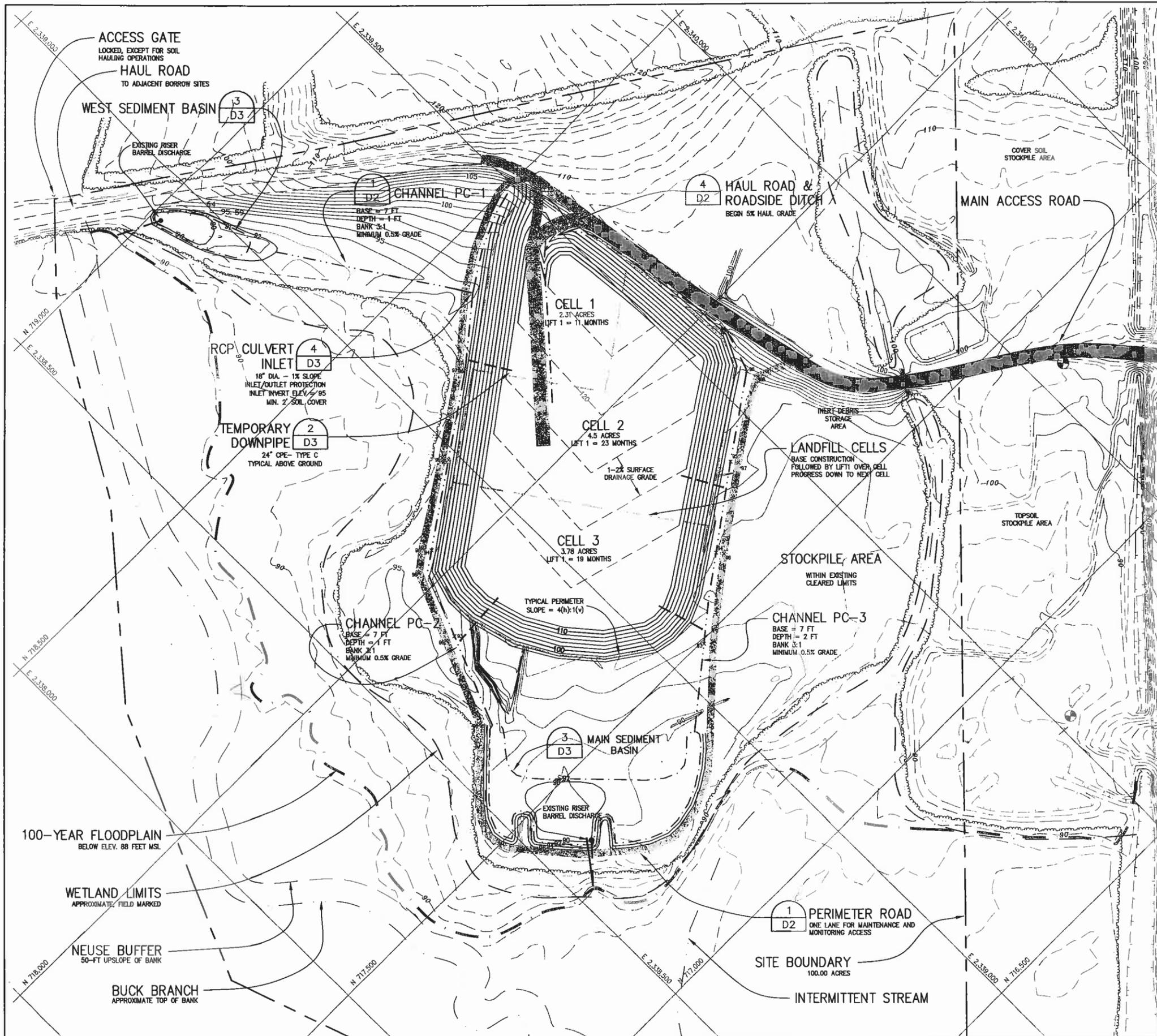
PROJECT NO:

**DRAWING NO. C1**

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PROJECT: WESTSIDE C&D LANDFILL CONSTRUCTION PLAN PERMIT WILSON, NORTH CAROLINA

PREPARED FOR: WILSON COUNTY DEPARTMENT OF SOLID WASTE 113 E. NASH STREET WILSON, NORTH CAROLINA 27894



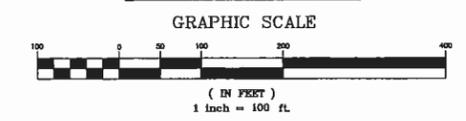
**CONSTRUCTION NOTES:**

- PURPOSE.** THIS PLAN FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, IS PREPARED FOR A PERMIT TO CONSTRUCT ISSUED BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B.
- WASTE STREAM AND DISPOSAL RATE.** THE LANDFILL WILL RECEIVE CONSTRUCTION AND DEMOLITION WASTE GENERATED WITHIN WILSON COUNTY, NORTH CAROLINA. OTHER WASTE TYPES APPROVED BY THE DIVISION FOR DISPOSAL: SEE PERMIT CONDITIONS OR AGENCY CORRESPONDENCE FOR SPECIFIC APPROVED WASTE TYPES, INCLUDING SPLIT TIRES AND TOBACCO DUST. THE ESTIMATED AVERAGE ANNUAL DISPOSAL RATES IS 20,000 TONS/YEAR.
- ACCESS CONTROL.** NATURAL TOPOGRAPHIC AND VEGETATIVE CONDITIONS AND CONTROL MEASURES LIMIT PUBLIC ACCESS TO THE SITE. WILSON COUNTY WILL MAINTAIN THE GATED ENTRANCE TO THE EXISTING MSW FACILITY. ACCESS TO THE WESTSIDE SITE WILL BE CONTROLLED VIA THE EXISTING MANNED SCALEHOUSE DURING OPERATING HOURS.
- LANDFILL OPERATIONAL GRADE.** THE LANDFILL WILL BE OPERATED IN 5 TO 10-FOOT LIFTS, PROGRESSING EVENLY ACROSS THE FOOTPRINT. AT THE INTERMEDIATE HEIGHT OF 10 FEET ABOVE BASE GRADE, THE ENTIRE 10.5 ACRE FOOTPRINT PROVIDES APPROXIMATELY 4 YEARS OF CAPACITY. INTERMEDIATE GRADE WITH A 1-2% SURFACE SLOPE SOILS SHALL BE MAINTAINED TO DIVERT STORMWATER OFF THE LANDFILL.
- LANDFILL CAPACITY AND CELL CONSTRUCTION SCHEDULE.** THE BASE SOIL LAYER SHALL BE CONSTRUCTED IN THREE CELLS. THE OPERATING LIFE FOR EACH INITIAL LIFT OVER A CELL AREA IS ESTIMATED AT 5 MONTHS/ACRE AS FOLLOWS:  
 CELL 1 - 2.31 ACRES: 11 MONTHS  
 CELL 2 - 4.50 ACRES: 23 MONTHS  
 CELL 3 - 3.78 ACRES: 19 MONTHS
- COVER SOILS.** DUE TO THE NON-PUTRESCIBLE NATURE OF THE WASTE, THE WORKING LIFT SHALL BE TYPICALLY COVERED ON A WEEKLY BASIS. THE TOP PORTION OF THE LIFT SHALL RECEIVE A MINIMUM COVER OF SIX INCHES. AS SECTIONS OF THE PERIMETER SLOPES ARE COMPLETED, THE 24-INCH FINAL COVER VSL SHALL BE PLACED AND COMPACTED. THE TOTAL SOIL VOLUME REQUIRED FOR THE WESTSIDE C&D LANDFILL PROJECT IS APPROXIMATELY 165,000 CUBIC YARDS. BASED ON AN AVERAGE EXCAVATION DEPTH OF 5 FEET BELOW THE EXISTING LAND SURFACE FROM THE 50 ACRES AVAILABLE FROM THE TUCKER AND MOHESKY SITES, THE MINIMUM ESTIMATE OF REMAINING SOIL RESOURCES FOR THE OFF-SITE BORROW AREAS IS 400,000 CUBIC YARDS. THE ENGINEER SHALL SPECIFY SOIL PROPERTIES FOR SPECIFIC LANDFILL APPLICATIONS.
- FILL PROGRESSION.** LANDFILL OPERATIONS ARE DESIGNED TO FILL THE CELLS IN SEQUENTIAL ORDER, WITH A TOP-DOWN PROGRESSION. SURFACE DRAINAGE SHALL BE MAINTAINED FROM THE CENTER TOWARD THE PERIMETER SLOPES. TEMPORARY DOWNPIPES SHALL BE USED TO CONVEY SURFACE DRAINAGE TO CHANNELS.
- PERIMETER SLOPES.** EXCEPT FOR SOIL EMBANKMENTS, PERIMETER SLOPES SHALL BE CONSTRUCTED AT A MAXIMUM GRADE OF 4(h):1(v).
- INERT DEBRIS STORAGE (IDS) AREA.** INERT DEBRIS MAY BE STORED TEMPORARILY FOR FUTURE USE IN HAUL OR ACCESS ROAD BASE CONSTRUCTION. NO LAND CLEARING DEBRIS OR OTHER WASTES ARE ALLOWED IN THE IDS AREA.

**LEGEND**

- 24" CPP TYPE C-DOWNRAIN
- WESTSIDE SITE BOUNDARY
- LANDFILL CELLS  
C1+C2+C3=10.59 ACRES TOTAL
- EXISTING LANDFILL LIMITS
- 100-YEAR FLOODPLAIN
- NEUSE BUFFER
- SURFACE WATER
- WETLAND BOUNDARY
- P1 INTERMEDIATE GRADE 2-FT CONTOUR
- FINAL GRADE 2-FT CONTOUR
- 2003 TOPOGRAPHY 1-FT CONTOUR
- 1998 TOPOGRAPHY 2-FT CONTOUR
- DRAINAGE CHANNEL

**PERMIT ISSUE  
NOT FOR CONSTRUCTION**

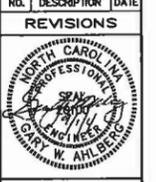


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PROJECT:  
 WESTSIDE C&D LANDFILL  
 CONSTRUCTION PLAN PERMIT  
 WILSON, NORTH CAROLINA

PREPARED FOR:  
 WILSON COUNTY  
 DEPARTMENT OF SOLID WASTE  
 113 E. NASH STREET  
 WILSON, NORTH CAROLINA 27894

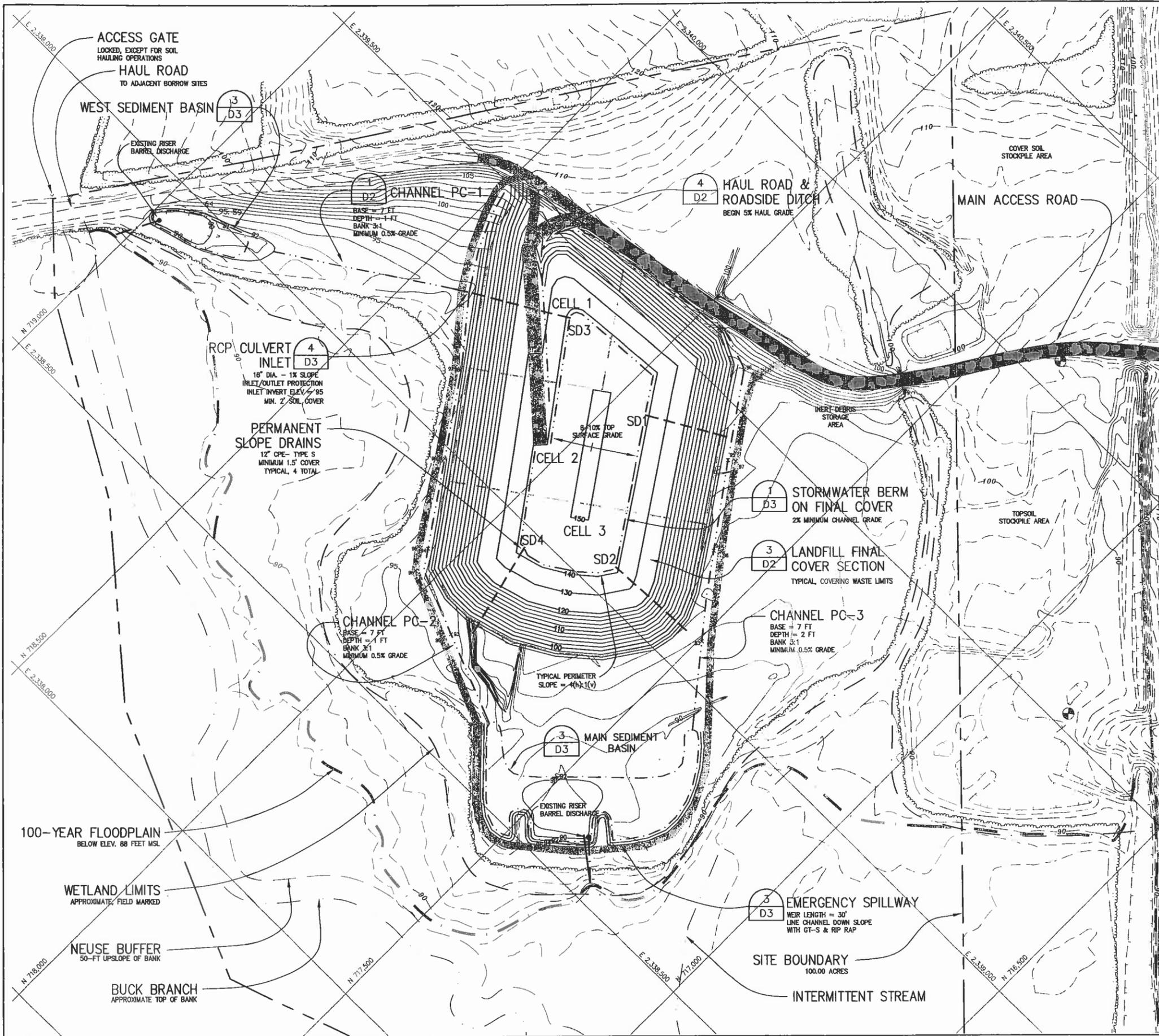
NO.	DESCRIPTION	DATE
REVISIONS		



**PHASE 1  
OPERATION  
PLAN**

SCALE: 1"=100'  
 DATE: 9/01/04  
 DRN. BY: GWA  
 CHECKED BY: GWA  
 PROJECT NO:

DRAWING NO.  
**C2**



**CONSTRUCTION NOTES:**

- PURPOSE.** THIS FACILITY PLAN FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, IS PREPARED FOR A PERMIT TO CONSTRUCT ISSUED BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 136.
- ACCESS CONTROL.** NATURAL TOPOGRAPHIC AND VEGETATIVE CONDITIONS AND CONTROL MEASURES LIMIT PUBLIC ACCESS TO THE SITE. WILSON COUNTY WILL MAINTAIN LOCATED GATES AT THE WEST AND MAIN ENTRANCES TO THE FACILITY.
- FINAL GRADE.** DESIGN GRADES PROVIDED ARE FOR TOP OF FINAL COVER. ANY ADJUSTMENTS TO INCREASE THE FINAL COVER THICKNESS WILL REQUIRE MODIFICATION TO INTERMEDIATE COVER GRADES TO ALLOW FOR FINAL COVER CONSTRUCTION.
- ALL CHANNELS** SHALL BE STABILIZED WITH EXCELSIOR CUREX 2 MATTING OR EQUIVALENT TO SECURE SEED AND ESTABLISH GRASSED CHANNEL. OUTLET PROTECTION SHALL BE CONSTRUCTED WITH D50 = 6-9 INCH RIP RAP, UNDERLAD WITH G1-S.
- CLOSURE AND POST CLOSURE.** WHEN OPERATIONS HAVE REACHED FINAL DESIGN GRADE, THE LANDFILL WILL BE COVERED WITH AT LEAST TWO FEET OF COMPACTED SOIL COVER. THE FINAL SOIL COVER WILL BE VEGETATED WITH NATIVE GRASSES ACCORDING TO THE SITE'S VEGETATION PLAN. INSPECTIONS WILL BE CONDUCTED PERIODICALLY TO OBSERVE THE INTEGRITY OF THE FINAL COVER. REPAIRS WILL BE MADE AS NECESSARY TO RESTORE THE VEGETATIVE SOIL COVER.

**LEGEND**

- 24" CPP TYPE C--DOWNDRAIN
- WESTSIDE SITE BOUNDARY
- LANDFILL CELLS  
C1+C2+C3=10.59 ACRES TOTAL
- EXISTING LANDFILL LIMITS
- 100-YEAR FLOODPLAIN
- NEUSE BUFFER
- SURFACE WATER
- WETLAND BOUNDARY
- FINAL COVER GRADE 2-FT CONTOUR
- FINAL COVER GRADE 10-FT CONTOUR
- 2003 TOPOGRAPHY 1-FT CONTOUR
- 1998 TOPOGRAPHY 2-FT CONTOUR
- DRAINAGE CHANNEL



**PERMIT ISSUE  
NOT FOR CONSTRUCTION**

GRAPHIC SCALE  
1" = 100'  
1 inch = 100 ft

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PROJECT:  
 WESTSIDE C&D LANDFILL  
 CONSTRUCTION PLAN PERMIT  
 WILSON, NORTH CAROLINA

PREPARED FOR:  
 WILSON COUNTY  
 DEPARTMENT OF SOLID WASTE  
 113 E. NASH STREET  
 WILSON, NORTH CAROLINA 27894

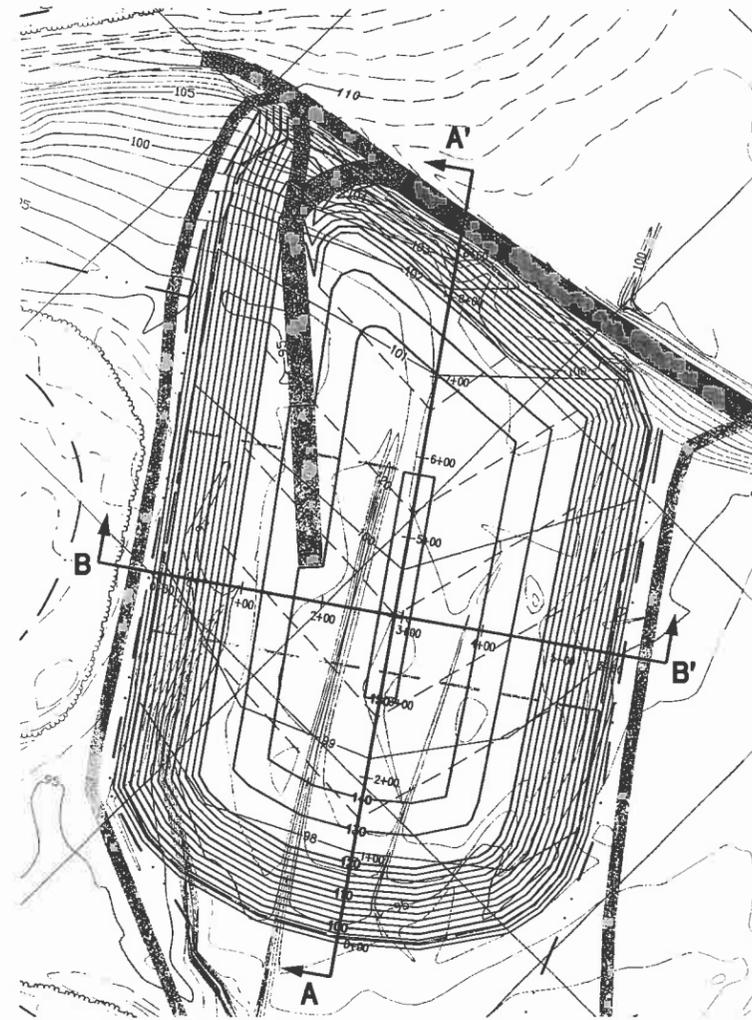
NO.	DESCRIPTION	DATE
REVISIONS		

**FINAL COVER PLAN**

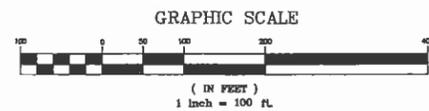
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 DATE: 9/01/04  
 DRN. BY: GWA  
 CHECKED BY: GWA

PROJECT NO:

DRAWING NO.  
**C3**

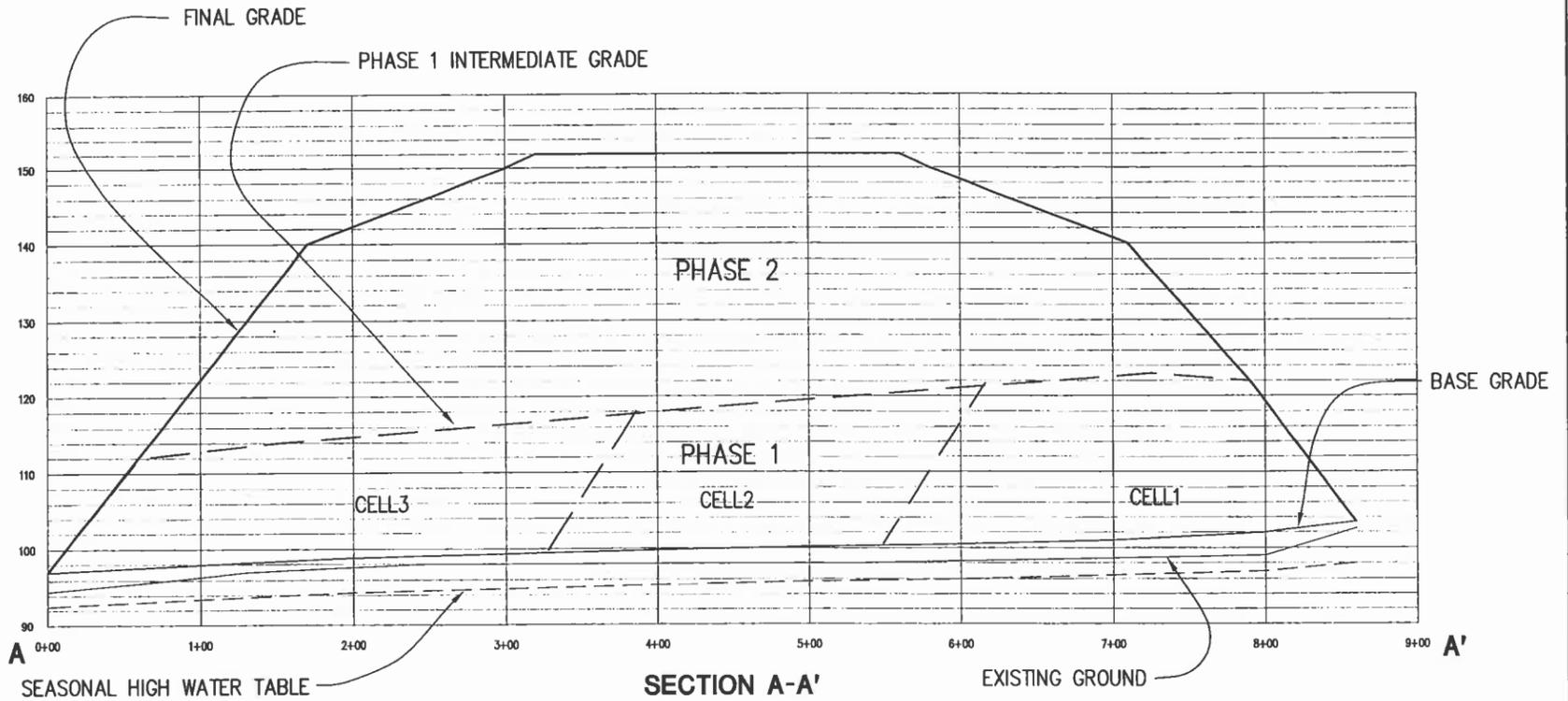


PLAN SECTION ALIGNMENT  
SCALE 1" = 100'



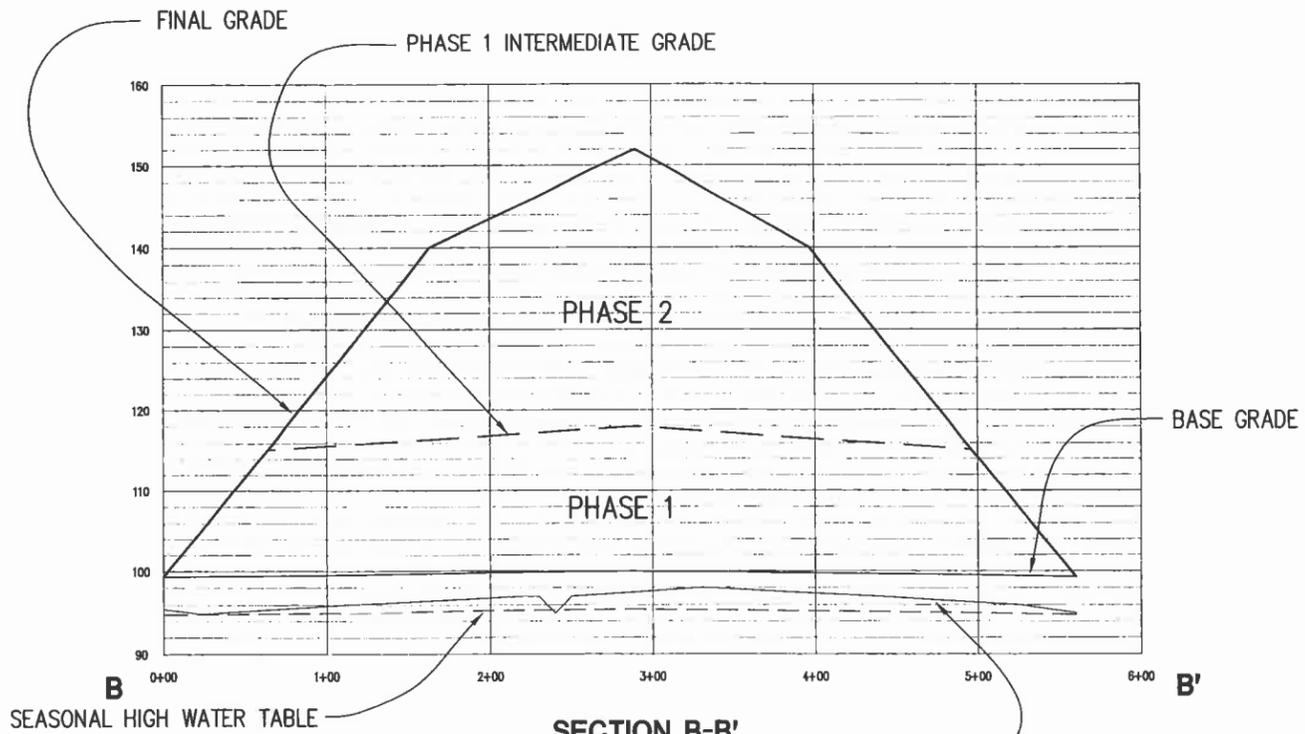
LEGEND

- LANDFILL FOOTPRINT  
10.5 ACRES
- LANDFILL BASE GRADE 1-FT CONTOUR
- P1 INTERMEDIATE GRADE 2-FT CONTOUR
- FINAL GRADE 2-FT CONTOUR
- 2003 TOPOGRAPHY 1-FT CONTOUR
- 1998 TOPOGRAPHY 2-FT CONTOUR
- DRAINAGE CHANNEL



SECTION A-A'

HORIZONTAL SCALE: 1" = 50'  
VERTICAL SCALE: 1" = 10'



SECTION B-B'

HORIZONTAL SCALE: 1" = 50'  
VERTICAL SCALE: 1" = 10'

PERMIT ISSUE  
NOT FOR CONSTRUCTION

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WILSON, NORTH CAROLINA

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113 E. NASH STREET  
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NO.	DESCRIPTION	DATE
REVISIONS		



LANDFILL  
CROSS  
SECTIONS

SCALE: 1" = 100'  
DATE: 9/01/04  
DRN. BY: GWA  
CHECKED BY: GWA

PROJECT NO:

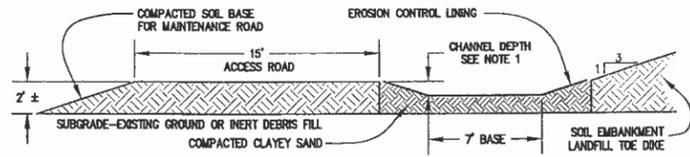
DRAWING NO.

D1

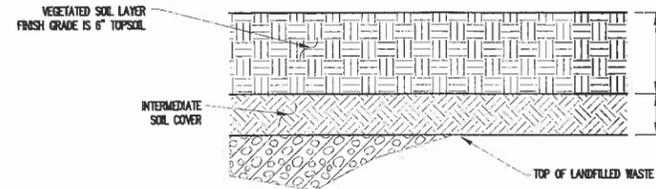
NOTES:

1. TYPICAL CHANNEL DEPTH IS 1 FOOT. PC-3 DEPTH IS 2 FEET. APPARENT DEPTH INCREASES WITHIN 300 FEET OF CHANNEL DISCHARGE TO THE MAIN BASIN DUE TO FIXED ELEVATION OF ACCESS ROAD AT 96.0.

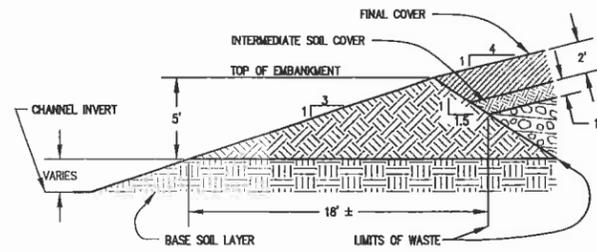
2. RECP LINING IS EXCELSIOR CURLEX 2 OR EQUIVALENT, INSTALLED ACCORDING TO MANUFACTURERS GUIDELINES.



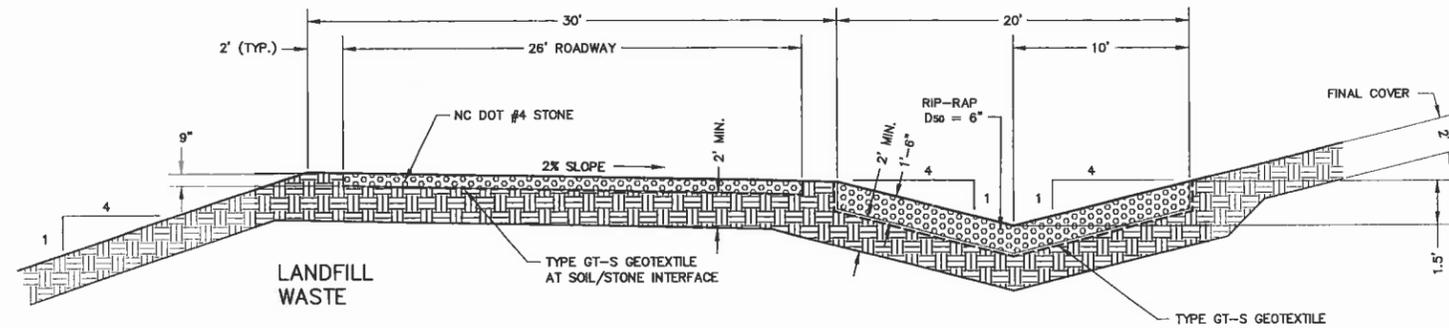
**1 - ACCESS ROAD & PERIMETER CHANNEL**  
SCALE: 1" = 5'



**3 - TYPICAL LANDFILL FINAL COVER SECTION**  
SCALE: 1" = 2'-0"



**2 - LANDFILL PERIMETER TOE DIKE**  
SCALE: 1" = 5'



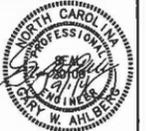
**4 - HAUL ROAD AND ROADSIDE DITCH**  
NOT TO SCALE

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PROJECT:  
WESTSIDE C&D LANDFILL  
CONSTRUCTION PLAN PERMIT  
WILSON, NORTH CAROLINA

PREPARED FOR:  
WILSON COUNTY  
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113 E. NASH STREET  
WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
REVISIONS		



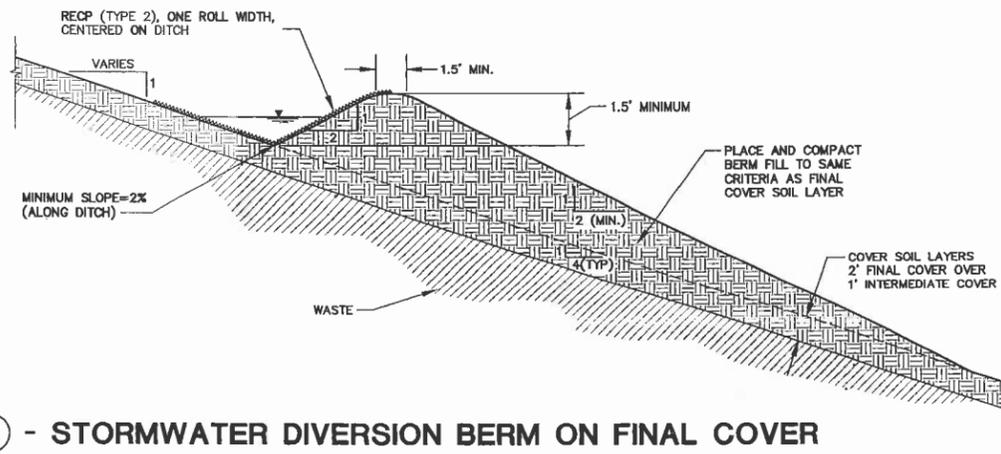
DETAILS

SCALE: AS SHOWN  
DATE: 8/31/04  
DRN. BY: GWA  
CHECKED BY: GWA  
PROJECT NO:

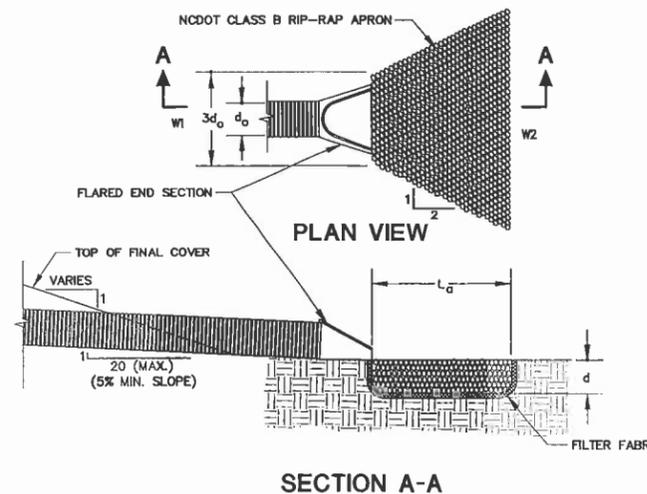
DRAWING NO.

**D2**

PERMIT ISSUE  
NOT FOR CONSTRUCTION



**1 - STORMWATER DIVERSION BERM ON FINAL COVER**  
NOT TO SCALE

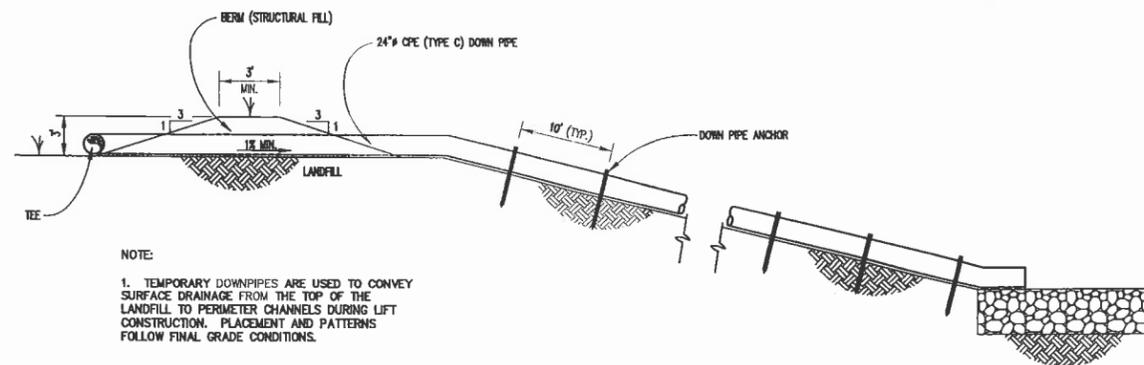


**NOTES:**

1.  $L_d$  IS THE LENGTH OF THE RIP-RAP APRON (MIN.  $4d_0$ ).
2.  $d=1.5$  TIMES THE MAXIMUM SPECIFIED STONE DIAMETER (MIN. 12").
3.  $d_0$ =PIPE DIAMETER.
4. IN A WELL-DEFINED CHANNEL, EXTEND THE APRON UP THE CHANNEL BANKS TO THE TOP OF THE BANK.
5. AN APPROVED FILTER FABRIC SHALL BE INSTALLED BETWEEN THE RIP-RAP AND SOIL FOUNDATION, WITH THE EDGES ANCHORED, PER MANUFACTURER'S GUIDELINES.
6. OUTLET PROTECTION SHALL CONFORM TO NC EROSION AND SEDIMENT CONTROL STANDARDS AND SPECIFICATIONS.

CULVERT DIAMETER	LENGTH	DEPTH	WIDTH 1	WIDTH 2
$d_0$	$L_d$	D	W1	W2
1	4	1.25	3	7
1.5	6	1.25	4.5	10.5

**4 - SLOPE DRAIN/CULVERT OUTLET**  
NOT TO SCALE



**NOTE:**

1. TEMPORARY DOWNPIPES ARE USED TO CONVEY SURFACE DRAINAGE FROM THE TOP OF THE LANDFILL TO PERIMETER CHANNELS DURING LIFT CONSTRUCTION. PLACEMENT AND PATTERNS FOLLOW FINAL GRADE CONDITIONS.

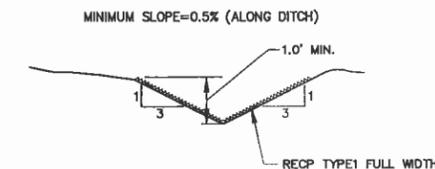
**2 - TEMPORARY DOWNPIPE**  
NOT TO SCALE - TYPICAL

**SEEDING REQUIREMENTS**

1. SEEDBED PREPARATION. APPLY LIME AND FERTILIZER AT RATES LISTED IN (2) AND INCORPORATE INTO THE TOP 4-6 INCHES OF SOIL BY DISKING OR OTHER SUITABLE MEANS. HYDROSEEDING MAY BE USED FOR APPLICATION.
2. SOIL AMENDMENTS. THE FOLLOWING LIME AND FERTILIZER APPLICATION RATES ARE MINIMUM REQUIREMENTS. CONTRACTOR SHOULD TEST SOIL FOR DETERMINING SPECIFIC RATES.  
  
AGRICULTURAL LIME 1.5 TONS/ACRE  
5-10-10 FERTILIZER 0.5 TON/ACRE
3. SEED. LEGUME SEED SHALL BE INOCULATED WITH RHIZOBIUM BACTERIA. ALL SEED SHALL BE "CERTIFIED SEED". APPLY SEED UNIFORMLY AND MULCH WITH STRAW OR WOOD FIBER MULCH AT A RATE OF 1 TON/ACRE.
4. EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, NC LAND QUALITY SECTION. INCLUDING HYDROSEEDING, ALL SEEDING APPLICATIONS SHALL BE CONSISTENT WITH THE REQUIREMENTS PROVIDED IN THE ESCPD MANUAL. UPON REQUEST, ENGINEER SHALL PROVIDE CONTRACTOR WITH SPECIFIC SECTIONS.

**NOTES:**

1. TC-2 IS INSTALLED AS A TEMPORARY DIVERSION ROUTING ALL CELL 1 RUNOFF TO THE WEST BASIN.



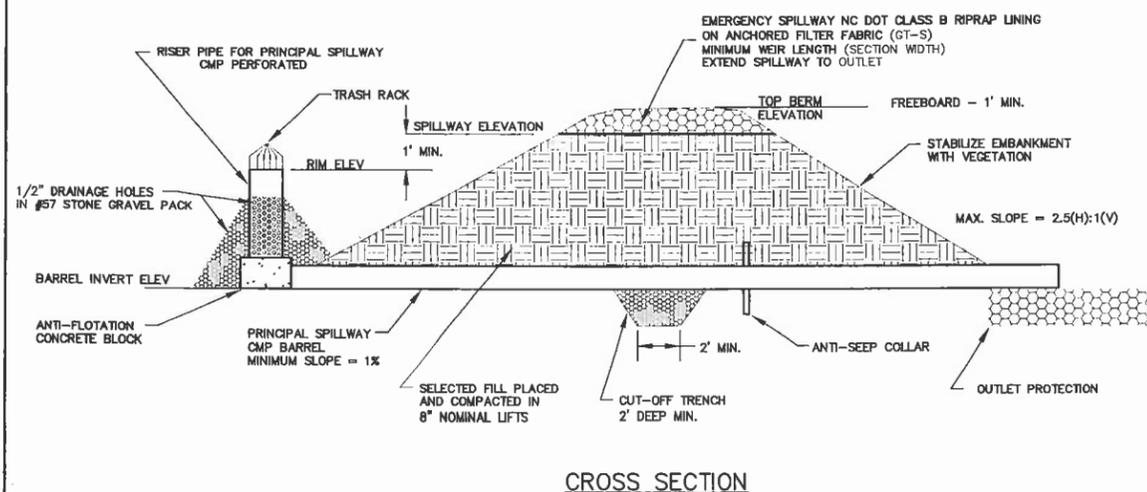
**5 - V-DITCH TC-2**  
NOT TO SCALE

**TABLE 1: SEDIMENT BASIN DATA**

BASIN	MAIN	WEST
Q 10-YR	85	26
VOLUME (CF)	84,050	17,000
SURFACE AREA (SF)	57,800	12,000
RISER DIA.	36"	15"
RIM ELEVATION	92	91
BARREL DIA.	30"	12"
INVERT ELEV.	87	88
SPILLWAY ELEV.	94	92
TOP OF BERM	96	94
WEIR LENGTH	30'	20'

**TABLE 2: SEEDING SCHEDULE**

APPLICATION AREA	SEEDING MIX	RATE (lb/acre)	BEST DATES	POSSIBLE DATES
Gross Lined Channels	Tall Fescue	100	late Aug - Oct	Feb - mid April
	Millet	100	Mar - Aug	
Borrow Areas	Tall fescue	80	8/15 - 9/15 or 2/15 - 3/21	8/20 - 10/25 or 2/1 - 4/15
	Sericea lespedeza	25		
Landfill - temporary	Tall fescue	80	8/15 - 9/15 or 2/15 - 3/21	8/20 - 10/25 or 2/1 - 4/15
	Sericea lespedeza	25		
Landfill - final	Tall fescue	80	2/15 - 3/20 or 9/1 - 9/30	2/15 - 4/30 or 9/1 - 10/31
	Kobe lespedeza	40		



**CROSS SECTION**

**3 - SEDIMENT BASIN**  
NOT TO SCALE

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PROJECT:  
WESTSIDE C&D LANDFILL  
CONSTRUCTION PLAN PERMIT  
WILSON, NORTH CAROLINA

PREPARED FOR:  
WILSON COUNTY  
DEPARTMENT OF SOLID WASTE  
113 E. NASH STREET  
WILSON, NORTH CAROLINA 27894

NO. DESCRIPTION DATE

REVISIONS



DETAILS

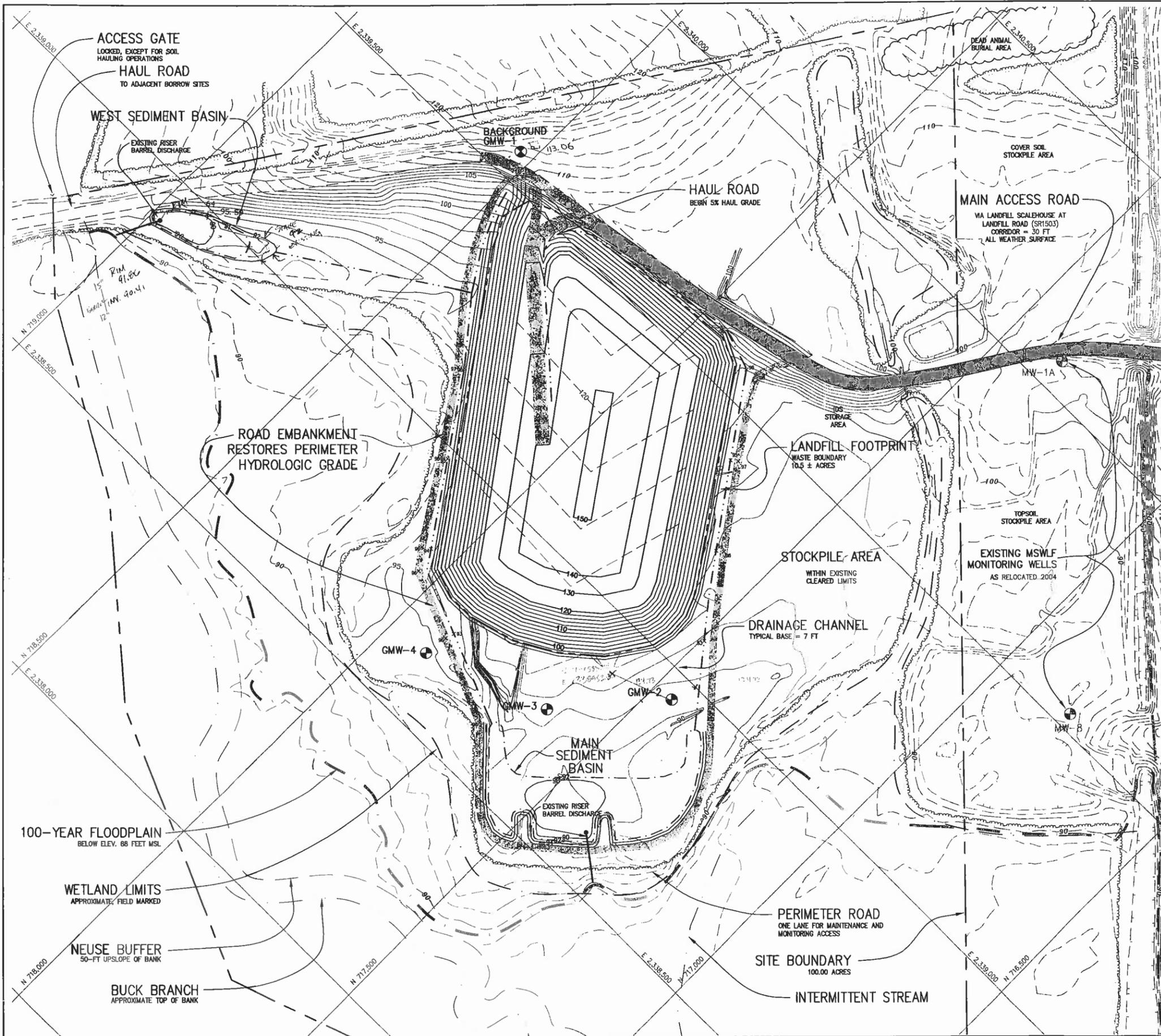
SCALE: AS SHOWN  
DATE: 8/31/04  
DRN. BY: GWA  
CHECKED BY: GWA

PROJECT NO:

DRAWING NO.

PERMIT ISSUE  
NOT FOR CONSTRUCTION

**D3**



**CONSTRUCTION NOTES:**

- PURPOSE:** THIS FACILITY PLAN FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, IS PREPARED FOR A PERMIT TO CONSTRUCT ISSUED BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 138.
- FACILITY DESCRIPTION:** THE PROPOSED FACILITY PROPERTY IS 100.00 ACRES OWNED BY WILSON COUNTY. THE PROPOSED WASTE BOUNDARY IS 10.5 ACRES, AND IS DEFINED AS THE LANDFILL FOOTPRINT. IN ADDITION TO THE LANDFILL, THE PLAN ALSO DELINEATES SEDIMENT BASINS, ROADS, EARTHEN EMBANKMENTS, AND BUFFER ZONES. THE ESTIMATED FACILITY LIFE IS 10.8 YEARS.
- WASTE STREAM AND DISPOSAL RATE:** THE LANDFILL WILL RECEIVE CONSTRUCTION AND DEMOLITION WASTE GENERATED WITHIN WILSON COUNTY, NORTH CAROLINA. OTHER WASTE TYPES APPROVED BY THE DIVISION FOR DISPOSAL; SEE PERMIT CONDITIONS OR AGENCY CORRESPONDENCE FOR SPECIFIC APPROVED WASTE TYPES, INCLUDING SPLIT TIRES AND TOBACCO DUST. THE ESTIMATED AVERAGE ANNUAL DISPOSAL RATES IS 20,000 TONS/YEAR.
- ACCESS CONTROL:** NATURAL TOPOGRAPHIC AND VEGETATIVE CONDITIONS AND CONTROL MEASURES LIMIT PUBLIC ACCESS TO THE SITE. WILSON COUNTY WILL MAINTAIN THE GATED ENTRANCE TO THE EXISTING MSW FACILITY. ACCESS TO THE WESTSIDE SITE WILL BE CONTROLLED VIA THE EXISTING MANNED SCALEHOUSE DURING OPERATING HOURS.
- LOCAL GOVERNMENT APPROVAL:** THE PROPOSED LAND USE HAS BEEN APPROVED BY THE CITY OF WILSON AND WILSON COUNTY, ESTABLISHING PRIOR APPROVAL FOR THE DIVISION'S LANDFILL PERMIT.
- HYDROLOGIC GRADE RESTORATION:** APPROXIMATELY 1000 LINEAR FEET OF SOIL EMBANKMENT FILL WILL BE PLACED TO RESTORE HYDROLOGIC CONDITIONS AND ESTABLISH STORMWATER CONTROL FOR THE LANDFILL CONSTRUCTION LIMITS. THE MINIMUM PEAK ELEVATION FOR THE EMBANKMENT FILL IS 94 MSL.
- BASE GRADE:** AN AVERAGE 2-FOOT LAYER OF COMPACTED SOIL WILL BE ADDED TO THE EXISTING GRADE WITHIN THE FOOTPRINT. UNDER THE INITIAL 5-YEAR PERMIT TO CONSTRUCT, THE COMPACTED SOIL LAYER WILL BE CONSTRUCTED IN THREE TO FOUR LIFTS WITH SOILS APPROVED BY THE ENGINEER. AT AN AVERAGE LAYER THICKNESS OF 3.0 FEET, THE REQUIRED SOIL VOLUME FOR BASE CONSTRUCTION IS APPROXIMATELY 50,000 CUBIC YARDS. SEE ENGINEERING PLAN AND BASE GRADE PLAN DRAWING C1 FOR REQUIREMENTS.
- LANDFILL OPERATIONAL GRADE:** THE LANDFILL WILL BE OPERATED IN 5 TO 10-FOOT LIFTS, PROGRESSING EVENLY ACROSS THE FOOTPRINT. AT THE INTERMEDIATE HEIGHT OF 10 FEET ABOVE BASE GRADE, THE ENTIRE 10.5 ACRE FOOTPRINT PROVIDES APPROXIMATELY 4 YEARS OF CAPACITY. SOILS FOR COVER CONSTRUCTION ARE AVAILABLE FROM THE DEDICATED BORROW SITES ADJACENT TO THE SITE AND OWNED BY WILSON COUNTY.
- LANDFILL CAPACITY AND PROJECT LIFE:** THE FINAL GRADING PLAN FOR THE LANDFILL'S CONCEPTUAL DESIGN PROVIDES 433,560 CUBIC YARDS OF AIRSPACE FOR LANDFILL OPERATION AND FINAL COVER CONSTRUCTION. USING AN IN-PACE DENSITY OF 0.86 TONS/CUBIC YARD AND A 1:8 SOIL TO WASTE RATIO (1:167), THE AVERAGE DISPOSAL RATE OF 20,000 TONS/YEAR YIELDS A PROJECT LIFE = 10.8 YEARS.
- COVER SOILS:** DUE TO THE NON-PUTRESIBLE NATURE OF THE WASTE, THE WORKING LIFT SHALL BE TYPICALLY COVERED ON A WEEKLY BASIS. THE TOP PORTION OF THE LIFT SHALL RECEIVE A MINIMUM COVER OF SIX INCHES. AS SECTIONS OF THE PERIMETER SLOPES ARE COMPLETED, THE 24-INCH FINAL COVER VSL SHALL BE PLACED AND COMPACTED. THE TOTAL SOIL VOLUME REQUIRED FOR THE WESTSIDE C&D LANDFILL PROJECT IS APPROXIMATELY 165,000 CUBIC YARDS. BASED ON AN AVERAGE EXCAVATION DEPTH OF 5 FEET BELOW THE EXISTING LAND SURFACE FROM THE 50 ACRES AVAILABLE FROM THE TUCKER AND MOHESKY SITES, THE MINIMUM ESTIMATE OF REMAINING SOIL RESOURCES FOR THE OFF-SITE BORROW AREAS IS 400,000 CUBIC YARDS. THE ENGINEER SHALL SPECIFY SOIL PROPERTIES FOR SPECIFIC LANDFILL APPLICATIONS.
- WATER QUALITY MONITORING PLAN:** THE DETECTION MONITORING NETWORK INCLUDES FOUR GROUNDWATER MONITORING WELLS. OVERALL, ONE UPGRADIENT AND THREE DOWNGRADIENT LOCATIONS PROVIDE A MONITORING WELL DENSITY OF 1 DETECTION STATION PER 3.5 ACRES OF LANDFILL AREA. DOWNGRADIENT WELL INSTALLATIONS ARE SPACED EQUALLY ACROSS A 125-FOOT OFFSET (REVIEW BOUNDARY) TO THE LANDFILL FOOTPRINT. COMPLETION INTERVALS SHALL BE WITHIN THE UPPERMOST 10-15 FEET OF THE SEASONAL HIGH WATER TABLE AND SHALL TARGET THE TAN AND ORANGE SAND UNITS IN THE CHARACTERIZED STRATIGRAPHY. GROUND SURFACE ELEVATIONS LEADING TO (HW DRIVE PATH) AND SURROUNDING THE WELLS SHALL BE AT LEAST 93 FEET MSL.
- CLOSURE AND POST CLOSURE:** WHEN OPERATIONS HAVE REACHED FINAL DESIGN GRADE, THE LANDFILL WILL BE COVERED WITH AT LEAST TWO FEET OF COMPACTED SOIL COVER. THE FINAL SOIL COVER WILL BE VEGETATED WITH NATIVE GRASSES ACCORDING TO THE SITE'S VEGETATION PLAN. INSPECTIONS WILL BE CONDUCTED PERIODICALLY TO OBSERVE THE INTEGRITY OF THE FINAL COVER. REPAIRS WILL BE MADE AS NECESSARY TO RESTORE THE VEGETATIVE SOIL COVER.

**LEGEND**

- WESTSIDE SITE BOUNDARY
- LANDFILL FOOTPRINT  
10.5 ACRES
- EXISTING LANDFILL LIMITS
- 100-YEAR FLOODPLAIN
- NEUSE BUFFER
- SURFACE WATER
- WETLAND BOUNDARY
- P1 INTERMEDIATE GRADE 2-FT CONTOUR
- FINAL GRADE 2-FT CONTOUR
- 2003 TOPOGRAPHY 1-FT CONTOUR
- 1998 TOPOGRAPHY 2-FT CONTOUR
- DRAINAGE CHANNEL
- ⊕ GMW-4 GROUNDWATER MONITORING WELL

**PERMIT ISSUE  
NOT FOR CONSTRUCTION**

GRAPHIC SCALE  
1" = 100'  
1 inch = 100 ft

**GARY W. AHLBERG, P.E.**  
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PROJECT: WESTSIDE C&D LANDFILL CONSTRUCTION PLAN PERMIT WILSON, NORTH CAROLINA

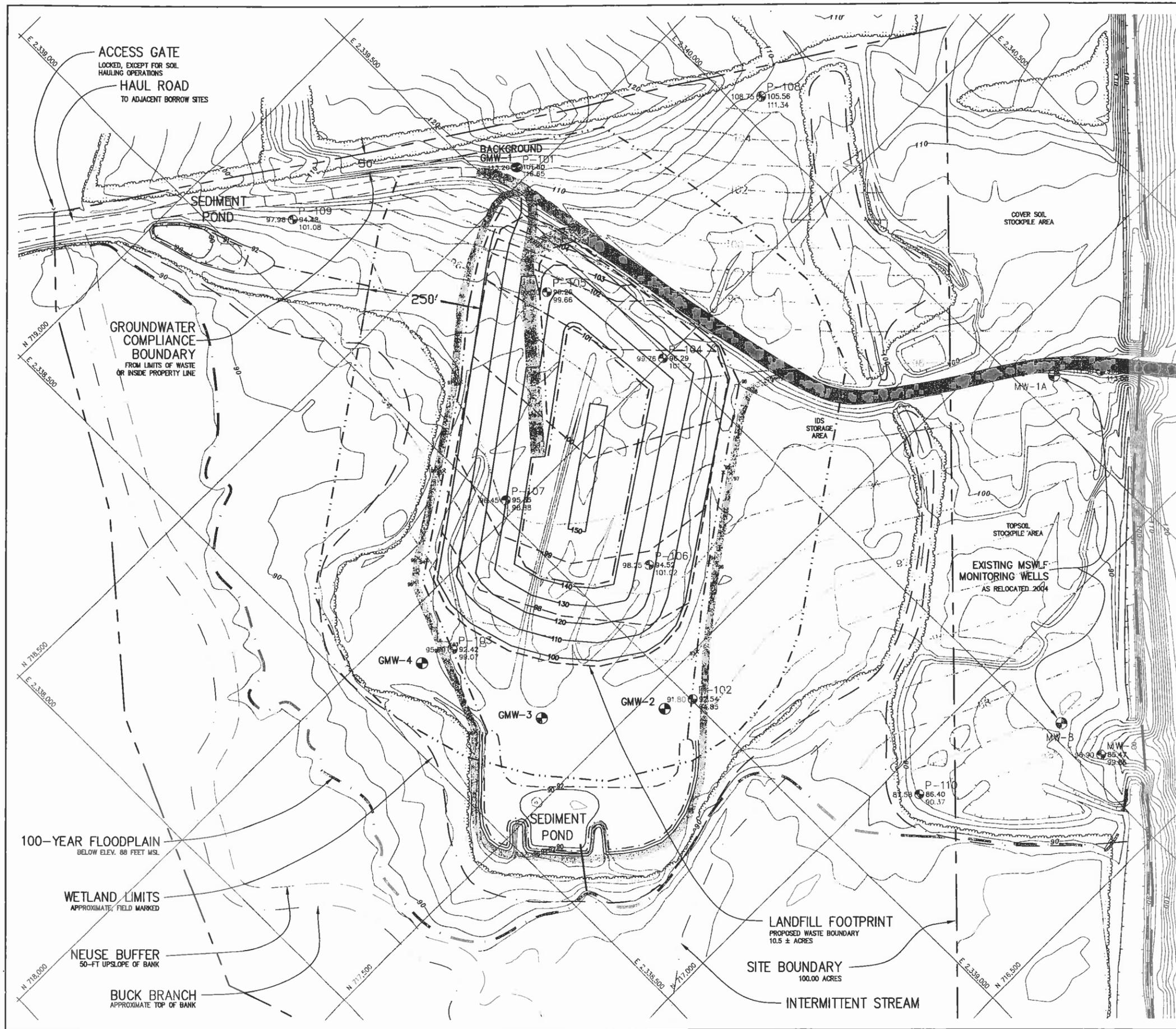
PREPARED FOR: WILSON COUNTY DEPARTMENT OF SOLID WASTE  
113 E. NASH STREET  
WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
<b>REVISIONS</b>		

**WESTSIDE FACILITY PLAN**

SCALE: 1"=100'  
DATE: 9/01/04  
DRN. BY: GWA  
CHECKED BY: GWA  
PROJECT NO:

**DRAWING NO. F1**



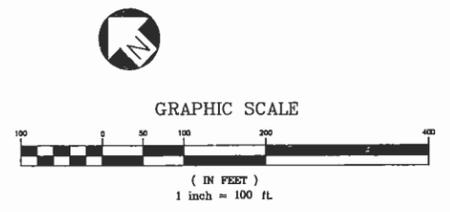
**NOTES:**

- PURPOSE.** THIS DETECTION MONITORING PLAN IS PROPOSED FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, PREPARED FOR APPROVAL BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B. THE PLAN WAS PREPARED UNDER THE SUPERVISION OF MR. GARY D. BABB, PG.
- TOPOGRAPHIC FEATURES.** SITE TOPOGRAPHY IS FROM AERIAL PHOTOGRAMMETRIC MAPPING PERFORMED BY GEODATA CORP., ZEBULON, NC. MAPPED CONDITIONS FROM MARCH 1998 ARE GENERALLY REPRESENTATIVE OF EXISTING CONDITIONS (JULY 2003). REFERENCE DRAWING SC1 FOR STREAM, WETLAND, FLOODPLAIN, AND OTHER SOURCES.
- WESTSIDE C&D LANDFILL SITE.** THE 100.00 ACRE SITE PROPERTY BOUNDARY ILLUSTRATED ON THIS DRAWING IS REPRESENTATIVE OF THE "RECOMBINATION PLAN FOR THE WESTSIDE C&D LANDFILL SITE" PREPARED BY HERRING-SUTTON & ASSOCIATES, P.C. (WILSON, NORTH CAROLINA), APRIL 2003.
- MONITORING NETWORK.** EXISTING WELL P-101 SHALL BE DESIGNATED AS THE UPGRADIENT BACKGROUND WELL GMW-1. THREE NEW WELLS WILL BE INSTALLED IN THE UPPER 15-20 FEET OF THE IN-SITU SOIL. DOWNGRADIENT WELL INSTALLATIONS ARE SPACED EQUALLY ACROSS A 125-FOOT OFFSET (REVIEW BOUNDARY) TO THE LANDFILL FOOTPRINT. GROUND SURFACE ELEVATIONS LEADING TO (4W DRIVE PATH) AND SURROUNDING THE WELLS SHALL BE AT LEAST 93 FEET MSL.
- PIEZOMETER ABANDONMENT.** ALL PIEZOMETERS SHALL BE ABANDONED ACCORDING TO 15A NCAC 2C, WITH ASSOCIATED DOCUMENTATION.
- SURVEY DATA.** NORTH CAROLINA REGISTERED LAND SURVEYORS, HERRING-SUTTON & ASSOCIATES, WILSON, NORTH CAROLINA, SHALL SURVEY THE LOCATION AND ELEVATION POSITIONS OF EACH WELL AFTER INSTALLATION.
- MONITORING SYSTEM DESIGN.** THE LANDFILL BASE DESIGN INCLUDES CONSTRUCTION OF A COMPACTED SOIL LAYER THAT WILL PROVIDE FOR VERTICAL SEPARATION FROM THE SEASONAL HIGH WATER TABLE AND CONTROL INFILTRATION FROM THE LANDFILL BASE. DEEPER IN THE SURFICIAL AQUIFER, THE PRESENCE OF LOW-PERMEABILITY CLAYS DEPOSITED IN HORIZONTAL LENSES SIGNIFICANTLY LIMITS VERTICAL GROUNDWATER FLOW POTENTIAL. MOST IMPORTANTLY, THE PREFERENTIAL LATERAL GROUNDWATER FLOW IN THE UNCONFINED SURFICIAL AQUIFER SANDS TOWARD A GROUNDWATER DISCHARGE ZONE PRESENTS HYDROGEOLOGIC CONDITIONS THAT CAN BE EFFECTIVELY MONITORED WITH SHALLOW GROUNDWATER MONITORING WELLS. DUE TO THE EXTENT OF WETLANDS AND DENSE VEGETATION SURROUNDING BUCK BRANCH, SURFACE WATER MONITORING IS NOT A NECESSARY COMPONENT OF THE SITE'S DETECTION MONITORING SYSTEM.
- DETECTION INTERVAL IN THE SURFICIAL AQUIFER.** COMPLETION INTERVALS SHALL BE WITHIN THE UPPERMOST 10-15 FEET OF THE SEASONAL HIGH WATER TABLE AND SHALL TARGET THE TAN AND ORANGE SAND UNITS IN THE CHARACTERIZED STRATIGRAPHY.

**LEGEND**

- GMW-2 MONITORING WELL**  
DETECTION MONITORING STATION
- POTENTIOMETRIC CONTOUR**  
1-FOOT CONTOUR INTERVAL, 19 NOV 02
- BASE CONTOUR 1-FOOT**  
1-FOOT CONTOUR INTERVAL, 19 NOV 02
- WESTSIDE SITE BOUNDARY**
- LANDFILL FOOTPRINT**  
PROPOSED 10.5 ACRES
- EXISTING LANDFILL LIMITS**  
OFFSITE MSWLF UNIT
- 100-YEAR FLOODPLAIN**
- NEUSE BUFFER**
- SURFACE WATER**
- WETLAND BOUNDARY**
- CONTOUR 2-FOOT** MAR98 MAPPING
- CONTOUR 10-FOOT** MAR98 MAPPING
- GROUND ELEVATION**
- WELL COORDINATES ON CENTER**
- BORING/PIEZO ID**
- WATER ELEVATION AT INSTALLATION 11/19/02**
- TOP OF CASING SURVEYED ELEVATION**

**PERMIT ISSUE**  
NOT FOR CONSTRUCTION



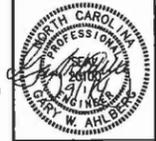
Babb & Associates, P.A.  
P.O. BOX 37897  
RALEIGH, NORTH CAROLINA 27627

**GARY W. AHLBERG, P.E.**  
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PROJECT:  
WESTSIDE C&D LANDFILL  
CONSTRUCTION PLAN APPLICATION  
WILSON, NORTH CAROLINA

PREPARED FOR:  
WILSON COUNTY  
DEPARTMENT OF SOLID WASTE  
113 E. NASH STREET  
WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
REVISIONS		



**GROUNDWATER MONITORING PLAN**

SCALE: 1"=100'  
DATE: 09/01/04  
DRN. BY: GWA  
CHECKED BY: GDB

PROJECT NO:

DRAWING NO.

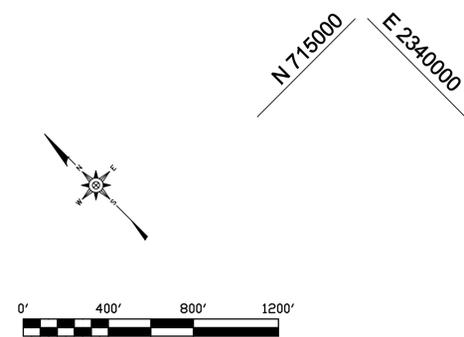
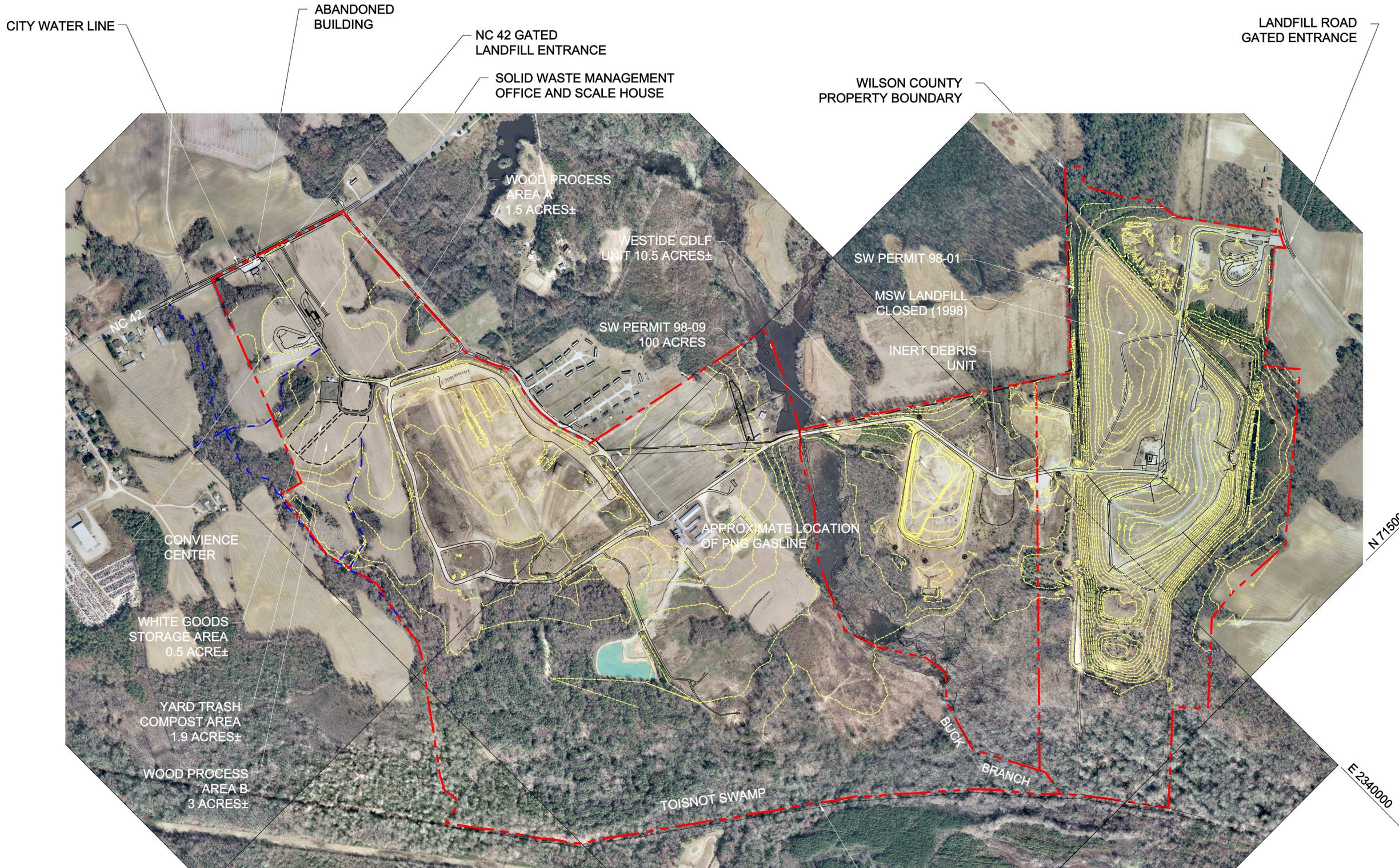
**M1**

## ATTACHMENT G-1

### PERMIT AMENDMENT DRAWINGS Revised December 2010

**Supplemental to Attachment G, additional Figures and Drawings are included for the S1- Wilson County Landfill Site Plan, Cross-sections, Phase 2 Grading, and Landfill Gas Monitoring and T&P Site Erosion and Sedimentation Control Plans (Bartlett).**

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- FACILITY NOTES:**
1. THE WILSON COUNTY LANDFILL FACILITY INCLUDES 709 ACRES, INCORPORATING THE FOLLOWING SITES AND AREAS:  
 INDENT ALL-CLOSED SANITARY LANDFILL (SW PERMIT 98-01)  
 WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL AND INERT DEBRIS UNIT (SW PERMIT 98-09)  
 WOOD PROCESSING AREAS  
 YARD TRASH COMPOST AREA  
 WHITE GOODS STORAGE AREA  
 SOIL BORROW SITES  
 MAINTENANCE AND ADMINISTRATION BUILDINGS  
 CONVENIENCE CENTER
  2. THE SITE IS SECURED BY LOCKING GATES, FENCES, AND BERMS TO PREVENT UNAUTHORIZED ACCESS.
  3. THE MAIN FACILITY ENTRANCE IS LOCATED ON NC 42.
  4. ALL WILSON COUNTY PROPERTY IS CURRENTLY ZONED AR.

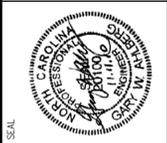
- REFERENCES:**
1. 2006 AERIAL PHOTOGRAPHY DOWNLOADED FROM WWW.NCONEMAP.ORG.
  2. TOPOGRAPHIC MAPPING BY COASTAL RESOURCE MAPPING, 2005.

**LEGEND**

	PROPERTY BOUNDARY
	SURFACE WATER
	5-FOOT CONTOURS

REVISION	NO.	DATE

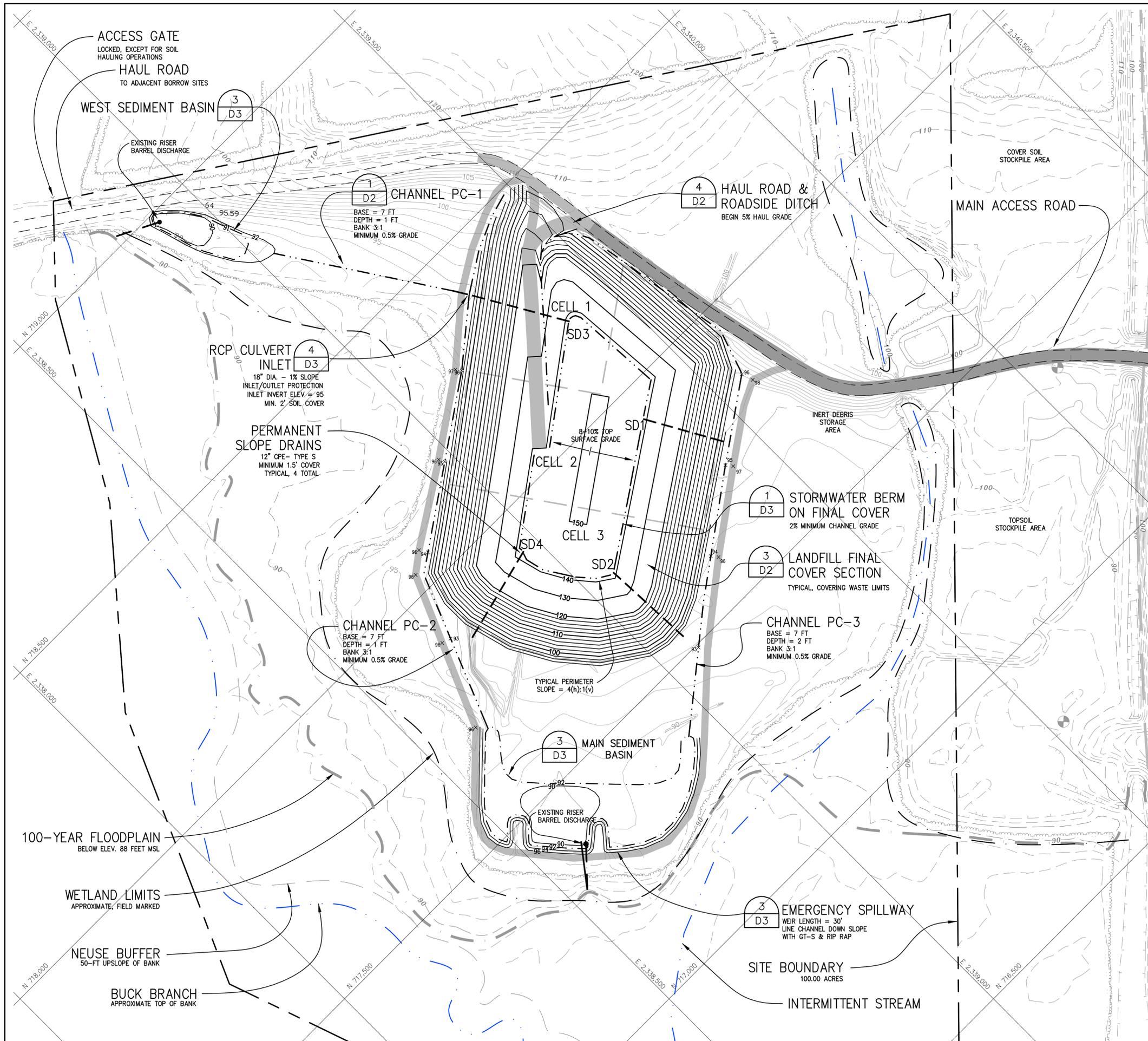
**BLACKROCK ENGINEERS, INC.**  
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 107 PLUMTREE LANE  
 CASTLE HAYNE, NORTH CAROLINA 28429  
 PHONE: 910.232.6696  
 NC LICENSE # C-2919



**PROJECT TITLE:**  
 WILSON COUNTY LANDFILL  
 2400 NC HWY 42 EAST  
 WILSON, NC

**DRAWING TITLE:**  
 WILSON COUNTY LANDFILL  
 FACILITY SITE PLAN

DESIGNED BY: G.W.A.	DRAWN BY: J.W.G.
CHECKED BY: G.W.A.	PROJECT NO.: WCL10-07
SCALE: 1"=400'	DATE: 11.11.10
FILE NAME: WCL1007_D0001_AERIAL	SHEET NO. DRAWING NO.
1	S1



- CONSTRUCTION NOTES:**
- PURPOSE.** THIS FACILITY PLAN FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, IS PREPARED FOR A PERMIT TO CONSTRUCT ISSUED BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B.
  - ACCESS CONTROL.** NATURAL TOPOGRAPHIC AND VEGETATIVE CONDITIONS AND CONTROL MEASURES LIMIT PUBLIC ACCESS TO THE SITE. WILSON COUNTY WILL MAINTAIN LOCATED GATES AT THE WEST AND MAIN ENTRANCES TO THE FACILITY.
  - FINAL GRADE.** DESIGN GRADES PROVIDED ARE FOR TOP OF FINAL COVER. ANY ADJUSTMENTS TO INCREASE THE FINAL COVER THICKNESS WILL REQUIRE MODIFICATION TO INTERMEDIATE COVER GRADES TO ALLOW FOR FINAL COVER CONSTRUCTION.
  - ALL CHANNELS** SHALL BE STABILIZED WITH EXCELSIOR CURLEX 2 MATTING OR EQUIVALENT TO SECURE SEED AND ESTABLISH GRASSSED CHANNEL. OUTLET PROTECTION SHALL BE CONSTRUCTED WITH D50 = 6-9 INCH RIP RAP, UNDERLAID WITH GT-S.
  - CLOSURE AND POST CLOSURE.** WHEN OPERATIONS HAVE REACHED FINAL DESIGN GRADE, THE LANDFILL WILL BE COVERED WITH AT LEAST TWO FEET OF COMPACTED SOIL COVER. THE FINAL SOIL COVER WILL BE VEGETATED WITH NATIVE GRASSES ACCORDING TO THE SITE'S VEGETATION PLAN. INSPECTIONS WILL BE CONDUCTED PERIODICALLY TO OBSERVE THE INTEGRITY OF THE FINAL COVER. REPAIRS WILL BE MADE AS NECESSARY TO RESTORE THE VEGETATIVE SOIL COVER.

- LEGEND**
- 24" CPP TYPE C-DOWNDRAIN
  - WESTSIDE SITE BOUNDARY
  - LANDFILL CELLS  
C1+C2+C3=10.59 ACRES TOTAL
  - EXISTING LANDFILL LIMITS
  - 100-YEAR FLOODPLAIN
  - NEUSE BUFFER
  - SURFACE WATER
  - WETLAND BOUNDARY
  - FINAL COVER GRADE 2-FT CONTOUR
  - FINAL COVER GRADE 10-FT CONTOUR
  - 2003 TOPOGRAPHY 1-FT CONTOUR
  - 1998 TOPOGRAPHY 2-FT CONTOUR
  - DRAINAGE CHANNEL



**PERMIT ISSUE  
NOT FOR CONSTRUCTION**

GRAPHIC SCALE

( IN FEET )  
1 inch = 100 ft.

**BLACKROCK ENGINEERS, INC.**  
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 107 PLUMTREE LANE  
 CASTLE HAYNE, NORTH CAROLINA 28429  
 PHONE: 910.232.6696  
 NC LIC. # C-2919

PROJECT:  
 WESTSIDE C&D LANDFILL  
 CONSTRUCTION PLAN PERMIT  
 WILSON, NORTH CAROLINA

PREPARED FOR:  
 WILSON COUNTY  
 DEPARTMENT OF SOLID WASTE  
 113 E. NASH STREET  
 WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
REVISIONS		



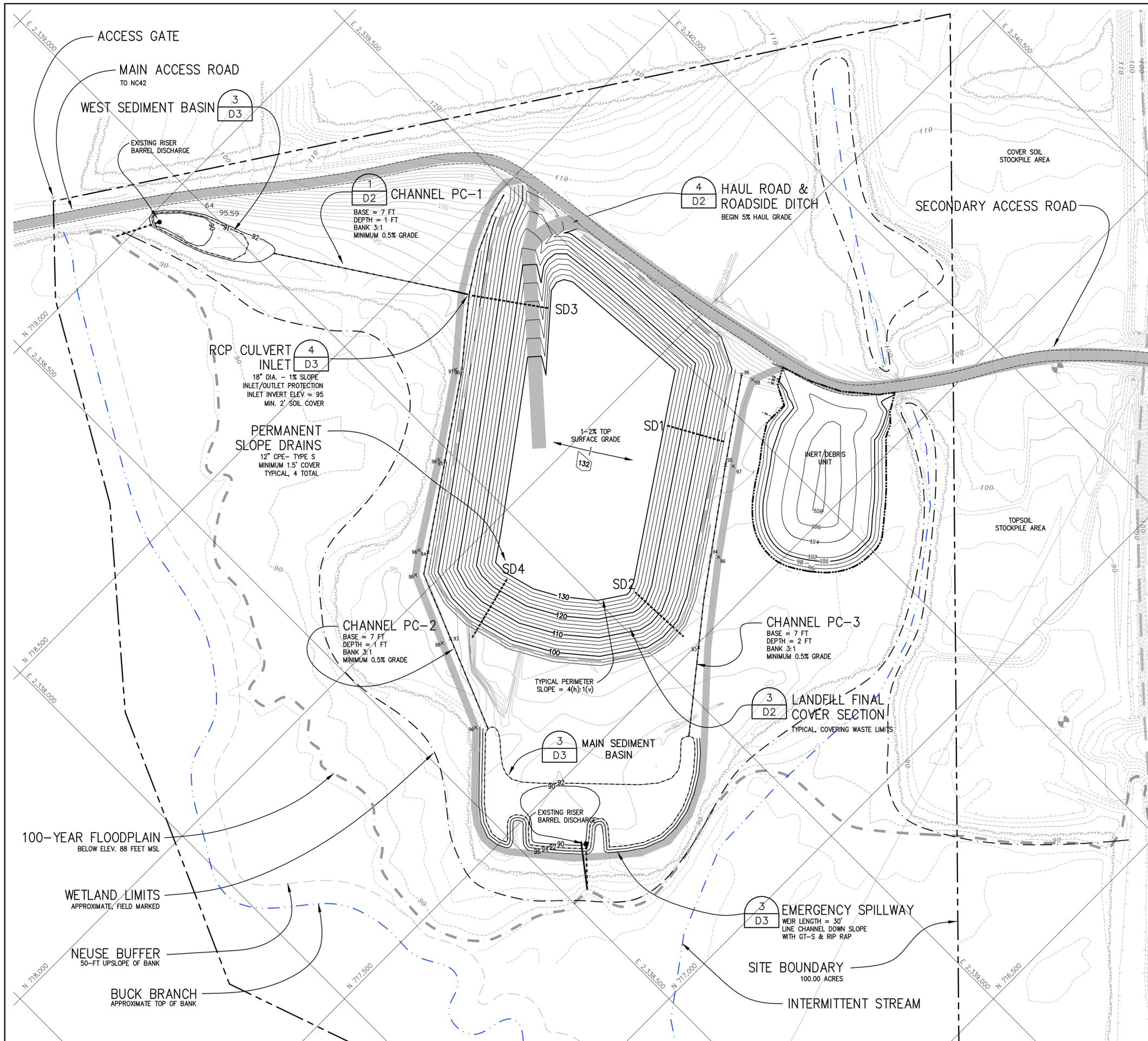
**FINAL  
COVER  
PLAN**

SCALE: 1"=100'  
 DATE: 11.24.10  
 DRN. BY: GWA  
 CHECKED BY: GWA

PROJECT NO:

DRAWING NO.

**C3**

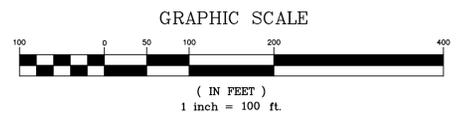


**CONSTRUCTION NOTES:**

- PURPOSE.** THIS PHASE 2 OPERATION PLAN FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, IS PREPARED FOR A PERMIT TO OPERATE ISSUED BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B. THIS OPERATION PLAN PROVIDES CAPACITY FOR 110,000 TONS; TOP ELEVATION MAY BE ADJUSTED BASED ON ACTUAL AIRSPACE UTILIZATION FACTOR FOR TONAGE.
- ACCESS CONTROL.** NATURAL TOPOGRAPHIC AND VEGETATIVE CONDITIONS AND CONTROL MEASURES LIMIT PUBLIC ACCESS TO THE SITE. WILSON COUNTY WILL MAINTAIN LOCATED GATES AT THE WEST AND MAIN ENTRANCES TO THE FACILITY.
- FINAL GRADE.** DESIGN GRADES PROVIDED ARE FOR TOP OF FINAL COVER. ANY ADJUSTMENTS TO INCREASE THE FINAL COVER THICKNESS WILL REQUIRE MODIFICATION TO INTERMEDIATE COVER GRADES TO ALLOW FOR FINAL COVER CONSTRUCTION.
- ALL CHANNELS SHALL BE STABILIZED WITH EXCELSIOR CURLEX 2 MATTING OR EQUIVALENT TO SECURE SEED AND ESTABLISH GRASSSED CHANNEL. OUTLET PROTECTION SHALL BE CONSTRUCTED WITH D50 = 6-9 INCH RIP RAP, UNDERLAID WITH GT-S.**
- CLOSURE AND POST CLOSURE.** WITH COMPLETION OF PERIMETER SLOPES TO INTERMEDIATE GRADE (PLAN - 3FT.), PARTIAL FINAL COVER MAY BE CONSTRUCTED AS SPECIFIED BY THE ENGINEER. FINAL COVER WILL BE COMPLETED FOLLOWING PHASE 3, SEE DRAWING C3 FINAL GRADE PLAN. THE FINAL SOIL COVER WILL BE VEGETATED WITH NATIVE GRASSES ACCORDING TO THE SITE'S VEGETATION PLAN. INSPECTIONS WILL BE CONDUCTED PERIODICALLY TO OBSERVE THE INTEGRITY OF THE FINAL COVER. REPAIRS WILL BE MADE AS NECESSARY TO RESTORE THE VEGETATIVE SOIL COVER.

**LEGEND**

- WESTSIDE SITE BOUNDARY
- EXISTING LANDFILL LIMITS
- 100-YEAR FLOODPLAIN
- NEUSE BUFFER
- SURFACE WATER
- WETLAND BOUNDARY
- FINAL COVER GRADE 2-FT CONTOUR
- FINAL COVER GRADE 10-FT CONTOUR
- 2003 TOPOGRAPHY 1-FT CONTOUR
- 1998 TOPOGRAPHY 2-FT CONTOUR
- DRAINAGE CHANNEL



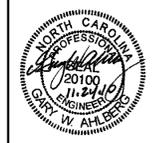
**PERMIT ISSUE**  
NOT FOR CONSTRUCTION

**BLACKROCK ENGINEERS, INC.**  
POST OFFICE BOX 58  
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107 PLUMTREE LANE  
CASTLE HAYNE, NORTH CAROLINA 28429  
PHONE: 910.232.6996  
NC LIC. # C-2919

PROJECT:  
WESTSIDE C&D LANDFILL  
CONSTRUCTION PLAN  
WILSON, NORTH CAROLINA

PREPARED FOR:  
WILSON COUNTY  
DEPARTMENT OF SOLID WASTE  
113 E. NASH STREET  
WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
REVISIONS		



**PHASE 2 GRADING PLAN**

SCALE: 1"=100'  
DATE: 11.24.10  
DRN. BY: JWG  
CHECKED BY: GWA

PROJECT NO:  
WCL10-07

DRAWING NO.

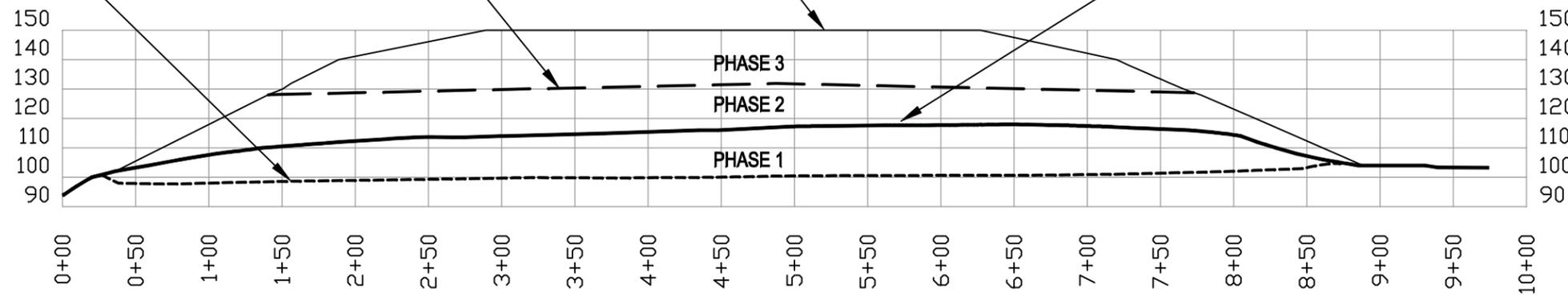
**C4**

BASE GRADE  
AS-BUILT

ESTIMATED PHASE 2  
INTERMEDIATE GRADE  
SEE DWG C4

PROPOSED  
FINAL COVER  
SEE DWG C3

EXISTING GRADE  
APRIL 2010



SECTION A

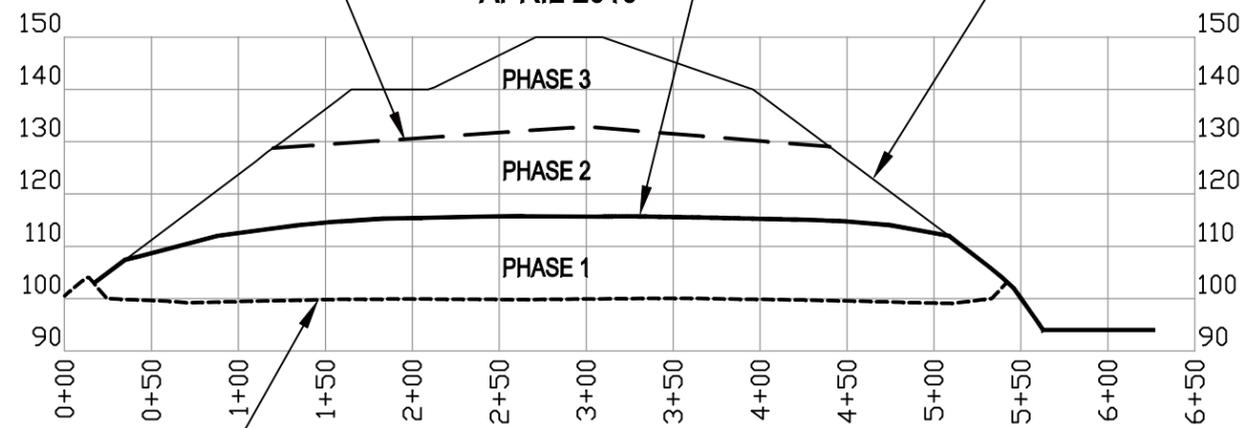
PHASE 1 EXISTING CONDITIONS  
CDLF - APRIL 2010



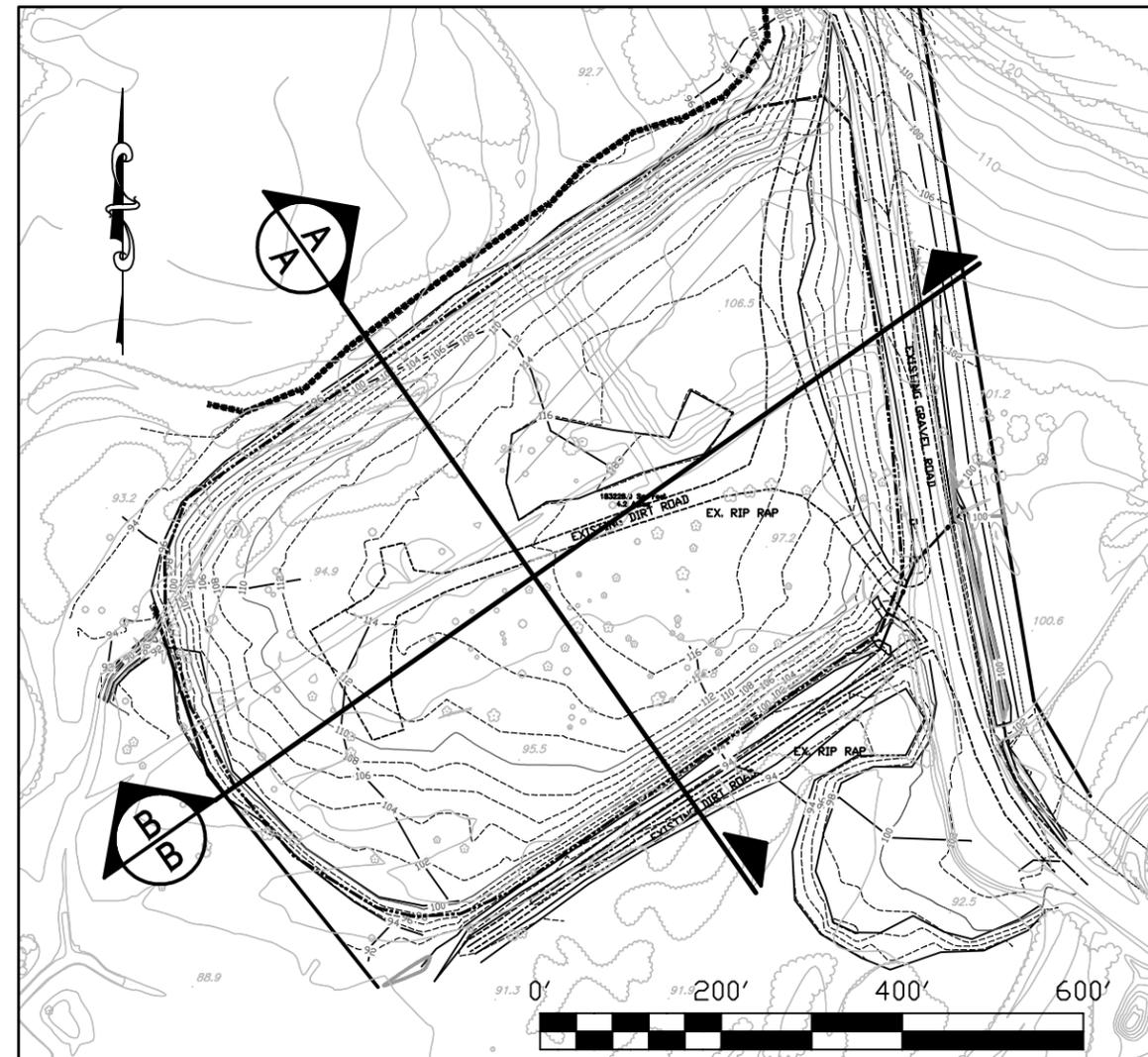
ESTIMATED PHASE 2  
INTERMEDIATE GRADE  
SEE DWG C4

EXISTING GRADE  
APRIL 2010

PROPOSED  
FINAL COVER  
SEE DWG C3



SECTION B



BASE GRADE  
AS-BUILT



**REFERENCE NOTE:**

- EXISTING GRADE APRIL 2010 SURVEYED BY BARTLETT ENGINEERING WILSON, N.C. NC SURVEYOR LIC. # L-4741

**BLACKROCK ENGINEERS, INC.**

POST OFFICE BOX 58  
WILMINGTON, NORTH CAROLINA 28401  
PHONE: 910.232.6696

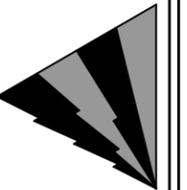


FIGURE NO.

4

SCALE:

AS SHOWN

CHECKED BY:

G.W.A.

DRAWN BY:

J.W.G.

PROJECT NO.

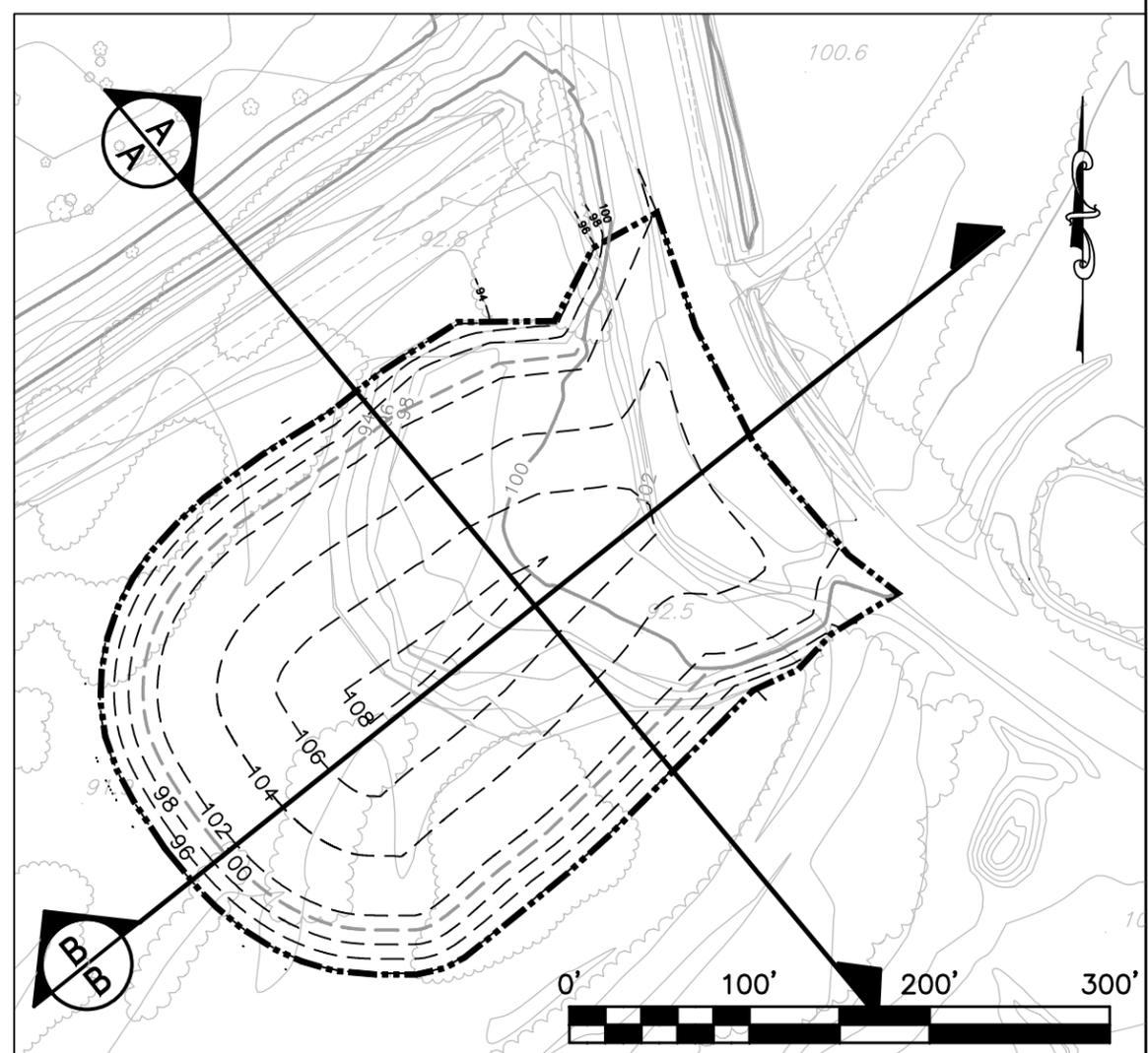
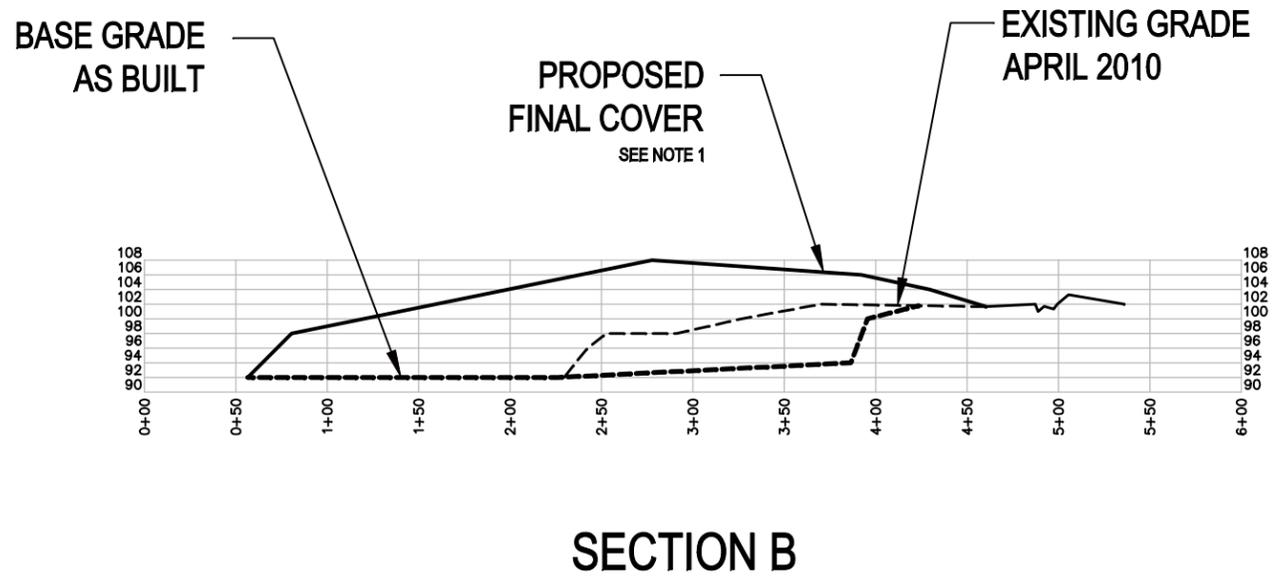
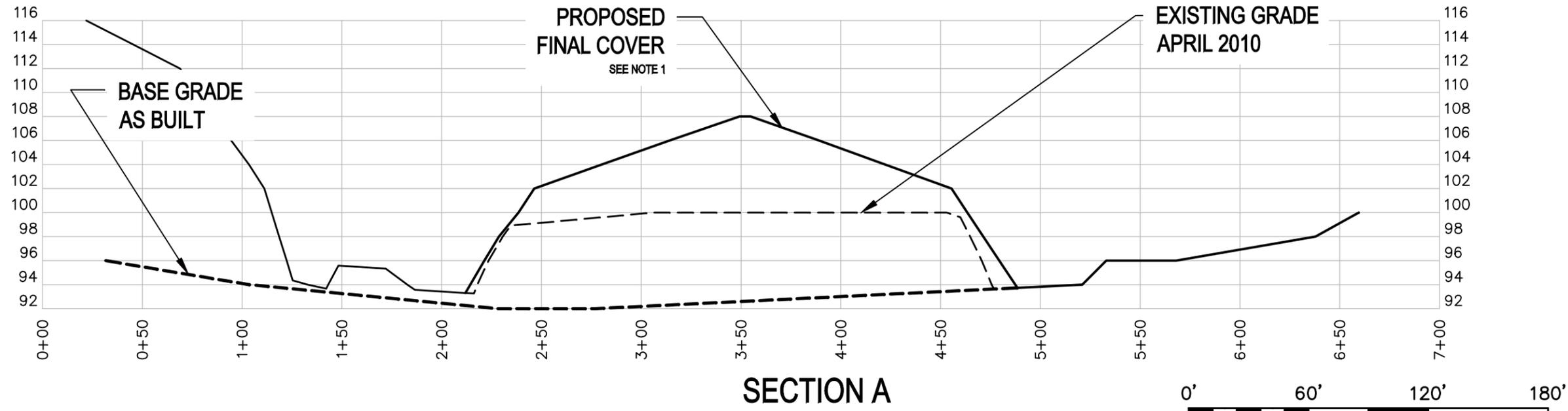
WGL10-07

DATE:

11.23.10

WILSON COUNTY LANDFILL  
WESTSIDE C&D UNIT  
CROSS SECTIONS

TITLE:



**NOTE:**  
 1. FINAL COVER. A 2-FT. VEGETATED SOIL LAYER SHALL BE PLACED AS FINAL COVER, INCLUDING A 6-INCH TOPSOIL LAYER. SEE DWG C4 GRADING PLAN.

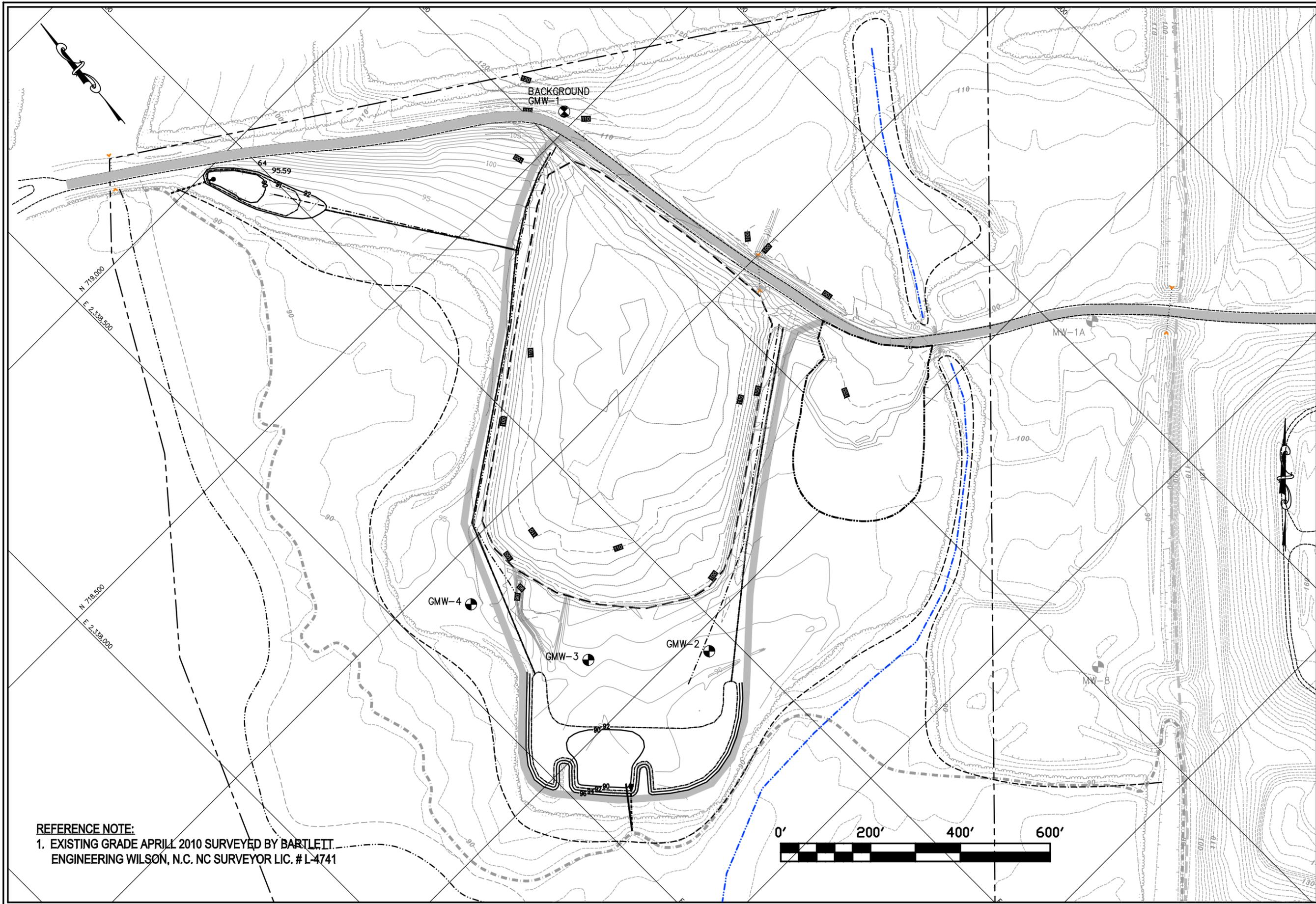
**REFERENCE NOTE:**  
 1. EXISTING GRADE APRILL 2010 SURVEYED BY BARTLETT ENGINEERING WILSON, N.C. NC SURVEYOR LIC. #

**BLACKROCK ENGINEERS, INC.**  
 POST OFFICE BOX 58  
 WILMINGTON, NORTH CAROLINA 28401  
 PHONE: 910.232.6696

FIGURE NO.	5	FILE NAME
SCALE:	AS SHOWN	PROJECT NO.
CHECKED BY:	G.W.A.	WCL10-07
DRAWN BY:	J.W.G.	DATE:
		11.23.10

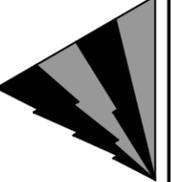
**WILSON COUNTY LANDFILL  
 INERT DEBRIS UNIT  
 CROSS SECTIONS**

TITLE:



**REFERENCE NOTE:**  
 1. EXISTING GRADE APRIL 2010 SURVEYED BY BARTLETT  
 ENGINEERING WILSON, N.C. NC SURVEYOR LIC. # L-4741

**BLACKROCK ENGINEERS, INC.**

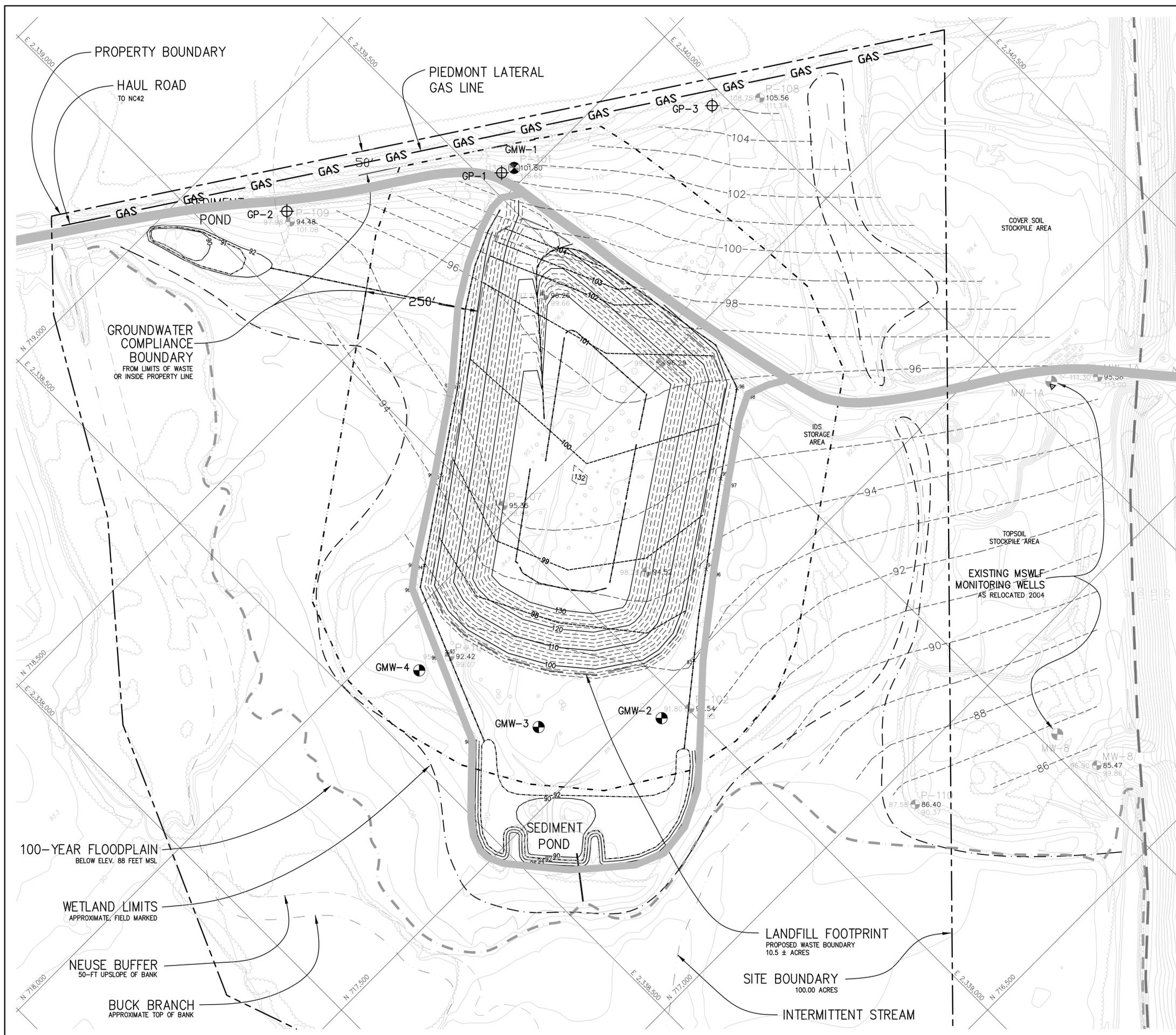


POST OFFICE BOX 58  
 WILMINGTON, NORTH CAROLINA 28401  
 PHONE: 910.232.6696

FIGURE NO.	6
SCALE:	AS SHOWN
CHECKED BY:	G.W.A.
PROJECT NO.	WCL10-07
FILE NAME	WCL-0001
DATE:	06.21.10

**WILSON COUNTY LANDFILL  
 EXISTING CONDITIONS**

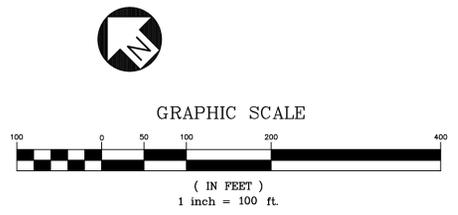
TITLE:



- NOTES:**
1. PURPOSE. THIS GAS DETECTION MONITORING PLAN IS PROPOSED FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, PREPARED FOR APPROVAL BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B.
  2. TOPOGRAPHIC FEATURES. SITE TOPOGRAPHY IS FROM AERIAL PHOTOGRAMMETRIC MAPPING PERFORMED BY GEODATA CORP., ZEBULON, NC. MAPPED CONDITIONS FROM MARCH 1998 ARE GENERALLY REPRESENTATIVE OF EXISTING CONDITIONS (JULY 2003). REFERENCE DRAWING SC1 FOR STREAM, WETLAND, FLOODPLAIN, AND OTHER SOURCES.
  3. WESTSIDE C&D LANDFILL SITE. THE 100.00 ACRE SITE PROPERTY BOUNDARY ILLUSTRATED ON THIS DRAWING IS REPRESENTATIVE OF THE "RECOMBINATION PLAT FOR THE WESTSIDE C&D LANDFILL SITE" PREPARED BY HERRING-SUTTON & ASSOCIATES, P.C. (WILSON, NORTH CAROLINA), APRIL 2003.
  4. GAS PROBE. GAS MONITORING PROBES SHALL BE INSTALLED WITH A TOTAL DEPTH JUST ABOVE THE WATER TABLE.
  5. EXPLOSIVE GAS MONITORING. EXPLOSIVE GAS CONCENTRATIONS SHALL BE MONITORED QUARTERLY AND RECORDED AS A PERCENTAGE OF THE LOWER EXPLOSIVE LIMIT (LEL).
  6. GAS PROBE INSTALLATION AND MONITORING SHALL CONFORM TO THE CURRENT SWS GUIDANCE, EQUIPMENT MANUFACTURER'S RECOMMENDATIONS, AND ACCEPTED STANDARDS OF PRACTICE.
  7. INSTALLATION AND SURVEY RECORDS, AND MONITORING RESULTS SHALL BE PLACED IN THE OPERATING RECORD AND SUBMITTED TO THE SWS IN ACCORDANCE WITH PERMIT CONDITIONS.

- LEGEND**
- GP-1 GAS PROBE PROPOSED LOCATION
  - GMW-2 MONITORING WELL DETECTION MONITORING STATION
  - POTENTIOMETRIC CONTOUR 1-FOOT CONTOUR INTERVAL, 19 NOV 02
  - BASE CONTOUR 1-FOOT 1-FOOT CONTOUR INTERVAL, 19 NOV 02
  - WESTSIDE SITE BOUNDARY
  - LANDFILL FOOTPRINT PROPOSED 10.5 ACRES
  - EXISTING LANDFILL LIMITS OFFSITE MSWLF UNIT
  - 100-YEAR FLOODPLAIN
  - NEUSE BUFFER
  - SURFACE WATER
  - WETLAND BOUNDARY
  - CONTOUR 2-FOOT MAR98 MAPPING
  - CONTOUR 10-FOOT MAR98 MAPPING
  - GROUND ELEVATION
  - WELL COORDINATES ON CENTER
  - BORING/PIEZO ID WATER ELEVATION AT INSTALLATION 11/19/02
  - TOP OF CASING SURVEYED ELEVATION

**PERMIT ISSUE  
NOT FOR CONSTRUCTION**



**BLACKROCK ENGINEERS, INC.**  
 POST OFFICE BOX 58  
 WILSON, NORTH CAROLINA 28401  
 107 PLUMTREE LANE  
 CASTLE HAYNE, NORTH CAROLINA 28429  
 PHONE: 910.232.6696  
 NC LIC. # C-2919

PROJECT:  
 WESTSIDE C&D LANDFILL  
 CONSTRUCTION PLAN  
 WILSON, NORTH CAROLINA

PREPARED FOR:  
 WILSON COUNTY  
 DEPARTMENT OF SOLID WASTE  
 113 E. NASH STREET  
 WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
REVISIONS		

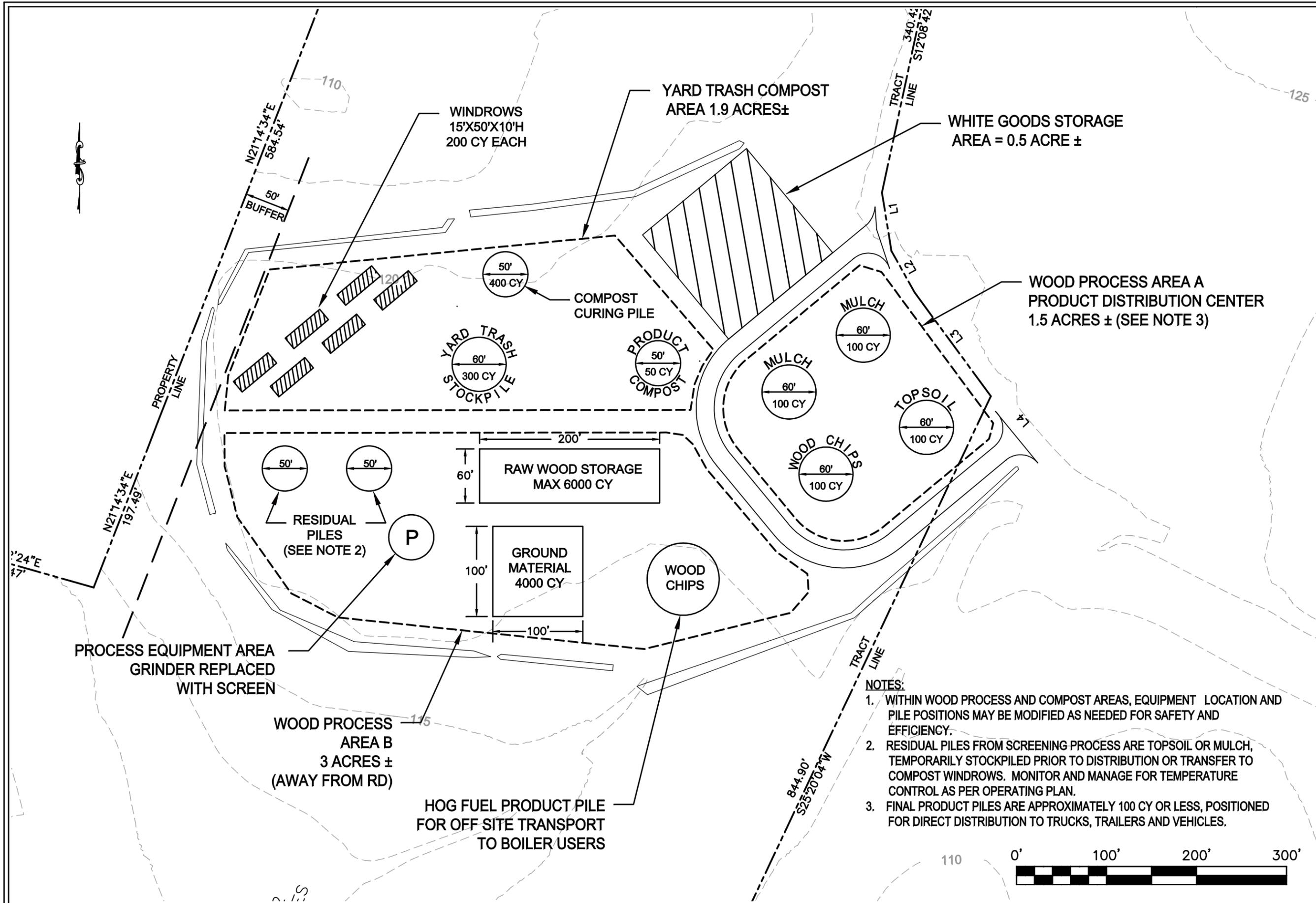


**GAS  
MONITORING  
PLAN**

SCALE: 1"=100'  
 DATE: 11.24.10  
 DRN. BY: JWG  
 CHECKED BY: GWA

PROJECT NO:  
 WCL10-07

DRAWING NO.  
**LFG1**



**BLACKROCK ENGINEERS, INC.**  
 POST OFFICE BOX 58  
 WILMINGTON, NORTH CAROLINA 28401  
 107 PLUMTREE LANE  
 CASTLE HAYNE, NORTH CAROLINA 28429  
 PHONE: 910.232.6696



FIGURE NO.	2	FILE NAME	T&P SITE
SCALE:	1"=100'	PROJECT NO.	WGL1007
CHECKED BY:	GWA	DATE:	12.14.10
DRAWN BY:	JWG		

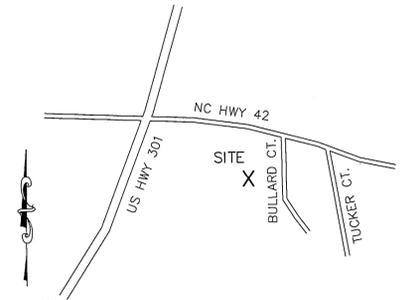
**GENERAL LAYOUT  
 TREATMENT & PROCESSING SITE  
 WILSON COUNTY LANDFILL**

- NOTES:**
1. WITHIN WOOD PROCESS AND COMPOST AREAS, EQUIPMENT LOCATION AND PILE POSITIONS MAY BE MODIFIED AS NEEDED FOR SAFETY AND EFFICIENCY.
  2. RESIDUAL PILES FROM SCREENING PROCESS ARE TOPSOIL OR MULCH, TEMPORARILY STOCKPILED PRIOR TO DISTRIBUTION OR TRANSFER TO COMPOST WINDROWS. MONITOR AND MANAGE FOR TEMPERATURE CONTROL AS PER OPERATING PLAN.
  3. FINAL PRODUCT PILES ARE APPROXIMATELY 100 CY OR LESS, POSITIONED FOR DIRECT DISTRIBUTION TO TRUCKS, TRAILERS AND VEHICLES.



# WILSON COUNTY LANDFILL

2400 NC Highway 42 East, Gardners Township  
Wilson County, North Carolina



VICINITY MAP  
NO SCALE

DEVELOPER/OWNER:

WILSON COUNTY  
PO BOX 1728  
WILSON, NC 27893

SHEET INDEX

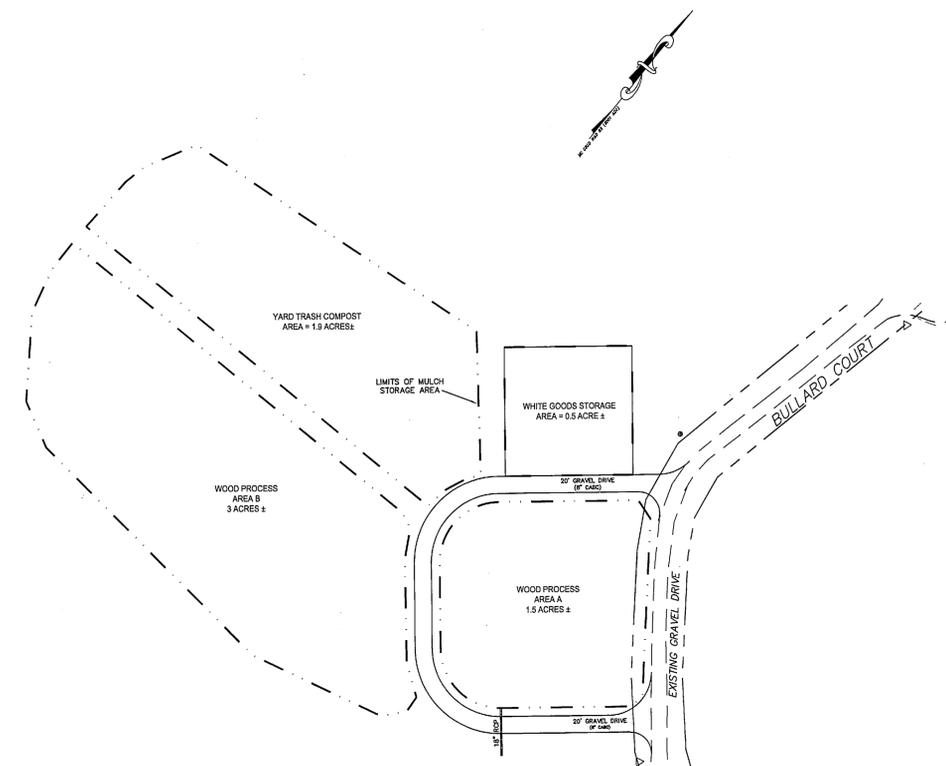
- SP1 OVERALL MAP
- SP2 SITE PLAN
- SP3 GRADING / SEDIMENTATION AND EROSION CONTROL
- SP4 CONSTRUCTION PLAN
- DT1 DETAILS AND CALCULATIONS

SITE DATA

TOTAL AREA 709± ACRES  
ZONING AR  
MIN. BLDG. LINES FRONT 35'  
SIDE 15'  
REAR 30'

REFERENCE:

- DB 1562 PG 165
- DB 1577 PG 567
- DB 1930 PG 792
- DB 2150 PG 709
- DB 2338 PG 867

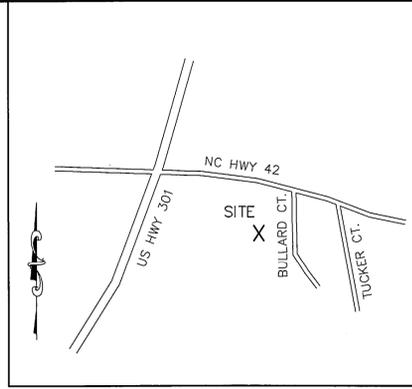


LOCATION MAP  
NO SCALE

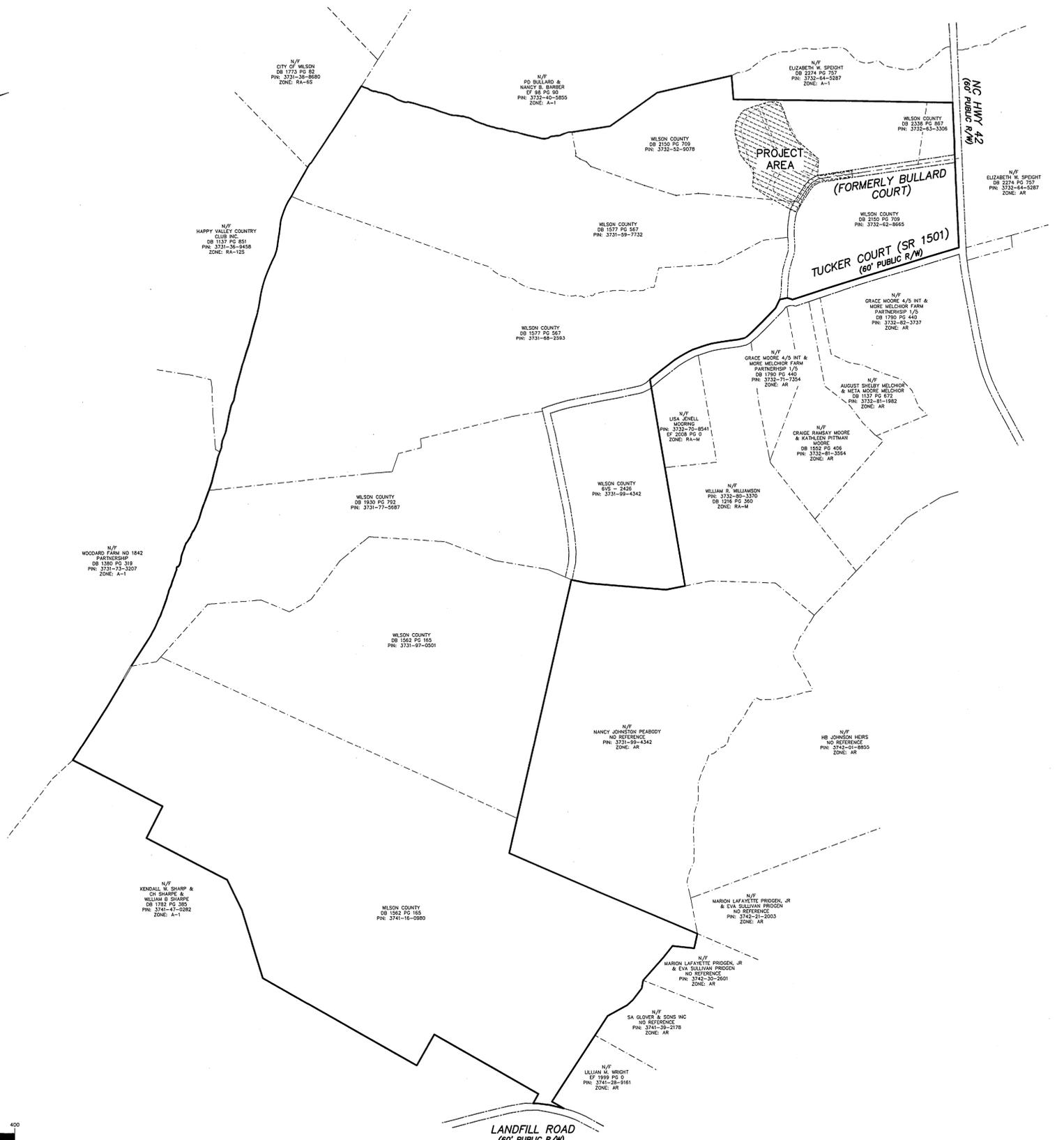
PREPARED BY:

BARTLETT ENGINEERING & SURVEYING, PC  
1906 NASH STREET NORTH  
WILSON, NORTH CAROLINA 27893-1726





LOCATION MAP  
NO SCALE

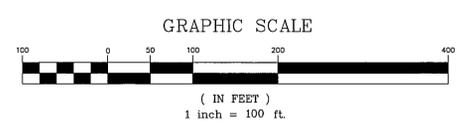


**SITE DATA**

TOTAL AREA	709± ACRES
ZONING	AR
MIN. BLDG. LINES	FRONT 35' SIDE 15' REAR 30'
REFERENCE:	DB 1562 PG 165 DB 1577 PG 567 DB 1930 PG 752 DB 2150 PG 709 DB 2338 PG 867

- NOTES**
- AREAS COMPUTED BY COORDINATE CALCULATIONS
  - NO GRID MONUMENT FOUND WITHIN 2000'
  - COORDINATES SHOWN ON PLAT ARE HORIZONTAL COORDINATES UNLESS STATED OTHERWISE.
  - ALL DISTANCES SHOWN ARE HORIZONTAL
  - ALL RIGHTS-OF-WAY ARE PUBLIC UNLESS NOTED OTHERWISE
  - WETLANDS, IF ANY, HAVE NOT BEEN DELINEATED
  - THIS PROPERTY IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA
  - THIS PROPERTY IS NOT LOCATED IN A PROTECTED WATERSHED AREA
  - THERE ARE NO CEMETERIES VISIBLE.
  - THIS PROPERTY IS SUBJECT TO ALL RIGHTS-OF-WAY, EASEMENTS, RESTRICTIVE COVENANTS AND ORDINANCES.
  - THIS IS NOT A BOUNDARY SURVEY.
  - BOUNDARY AND TOPOGRAPHICAL INFORMATION PROVIDED FROM WILSON COUNTY TAX MAPS, NCDOT DIGITAL TOPOGRAPHY, AND FIELD SURVEY BY BARTLETT ENGINEERING & SURVEYING, PC.

**LEGEND**  
 PROJECT LOCATION



THIS SHEET INTENDED TO SHOW THE OVERALL LANDFILL SITE AND THE PROJECT AREA FOR THIS PROJECT



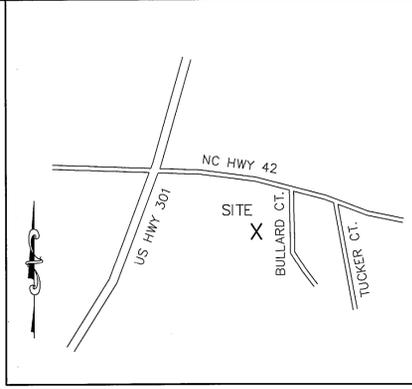
**BARTLETT**  
ENGINEERING & SURVEYING, PC  
 1906 NASH STREET NORTH  
WILSON, N.C. 27893-1726  
 TELE: (252) 399-0704  
FAX: (252) 399-0804  
 EMAIL: info@bartletteng.com

**OVERALL MAP**

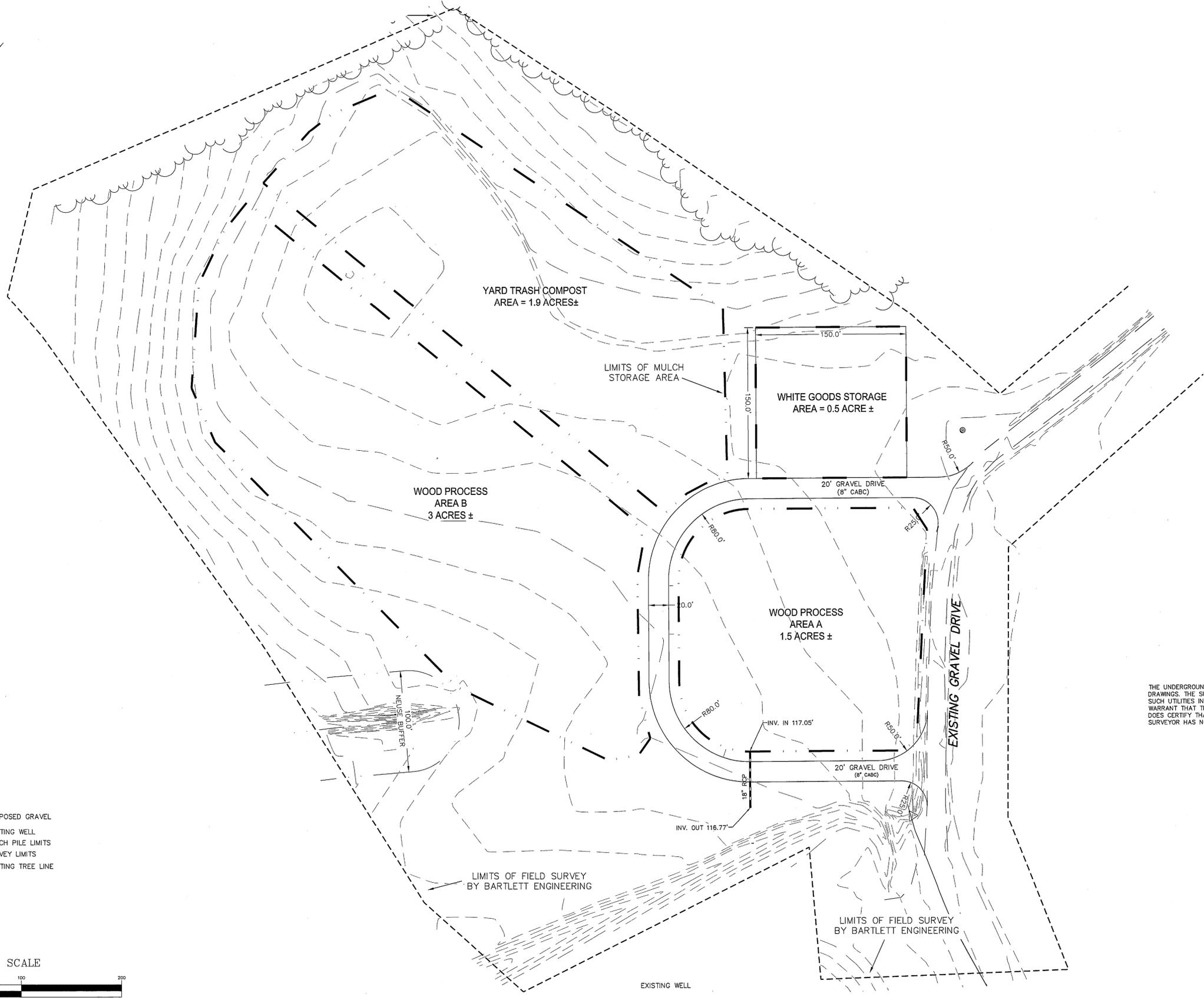
**WILSON COUNTY LANDFILL**  
(MULCH STORAGE, YARD WASTE COLLECTION, WHITE GOODS COLLECTION AREAS)  
2400 NC HIGHWAY 42 EAST

DATE:	OCT. 2009	PROJECT:	09158 WC
SCALE:	1" = 100'	CADFILE:	09158TP2
REVISIONS:		FIELD BOOK:	
		DRAWN BY:	CEP
		SURVEY BY:	TB,KP,LP

GARDNERS TOWNSHIP	WILSON COUNTY
NORTH CAROLINA	ZONE: AR
PIN # 3732-52-9078	SHEET SP1

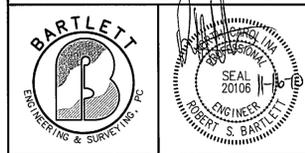
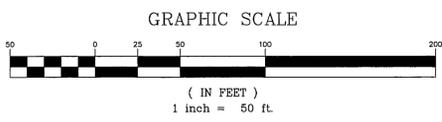


LOCATION MAP  
NO SCALE



THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

- LEGEND
- PROPOSED GRAVEL
  - EXISTING WELL
  - MULCH PILE LIMITS
  - SURVEY LIMITS
  - EXISTING TREE LINE



**BARTLETT**  
ENGINEERING & SURVEYING, PC

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FAX: (252) 399-0804  
EMAIL: info@bartletteng.com

SITE PLAN

**WILSON COUNTY LANDFILL**  
(MULCH STORAGE, YARD WASTE COLLECTION, WHITE GOODS COLLECTION AREAS)  
2400 NC HIGHWAY 42 EAST

DATE: OCT. 2009

SCALE: 1" = 50'

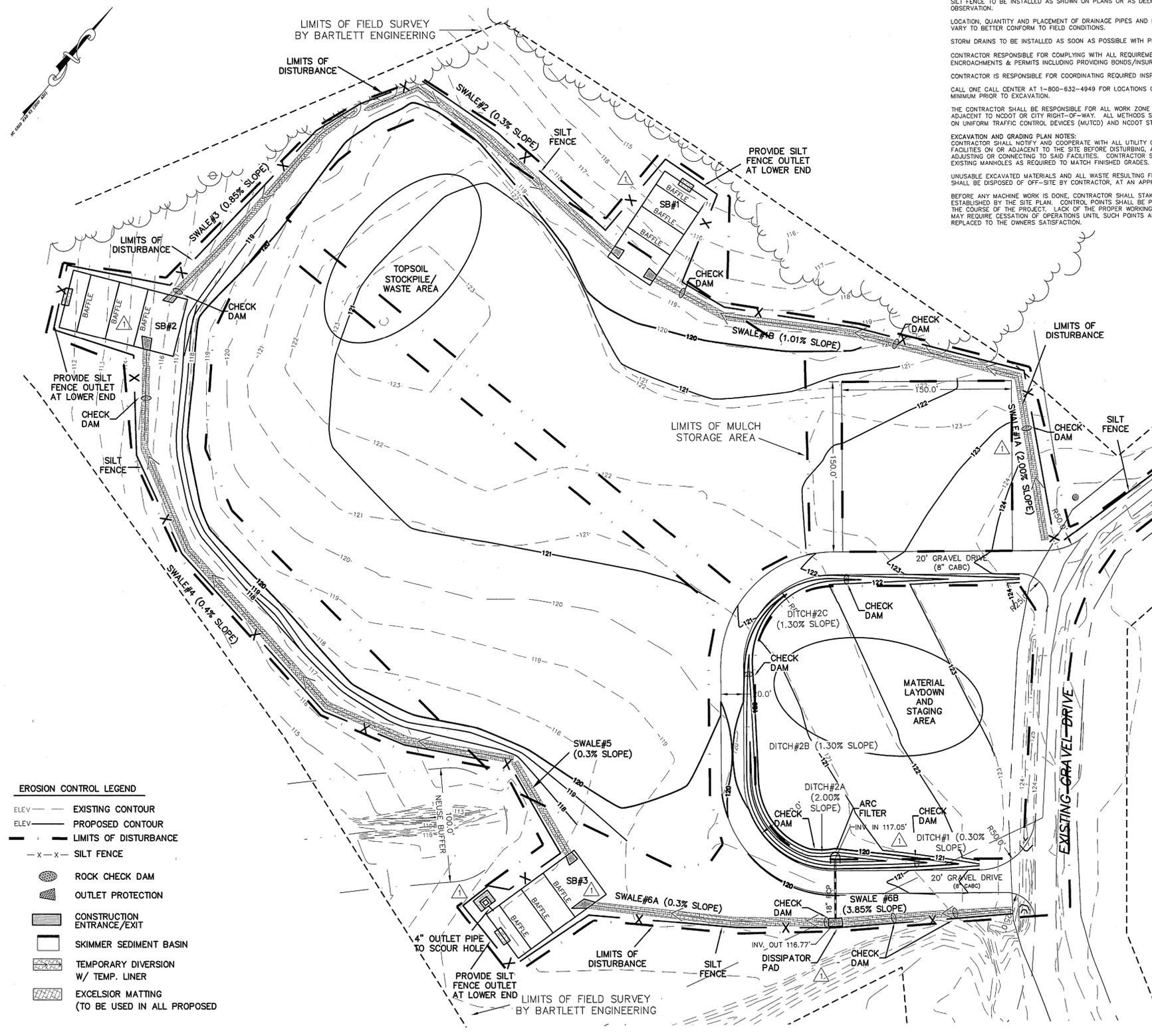
REVISIONS:

PROJECT: 09158 WC  
CLIENT CODE: WC  
CADFILE: 09158TP2  
FIELD BOOK:  
DRAWN BY: CEP/LR/JM  
SURVEY BY: TB, KP, LP

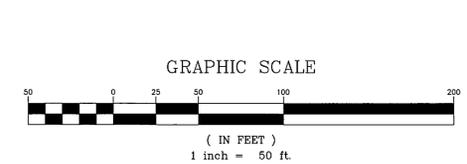
GARDNERS TOWNSHIP WILSON COUNTY

NORTH CAROLINA ZONE: AR

PIN # 3732-52-9078 SHEET SP2



- EROSION CONTROL LEGEND**
- ELEV. --- EXISTING CONTOUR
  - ELEV. --- PROPOSED CONTOUR
  - LIMITS OF DISTURBANCE
  - x-x- SILT FENCE
  - ROCK CHECK DAM
  - OUTLET PROTECTION
  - CONSTRUCTION ENTRANCE/EXIT
  - SKIMMER SEDIMENT BASIN
  - TEMPORARY DIVERSION W/ TEMP. LINER
  - EXCELSIOR MATTING (TO BE USED IN ALL PROPOSED)

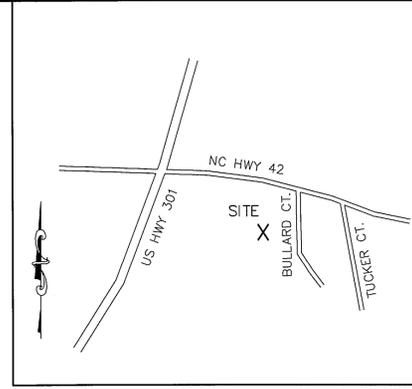


- LEGEND**
- PROPOSED GRAVEL
  - EXISTING WELL
  - MULCH PILE LIMITS
  - EXISTING TREE LINE

**GENERAL NOTES:**

SILT FENCE TO BE INSTALLED AS SHOWN ON PLANS OR AS DEEMED NECESSARY BY VISUAL OBSERVATION.  
 LOCATION, QUANTITY AND PLACEMENT OF DRAINAGE PIPES AND EROSION CONTROL DEVICES MAY VARY TO BETTER CONFORM TO FIELD CONDITIONS.  
 STORM DRAINS TO BE INSTALLED AS SOON AS POSSIBLE WITH PROPER INLET PROTECTION.  
 CONTRACTOR RESPONSIBLE FOR COMPLYING WITH ALL REQUIREMENTS/ CONDITIONS OF THE YEAR. THE CONTRACTOR SHOULD BE PREPARED TO MOISTURE CONDITION THE SOILS AS NECESSARY IN ORDER TO IMPROVE THE EFFICIENCY OF THE COMPACTING OPERATIONS AND EFFORTS.  
 CONTRACTOR IS RESPONSIBLE FOR COORDINATING REQUIRED INSPECTIONS.  
 CALL ONE CALL CENTER AT 1-800-632-4949 FOR LOCATIONS OF EXISTING UTILITIES 48 HOURS MINIMUM PRIOR TO EXCAVATION.  
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK ZONE TRAFFIC CONTROL IN OR ADJACENT TO NCDOT OR CITY RIGHT-OF-WAY. ALL METHODS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND NCDOT STANDARDS.  
 EXCAVATION AND GRADING PLAN NOTES:  
 CONTRACTOR SHALL NOTIFY AND COOPERATE WITH ALL UTILITY COMPANIES OR FIRMS HAVING FACILITIES ON OR ADJACENT TO THE SITE BEFORE DISTURBING, ALTERING, REMOVING, RELOCATING, ADJUSTING OR CONNECTING TO SAID FACILITIES. CONTRACTOR SHALL RAISE OR LOWER TOPS OF EXISTING MANHOLES AS REQUIRED TO MATCH FINISHED GRADES.  
 UNUSABLE EXCAVATED MATERIALS AND ALL WASTE RESULTING FROM CLEARING AND GRUBBING SHALL BE DISPOSED OF OFF-SITE BY CONTRACTOR, AT AN APPROVED PERMITTED LOCATION.  
 BEFORE ANY MACHINE WORK IS DONE, CONTRACTOR SHALL STAKE OUT AND MARK ITEMS ESTABLISHED BY THE SITE PLAN. CONTROL POINTS SHALL BE PRESERVED AT ALL TIMES DURING THE COURSE OF THE PROJECT. LACK OF THE PROPER WORKING POINTS AND GRADE STAKES MAY REQUIRE CESSATION OF OPERATIONS UNTIL SUCH POINTS AND GRADES HAVE BEEN REPLACED TO THE OWNERS SATISFACTION.

**STRUCTURAL FILL:**  
 ALL NEWLY PLACED STRUCTURAL FILL OR BACK FILL SHOULD BE COMPACTED TO NOT LESS THAN 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY EXCEPT IN THE FINAL FOOT BENEATH PAVEMENT STRUCTURES WHERE THE REQUIREMENT SHOULD BE INCREASED TO 98% OF THE PROCTOR MAXIMUM DRY DENSITY. IT IS NOT ANTICIPATED THAT EITHER DIFFICULT EXCAVATION OR GROUND WATER WILL BE ENCOUNTERED FOR CUT DEPTHS UP TO 15 FEET ON THIS SITE. ALTHOUGH THE SOIL APPEARS TO BE WELL SUITED FOR REUSE AS STRUCTURAL FILL, IT SHOULD BE RECOGNIZED THAT CLAY SOILS ARE SENSITIVE TO MOISTURE, AND THEREFORE, IT IS RECOMMENDED THAT EARTHWORK BE PERFORMED DURING THE DRIER MONTHS OF THE YEAR. THE CONTRACTOR SHOULD BE PREPARED TO MOISTURE CONDITION THE SOILS AS NECESSARY IN ORDER TO IMPROVE THE EFFICIENCY OF THE COMPACTING OPERATIONS AND EFFORTS.  
**OFF-SITE BORROW / TRENCH BORROW**  
 OFF-SITE BORROW MATERIAL PLACED ON SITE SHOULD BE LOW PLASTICITY (PI LESS THAN 25 AND LL LESS THAN 50) AND SHALL BE FREE OF ORGANIC MATERIAL OR DEBRIS. PLACE FILL IN 8" TO 10" LOOSE LIFTS AND COMPACT TO 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. ASTM D698. THE MOISTURE CONTENT OF THE SOIL SHOULD BE MAINTAINED WITHIN ± 3 PERCENTAGE POINTS OF THE OPTIMUM MOISTURE CONTENT DETERMINED BY THE SAME TEST. OFF-SITE BORROW MATERIAL TO BE OBTAINED FROM A PERMITTED SOURCE.  
**EXISTING CONDITIONS:**  
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL EXISTING JOB CONDITIONS. ANY ADVERSE CONDITIONS AFFECTING WORK SHOWN ON THESE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR POSSIBLE CLARIFICATION OR RECONCILIATION.  
**CONSTRUCTION SAFETY:**  
 THESE DRAWINGS DO NOT CONTAIN THE REQUIREMENTS FOR JOB SAFETY. ALL PROVISIONS FOR SAFETY SHALL BE SOLE RESPONSIBILITY OF THE CONTRACTOR.  
 \*\*REFER TO ARCHITECTURAL PLANS FOR EXACT BUILDING DIMENSIONS AND FINAL PLUMBING SIZES AND LOCATIONS.



**LOCATION MAP**  
NO SCALE

DISTURBED ACREAGE = 10.42± ACRES

**PREFORMED SCOUR HOLES SCHEDULE**

LOCATION	PIPE DIA. D (IN.)	RIPRAP STONE CLASS	RIPRAP DEPTH FT	D50 SIZE FT	BASE WIDTH FT	SCOUR HOLE DEPTH FT
SB#3	4	B	1	8	3.75	1

MINIMUM SCOUR HOLE DEPTH = 1'  
 BASE WIDTH = 3 x PIPE SIZE; MIN = 3.75'

**DISSIPATOR PAD/OUTLET PROTECTION SCHEDULE**  
(NYDOT METHOD)

LOCATION	Q (ft³/s)	Q (10)	V (ft/s)	V (10)	D <sub>50</sub> INCHES	ZONE	M	NUMBER OF PIPES	APRON LENGTH (L <sub>a</sub> ) FEET	APRON WIDTH (W) FEET	CLASS STONE	STONE DEPTH (D <sub>50</sub> ) INCHES	OUTLET CHANNEL PROTN DEPTH FT	CHANNEL DEPTH FT	CHANNEL SIDE SLOPE	SOIL TYPE		
18" CROSSPIPE	7.42	6.48	4.20	3.68	18	1	4	1	6	14	A	18	2'-6"	B	1.89	2	3:1	GB2
SWALE#1B	10.01	1.90	28	1	4	1	9	1	9	9	A	18	2'-6"	A	-	-	-	GB2
SWALE#2	2.38	0.57	27	1	4	1	9	1	9	7	A	18	2'-6"	A	-	-	-	GB2
SWALE#3	2.38	0.82	20	1	4	1	7	1	7	7	A	18	2'-6"	A	-	-	-	GB2
SWALE#4	10.18	1.27	34	1	4	1	11	1	11	11	A	18	2'-6"	A	-	-	-	GB2
SWALE#5	2.07	0.48	25	1	4	1	8	1	8	8	A	18	2'-6"	A	-	-	-	GB2
SWALE#6A	9.01	1.05	35	1	4	1	12	1	12	12	A	18	2'-6"	A	-	-	-	GB2

FOR PIPE D<sub>50</sub> IS DIAMETER; FOR CHANNEL OUTLETS, D<sub>50</sub> = SQUARE ROOT OF THE CROSS SECTIONAL AREA OF FLOW AT OUTLET  
 L<sub>a</sub> = M x D<sub>50</sub>; (IF N>1, L<sub>a</sub> = 1.25 x M x D<sub>50</sub>)  
 FLAT = 4 x PIPE DIAMETER; CHANNEL = CHANNEL BOTTOM + SIDES UP TO TOP OF BANK  
 FLAT = USE TABLE; CHANNEL = 1.5 x MAX. STONE SIZE

**DITCH CALCULATIONS-FULLY VEGETATED CHANNELS**  
 10-YEAR DESIGN STORM (n VALUES OBTAINED FROM CHART 8.05c OF THE NC EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL)

LOCATION	FORM LNER	DRAINAGE AREA ACRES	C COEFF	RAINFALL INTENSITY IN/HR	REQUIRED FLOW Q cfs	DITCH SLOPE	BOTTOM DEPTH d ft	FLOW DEPTH y ft	SIDE SLOPE M	FLOW AREA A sq ft	WETTED PERIMETER P ft	HYDRAULIC RADIUS R ft	MANN VEL. V ft/s	ACTUAL CAPACITY Q ft³/s	TOP WIDTH W ft	SHEAR STRESS (lb/ft²)	n	VR LNER	TEMP. REQUIRED
SWALE#1A	NO	0.05	0.50	7.54	0.19	0.0200	2	0.24	3	0.66	3.53	0.19	0.29	0.19	3.45	0.30	0.05	NO	
SWALE#1B	NO	1.74	0.78	7.54	10.01	0.0101	2	1.03	3	5.27	8.54	0.62	1.90	10.01	8.20	0.65	1.17	NO	
SWALE#2	NO	0.75	0.50	7.54	2.83	0.0030	2	1.00	3	4.96	8.29	0.60	0.57	2.83	7.97	0.19	0.34	NO	
SWALE#3	NO	0.83	0.50	7.54	2.38	0.0085	2	0.70	3	2.89	6.45	0.65	0.82	2.38	6.22	0.37	0.37	NO	
SWALE#4	NO	2.70	0.50	7.54	10.18	0.0040	2	1.34	3	8.03	10.45	0.77	1.27	10.18	10.02	0.33	0.97	NO	
SWALE#5	NO	0.55	0.50	7.54	2.07	0.0030	2	0.81	3	4.28	7.74	0.55	0.48	2.07	7.44	0.17	0.27	NO	
SWALE#6A	NO	2.39	0.50	7.54	9.01	0.0030	2	1.39	3	8.82	10.82	0.80	1.05	9.01	10.36	0.26	0.83	NO	
SWALE#6B	NO	0.13	0.50	7.54	0.49	0.0385	2	0.27	3	0.76	3.71	0.21	0.64	0.49	3.63	0.65	0.13	NO	
DITCH#1	NO	0.32	0.53	7.54	1.28	0.0292	2	0.40	3	1.29	4.55	0.28	0.99	1.28	4.42	0.73	0.28	NO	
DITCH#2A	NO	1.30	0.52	7.54	5.10	0.0200	2	0.70	3	2.85	6.40	0.44	1.79	5.10	6.18	0.87	0.80	NO	
DITCH#2B	NO	1.21	0.52	7.54	4.75	0.0030	2	1.16	3	6.34	9.33	0.68	0.75	4.75	8.95	0.22	0.51	NO	
DITCH#2C	NO	0.96	0.53	7.54	2.25	0.0130	2	0.81	3	2.35	5.87	0.40	0.96	2.25	5.67	0.50	0.38	NO	

**PIPE SIZING TABLE**  
n = 0.013

FROM	TO	INLET AREA (ACRES)	TOTAL AREA (ACRES)	INLET TIME (MIN)	PIPE TIME (MIN)	CONC (MIN)	I (IN/HR)	Cc COEFF	Cc COEFF	Q10 (CFS)	SLOPE (FT/FT)	D <sub>theo</sub> (INCHES)	SIZE (INCHES)	V <sub>full</sub> (FT/SEC)	Q <sub>full</sub> (CFS)	LENGTH (FT)	SEGMENT TIME (MIN)	UPPER INVERT	LOWER INVERT
18" CROSSPIPE		1.62	1.62	5	5.0	5.0	7.54	0.53	0.53	6.5	0.0050	17.1	18	4.2	7.4	56	0.2	117.05	116.77

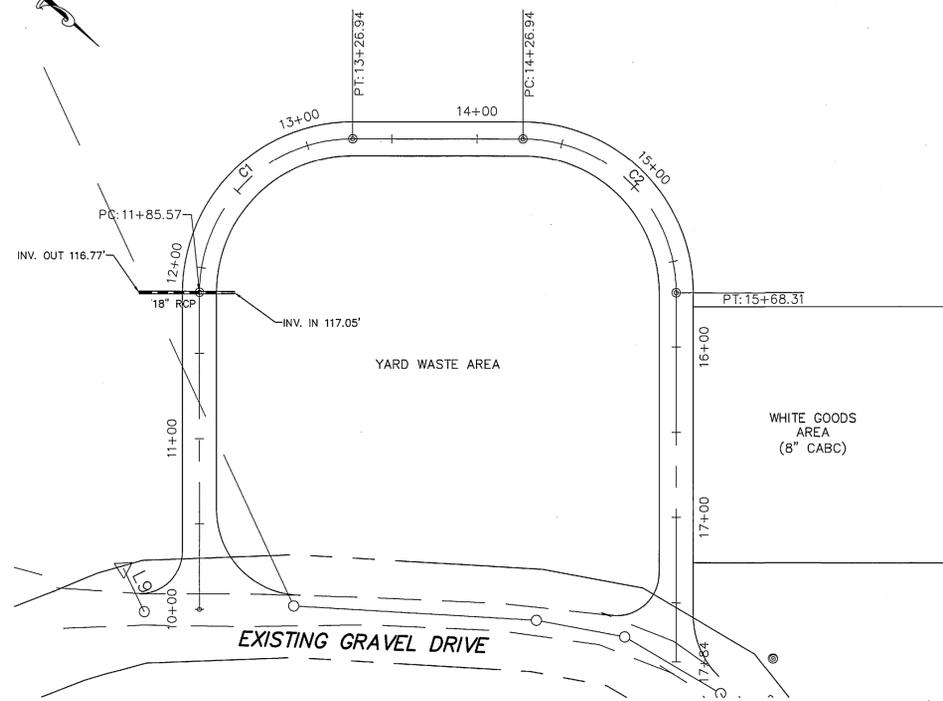
**SKIMMER SEDIMENT BASIN SCHEDULE**

BASIN	AREA ACRES	REQ. SURFACE SQ. FT.	LENGTH FT	WIDTH FT	DEPTH FT	WER LENGTH FT	BAFFLES SURFACE SQ. FT.	PROP. VOL. SQ. FT.	PROP. AREA SQ. FT.	PROP. BOTTOM VOLUME (MEASURED FROM INFLOW END) CF	BAFFLE PLACEMENT	SKIMMER SIZE (DIA.) IN.	ORIFICE SIZE (DIA.) IN.	DEWATERING TIME DAYS									
1	2.80	2.80	5.00	0.60	7.54	12.87	4118	91	45	2.0	12	YES	4118	5040	3:1	2628	6991	32	54	77	2.0	1.59	3.0
2	3.68	3.68	5.00	0.60	7.54	16.85	5412	104	52	2.0	16	YES	5412	6624	3:1	3683	9040	36	62	88	2.0	1.85	3.0
3	3.16	3.16	5.00	0.60	7.54	14.30	4647	96	48	2.0	13	YES	4647	5688	3:1	3056	7648	34	58	82	2.5	1.96	2.0

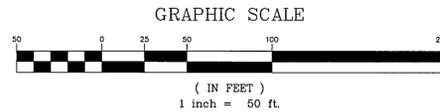
MINIMUM WER WIDTH = 4'  
 \*REQUIRED VOLUME IS 1800 CU FT/DISTURBED ACRE  
 2 days

	<p><b>BARTLETT ENGINEERING &amp; SURVEYING, PC</b>          1906 NASH STREET NORTH          WILSON, N.C. 27893-1726          TELE: (252) 399-0704          FAX: (252) 399-0804          EMAIL: info@bartletteng.com</p>	<p><b>GRADING PLAN</b></p>		<p><b>WILSON COUNTY LANDFILL</b>          (MULCH STORAGE, YARD WASTE COLLECTION, WHITE GOODS COLLECTION AREAS)          2400 NC HIGHWAY 42 EAST</p>		DATE: OCT. 2009	PROJECT: 09158 CLIENT CODE: WC CADFILE: 09158TP2	GARDNERS TOWNSHIP WILSON COUNTY
		SCALE: 1" = 50'		REVISIONS: Δ NC DENR COMMENTS 11-12-09		NORTH CAROLINA PIN # 3732-52-9078	ZONE: AR	SHEET SP3
		REVISIONS: Δ NC DENR COMMENTS 11-12-09		REVISIONS: Δ NC DENR COMMENTS 11-12-09		REVISIONS: Δ NC DENR COMMENTS 11-12-09		REVISIONS: Δ NC DENR COMMENTS 11-12-09

CURVE TABLE						
CURVE	LENGTH	RADIUS	DELTA	TANGENT	CHORD BRG.	CHORD
C1	141.37	90.00	90°00'00"	90.00	N84°40'31"W	127.28
C2	141.37	90.00	90°00'00"	90.00	N5°19'29"E	127.28



**GRAVEL DRIVE**  
20' EP-EP  
**PLAN VIEW**



CONTRACTOR RESPONSIBLE FOR COMPLYING WITH ALL REQUIREMENTS/CONDITIONS OF ALL ENCROACHMENTS & PERMITS INCLUDING PROVIDING BONDS/INSURANCE IF REQUIRED.  
CONTRACTOR IS RESPONSIBLE FOR COORDINATING REQUIRED INSPECTIONS BY NCDOT AND/OR WITH MUNICIPALITY.

**EROSION CONTROL NOTES**

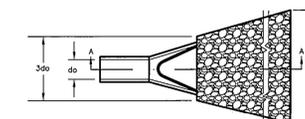
- SEEDING AND MULCHING TO BE APPLIED WITHIN 15 WORKING DAYS OF ALL LAND DISTURBING ACTIVITIES NOT PREVIOUSLY STABILIZED.
- SILT FENCE TO BE INSTALLED AS SHOWN ON PLANS OR AS DEEMED NECESSARY BY VISUAL OBSERVATION.

LOCATION, QUANTITY AND PLACEMENT OF DRAINAGE PIPES AND EROSION CONTROL DEVICES MAY VARY TO BETTER CONFORM TO FIELD CONDITIONS.

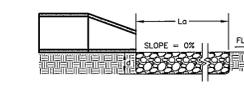
UTILITIES SHOWN ON PLANS ARE LOCATED APPROXIMATELY. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UTILITIES AND SERVICES WHETHER SHOWN ON PLANS OR NOT.

CONTRACTOR TO BE RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF THESE FACILITIES IF DAMAGED.

TYPE A  
PIPE OUTLET TO FLAT AREA WITH NO DEFINED CHANNEL



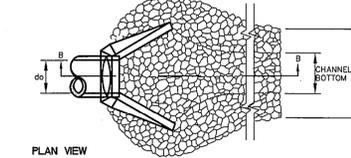
PLAN VIEW



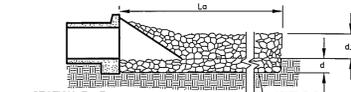
SECTION A - A

MAINTENANCE  
INSPECT RIPRAP OUTLET STRUCTURES AFTER HEAVY RAINS TO SEE IF ANY EROSION AROUND OR BELOW THE RIPRAP HAS TAKEN PLACE OR IF STONES HAVE BEEN DISLOADED. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

TYPE B  
PIPE OUTLET TO WELL-DEFINED CHANNEL



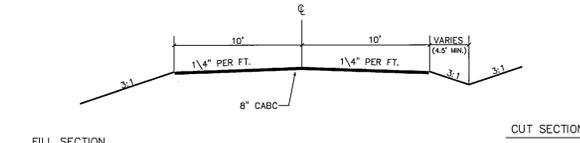
PLAN VIEW



SECTION B - B

NOTES:  
1.  $\phi$  = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 8 INCHES.  
2.  $\phi +$  = 6" ABOVE MAXIMUM TALKWATER OR TOP OF CHANNEL BANK (WHICHEVER IS LESS).  
3.  $L_r$  = LENGTH OF RIPRAP APRON.  
4.  $do$  = PIPE DIAMETER  
5. STONE DIA. = (FROM CHART)

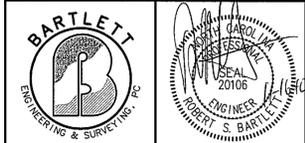
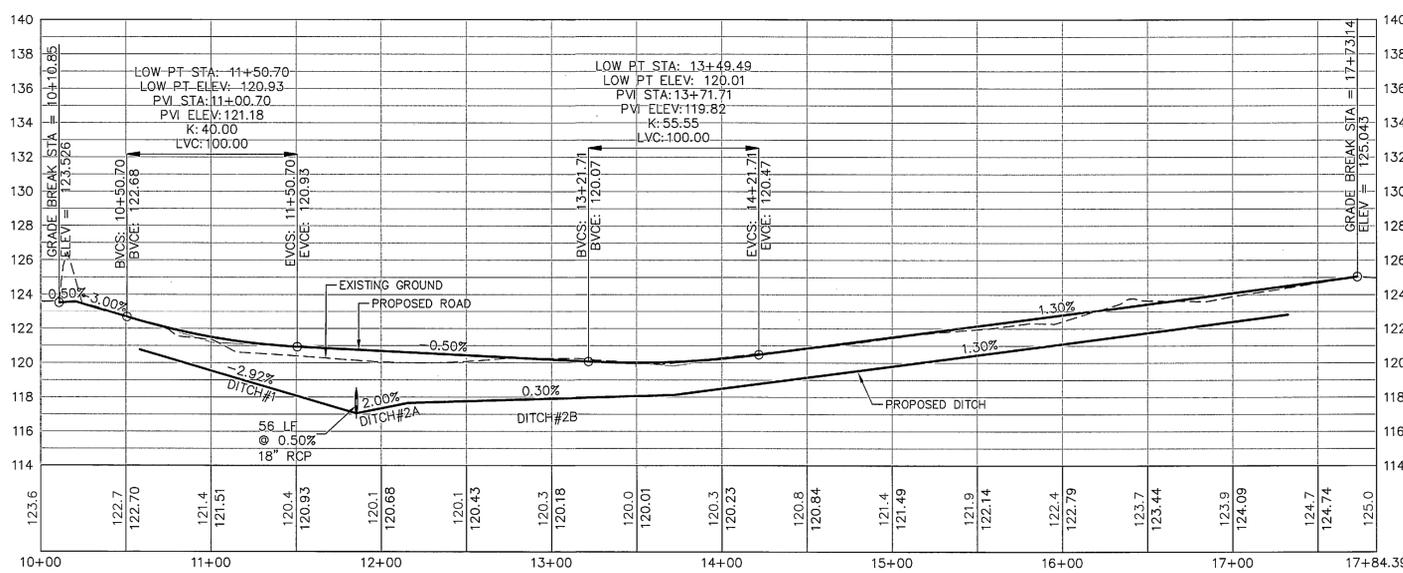
**OUTLET PROTECTION**  
NO SCALE



FILL SECTION

CUT SECTION

**PROPOSED 20' EP-EP ROAD SECTION**  
No Scale



**BARTLETT**  
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EMAIL: info@bartletteng.com

**CONSTRUCTION PLANS**

**WILSON COUNTY LANDFILL**  
(MULCH STORAGE, YARD WASTE COLLECTION, WHITE GOODS COLLECTION AREAS)  
2400 NC HIGHWAY 42 EAST

DATE: OCT. 2009  
SCALE: H: 1"=50' V: 1"=5'  
REVISIONS:  $\Delta$  NC DENR COMMENTS 11-12-09

PROJECT: 09158 WC  
CLIENT CODE: 09158TP2  
FIELD BOOK:  
DRAWN BY: RF  
SURVEY BY: TB,KP,LP  
GARDNERS TOWNSHIP WILSON COUNTY  
NORTH CAROLINA ZONE: AR  
PIN # 3732-52-9078 SHEET SP4

**CONSTRUCTION SEQUENCE:**

- OBTAIN PLAN APPROVAL BEFORE BEGINNING WORK. PRE-CONSTRUCTION MEETING AT DISCRETION OF APPROVING L&S ENGINEER. CALL 919-791-4200 MCDENR/LOS AT RR TO NOTIFY MCDENR/LOS OF START-UP.
- INSTALL APPLICABLE E&S CONTROL MEASURES PRIOR TO ONSET OF ANY LAND DISTURBING (INCLUDING DEMOLITION) ACTIVITIES.
- INSTALL CONSTRUCTION ENTRANCE AND SILT FENCE ACCORDING TO PLANS AND AS NEEDED.
- CONSTRUCT SKIMMER BASINS WITH BAFFLES, SWALES AND CHECK DAMS.
- PROVIDE STABILIZATION FOR SWALES AND SKIMMER BASINS IMMEDIATELY UPON COMPLETION OF THEIR INSTALLATION.
- BEGIN GRADING, PIPE LAYING AND CONSTRUCTION OF ROADS. MAINTAIN DEVICES AS NEEDED.
- AFTER GRADING IS COMPLETED, TOPSOIL STOCKPILE AND WASTE AREAS TO BE REMOVED AND AREA STABILIZED.
- WHEN ROAD CONSTRUCTION AND SITE GRADING IS COMPLETE AND ALL DISTURBED AREAS ARE STABILIZED COMPLETELY, INCLUDING WASTE PILES, REMOVE TEMPORARY MEASURES INCLUDING SEDIMENTS INSIDE SKIMMER BASIN AND RESTORE TO DESIGN DIMENSIONS THEN STABILIZE.
- VEGETATION TO BE ESTABLISHED ON SLOPES OR OTHER AREAS (INCLUDING STOCKPILE AREAS) WITHIN 21 CALENDAR DAYS OR SOONER FOLLOWING COMPLETION OF ANY PHASE OF GRADING. ANY DISTURBED LOTS AND SPOTS, TOPSOIL, WASTE PILES TO BE STABILIZED. SEEDING TO BE DONE AT RATES AS INDICATED ON PLAN.
- ALL APPLICABLE E&S CONTROL MEASURES TO BE PERMANENTLY MAINTAINED UNTIL A VIGOROUS STAND OF PERMANENT VEGETATION IS ESTABLISHED.

**MAINTENANCE:**

EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE CHECKED AT LEAST ONCE EVERY WEEK AND AFTER EVERY RUN-OFF PRODUCING RAINFALL.  
SEDIMENT SHALL BE REMOVED AND DEVICES REPAIRED AND/OR REPLACED AS NECESSARY.

**SEEDBED PREPARATION:**

CHISEL COMPACTED AREAS AND SPREAD TOPSOIL 3" DEEP OVER ADVERSE SOIL CONDITIONS, IF AVAILABLE. RIP UNDER AREA 6" DEEP. REMOVE ALL LOOSE ROCK, ROOTS, AND OTHER OBSTRUCTIONS LEAVING SURFACE REASONABLY SMOOTH AND UNIFORM. APPLY AGRICULTURAL LIME AND FERTILIZER UNIFORMLY AND MIX WITH SOIL. CONTINUE TILLAGE UNTIL A WELL PULVERIZED, REASONABLY UNIFORM SEEDBED IS PREPARED 4" TO 6" DEEP. SPREAD SEED ON FRESHLY PREPARED SEEDBED AND COVER LIGHTLY WITH SEEDING EQUIPMENT OR CULTIVATOR AFTER SEEDING. MULCH IMMEDIATELY AFTER SEEDING AND ANCHOR MULCH.

**SEEDING SCHEDULE:**

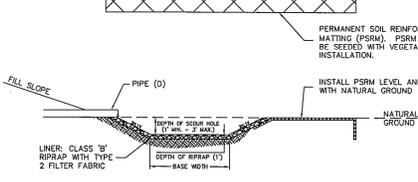
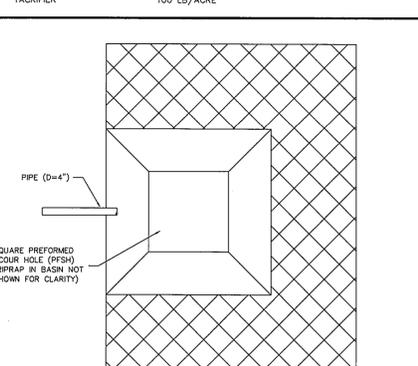
PERMANENT SEEDING	SEEDING MIXTURE SPECIES	RATE(LB./ACRE)	SEEDING DATES	BEST	POSSIBLE
TALL FESCUE	200		8/25-10/1		2/1-4/15
COMMON BERBERMUDA	10				

SOIL AMENDMENTS	LIMESTONE	FERTILIZER(10-10-10)	STRAW MULCH	EMULSIFIED ASPHALT TACK
	3000-5000 LBS/ACRE	1000 LB/ACRE	4000 LB/ACRE	435 GALLON/ACRE

TEMPORARY SEEDING	SEEDING MIXTURE SPECIES	WINTER/EARLY RATE(LB./ACRE)	SPRING RATE(LB./ACRE)	SUMMER RATE(LB./ACRE)
GERMAN MILLET (GRASS)	120	40	120	
ANNUAL (KOBÉ) LESPEDEZA	150			

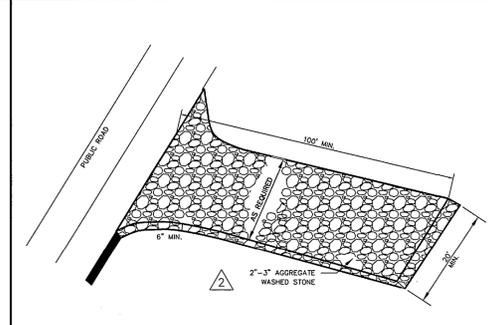
SEEDING DATES	12/1-4/15	4/15-8/15	8/15-12/30
SOIL AMENDMENTS	2000 LB/ACRE	2000 LB/ACRE	2000 LB/ACRE
LIMESTONE	750 LB/ACRE	750 LB/ACRE	750 LB/ACRE
FERTILIZER(10-10-10)	4000 LB/ACRE	4000 LB/ACRE	4000 LB/ACRE
STRAW MULCH	435 GALLON/ACRE	435 GALLON/ACRE	435 GALLON/ACRE
EMULSIFIED ASPHALT TACK	435 GALLON/ACRE	435 GALLON/ACRE	435 GALLON/ACRE

HYDROSEEDING MATERIAL	SEED	FERTILIZER	STRAW MULCH	TACKIFIER
	200 LB/ACRE	500 LB/ACRE	1200 LB/ACRE	100 LB/ACRE



- TO AVOID SHIFTING OF THE SCOUR HOLE AFTER INSTALLATION, THE BMP SHOULD BE INSTALLED IN UNDISTURBED SOIL INSTEAD OF FILL MATERIAL.
- INSTALL PREFORMED SCOUR HOLES AFTER SITE STABILIZATION.
- ENSURE THAT THE APPROX IS FLUSH WITH NATURAL GROUND. THE ELEVATION OF THE TOP OF THE PREFORMED SCOUR HOLE SHOULD BE THE SAME AS THE ELEVATION OF THE PFSM.
- ENSURE THAT RIPRAP CONSISTS OF A WELL-GRADED MIXTURE OF STONE. SMALLER-SIZE RIPRAP STONES SHOULD BE USED TO FILL GAPS BETWEEN LARGER STONES.
- WHERE PRACTICAL, ROUTE OFF-SITE RUNOFF AWAY FROM BMP.
- IMMEDIATELY AFTER CONSTRUCTION, STABILIZE THE ENTIRE AREA WITH VEGETATION.
- CLEAN THE AREA OF ALL CONSTRUCTION DEBRIS AND CHECK THE ENTIRE AREA FOR ANY POTENTIAL OBSTRUCTIONS THAT COULD PROMOTE CHANNELLED FLOW.

**MAINTENANCE:**  
INSPECT LEVEL SPREADER AFTER EVERY RAINFALL UNTIL VEGETATION IS ESTABLISHED, AND PROMPTLY MAKE NEEDED REPAIRS. AFTER THE AREA HAS BEEN STABILIZED, MAKE PERIODIC INSPECTIONS AND KEEP VEGETATION IN A HEALTHY, WOODS CONDITION.



- APPLICABLE AT ALL POINTS OF INGRESS & EGRESS UNTIL SITE IS STABILIZED. FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE MUST BE PROVIDED.
- 2'-3" AGGREGATE WASHED STONE SHALL BE USED. PAD TO BE 100' L X 20' W X 6" D.
  - TURNING RADIUS TO BE SUFFICIENT TO ACCOMMODATE LARGER TRUCKS C ENTRANCE(S) SHOULD BE LOCATED TO PROVIDE FOR MAXIMUM UTILIZATION BY ALL CONSTRUCTION TRUCKS.
  - MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF TRAFFIC ONTO STREETS. PERIODIC TOP DRESSING WITH STONE WILL BE NECESSARY. KEEP STONE ON HAND.
  - ANY MATERIAL WHICH STILL MAKES IT ONTO THE ROAD MUST BE CLEANED IMMEDIATELY.

**MAINTENANCE:**  
MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD AND SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOPDRESSING WITH 2-INCH STONE. AFTER EACH RAINFALL, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY. IMMEDIATELY REMOVE ALL OBSTRUCTIONAL MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS.

**CONSTRUCTION ENTRANCE NO SCALE**



REMOVE BRUSH, TREES, STUMPS, AND OTHER OBJECTIONABLE MATERIALS. EXCAVATE DEEP ENOUGH FOR BOTH FILTER AND RIPRAP. COMPACT ANY FILL MATERIAL TO THE DENSITY OF SURROUNDING UNDISTURBED SOIL. NOTE: OVER-EXCAVATION TO ALLOW FOR RIPRAP AND FILTER INCREASES THE AMOUNT OF SPOIL, CONSIDERABLY. (FIGURE 6.15B)

CUT A KEYWAY IN STABLE MATERIAL AT BASE OF SLOPE TO REINFORCE THE TOE. KEYWAY DEPTH SHOULD BE 1.5 TIMES THE DESIGN THICKNESS OF RIPRAP AND SHOULD EXTEND A HORIZONTAL DISTANCE EQUAL TO THE DESIGN THICKNESS. (FIGURE 6.15B)

**FILTER:**  
INSTALL SYNTHETIC FILTER FABRIC OR SAND/GRAVEL FILTER ON SUBGRADE SPECIFIED IN PLANS.

SYNTHETIC FILTER FABRIC-PLACE FILTER FABRIC ON A SMOOTH FOUNDATION. OVERLAP EDGES AS LEAST 12 INCHES, WITH ANCHOR PINS SPACED EVERY 3 FT. ALONG OVERLAP. FOR LARGE STONES, A 4-INCH LAYER OF SAND MAY BE NEEDED TO PROTECT FILTERCLOTH.

SAND/GRAVEL FILTER-SPREAD WELL-GRADED AGGREGATE IN A UNIFORM LAYER TO THE REQUIRED THICKNESS (6 INCHES MIN.) IF TWO OR MORE LAYERS ARE SPECIFIED, PLACE THE LAYER OF SMALLER STONES FIRST AND AVOID MIXING THE LAYERS.

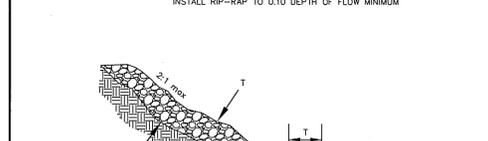
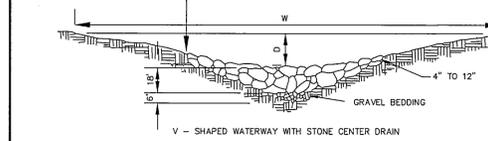
**STONE PLACEMENT:**  
PLACE RIPRAP IMMEDIATELY AFTER INSTALLING FILTER.

INSTALL RIPRAP TO FULL THICKNESS IN ONE OPERATION. DO NOT DUMP THROUGH CHUTES OR ANY METHOD THAT CAUSES STONE SEGREGATION OF STONE SIZES. AVOID DISLODGING OR DAMAGING UNDERLYING FILTER MATERIAL WHEN PACING STONE.

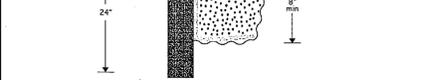
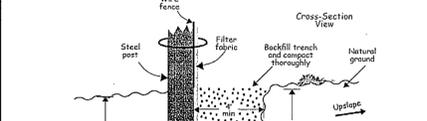
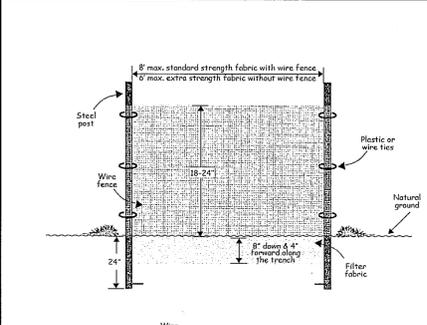
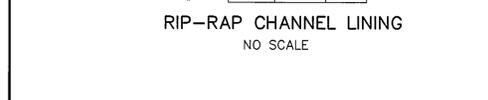
IF FABRIC IS DAMAGED, REMOVE RIPRAP AND REPAIR FABRIC BY ADDING ANOTHER LAYER, OVERLAPPING THE DAMAGE AREA BY 12 INCHES.

PLACE SMALLER STONES IN VOIDS TO FORM A DENSE, UNIFORM, WELL-GRADED MASS. SELECTIVE LOADING AT THE QUARRY AND SOME HAND PLACEMENT MAY BE NECESSARY TO OBTAIN AN EVEN DISTRIBUTION OF STONE SIZES.

BLEND THE STONE SURFACE SMOOTHLY WITH THE SURROUNDING AREA ALLOWING NO PROTRUSIONS OR OVERFALL (FIGURE 6.15C).



MATERIAL CLASS	T DESIGN THICKNESS	STONE SIZE RANGE
A	9"	2"-6"
A	9"	2"-6"



**INSTALLATION SPECIFICATIONS**

- THE BASE OF BOTH END POSTS SHOULD BE AT LEAST ONE FOOT HIGHER THAN THE MIDDLE OF THE FENCE. CHECK WITH A LEVEL IF NECESSARY.
- INSTALL POSTS 4 FEET APART IN CRITICAL AREAS AND 6 FEET APART ON STANDARD APPLICATIONS.
- INSTALL POSTS 2 FEET DEEP ON THE DOWNSTREAM SIDE OF THE SILT FENCE, AND AS CLOSE AS POSSIBLE TO THE FABRIC, ENABLING POSTS TO SUPPORT THE FABRIC FROM UPSTREAM WATER PRESSURE.
- INSTALL POSTS WITH THE NIPPLES FACING AWAY FROM THE SILT FABRIC.
- ATTACH THE FABRIC TO EACH POST WITH THREE TIES. ALL SPACED WITHIN THE TOP 8 INCHES OF THE FABRIC. ATTACH EACH OF THE DIAGONAL ROD DEVICES THROUGH THE FABRIC WITH EACH PUNCTURE AT LEAST 1 INCH VERTICALLY APART. ALSO, EACH TIE SHOULD BE POSITIONED TO HANG ON A POST NIPPLE WHEN TIGHTENED TO PREVENT SAGGING.
- WRAP APPROXIMATELY 6 INCHES OF FABRIC AROUND THE END POSTS AND SECURE WITH 3 TIES.
- NO MORE THAN 24 INCHES OF A 36 INCH FABRIC IS ALLOWED ABOVE THE GROUND LEVEL.
- THE INSTALLATION SHOULD BE CHECKED AND CORRECTED FOR ANY DEVIATIONS BEFORE COMPACTION.
- COMPACTION IS VITALLY IMPORTANT FOR EFFECTIVE RESULTS. COMPACT THE SOIL IMMEDIATELY NEXT TO THE SILT FENCE FABRIC WITH THE FRONT WHEEL OF THE TRACTOR, SKID STEER, OR ROLLER EXERTING AT LEAST 60 POUNDS PER SQUARE INCH. COMPACT THE UPSTREAM SIDE FIRST, AND THEN EACH SIDE TWICE FOR A TOTAL OF 4 TRIPS.

**MAINTENANCE**

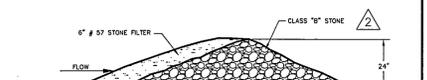
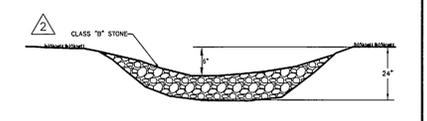
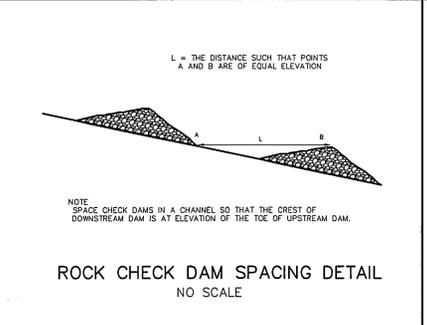
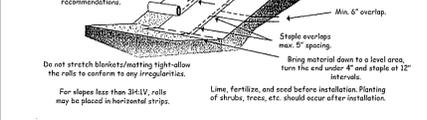
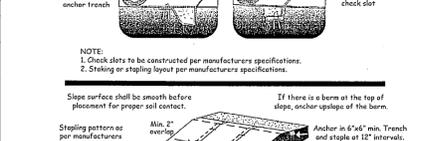
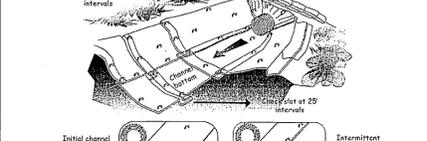
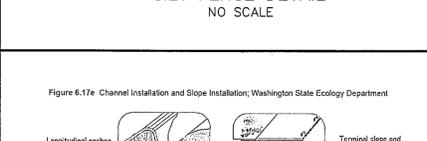
INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.

SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE PROMPTLY.

REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANUP.

REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

**SILT FENCE DETAIL NO SCALE**

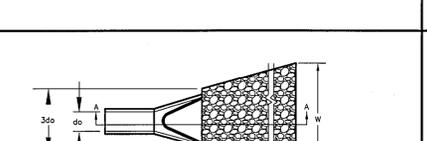


**ROCK CHECK DAM DETAIL NO SCALE**

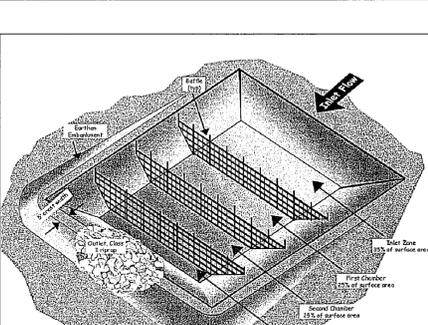
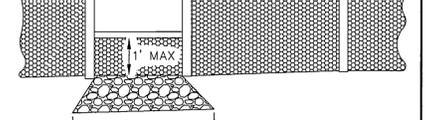
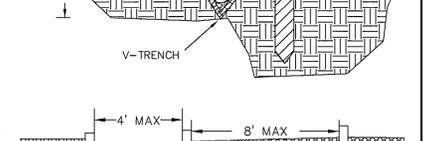
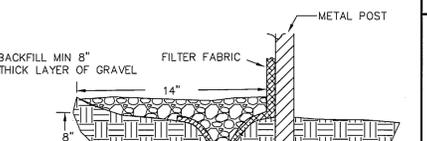
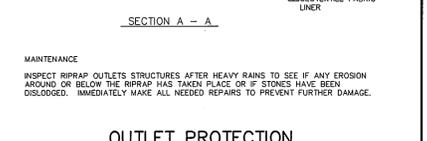
**MAINTENANCE:**  
INSPECT CHECK DAMS AND CHANNELS FOR DAMAGE AFTER EACH RUNOFF EVENT. ANTICIPATE SUBMERGENCE AND DEPOSITION ABOVE THE CHECK DAM AND EROSION FROM HIGH FLOWS AROUND THE SIDES OF THE DAM. CORRECT ALL DAMAGE IMMEDIATELY. IF SIGNIFICANT EROSION OCCURS BETWEEN DAMS, INSTALL A PROTECTIVE RIP-RAP LINER IN THAT PORTION OF THE CHANNEL.

REMOVE SEDIMENT ACCUMULATED BEHIND THE DAMS AS NEEDED TO PREVENT DAMAGE TO THE CHANNEL VEGETATION. ALLOW THE CHANNEL TO DRAIN THROUGH THE STONE CHECK DAM, AND PREVENT LARGE FLOW FROM THE CARRYING SEDIMENT OVER THE DAM. ADD STONES TO DAMS AS NEEDED TO MAINTAIN DESIGN HEIGHT AND CROSS SECTION.

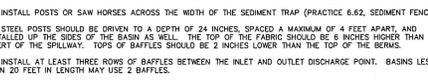
**ROCK CHECK DAM DETAIL NO SCALE**



**OUTLET PROTECTION NO SCALE**



- GRADE THE BASIN SO THAT THE BOTTOM IS LEVEL, FRONT TO BACK AND SIDE TO SIDE.
- INSTALL POSTS OR SAW HORSES ACROSS THE WIDTH OF THE SEDIMENT TRAP (PRACTICE 6.62, SEDIMENT FENCE).
- STEEL POSTS SHOULD BE DRIVEN TO A DEPTH OF 24 INCHES, SPACED A MAXIMUM OF 4 FEET APART, AND INSTALLED UP THE SIDES OF THE BASIN AS WELL. THE TOP OF THE FABRIC SHOULD BE 8 INCHES HIGHER THAN THE INVERT OF THE SPILLWAY. TOPS OF BAFFLES SHOULD BE 2 INCHES LOWER THAN THE TOP OF THE BASIN.
- INSTALL AT LEAST THREE ROWS OF BAFFLES BETWEEN THE INLET AND OUTLET DISCHARGE POINT. BASINS LESS THAN 20 FEET IN LENGTH MAY USE 2 BAFFLES.
- WHEN USING POSTS, ADD A SUPPORT WIRE OR ROPE ACROSS THE TOP OF THE MEASURE TO PREVENT SAGGING.
- WRAP POROUS MATERIAL LIKE JUTE BACKED BY COB MATERIAL, OVER A SAWHORSE OR THE TOP WIRE, HAMMER REAR INTO THE SAWHORSE LEGS FOR ANCHORING. THE FABRIC SHOULD HAVE FIVE TO TEN PERCENT OPENINGS IN THE WEAVE. ATTACH FABRIC TO A ROPE AND A SUPPORT STRUCTURE WITH 2P TIES, WIRE, OR STAPLES.
- THE BOTTOM AND SIDES OF THE FABRIC SHOULD BE ANCHORED IN A TRENCH OR PINNED WITH 8-INCH EROSION CONTROL MATTING STAPLES.
- DO NOT SPICE THE FABRIC, BUT USE A CONTINUOUS PIECE ACROSS THE BASIN.



**TEMPORARY SEDIMENT TRAP (TST)-BAFFLE INSTALLATION NO SCALE**

INSPECT BAFFLES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY. BE SURE TO MAINTAIN ACCESS TO THE BAFFLES. SHOULD THE FABRIC OF A BAFFLE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.

ENSURE THAT FILL MATERIAL FOR THE EMBANKMENT IS FREE OF ROOTS, WOODY VEGETATION, ORGANIC MATTER, AND OTHER OBJECTIONABLE MATERIAL. PLACE THE FILL IN LIFTS NOT TO EXCEED 18 INCHES, AND MACHINE COMPACT IT. OVERFILL THE EMBANKMENT 6 INCHES TO ALLOW FOR SETTLEMENT.

SHAPE THE BASIN TO THE SPECIFIED DIMENSIONS. PREVENT THE SKIMMING DEVICE FROM SETTLING INTO THE MUD BY EXCAVATING A SHALLOW PIT UNDER THE SKIMMER OR PROVIDING A LOW SUPPORT UNDER THE SKIMMER OF STONE OR TIMBER.

PLACE THE BARREL (TYPICALLY 4-INCH SCHEDULE 40 PVC PIPE) ON A FIRM, SMOOTH FOUNDATION OF IMPERVIOUS SOIL. DO NOT USE PERVIOUS MATERIAL SUCH AS SAND, GRAVEL OR CRUSHED STONE AS BACKFILL AROUND THE PIPE. PLACE THE FILL MATERIAL AROUND THE PIPE SPILLWAY IN AT LEAST THREE LAYERS AND COMPACT IT UNDER AND AROUND THE PIPE TO AT LEAST THE SAME DENSITY AS THE ADJACENT EMBANKMENT. CARE MUST BE TAKEN NOT TO RAISE THE PIPE FROM THE FIRM CONTACT WITH ITS FOUNDATION WHEN COMPACTING UNDER THE PIPE HAUNCHES. PLACE A MINIMUM DEPTH OF 2 FEET OF COMPACTED BACKFILL OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT. IN NO CASE SHOULD THE PIPE CONDUIT BE INSTALLED BY CUTTING A TRENCH THROUGH THE DAM AFTER THE EMBANKMENT IS COMPLETE.

ASSEMBLE THE SKIMMER FOLLOWING THE MANUFACTURER'S INSTRUCTIONS, OR AS DESIGNED.

LAY THE ASSEMBLED SKIMMER ON THE BOTTOM OF THE BASIN WITH THE FLEXIBLE JOINT AT THE INLET OF THE BARREL PIPE. ATTACH THE FLEXIBLE JOINT TO THE BARREL PIPE AND POSITION THE SKIMMER OVER THE EXCAVATED PIT OR SUPPORT. BE SURE TO ATTACH A ROPE TO THE SKIMMER AND ANCHOR IT TO THE SIDE OF THE BASIN. THIS WILL BE USED TO PULL THE SKIMMER TO THE SIDE FOR MAINTENANCE.

EARTHEN SPILLWAYS-INSTALL THE SPILLWAY IN UNDISTURBED SOIL TO THE GREATEST EXTENT POSSIBLE. IF THE LENGTH OF THE FABRIC IS INSUFFICIENT FOR THE ENTIRE LENGTH OF THE SPILLWAY, MULTIPLE SECTIONS, SPANNING THE COMPLETE WIDTH, MAY BE USED. THE UPPER SECTION(S) SHOULD OVERLAP THE LOWER SECTION(S) SO THAT WATER CANNOT FLOW UNDER THE FABRIC. SECURE THE UPPER EDGE AND SIDES OF THE FABRIC IN A TRENCH WITH STAPLES OR PINS.

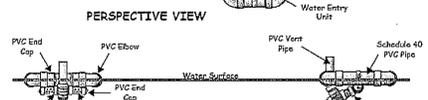
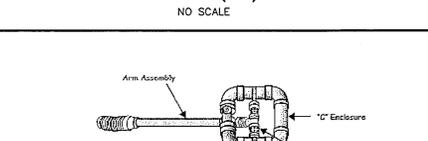
INLETS-DISCHARGE WATER INTO THE BASIN IN A MANNER TO PREVENT EROSION. USE TEMPORARY SLOPE DRAINS OR DIVERSIONS WITH OUTLET PROTECTION TO DIVERT SEDIMENT-LADEN WATER TO THE UPPER END OF THE POOL AREA TO IMPROVE BASIN TRAP EFFICIENCY.

EROSION CONTROL-CONSTRUCT THE STRUCTURE SO THAT THE DISTURBED AREA IS MINIMIZED. DIVERT SURFACE WATER AWAY FROM BARE AREAS. COMPLETE THE EMBANKMENT BEFORE THE AREA IS CLEARED. STABILIZE THE EMERGENCY SPILLWAY EMBANKMENT AND OTHER DISTURBED AREAS ABOVE THE CREST OF THE PRINCIPAL SPILLWAY IMMEDIATELY AFTER CONSTRUCTION.

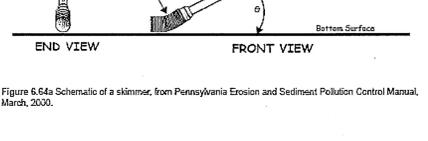
INSTALL POROUS BAFFLES AS SPECIFIED IN PRACTICE 6.65

AFTER ALL THE SEDIMENT-PRODUCING AREAS HAVE BEEN PERMANENTLY STABILIZED, REMOVE THE STRUCTURE AND ALL THE UNSTABLE SEDIMENT. SMOOTH THE AREA TO BLEND WITH THE ADJOINING AREAS AND STABILIZE PROMPTLY.

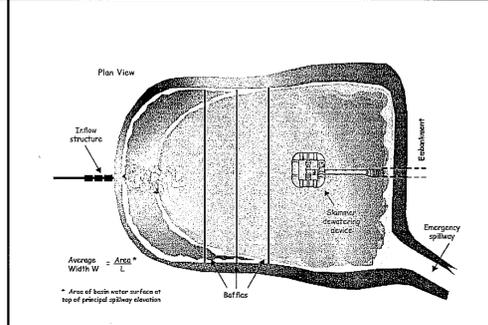
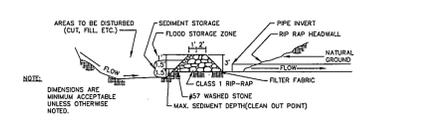
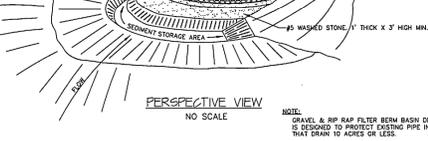
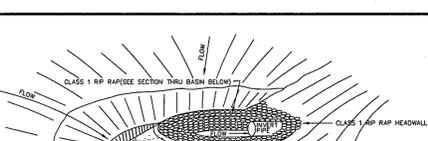
**TEMPORARY SEDIMENT TRAP (TST)-BAFFLE INSTALLATION NO SCALE**



**SKIMMER DETAIL NO SCALE**



**SKIMMER DETAIL NO SCALE**

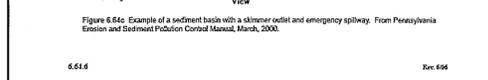


- INSPECT SKIMMER SEDIMENT BASINS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (ONE-HALF INCH OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. REMOVE SEDIMENT AND RESTORE THE BASIN TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT ACCUMULATES TO ONE-HALF THE HEIGHT OF THE FIRST BAFFLE. PULL THE SKIMMER TO ONE SIDE SO THAT THE SEDIMENT UNDERNEATH IT CAN BE EXCAVATED. EXCAVATE THE SEDIMENT FROM THE ENTIRE BASIN, NOT JUST AROUND THE SKIMMER OR THE FIRST CELL. MAKE SURE VEGETATION GROWING IN THE BOTTOM OF THE BASIN DOES NOT HOLD DOWN THE SKIMMER.

REPAIR THE BAFFLES IF THEY ARE DAMAGED. RE-ANCHOR THE BAFFLES IF WATER IS FLOWING UNDERNEATH OR AROUND THEM.

IF THE SKIMMER ARM OR BARREL PIPE IS CLOGGED, THE ORIFICE CAN BE REMOVED AND THE OBSTRUCTION CLEARED WITH A PLUMBER'S SNAKE OR BY FLUSHING WITH WATER. BE SURE AND REPLACE THE ORIFICE BEFORE REPOSITIONING THE SKIMMER. CHECK THE FABRIC LINED SPILLWAY FOR DAMAGED AREAS AND MAKE ANY REQUIRED REPAIRS WITH FABRIC THAT SPANS THE FULL WIDTH OF THE SPILLWAY. CHECK THE EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE, AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. MAKE ALL NECESSARY REPAIR IMMEDIATELY. REMOVE ALL TRASH AND OTHER DEBRIS FROM THE SKIMMER AND POOL AREAS.

FREEZING WEATHER CAN RESULT IN ICE FORMING IN THE BASIN. SOME SPECIAL PRECAUTIONS SHOULD BE TAKEN IN THE WINTER TO PREVENT THE SKIMMER FROM PLUGGING WITH ICE.



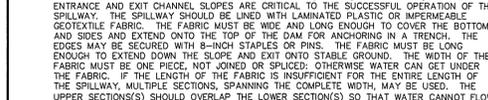
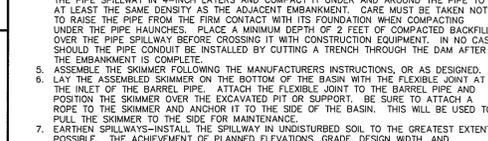
**TEMPORARY SKIMMER BASIN NO SCALE**

REPAIR THE BAFFLES IF THEY ARE DAMAGED. RE-ANCHOR THE BAFFLES IF WATER IS FLOWING UNDERNEATH OR AROUND THEM.

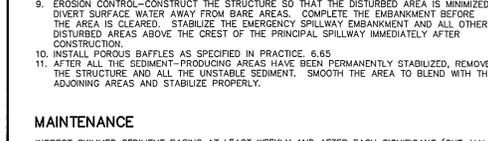
IF THE SKIMMER ARM OR BARREL PIPE IS CLOGGED, THE ORIFICE CAN BE REMOVED AND THE OBSTRUCTION CLEARED WITH A PLUMBER'S SNAKE OR BY FLUSHING WITH WATER. BE SURE AND REPLACE THE ORIFICE BEFORE REPOSITIONING THE SKIMMER. CHECK THE FABRIC LINED SPILLWAY FOR DAMAGED AREAS AND MAKE ANY REQUIRED REPAIRS WITH FABRIC THAT SPANS THE FULL WIDTH OF THE SPILLWAY. CHECK THE EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE, AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. MAKE ALL NECESSARY REPAIR IMMEDIATELY. REMOVE ALL TRASH AND OTHER DEBRIS FROM THE SKIMMER AND POOL AREAS.

FREEZING WEATHER CAN RESULT IN ICE FORMING IN THE BASIN. SOME SPECIAL PRECAUTIONS SHOULD BE TAKEN IN THE WINTER TO PREVENT THE SKIMMER FROM PLUGGING WITH ICE.

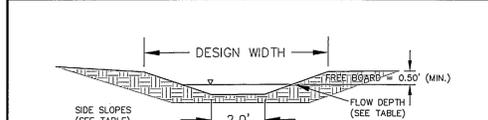
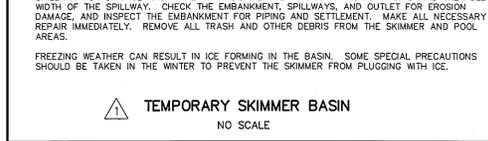
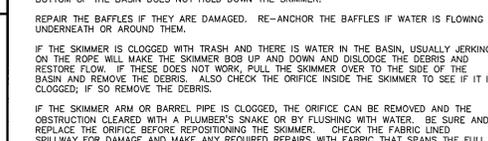
**TEMPORARY SKIMMER BASIN NO SCALE**



**TEMPORARY SKIMMER BASIN NO SCALE**



**TEMPORARY SKIMMER BASIN NO SCALE**



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## **Monitoring Plan**

**Wilson County Westside C&D Landfill  
Wilson County, North Carolina**

Prepared for:

**Wilson County Solid Waste Management Dept.  
Wilson, North Carolina**

**June 2010**

**Revised December 2010**



**BlackRock Engineers, Inc.**  
PO Box 58  
Wilmington, NC 28402

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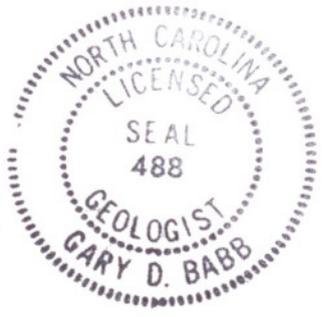
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**Certification**

The water quality monitoring plan for this facility has been prepared by a qualified geologist/engineer who is licensed to practice in the State of North Carolina. The plan has been prepared based on first-hand knowledge of site conditions and familiarity with North Carolina solid waste rules and industry standard protocol. This certification is made in accordance with North Carolina Solid Waste Regulations, indicating this Water Quality Monitoring Plan should provide early detection of any release of hazardous constituents to the uppermost aquifer, so as to be protective of public health and the environment. No other warranties, expressed or implied, are made.

Signed Gary D. Babb  
Printed Gary D. Babb  
Date June 21, 2010



Not valid unless this document bears the seal of the above mentioned licensed professional.

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## **1.0 WATER QUALITY MONITORING PLAN**

This Water Quality Monitoring Plan (WQMP) is designed to address regulatory requirements as set forth in the Rules and to establish the compliance boundary for groundwater quality for the Westside C&D facility. The monitoring plan considers information and data gathered from previous and current studies of the Westside Site, adjacent MSWLF and Tucker Borrow Site and the Wilson County vicinity. Items that are addressed in this WQMP are:

- o Regional Geology
- o Existing Site Conditions
- o Monitoring System Design
- o Sampling and Analysis Procedures

Prepared under the supervision of Mr. Gary D. Babb, P.G., the final WQMP is presented in this Section. Based on the data and information provided, the monitoring system has been designed to provide early detection of any release of hazardous constituents to the uppermost aquifer, so as to be protective of the public health and the environment. Design of the monitoring system considers regional geology, data and conclusions from geologic and hydrogeologic investigations of the Westside Site and adjacent properties owned by Wilson County, characteristics of the waste, and the applicable state and federal rules and guidelines published for monitoring of RCRA Subtitle D facilities.

## 1.1 Regional Geology and Groundwater Use

### 1.1.1 Regional Geology

The Westside C&D facility is located in the western portion of the Carolina Coastal Plain near the Fall Line. The Fall Line is the province boundary between the Piedmont and the Coastal Plain provinces. It represents a significant change in lithology which in turn reflects a change in stream gradients. Lithology in the Piedmont province is primarily igneous and metamorphic while the Coastal Plain province is primarily sedimentary. In general, rivers and streams in the Piedmont Province have higher flow rates with well defined channels while Coastal Plain rivers and streams are meandering with lesser defined channels resulting in swamps and bays. These streams, swamps, and bays are the major discharge point of the uppermost aquifer. Downgradient from the CDLF footprint, Toisnot Swamp and Buck Branch are regional streams that form the property boundary for the Westside site and adjoining Wilson County properties (Mohesky Farm and MSWLF).

The Carolina Coastal Plain is underlain by flat-lying to very gently eastward dipping sedimentary strata which overlay a foundation of crystalline rocks. These sediments were deposited during repeated marine transgressive and regressive cycles due to fluctuations in sea level caused by expansion and recession of glacial ice caps during the Pliocene and early Pleistocene epochs (approximately 2 to 5 million years ago).

Sediments in the area of the Westside C&D facility are classified as being in the Yorktown Formation. Information gathered from the 1985 edition of the Geologic Map of North Carolina and The Geology of the Carolina, published in 1991, sites that sediments of the Yorktown Formation are fossiliferous clay with varying amounts of fine-grained sand, silty sand, sandy silt, silty clay, and bluish gray shell material. These types of deposits are found mainly north of the Neuse River and are commonly concentrated in lenses and vary in vertical and horizontal

dimensions. The topography of the Coastal Plain is characterized by flat to gently undulating relief.

### *1.1.2 Original Site Conditions*

The Westside Site is a depleted borrow site for the Wilson County Landfill. The borrow site operation was completed in the mid 1990's. Prior to excavation the upland portion of the site was agricultural land, bounded by woodlands which still incorporate wetlands adjacent to Buck Branch and the intermittent stream present on-site.

### *1.1.3 Groundwater Use*

The primary use of groundwater in the Coastal Plain region is for agricultural operations and for residential water supply. Expansion of city water and sewer systems will eventually make agriculture operations the primary user of groundwater in this region. Ms. Georgia Boulo, with the Wilson County Environmental Health Department, stated that presently, groundwater usage is 50 percent agriculture and 50 percent residential. She also stated that once planned expansion of the Wilson water and sewer system is complete, residential groundwater usage will likely decrease to approximately 5 percent and agriculture usage will increase to approximately 95 percent. Currently, the City of Wilson is capable of providing water services to residents in the landfill area through a 12 inch water line along SR 1503 - Landfill Road.

## **1.2 Existing Site Hydrogeological Conditions**

The geologic and hydrogeologic investigations for the Westside CDLF were implemented in three phases to progressively define existing site conditions relevant to site suitability, and monitoring and engineering design. All data and evaluation of the hydrogeologic conditions are presented in the Site Plan documents and Addendum No. 1. A summary of the investigations is provided in this section relative to monitoring system design.

As shown in the USGS topographic map for the area, the major groundwater recharge feature for the Westside C&D facility is a topographic high (130± feet mean sea level) located approximately 4,000 feet northeast of the facility. The major groundwater discharge features influencing groundwater flow direction on the site are the Toisnot Swamp and Buck Branch. The existing MSWLF facility is generally located to the east of the proposed CDLF footprint and is separated by a deep drainage canal that intercepts the uppermost aquifer.

In general, the site geology conforms to the regional Coastal Plain characteristics. The depositional environment is influenced by Buck Branch and Toisnot Swamp, where fluvial sediments are mixed with marine sediments in an estuarine setting. Where these streams once flowed into the Atlantic Ocean, a much broader river was likely present. Swift currents during flood conditions may have deposited lenticular beds of sand and other sediments. Incoming tidal currents rework the stream sediments, creating alternating layers of continental and marine sediments.

On the Westside Site, all groundwater level measurements and the modeled potentiometric surfaces through the course of investigation indicate that the general groundwater flow direction from the CDLF footprint to the southwest towards Toisnot Swamp. Based on the analysis of site stratigraphy and comparing aquifer testing results with laboratory clay unit permeability testing, it is clear that the potential for groundwater flow is highest through the water bearing sand layers in the uppermost 15 feet of the aquifer. The marine clays present a confining or semi-confining layer limiting potential vertical groundwater flow. Furthermore, the elevation of the wetlands adjacent to Buck Branch relative to the mapped potentiometric surface indicates an area of extensive groundwater discharge surrounding the stream.

As determined from the soil boring logs, the site stratigraphy is best illustrated in hydrogeologic profiles C and D, presented in Figure 4 of the Site Plan. The local stratigraphy is characterized by relatively thin layers of continental and marine silt, sand, and clay in varying textures and colors. Figure 4 illustrates the uniformities and unconformities associated with the depositional environment. Typically, the color of fluvial sediments are tan, brown, light grey or orange. With the unconformities expected in the depositional environment, the typical profile includes a lean clay overlying poorly graded sands, interbedded with thin clay and clayey sand lenses. The water bearing zone is present in coarse and well graded sand layers, typically beneath surficial clay. Below the fluvial sediments, a marine clay layer is consistently encountered. This marine clay unit is typically dark grey, fat, and laminated with microlenses of fine sand. Below the marine clay, a dark greenish grey silty clayey sand with shell fragments overlies the residual, fully weathered bedrock. As evidence of the site's proximity to the regional fall line, bedrock was encountered approximately 30-35 feet below the disturbed land surface, at an elevation of 60 to 64 feet mean sea level. Dip of the marine sediments mirror the southwest groundwater flow direction.

### **1.3 Monitoring System Design**

Design of the monitoring system for the Westside Site considers the site an regional hydrogeologic conditions with the base design for the landfill unit. The site's adjacent, upgradient position to major stream features in the area (Buck Branch and Toisnot Swamp) provide relative hydrogeologic isolation in a groundwater discharge area. The landfill base design includes construction of a compacted soil layer that will provide for vertical separation from the seasonal high water table and control infiltration from the landfill base. Deeper in the surficial aquifer, the presence of low-permeability clays deposited in horizontal lenses significantly limits vertical groundwater flow potential. Most importantly, the preferential lateral groundwater flow in the unconfined surficial aquifer sands toward a groundwater discharge zone presents hydrogeologic conditions that can be

effectively monitored with shallow groundwater monitoring wells. Due to the extent of wetlands and dense vegetation surrounding Buck Branch, surface water monitoring is not a necessary component of the site's detection monitoring system.

### *1.3.1 Groundwater Monitoring System*

Proposed monitoring well locations are shown on Drawing M1, Groundwater Monitoring Plan. Based on the geology and hydrogeology Section *and* the criteria for establishing the relevant point of compliance, the following detection monitoring stations are recommended for the WQMP.

The Westside WQMP will include a total of four groundwater monitoring wells to establish the relevant point of compliance. The following is a discussion of existing monitor well status, field conditions, and proposed location of the groundwater monitoring system for the proposed Westside C&D facility. The detection monitoring system utilizes one existing well (P-101) and requires installation of three additional downgradient wells. Overall, one upgradient and three downgradient locations provide a monitoring well density of 1 detection station per 3.5 Acres of landfill area. Downgradient well installations are spaced equally across a 125-foot offset (review boundary) to the landfill footprint. Completion intervals shall be within the uppermost 10-15 feet of the seasonal high water table and shall target the tan and orange sand units in the characterized stratigraphy. Ground surface elevations leading to (4W drive path) and surrounding the wells shall be at least 93 feet msl.

**TABLE 1-1**  
**MONITORING WELL NETWORK**

<b>WELL ID</b>	<b>TD</b>	<b>TOS</b>	<b>BOS</b>	<b>COMMENT</b>	<b>WELL TYPE</b>	<b>MONITORING SCHEDULE</b>
GMW-1	20	10	20	UPGRADIENT	2	SEMI-ANNUAL
GMW-2	16	6	16	SOIL	2	SEMI-ANNUAL
GMW-3	17	7	17	SOIL	2	SEMI-ANNUAL
GMW-4	17	7	17	SOIL	2	SEMI-ANNUAL

Note:

All wells shall be constructed in accordance with 15A NCAC 2C .0108. All new and existing wells were surveyed to a known datum to provide groundwater elevations to determine flow characteristics. Ground surface and top of casing elevations were also surveyed to provide information for potentiometric maps of the uppermost aquifer at the facility. Accuracy requirements for the survey are  $\pm 0.01$  ft for elevation, and  $\pm 0.1$  ft for horizontal location.

In accordance with 15A NCAC 2C **.0108**, the wells will be constructed of schedule 40 PVC and installed with wash drilling methods (sands) in accordance with standard monitoring well installation procedures by a NC licensed driller. Split spoon samples will be collected at a minimum of five-foot intervals to document lithology; more frequent sampling may be directed during installation.

*1.3.2 Piezometer Abandonment*

All existing piezometers within the landfill footprint and as directed by the engineer shall be abandoned in accordance with 15A NCAC 2C. Abandonment may utilize either bentonite or cement grout, or a combination of the two materials. Abandonment shall be documented with standard documentation and included in the pre-operative submittal.

### *1.3.3 Background Sampling*

Prior to beginning landfill operations, one set of background samples shall be collected for the monitoring network. These baseline results will be submitted to the agency according to the plan reporting procedures. Following background sampling, routine detection monitoring

## **1.4 Sampling and Analysis Procedures**

### *1.4.1 Sampling Equipment and Containers*

Disposable Teflon bailers will be utilized for groundwater sample collection. Samplers will wear clean disposable vinyl or latex gloves during the sampling process. Bailing line shall be nylon, Teflon coated wire, or single stranded stainless steel wire. Groundwater sample containers will be obtained from the laboratory prior to sample collection. The laboratory will provide pre-cleaned sample containers with the appropriate preservatives.

### *1.4.2 Cleaning Procedures*

Prior to beginning sampling, field equipment should be deconned in the office laboratory. Documentation of proper cleaning protocol must be provided with disposable bailers. Between wells, field decontamination for field equipment will consist of a five step process: 1) deionized or distilled water rinse, 2) wash with a phosphate free soap/water mixture, 3) deionized or distilled water rinse, 4) isopropyl alcohol rinse or 10% nitric acid or 10% hydrochloric acid rinse, and 5) deionized or distilled water rinse. Clean unused disposable Teflon bailers will be used for monitor well sample collection and will not require decontamination.

### *1.4.3 Purging Procedures*

Prior to the purging of any groundwater monitoring wells the water levels in all wells will be determined. The water levels are to be determined by using an electric water level meter. Any one of several commercial models of water level meters are

acceptable for this purpose. The meter chosen for use will be able to determine the depth to groundwater to at least the nearest 0.01 foot. The water level for each well is to be recorded in the bound field notebook at the time of measurement. During the water level measurement procedure the personnel performing the measurement will wear clean protective gloves (i.e. disposable vinyl or latex gloves). The water level meter will be decontaminated between each well location by a distilled water rinse. The reference point for groundwater level measurements will be the top of the northern side of the inner well casing.

Due to the relatively shallow groundwater level on-site, each groundwater monitoring well will be purged with disposable Teflon bailers. Each well will be purged of approximately three to five well volumes of water or until dry prior to sampling. In order to determine the volume of water to be purged from each well the volume of one well casing volume will need to be determined. This volume is calculated by subtracting the depth to the water table from the total depth of the well to give the volume of standing water in the well casing. Then by using Table 1 (attached) the approximate volume of water in the well casing may be estimated. This volume is then multiplied by three, four or five to give the total purge volume necessary for each well. Once this volume is calculated the well may then be purged. Purging may need to be continued past the 3 to 5 volumes if pH and spec conductance are not initially stabilized.

#### *1.4.4 Groundwater Sample Collection Procedure*

Upon completion of the purging procedure and stabilization of field parameters, groundwater samples may be collected. Samples will be collected using disposable Teflon bailers. Separate bailers may be used during the purging and sampling processes. Samples will be poured directly from the bailer into the laboratory supplied containers that they are to be transported to laboratory. Under no circumstances will an intermediate sample container be used, i.e. jar, beaker, etc., and then transferred to the sample container. Water samples will not be filtered.

Groundwater sample containers should be labeled prior to filling. Sample containers have a tendency to "sweat" when filled with groundwater, this makes it difficult to affix a label to the container. The sample label should be covered with a clear tape, which should be wrapped around the sample container. This prevents the label from detaching from the container during sample storage and shipment.

Each sample container should have its own label. The label should indicate at a minimum, the sample location (i.e. GMW-1), date and time of collection, and project site. Other pertinent sample information such as sample location, collector, etc. should be recorded in the field notes.

Samples will be placed in a sample cooler containing ice immediately after collection. After collection, samples are to be transported to the laboratory either in person or by some form of accepted courier service (Federal Express, etc). When practical, samples should be delivered to lab on the collection day.

#### *1.4.5 Field QA/QC Procedures*

Each sample will be recorded on a Chain-of-Custody record at the time of collection. A sample Chain-of-Custody form is attached to this plan for reference. The Chain-of-Custody form will contain sample and well identification, signature(s) of the sample collector and others who accept the samples from the collector, date and time of sample collection, requested laboratory analytical parameters, and other pertinent information or special requests etc.

One trip blank per sampling event will be collected and one equipment blank sample will be collected for each day that groundwater monitor wells are sampled. Blank samples will be analyzed for all constituents that are being analyzed in the groundwater and surface water quality samples.

#### 1.4.6 Laboratory QA/QC Procedures

All water samples will be analyzed by a North Carolina certified laboratory for Appendix I VOCs and RCRA metals along with specific conductance, pH, and temperature. The laboratories will be certified for drinking water analysis and for the constituents being analyzed. The following is a list of the analytical parameters to be analyzed for this project. Each parameter has an appropriate EPA method number associated with the parameter. Samples are to be analyzed by the listed method or by an equivalent acceptable method. A copy of the laboratory Quality Assurance/Quality Control measures may be provided on request (100 pages). All analysis shall be in accordance with methods listed in the publication SW-846.

- o Inorganic Constituents

<u>Metals</u>	<u>Method</u>	<u>SWSL***</u>
Antimony	SW-846 Method 6010	0.006 mg/L
Arsenic	SW-846 Method 6010	0.010 mg/L
Barium	SW-846 Method 6010	0.10 mg/L
Beryllium	SW-846 Method 6020	0.001 mg/L
Cadmium	SW-846 Method 6020	0.001 mg/L
Chromium	SW-846 Method 6010	0.01 mg/L
Cobalt	SW-846 Method 6010	0.01 mg/L
Copper	SW-846 Method 6010	0.01 mg/L
Lead	SW-846 Method 6010	0.01 mg/L
Nickel	SW-846 Method 6010	0.05 mg/L
Selenium	SW-846 Method 6010	0.01 mg/L
Silver	SW-846 Method 6010	0.01 mg/L
Thallium	SW-846 Method 6020	0.0055 mg/L
Vanadium	SW-846 Method 6020	0.025 mg/L
Zinc	SW-846 Method 6010	0.01 mg/L

- o Organic Parameters  
Volatile Organic Compounds (EPA Method SW-846 8240 or 8260\*\*) *Added volatile compound: Tetrahydrofuran*

- o Field Parameters
  - Specific Conductance
  - pH
  - Temperature

\* All metals analysis will be performed by acceptable methodology as described in EPA SW-846

\*\* Specific constituents listed for these methods are not listed here, please refer to the EPA publication SW-846 for the complete list of volatile and semi-volatile parameters listed for the above references methods.

\*\*\* Solid Waste Section Limit

## 1.5 Field Logbook

The field technician will keep an up-to-date logbook documenting important information pertaining to the technician's field activities. The field logbook will document the following:

- Site Name and Location
- Date and Time of Sampling
- Climatic Conditions During Sampling Event
- Sampling Point/Well Identification Number
- Well Static Water Level
- Height of Water Column in Well
- Purged Water Volume and Well Yield (High or Low)
- Observations on Purging and Sampling Event
- Time of Sample Collection
- Temperature, pH, Turbidity, and Conductivity Readings
- Signature of Field Technician.

## **1.6 Record Keeping and Reporting**

### *1.6.1 Sampling Reports*

Copies of all laboratory analytical data will be forwarded to the DWM within 45 calendar days of the sample collection date. The analytical data submitted will specify the date of sample collection, the sampling point identification and include a map of sampling locations. Should a significant concentration of contaminants be detected in ground and surface water, as defined in North Carolina Solid Waste Rules, Ground Water Quality Standards, or Surface Water Quality Standards, the owner/operator of the landfill shall notify the DWM and will place a notice in the landfill records as to which constituents were detected.

Monitoring data will be compared to compliance standards established by Groundwater Standards 15A NCAC 2L .0202 and 15A NCAC 13B. If a standard is exceeded in any well, additional samples or assessment monitoring will begin following notification of the Division. In response to non-compliance data results, the Division of Solid Waste Management will be notified with a plan of action to further investigate, verify or assess the source of the observed contaminants.

## **1.7 Well Abandonment/Rehabilitation**

Should wells become irreversibly damaged or require rehabilitation, the DWM shall be notified. If monitoring wells and/or piezometers are damaged irreversibly they shall be abandoned according to 15A NCAC 2C .0113, with notification to the Division. The abandonment procedure in unconsolidated materials will consist of over-drilling and/or pulling the well casing and plugging the well with an impermeable, chemically-inert sealant such as neat cement grout and/or bentonite clay (HolePlug or 15A NCAC 2L approved materials). For bedrock well completions the abandonment will consist of plugging the interior well riser and screen with an impermeable neat cement grout and/or bentonite cement grout.

## **1.8 Additional Well Installations**

The data will be analyzed to verify the correct placement of wells and determine locations for future monitoring wells, if necessary. Any additional well installations will be carried out in accordance with DWM directives. If the potentiometric maps reveal that the depths, location, or number of wells is insufficient to monitor potential releases of solid waste constituents from the solid waste management area, new well locations and depths will be submitted to the DWM for approval.

All monitoring wells shall be installed under the supervision of a geologist or engineer who is registered in North Carolina and who will certify to the DWM that the installation complies with the North Carolina Regulations. Upon installation of future wells the registered geologist or engineer will submit the documentation for the construction of each well within 30 days after well construction.

TABLE 1-2

CONVERSION OF FEET OF WATER  
TO  
VOLUME IN GALLONS  
FOR A TWO INCH I.D. WELL CASING

FEET OF WATER	1	2	3	4	5	6	7	8	9	10
------------------	---	---	---	---	---	---	---	---	---	----

VOLUME IN GALLONS	0.2	0.4	0.5	0.7	0.9	1.0	1.2	1.4	1.5	1.7
-------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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FEET OF WATER	15	20	25	30	35	40	45	50	55	60
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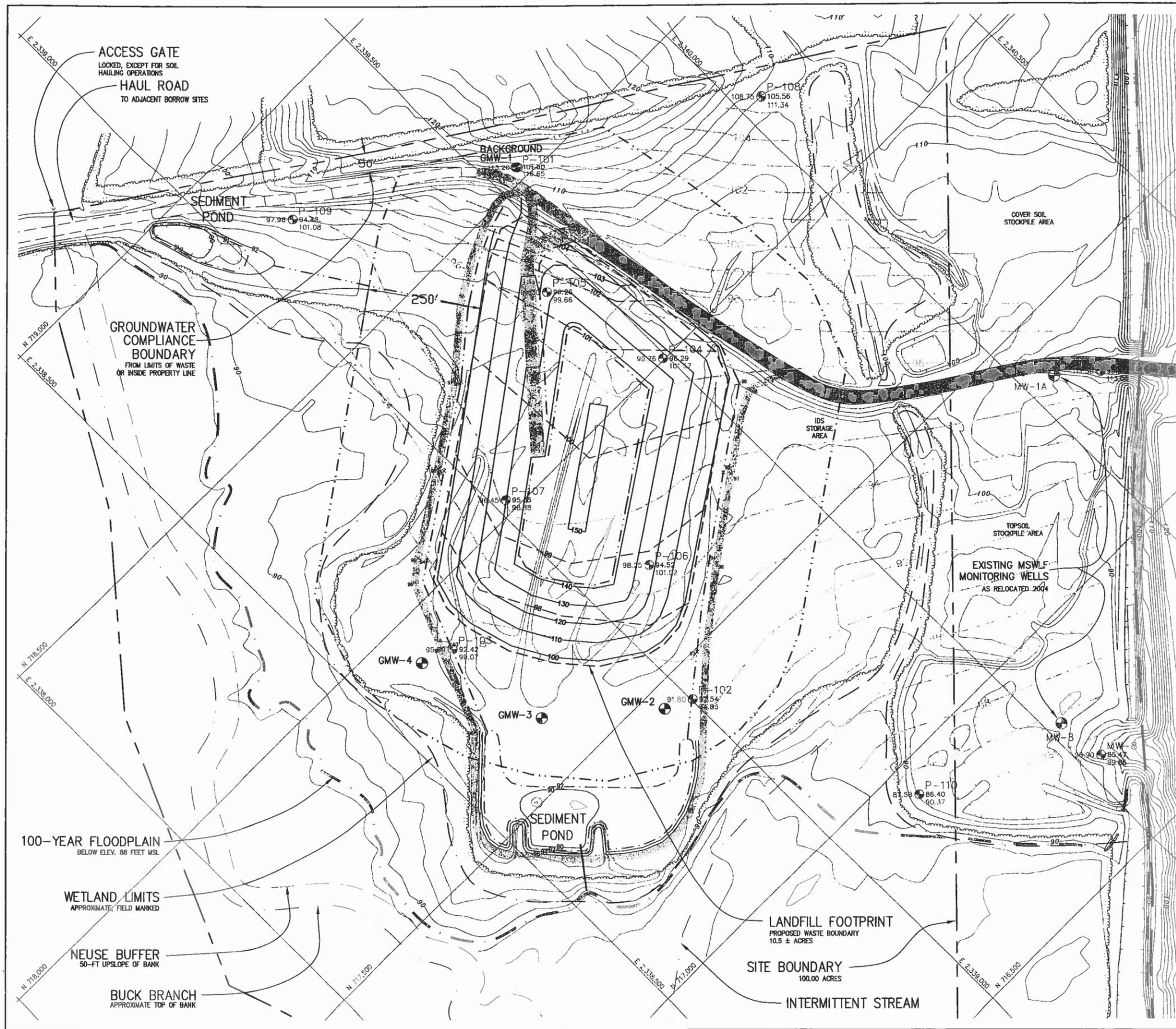
VOLUME IN GALLONS	2.5	3.3	4.1	4.9	5.8	6.6	7.4	8.2	9.0	9.8
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FEET OF WATER	65	70	75	80	85	90	95	100	105	110
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VOLUME IN GALLONS	10.7	11.5	12.3	13.1	13.9	14.7	15.5	16.4	17.2	18.0
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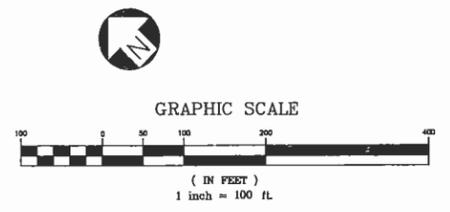
**NOTES:**

- PURPOSE.** THIS DETECTION MONITORING PLAN IS PROPOSED FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, PREPARED FOR APPROVAL BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B. THE PLAN WAS PREPARED UNDER THE SUPERVISION OF MR. GARY D. BABB, PG.
- TOPOGRAPHIC FEATURES.** SITE TOPOGRAPHY IS FROM AERIAL PHOTOGRAMMETRIC MAPPING PERFORMED BY GEODATA CORP., ZEBULON, NC. MAPPED CONDITIONS FROM MARCH 1998 ARE GENERALLY REPRESENTATIVE OF EXISTING CONDITIONS (JULY 2003). REFERENCE DRAWING SC1 FOR STREAM, WETLAND, FLOODPLAIN, AND OTHER SOURCES.
- WESTSIDE C&D LANDFILL SITE.** THE 100.00 ACRE SITE PROPERTY BOUNDARY ILLUSTRATED ON THIS DRAWING IS REPRESENTATIVE OF THE "RECOMBINATION PLAN FOR THE WESTSIDE C&D LANDFILL SITE" PREPARED BY HERRING-SUTTON & ASSOCIATES, P.C. (WILSON, NORTH CAROLINA), APRIL 2003.
- MONITORING NETWORK.** EXISTING WELL P-101 SHALL BE DESIGNATED AS THE UPGRADIENT BACKGROUND WELL GMW-1. THREE NEW WELLS WILL BE INSTALLED IN THE UPPER 15-20 FEET OF THE IN-SITU SOIL. DOWNGRADIENT WELL INSTALLATIONS ARE SPACED EQUALLY ACROSS A 125-FOOT OFFSET (REVIEW BOUNDARY) TO THE LANDFILL FOOTPRINT. GROUND SURFACE ELEVATIONS LEADING TO (4W DRIVE PATH) AND SURROUNDING THE WELLS SHALL BE AT LEAST 93 FEET MSL.
- PIEZOMETER ABANDONMENT.** ALL PIEZOMETERS SHALL BE ABANDONED ACCORDING TO 15A NCAC 2C, WITH ASSOCIATED DOCUMENTATION.
- SURVEY DATA.** NORTH CAROLINA REGISTERED LAND SURVEYORS, HERRING-SUTTON & ASSOCIATES, WILSON, NORTH CAROLINA, SHALL SURVEY THE LOCATION AND ELEVATION POSITIONS OF EACH WELL AFTER INSTALLATION.
- MONITORING SYSTEM DESIGN.** THE LANDFILL BASE DESIGN INCLUDES CONSTRUCTION OF A COMPACTED SOIL LAYER THAT WILL PROVIDE FOR VERTICAL SEPARATION FROM THE SEASONAL HIGH WATER TABLE AND CONTROL INFILTRATION FROM THE LANDFILL BASE. DEEPER IN THE SURFICIAL AQUIFER, THE PRESENCE OF LOW-PERMEABILITY CLAYS DEPOSITED IN HORIZONTAL LENSES SIGNIFICANTLY LIMITS VERTICAL GROUNDWATER FLOW POTENTIAL. MOST IMPORTANTLY, THE PREFERENTIAL LATERAL GROUNDWATER FLOW IN THE UNCONFINED SURFICIAL AQUIFER SANDS TOWARD A GROUNDWATER DISCHARGE ZONE PRESENTS HYDROGEOLOGIC CONDITIONS THAT CAN BE EFFECTIVELY MONITORED WITH SHALLOW GROUNDWATER MONITORING WELLS. DUE TO THE EXTENT OF WETLANDS AND DENSE VEGETATION SURROUNDING BUCK BRANCH, SURFACE WATER MONITORING IS NOT A NECESSARY COMPONENT OF THE SITE'S DETECTION MONITORING SYSTEM.
- DETECTION INTERVAL IN THE SURFICIAL AQUIFER.** COMPLETION INTERVALS SHALL BE WITHIN THE UPPERMOST 10-15 FEET OF THE SEASONAL HIGH WATER TABLE AND SHALL TARGET THE TAN AND ORANGE SAND UNITS IN THE CHARACTERIZED STRATIGRAPHY.

**LEGEND**

- GMW-2 MONITORING WELL**  
DETECTION MONITORING STATION
- POTENTIOMETRIC CONTOUR**  
1-FOOT CONTOUR INTERVAL, 19 NOV 02
- BASE CONTOUR 1-FOOT**  
1-FOOT CONTOUR INTERVAL, 19 NOV 02
- WESTSIDE SITE BOUNDARY**
- LANDFILL FOOTPRINT**  
PROPOSED 10.5 ACRES
- EXISTING LANDFILL LIMITS**  
OFFSITE MSWLF UNIT
- 100-YEAR FLOODPLAIN**
- NEUSE BUFFER**
- SURFACE WATER**
- WETLAND BOUNDARY**
- CONTOUR 2-FOOT** MAR98 MAPPING
- CONTOUR 10-FOOT** MAR98 MAPPING
- GROUND ELEVATION**
- WELL COORDINATES ON CENTER**
- BORING/PIEZO ID**
- WATER ELEVATION AT INSTALLATION 11/19/02**
- TOP OF CASING SURVEYED ELEVATION**

**PERMIT ISSUE**  
NOT FOR CONSTRUCTION



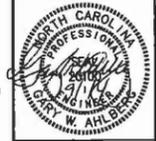
Babb & Associates, P.A.  
P.O. BOX 37897  
RALEIGH, NORTH CAROLINA 27627

**GARY W. AHLBERG, P.E.**  
P.O. BOX 58  
WILMINGTON, NORTH CAROLINA 28402  
910.232.6696  
gahw@earthlink.net

PROJECT:  
WESTSIDE C&D LANDFILL  
CONSTRUCTION PLAN APPLICATION  
WILSON, NORTH CAROLINA

PREPARED FOR:  
WILSON COUNTY  
DEPARTMENT OF SOLID WASTE  
113 E. NASH STREET  
WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
REVISIONS		



**GROUNDWATER MONITORING PLAN**

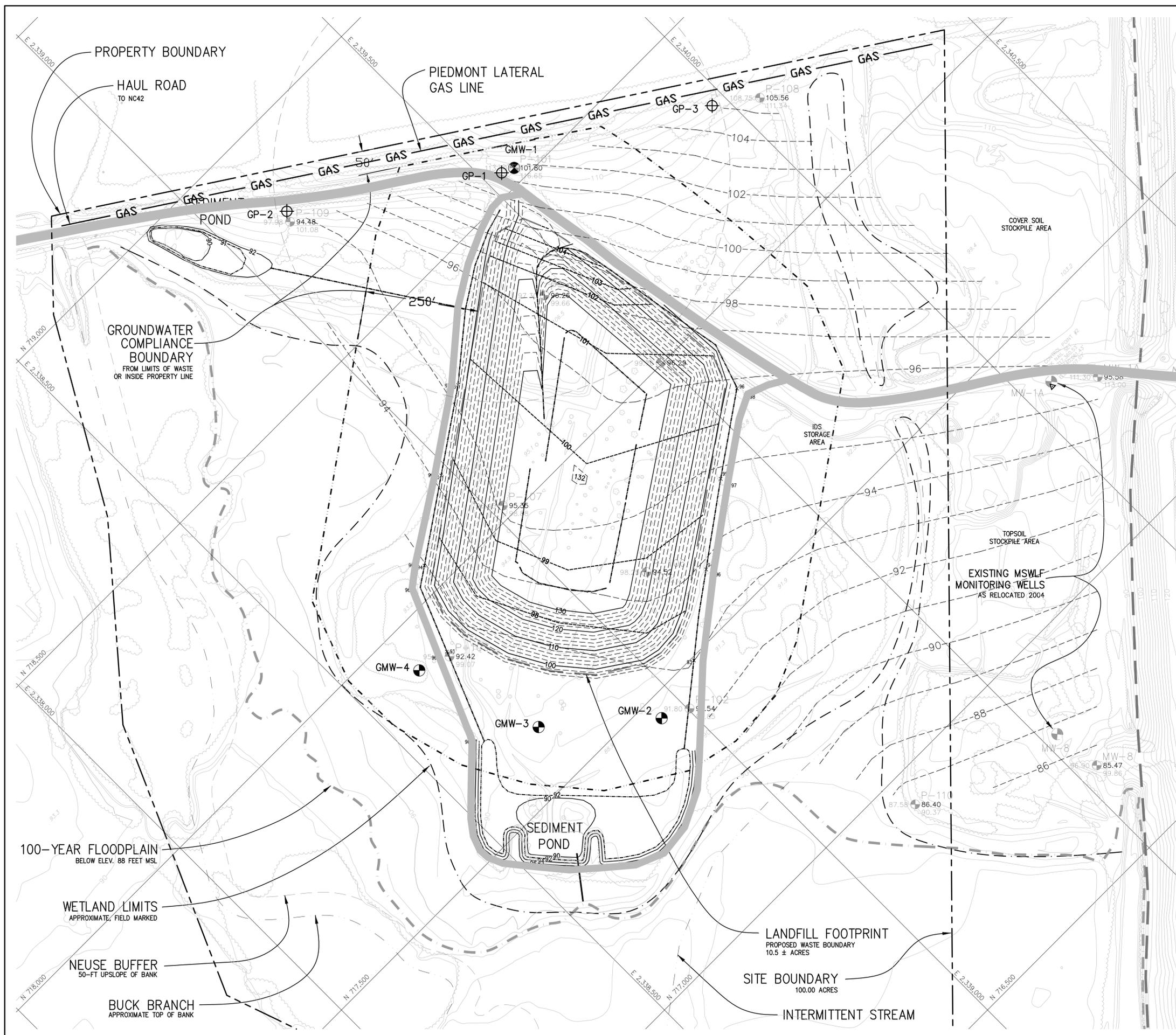
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DATE: 09/01/04  
DRN. BY: GWA  
CHECKED BY: GDB

PROJECT NO:

DRAWING NO.

**M1**

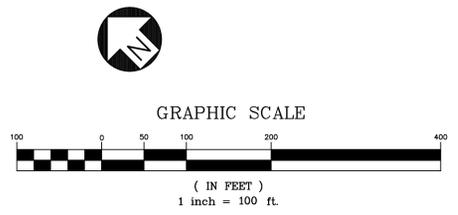
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- NOTES:**
1. PURPOSE. THIS GAS DETECTION MONITORING PLAN IS PROPOSED FOR THE WESTSIDE CONSTRUCTION AND DEMOLITION LANDFILL FACILITY, OWNED BY WILSON COUNTY, NORTH CAROLINA, PREPARED FOR APPROVAL BY THE NC DENR DIVISION OF WASTE MANAGEMENT IN ACCORDANCE WITH THE 15A NCAC 13B.
  2. TOPOGRAPHIC FEATURES. SITE TOPOGRAPHY IS FROM AERIAL PHOTOGRAMMETRIC MAPPING PERFORMED BY GEODATA CORP., ZEBULON, NC. MAPPED CONDITIONS FROM MARCH 1998 ARE GENERALLY REPRESENTATIVE OF EXISTING CONDITIONS (JULY 2003). REFERENCE DRAWING SC1 FOR STREAM, WETLAND, FLOODPLAIN, AND OTHER SOURCES.
  3. WESTSIDE C&D LANDFILL SITE. THE 100.00 ACRE SITE PROPERTY BOUNDARY ILLUSTRATED ON THIS DRAWING IS REPRESENTATIVE OF THE "RECOMBINATION PLAT FOR THE WESTSIDE C&D LANDFILL SITE" PREPARED BY HERRING-SUTTON & ASSOCIATES, P.C. (WILSON, NORTH CAROLINA), APRIL 2003.
  4. GAS PROBE. GAS MONITORING PROBES SHALL BE INSTALLED WITH A TOTAL DEPTH JUST ABOVE THE WATER TABLE.
  5. EXPLOSIVE GAS MONITORING. EXPLOSIVE GAS CONCENTRATIONS SHALL BE MONITORED QUARTERLY AND RECORDED AS A PERCENTAGE OF THE LOWER EXPLOSIVE LIMIT (LEL).
  6. GAS PROBE INSTALLATION AND MONITORING SHALL CONFORM TO THE CURRENT SWS GUIDANCE, EQUIPMENT MANUFACTURER'S RECOMMENDATIONS, AND ACCEPTED STANDARDS OF PRACTICE.
  7. INSTALLATION AND SURVEY RECORDS, AND MONITORING RESULTS SHALL BE PLACED IN THE OPERATING RECORD AND SUBMITTED TO THE SWS IN ACCORDANCE WITH PERMIT CONDITIONS.

- LEGEND**
- GP-1 GAS PROBE PROPOSED LOCATION
  - GMW-2 MONITORING WELL DETECTION MONITORING STATION
  - POTENTIOMETRIC CONTOUR 1-FOOT CONTOUR INTERVAL, 19 NOV 02
  - BASE CONTOUR 1-FOOT 1-FOOT CONTOUR INTERVAL, 19 NOV 02
  - WESTSIDE SITE BOUNDARY
  - LANDFILL FOOTPRINT PROPOSED 10.5 ACRES
  - EXISTING LANDFILL LIMITS OFFSITE MSWLF UNIT
  - 100-YEAR FLOODPLAIN
  - NEUSE BUFFER
  - SURFACE WATER
  - WETLAND BOUNDARY
  - CONTOUR 2-FOOT MAR98 MAPPING
  - CONTOUR 10-FOOT MAR98 MAPPING
  - GROUND ELEVATION
  - WELL COORDINATES ON CENTER
  - BORING/PIEZO ID WATER ELEVATION AT INSTALLATION 11/19/02
  - TOP OF CASING SURVEYED ELEVATION

**PERMIT ISSUE  
NOT FOR CONSTRUCTION**



**BLACKROCK ENGINEERS, INC.**  
 POST OFFICE BOX 58  
 WILSON, NORTH CAROLINA 28401  
 107 PLUMTREE LANE  
 CASTLE HAYNE, NORTH CAROLINA 28429  
 PHONE: 910.232.6696  
 NC LIC. # C-2919

PROJECT:  
 WESTSIDE C&D LANDFILL  
 CONSTRUCTION PLAN  
 WILSON, NORTH CAROLINA

PREPARED FOR:  
 WILSON COUNTY  
 DEPARTMENT OF SOLID WASTE  
 113 E. NASH STREET  
 WILSON, NORTH CAROLINA 27894

NO.	DESCRIPTION	DATE
REVISIONS		



**GAS  
MONITORING  
PLAN**

SCALE: 1"=100'  
 DATE: 11.24.10  
 DRN. BY: JWG  
 CHECKED BY: GWA

PROJECT NO:  
 WCL10-07

DRAWING NO.  
**LFG1**

# ATTACHMENT I

## SOLID WASTE MANAGEMENT FACILITIES

**Dec 2010 Revision incorporates information for approval of other solid waste management facilities at the Wilson County Landfill Site; see also Attachment G for Site Plan drawing.**

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## **1.0 SOLID WASTE MANAGEMENT FACILITIES**

This report provides a general plan for solid waste management (SWM) activities associated with site operation of the Westside CDLF. Attachment G includes Dwg S1 - Facility Site Plan with aerial photography that delineates all SWM activities on the County Property and identifies pertinent characteristics of the surrounding land. Attached to this report is a zoning compliance letter that documents approval of solid waste management activities in accordance with the Wilson County Zoning Ordinance. Descriptions of activities at the following SWM facilities, located at the Wilson County Landfill site include:

- Convenience Center
- Wood Waste Processing
- Mulch Compost
- White Goods Storage
- Inert Debris Area

### **1.1 CONTROLLED ACCESS**

Access to the site is controlled via security fencing, locking gates, and physical barriers. Primary access is from NC 42, where the weighmaster initially screens and directs customers to the appropriate management area. In general, all SWM activities are limited to the following operating hours:

- Monday – Friday 8:00 a.m. to 5:00 p.m.
- Saturday 8:00 a.m. to 12:00 p.m.

### **1.2 CONVENIENCE CENTER**

The convenience center is open for use by Wilson County residents to deliver recycled materials, used tires, and municipal solid waste for transfer to permitted facilities. Signage identifies materials for segregation in the appropriate container. Containers are hauled and replaced as they are filled, typically twice a

week. Sedimentation and erosion control for the Convenience Center and Scalehouse Offices are NC LQS approved by an individual plan.

### **1.3 WOOD WASTE PROCESSING**

Stumps and wood waste exceeding 2 feet in diameter are typically routed to the C&D landfill for disposal. All other wood wastes are stockpiled for periodic processing by a contractor at the wood on-site wood processing site. Approximately 2,000 tons of wood waste is processed quarterly. The contractor typically recovers a majority of the wood waste as wood chips used as commercial biomass fuel. The residual wood fines are combined with yard trash and windrowed in the yard waste compost area. The residual soil generated from processing is stockpiled separately as topsoil for use in landfill cover operations or public distribution. Wood Processing operations are described in Section 3 with Mulch Compost.

### **1.4 MULCH COMPOST**

Residuals from wood processing are typically composted with yard trash. The mulch or compost product is primarily used on County property as a soil amendment. The mulch compost operation is designed to meet the criteria of a small Type 1 composting facility according to 15A NCAC 13B .1402. The facility typically processes and stores less than 2,000 CY of yard waste per quarter, and the compost area will not exceed 2 Acres. The maximum processing and storage criteria for a small Type 1 compost site is 6,000 CY per quarter. The mulch and compost operation is described in Section 3.

The yard trash is primarily grass, leaves and small branches. Sedimentation and erosion control for the wood waste, yard trash, and white goods areas are LQS approved by an individual plan (attached Bartlett Plans). The yard trash site will be operated in accordance with .1406 for Type 1 compost.

## **1.5 WHITE GOODS**

White goods and scrap metal are stored on an all weather surface as shown on the Site Plan. Any white goods with refrigeration units are segregated for Freon removal by the white goods contractor at his facilities at:

United Salvage & Auto, Inc.

Operation Manager : Scott Sawyer

11476 HWY 903

Halifax, NC 27839

Recyclable metals are removed from the site monthly, with storage generally limited to approximately 2,000 tons or less at any time. Recordkeeping for white goods is performed according to all state requirements.

## 1.6 INERT DEBRIS

For large demolition projects or similar activities, inert debris is segregated from the C&D landfill and stored in the Inert Debris Unit, located on the Westside CDLF Site. Inert debris is recovered for on-site projects as beneficial fill, on a limited basis. The Inert Debris Unit is approximately 2 Acres and is covered consistent with 15A NCAC 13B .0566. The Inert Debris unit is recorded with the Westside CDLF Permit 98-09.

The Inert Debris unit operation shall conform to the following standards:

- Adequate soil cover (6-in minimum layer) shall be applied monthly, or when the active area reaches one acre in size, whichever occurs first.
- 120 calendar days after completion of any phase of disposal operations, or upon revocation of a permit, the disposal area shall be covered with a minimum of one foot of suitable soil cover sloped to allow surface water runoff in a controlled manner.
- Adequate erosion control measures, structures, or devices shall be utilized to prevent silt from leaving the site and to prevent excessive on site erosion.
- Provisions for a ground cover sufficient to restrain erosion must be accomplished within 30 working days or 120 calendar days upon completion of any phase of landfill development.
- Surface water shall be diverted from the working face and shall not be impounded over waste.
- Edge of Waste markers shall be set to define the limits of the Inert Debris Unit.

As an option for DWM approval, the inert debris area could be divided to provide a separate asbestos area. If approved in the permit, operations shall conform to the operational requirements of the Westside Operations Plan, Section 1.13.

## **2.0 USED TIRE COLLECTION**

### **2.1 GENERAL REQUIREMENTS**

The used tire collection site is accessed via the main NC 42 gate for the Westside C&D Landfill. Waste screening and fire control conform to the facility operation plan in Attachment D. In accordance with .1105 (g), the tire collection site is deemed permitted under SW Permit 98-09.

### **2.2 OPERATION AND MANAGEMENT PLAN**

Used Tires shall be collected and stored in 18-wheel trailers at the convenience center. Two trailers will be on-site at all times. Tires shall be removed monthly by the scrap tire hauler. The site meets the following .1106 pertinent requirements for used tire collection, where:

- (3) The site and proposed plan shall comply with all requirements of the local zoning ordinance.
- (4) The site shall be served by an access road which shall be kept passable for any motor vehicle, including fire trucks, at all times.
- (8) Access to the site shall be controlled through the use of fences, gates, berms, natural barriers or other means.
- (10) The provider of fire protection services for the site shall be identified in the permit application. Wilson County Emergency Management Services provides fire service to the site via 911 calls.

The following operational practices shall be used to manage the tire trailer storage.

1. Whole and sliced scrap tires, and other scrap tires capable of holding water shall be covered upon receipt with a water shedding material or disposed of, processed or removed from the site within ten days of receipt. Sliced scrap tires stacked concave-side down are not required to be covered.

2. No operations involving the use of open flames, blow torches or highly flammable substances shall be conducted within 50 feet of scrap tires. According to the posted signage, smoking is prohibited at the tire collection site.
3. A fire safety survey shall be conducted annually by local fire protection authorities or other persons as approved by the Division.
4. Communication equipment shall be maintained at the scrap tire collection site to assure that the site operator can contact local fire protection authorities (911) in case of a fire.
5. Two fire extinguishers shall be maintained on-site at the collection trailer to provide immediate control of any observed combustion.

Wilson County contracts the hauling and disposal of scrap tires with a registered contractor. Current information for the contractor is included in the operating record for:

Company name: Central Carolina Holding,LLC  
Contact Thomas Womble  
Address 1616 Mckoy Town Road, Cameron, NC 28326  
Phone 1-800-232-0035  
NC Tire Hauler or Recycler Registration No. 4304-TIRELF-1992

## **3.0 WOOD PROCESSING AND MULCH COMPOST**

### **3.1 OVERVIEW**

This section describes the Wood processing and mulch composting operations associated with the Wilson County Landfill Facility. The primary purpose of wood waste processing is to recover wood chips to be reused as biomass fuel, also commonly known as “hog fuel,” for commercial power boilers. The residuals from the recovery operation are composted with segregated yard trash to produce a mulch compost product. A soil fraction from grinding land clearing debris is recovered and reused as “topsoil” (not composted).

The general areas for wood waste processing are illustrated in the attached Wood Processing Site Drawing. There are two areas for storing and processing wood waste, designated Areas A and B. Additionally, a small Type 1 compost facility is included in this operations report for processing yard waste and generating mulch compost. If nutrient testing is completed and indicates plant food value, Wilson County may distribute a compost product. The primary intended product of the compost process is a fine mulch for use by the County and made available to the public. The mulch product made available to the public will not claim any plant nutrient value.

### **3.2 WASTE TYPES**

The proposed processing center will only accept and process organic materials. The materials acceptable for processing on the site include delivered materials as follows:

- Land clearing waste such as stumps, trees, limbs, brush, grass, and other naturally occurring vegetative materials;

- Site clearing debris;
- Yard trash;
- High carbon nitrogen (C:N) yard waste such as brush, tree limbs, and similar vegetative matter with C:N ratios greater than 75;
- Untreated and unpainted wood wastes that have not been glued, treated with preservatives, painted, stained, or varnished (i.e. engineered wood products); and
- Other wastes as approved by the Division of Waste Management.

All other identified wastes will be removed and disposed in accordance with the Landfill's Waste Acceptance and Screening Plan.

### **3.3 WASTE ACCEPTANCE**

All material received for processing will be monitored upon entrance to the site in accordance with the Landfill's Waste Acceptance and Screening Plan. The Wilson County Solid Waste Facility is designed to receive up to 6,000 cubic yards (raw) per quarter from off-site. The typical quarterly waste volume is 2,000 cubic yards. Approximately 60% of the wood waste processed is recovered as hog fuel wood chips.

### **3.4 WASTE SEGREGATION**

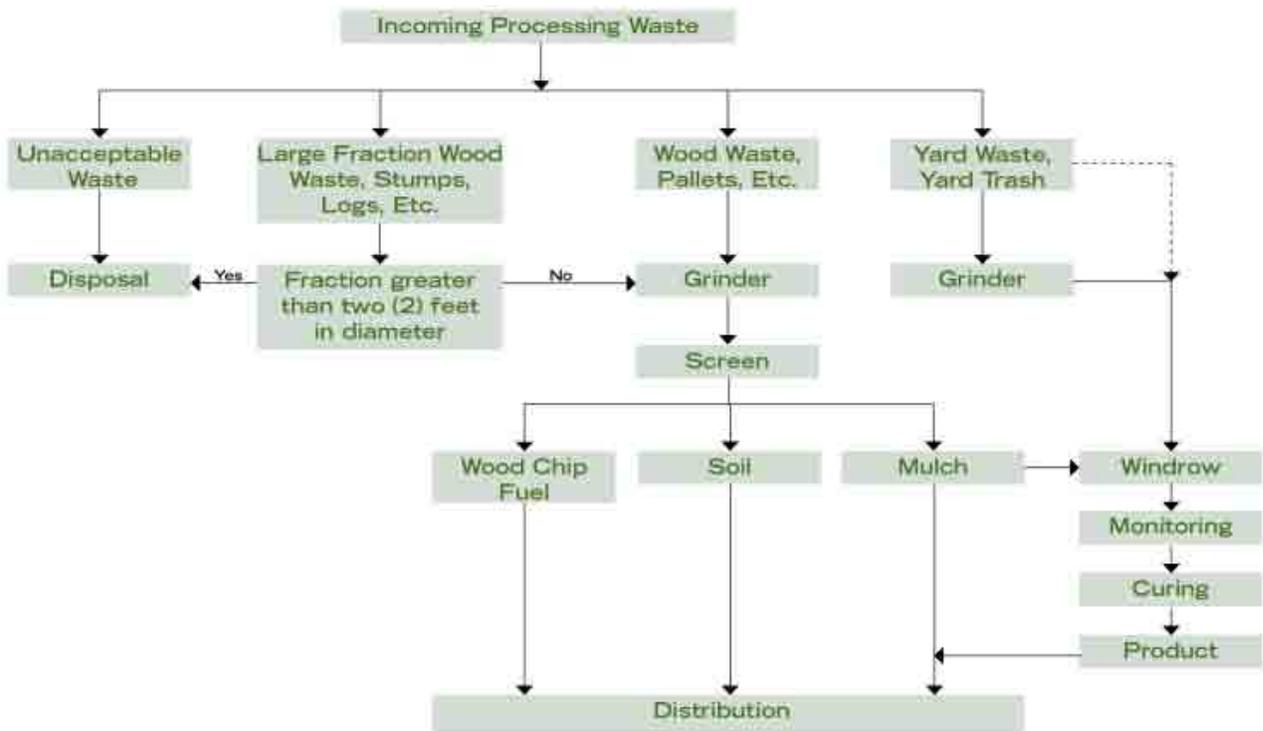
Subsequent to acceptance and initial screening at the scalehouse, site specific waste screening will be further implemented at the wood processing area to assure that prohibited wastes are not processed. If any non-acceptable wastes are identified, these wastes will be placed into a stockpile or container and removed from the site for disposal at a solid waste facility permitted to accept the particular waste. All records and receipts for this disposal shall be kept in the waste screening operating record for the Wilson County Landfill.

Yard trash is piled and processed separately from the wood waste material in the compost operation. If the delivered load is suspected of containing yard trash, it shall be placed in the yard trash pile for composting.

### 3.5 WOOD PROCESSING AND COMPOST OPERATIONS

The recycling process involves a flow through of organic materials. Generally, the process includes sorting of the material into small and large fraction materials for grinding and screening. The processing products include hog fuel wood chips, top soil and mulch compost. This section provides discussion on the major components of the process. Please refer below to **Figure 1** for a flowchart outlining the overall process.

**Figure 1. Recycling Process Flowchart**



### 3.5.1 Design Criteria

The primary purpose of wood processing is to recover wood chips to be reused as biomass fuel, also commonly known as “hog fuel,” for commercial power boilers. The residuals from the recovery operation are composted with segregated yard trash to produce a mulch compost product. A soil fraction from grinding land clearing debris is recovered and reused as “topsoil” (not composted).

The general areas for wood waste processing are illustrated in the attached Wood Processing Site Drawing. There are two areas for storing and processing wood waste, designated Areas A and B. A schematic of the processing equipment and areas is generally illustrated in attached Figure 2; the location of piles and equipment may vary based on the actual volume of material processed and to optimize operations and overall safety.

The designed Operating Capacity for the processing facility is to be up to 6,000 cubic yards (raw) of material undergoing processing per quarter. Based on the anticipated equipment (listed below), the site is capable of processing as much as 35,600 cubic yards per quarter (limited by the grinding operation) providing an acceptable factor of safety.

Separate from the wood processing areas, a small Type 1 compost facility is included in this operations report for storing and treating yard waste and generating mulch compost. If nutrient testing is completed and indicates plant food value, Wilson County may distribute a compost product. The primary intended product of the compost process is a fine mulch for use by the County and made available to the public. The mulch product made available to the public will not claim any plant nutrient value.

Prior to beginning compost operations, soil and groundwater conditions shall be evaluated by a qualified professional. The evaluation shall be documented in the facility operating record to demonstrate compliance with the following design requirements in 15A NCAC 13B .1404 (10) for a Type 1 compost area:

- (A) A site shall not contravene groundwater standards as established under 15A NCAC 2L;
- (B) Portions of a site used for waste receipt and storage, active composting, and curing shall have a soil texture finer than loamy sand and the depth to the seasonal high water table shall be maintained at least 12 inches for a Type 1 or 2 facility and 24 inches for a Type 3 facility, unless a pad is provided;
- (D) A pad is not required for storage of finished product that is dried so as to pass the Paint Filter Liquids Test (EPA Method 9095), and for which the storage area is prepared in such a manner that water does not collect around the base of the stored material, and where the depth to the seasonal high watertable is maintained at least 12 inches.

### 3.5.2 Equipment Requirements

The anticipated equipment requirements for operation and maintenance of the site are listed in the following table.

Description	Primary Function (Allocation)
1) Excavator	Sorting
2) Front End Loader	loading and mixing

Description	Primary Function (Allocation)
3) Grinder (Contracted)	grinding/shredding of bulky wastes, stumps, limbs, etc.
4) Screening Equipment (Contracted)	processing material to uniform consistency and sorting of various gradations.
5) Dump Truck	hauling material around site.

### 3.5.3 Grinding

The grinding operations will be conducted as needed to facilitate the recycling operations. The facility intends to utilize a single grinder to process the collected material. When the wood waste stockpile is approximately 2,000 cubic yards, grinding will be conducted by the wood contractor in a designated area separate from public access, and as determined by the landfill operator. The material will be directed to the grinders as per the material size. Yard waste grinding will be batched separately to the grinder and placed in the compost area for subsequent treatment.

It is anticipated that grinding and chipping will be conducted on a quarterly basis as materials are available. Grinders and chippers pose both maintenance and safety hazards. Therefore, please refer to the manufacturer's safety and or maintenance literature prior to operating equipment at the site.

### **3.5.4 Screening**

Typically, the grinding operation is completed and then replaced by the contractor's screening equipment. The facility intends to utilize a single screening machine to process the ground materials. Screening is conducted primarily to recover the oversized wood chips as recycled hog fuel. The residual mulch material ranges in particle size depending on the screen size and grinding equipment, typically resulting in 5/8" to 2" mulch. Finer material (< 5/8") screened from land clearing debris is stockpiled as topsoil. The material not passing the screen, "overs" (>2"), are stored in the material storage area and will either be re-ground and chipped for additional screening, sold as "enhanced mulch", re-ground and recycled back into the compost facility to be used in new windrows, or disposed in the C&D facility. The finished product is stored on site in a loading area until ready for delivery. Three (3) finished products are anticipated as follows:

- Wood Chip Hog Fuel;
- Soil/Topsoil; and
- Mulch Compost.

Screening machines pose both maintenance and safety hazards. Therefore, please refer to the manufacturer's safety and or maintenance literature prior to operating equipment at the site.

### **3.5.5 Compost Management**

#### **3.5.5.1 Mixing & Windrow/Pile Formation**

The ground products will be either separated into mulch piles or placed in composting windrows or piles using a front end loader.

The dimensions anticipated for the triangular compost piles will be approximately eight (8) feet in height and have a maximum base diameter of 15 feet.

### **3.5.5.2 Active Composting**

The active compost process is achieved once the compost temperatures have gone from mesophylic temperatures (< 110 degrees Fahrenheit) to thermophylic temperatures (> 110 degrees Fahrenheit) until it has matured (gone back down to its original mesophylic state). During active composting, the windrows or piles will be turned periodically to keep them from going into an anaerobic (oxygen deprived) state. It is anticipated that the compost process will take approximately 24 weeks (six (6) months) from start to finish.

While in the active composting phase, the facility will maintain the windrows/piles at or above 131 degrees Fahrenheit for at least (3) days and aerate as needed to maintain elevated temperatures compliant with 15A NCAC 13B .1406. If for some reason a windrow reaches temperatures in excess of 160 degrees Fahrenheit, the windrows will be turned and/or moisture added to reduce the temperature to a normal operating condition.

### **3.5.5.3 Storing Compost**

The compost which has been determined to be matured finished product (3-day: 131° F) will be maintained in the windrow or placed in the curing pile. The curing pile (approximately 400 CY) shall be

continue to be monitored with the windrow schedule. Typically, the storage piles will not exceed eight (8) feet in height and 50 feet in diameter to maintain product integrity. Final compost product shall be transferred to a distribution pile as needed (approximately 50 CY) adjacent to public access for directly loading vehicles. All piles will have a minimum 25 foot horizontal separation for fire protection.

#### **3.5.5.4 Compost Monitoring**

The process control parameters which will be monitored during composting are moisture content, temperature, oxygen content, and pH balance.

Moisture content of a compost mix is important because the microorganisms responsible for biodegradation of the waste need water to survive and grow. The desired moisture content of the compost mix is between 40% and 60%. Moisture can be monitored with two methods; the “squeeze” test in the field which will be performed routinely (typically daily), and the microwave oven method. The “squeeze” moisture test is done by grabbing a handful of compost from the interior of the pile in a area that is well mixed. If the material appears dry and crumbles after squeezing then it is too dry. If the material retains its clumped shape after squeezing without releasing excess water and leaves the hand damp then it is approximately between 40% and 60% which is the desired moisture content. The microwave oven test is a more accurate test. This method is accomplished by a few simple steps:

1. Weigh out a wet sample taken directly from a windrow.
2. Weigh the sample after it is dried in a microwave oven.

3. Find the weight of water evaporated by subtracting the wet sample weight from the dry sample weight.
4. Finally calculate the moisture content percentage by dividing the weight of water evaporated by the weight of the wet (original) sample and multiplying by 100 to get a percentage.

Temperature is one of the primary measures for testing compost because the heat produced during the process is directly related to microbial activity. After the initial turning/mixing process, windrows will remain undisturbed for the first three (3) to five (5) days to allow temperatures and microbial activity to increase. Once temperatures have maintained at or above 131 degrees Fahrenheit for at least three (3) days, the windrows will be turned. Temperature will be monitored and recorded on a daily basis to ensure that the compost has achieved adequate thermophilic levels while not exceeding 160 degrees Fahrenheit. Temperature testing will be performed at one (1) and three (3) foot depths and 20 foot intervals along both sides of all windrows.

Generally, five (5) percent oxygen concentration is considered the minimum for sustained aerobic composting. Wilson County operators will ensure adequate oxygen content in compost piles by maintaining structural porosity within the windrows. This will be accomplished by inspecting the incoming waste after the grinding and screening process to ensure the consistency of the compost material. If a windrow is inspected and found to be too dense, not porous enough, it will be “fluffed” either by turning or combining some cured compost with the volumetrically-reduced compost.

As a soil amendment, the pH level of a compost product is an important factor in determining what types of plants are suitable for any given compost. pH testing will be performed using a soil pH

test kit that employs a color coding system to determine the pH of the compost once mixed with a solution.

#### **3.5.5.5 Curing**

Once the compost process has completed its active phase, a curing phase is initiated to insure that the final compost material has reached stability. Compost stability is defined as the point at which the rate of oxygen consumption is reduced so that anaerobic or odorous conditions are not produced to the extent of that they cause problems with the storage and end use of the product. The stability of the compost signifies the completion of the product. Only stable compost shall be moved the final product pile. Stable compost shall be considered mature as determined by the Solvita test at an index value greater than 5.

#### **3.5.5.6 Product Testing**

Proper compost product sampling and testing is important to determine compliance with the applicable regulations of the North Carolina Department of Environment and Natural Resources (NCDENR) and to assure its customers they are manufacturing a quality product. If the final product has no declared nutrient value it will be distributed as a mulch product. If Wilson County distributes the final product as compost, representative samples should be obtained and tested by a qualified laboratory before any final compost product is released for sale.

The following procedure is required for sampling the compost:

1. Collect samples from areas of the compost pile that are representative of the general appearance and will avoid collecting atypically moist samples (> 60% moisture). If the samples are suspected of being too moist after they are collected new samples must be collected.
2. A representative compost sample will be collected from appropriate sampling locations and consist of no less than five (5) point samples. All samples will be taken at least 15 inches inside the windrow.
3. All samples will then be added to a sterilized five (5) gallon bucket and mixed thoroughly for subsequent testing.

Some of the compost samples collected, according to the sampling procedure above, should be tested and examined by the facility to ensure that the compost meets minimum requirements for pathogenic organisms, is free from offensive odor, and contains no sharp particles that would cause injury to persons handling the compost. If directions are provided with the compost product it shall have unrestricted applications and distributions. All product distribution as compost shall be in accordance with 15 NCAC 13B.1407(d)(3) for a Type 1 facility. Mulch and compost products used by Wilson County on the facility property do not require testing prior to use.

The final compost product may be distributed/sold to the public if it is determined to be of suitable quality. Before any compost product is sold or given away with a declared nutrient value it will be tested pursuant to 15 NCAC 13B.1407. The samples to be tested will be obtained according to the sampling procedure above and processed using the following protocol:

1. Sample will be chilled immediately upon collection and preparation.
2. They will then be bagged and labeled in water tight bags/containers and packed in a cooler with cooling packs.
3. Finally, the samples will be shipped to a approved laboratory for delivery within 24 hours only to be accepted by the laboratory if received at or below four (4) degrees Celsius.

### **3.5.6 Access and Roadways**

The site has been designed to provide all-weather access to the processing area.

## **3.6 FINAL PRODUCT**

Once the processing is completed to meet the specifications of this plan, on-site storage will be necessary until the product can be delivered. The area designated for the finished products will be accessible for both equipment involved in the storage as well as the equipment involved in loading the finished product off-site. The storage areas provide a buffer between processing operations and truck loading operations to maintain a safe controlled working environment.

Areas designated for storage will be protected against excessive runoff, soil loss or erosion by providing surface water diversions, silt fence, applying mulch products, or other best management practices (BMP's). The stockpiles shall not exceed heights beyond the limits of equipment available on-site or in such quantities as to provide a fire hazard due to decomposition (i.e. for the mulch product).

### 3.7 TROUBLESHOOTING

The final product must be maintained and monitored to prevent fire potential and to maintain an acceptable product. Typical problems and solutions have been provided in **Table 3.2**. This table may be updated from time to time to include additional information about the specific process at this site.

**TABLE 3.2 TROUBLESHOOTING**

Condition	Reason	Check	Remedy
PILE TEMPERATURE TOO HIGH (>150 °F)	INSUFFICIENT AERATION	IS PILE MOIST?	TURN PILE OR AERATE
	PILE IS TOO LARGE	HEIGHT > 8 FEET?	DECREASE PILE HEIGHT
EXTREMELY HIGH TEMPERATURE (>170 °F)	SPONTANEOUS COMBUSTION	LOW MOISTURE? BURNT SMELL?	DECREASE PILE SIZE, ADD WATER TO SMOLDERING SECTION, AND COMBINE WITH OTHER PILES
ODORS IN PILE	PILES ARE TOO LARGE	HEIGHT > 8 FEET OR WIDTH > 20 FEET ?	DECREASE PILE SIZE
NON-UNIFORM TEXTURE	POOR MIXING	ORIGINAL RAW MATERIALS DISCERNIBLE?	SCREEN PRODUCT & IMPROVE MIXING



# Wilson County Planning Department

Mark M. Johnson, AICP, CZO, CFM  
*Director*

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2201 Miller Road, South • PO Box 1728 • Wilson, NC 27894-1728 • Fax: (252) 399-2770

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**Planning/Inspections**  
252-399-2965

**Mapping/GIS**  
252-399-2846

**Wilson County Transportation Services**  
252-399-2817

October 27, 2010

Mr. Andy Davis

Wilson County Solid Waste Director

Wilson, NC 27894-1728

Subject: Zoning Compliance Letter

Andy, per your request and as required under 15A NCAC 13B.1405(a)(2), I am submitting this letter of zoning compliance for landfill parcel identified by the following PIN numbers; 3732-52-9078, 3732-62-8665 and 3731-59-7732.

The property on which the Wilson County landfill is located is zoned A-R. Landfill operations are permitted in A-R zones under the provisions of a Special Use Permit. The Wilson County landfill is currently operating under Special Use Permit, SU 2007-03. This special use permit allows a landfill operation on the above subject properties.

The proposed managing, processing and storage of yard waste compost and white goods, are considered part of landfill operations and is therefore permitted at under the existing Special Use Permit.

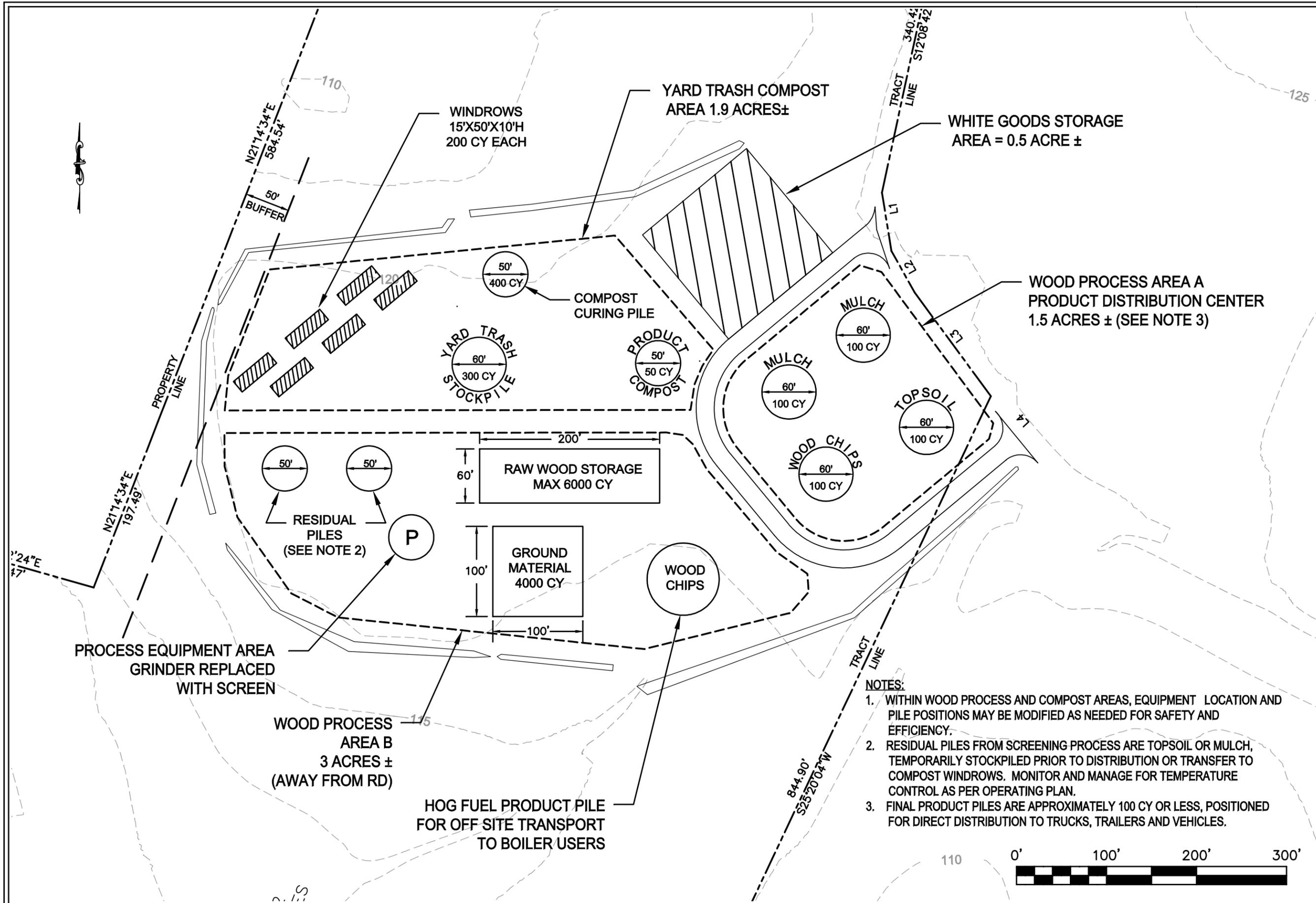
If you need additional information please do not hesitate to contact me.

Best Regards,

A handwritten signature in cursive script that reads "Mark M. Johnson".

Mark M. Johnson, AICP

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- NOTES:**
1. WITHIN WOOD PROCESS AND COMPOST AREAS, EQUIPMENT LOCATION AND PILE POSITIONS MAY BE MODIFIED AS NEEDED FOR SAFETY AND EFFICIENCY.
  2. RESIDUAL PILES FROM SCREENING PROCESS ARE TOPSOIL OR MULCH, TEMPORARILY STOCKPILED PRIOR TO DISTRIBUTION OR TRANSFER TO COMPOST WINDROWS. MONITOR AND MANAGE FOR TEMPERATURE CONTROL AS PER OPERATING PLAN.
  3. FINAL PRODUCT PILES ARE APPROXIMATELY 100 CY OR LESS, POSITIONED FOR DIRECT DISTRIBUTION TO TRUCKS, TRAILERS AND VEHICLES.



**BLACKROCK ENGINEERS, INC.**

POST OFFICE BOX 58  
 WILMINGTON, NORTH CAROLINA 28401  
 107 PLUMTREE LANE  
 CASTLE HAYNE, NORTH CAROLINA 28429  
 PHONE: 910.232.6696

FIGURE NO.	2	FILE NAME	T&P SITE
SCALE:	1"=100'	PROJECT NO.	WGL1007
CHECKED BY:	GWA	DATE:	12.14.10
DRAWN BY:	JWG		

**GENERAL LAYOUT  
 TREATMENT & PROCESSING SITE  
 WILSON COUNTY LANDFILL**

TITLE: