

Subject: Johnston County - Drawings Showing Phase 4A - Cell 3

From: Pieter Scheer <pieter@rsgengineers.com>

Date: Mon, 27 Oct 2008 16:22:23 -0400

To: "Wilson, Donna" <Donna.Wilson@ncmail.net>

Donna:

Per our conversation, attached are drawings referenced in the currently approved Facility Plan that show Cell 3. The whole set was too large to email. I'll put on a CD and send separately.

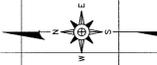
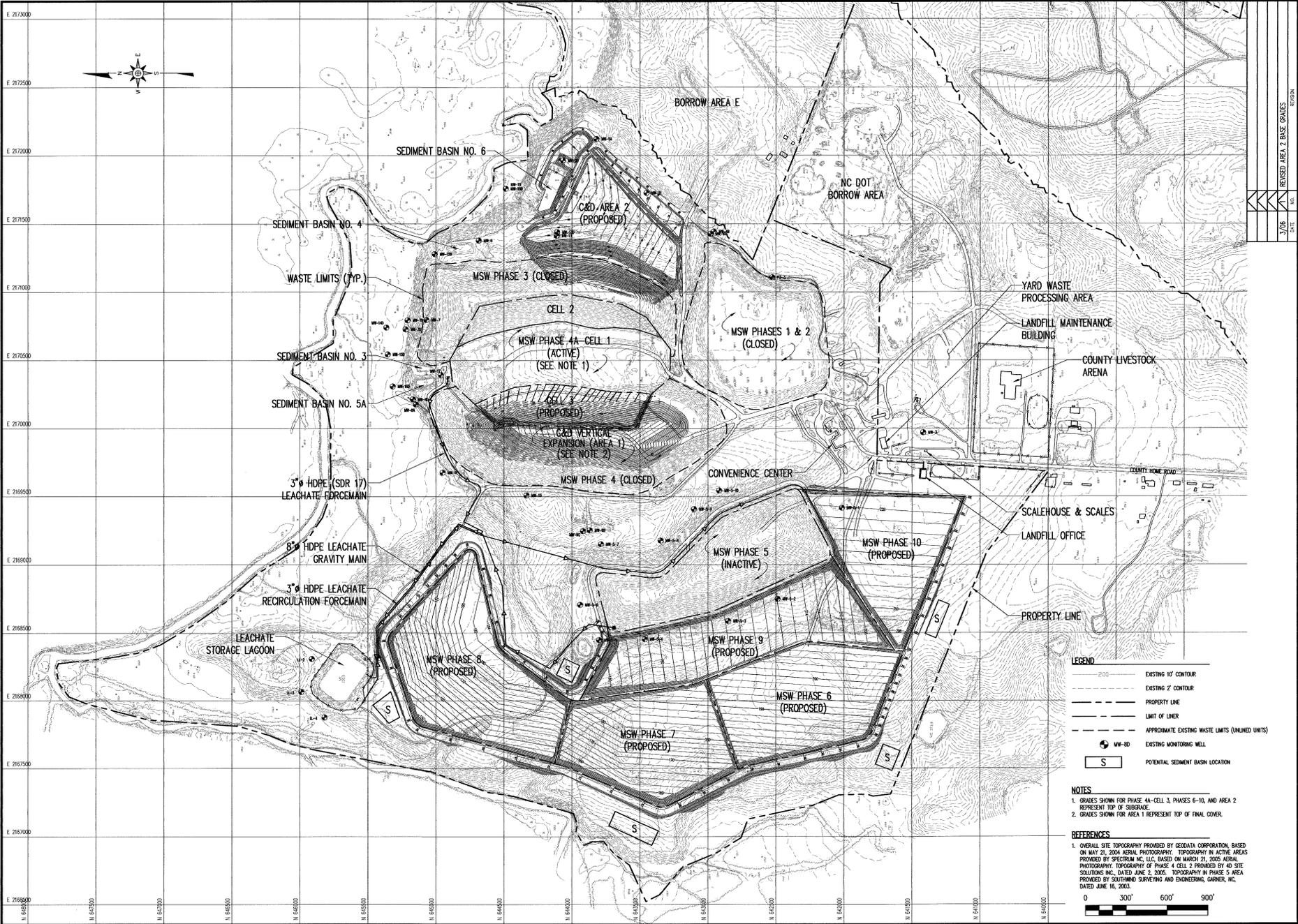
Pieter

--

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

JC 03 Drawing S2.TIF	Content-Type: image/tiff Content-Encoding: base64
-----------------------------	--

JC 24 Drawing P2.TIF	Content-Type: image/tiff Content-Encoding: base64
-----------------------------	--



REVISION	NO.	DATE	DESCRIPTION
1	3/06		REVISED AREA 2 BASE GRADES

G. N. RICHARDSON & ASSOCIATES, INC.
Engineering and Geological Services
 14 N. Boylan Ave.
 Raleigh, N.C. 27603
 www.gnra.com
 ph: 919-428-0877
 fax: 919-428-3899



**JOHNSTON COUNTY C&D LANDFILL
 AREA 2
 PERMIT DRAWINGS**

**SITE DEVELOPMENT PLAN
 BASE GRADES
 (MSW AND C&D UNITS)**

LEGEND

	EXISTING 10' CONTOUR
	EXISTING 2' CONTOUR
	PROPERTY LINE
	LIMIT OF LINER
	APPROXIMATE EXISTING WASTE LIMITS (UNLINED UNITS)
	MSW-8D EXISTING MONITORING WELL
	POTENTIAL SEDIMENT BASIN LOCATION

NOTES

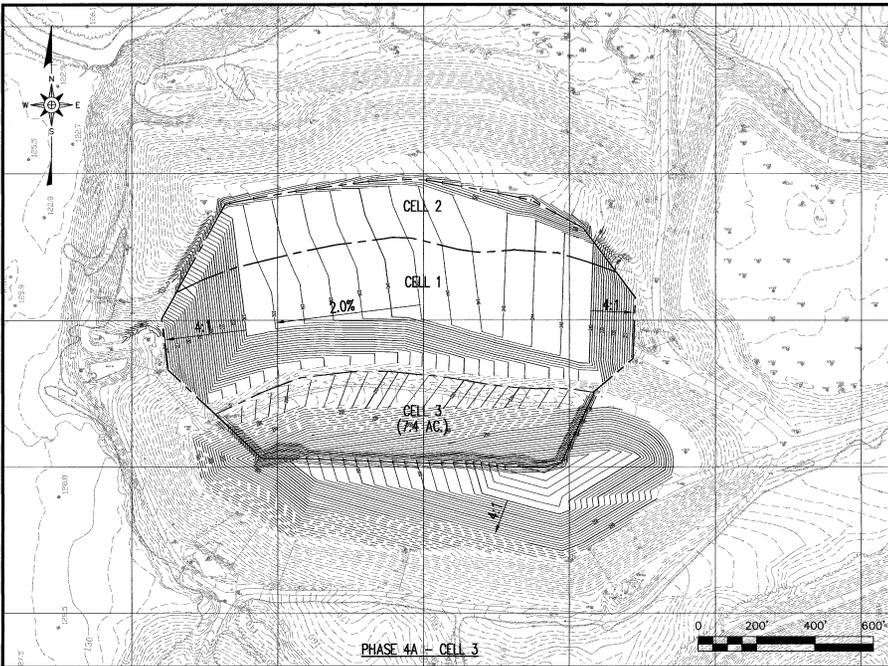
- GRADES SHOWN FOR PHASE 4A-CELL 3, PHASES 6-10, AND AREA 2 REPRESENT TOP OF SUBGRADE.
- GRADES SHOWN FOR AREA 1 REPRESENT TOP OF FINAL COVER.

REFERENCES

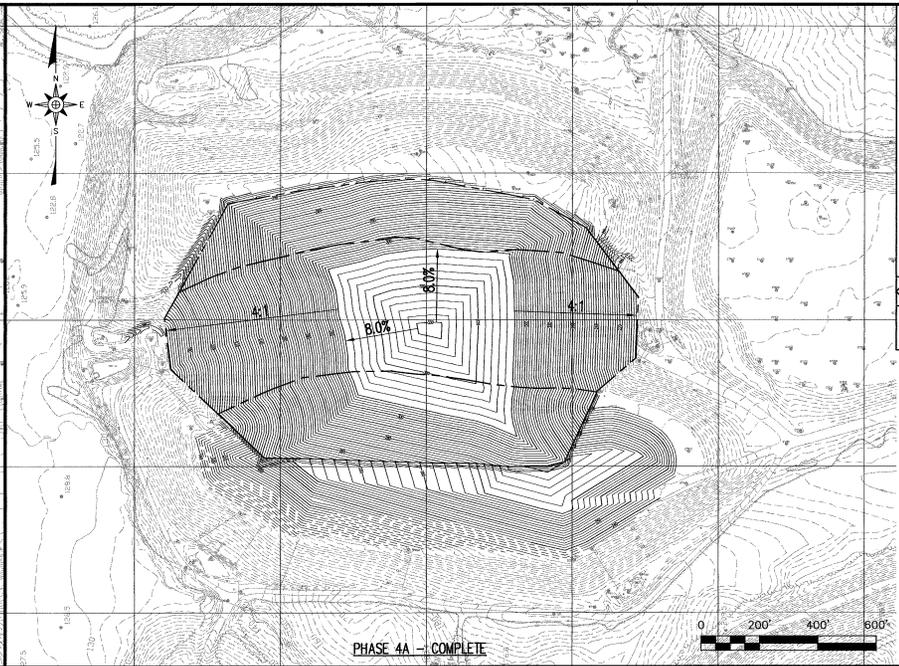
- OVERALL SITE TOPOGRAPHY PROVIDED BY GEODATA CORPORATION, BASED ON MAY 21, 2004 AERIAL PHOTOGRAPHY. TOPOGRAPHY IN ACTIVE AREAS PROVIDED BY SPECTRUM INC. LLC, BASED ON MARCH 21, 2005 AERIAL PHOTOGRAPHY. TOPOGRAPHY OF PHASE 4 CELL 2 PROVIDED BY 4D SITE SOLUTIONS INC. DATED JUNE 2, 2005. TOPOGRAPHY IN PHASE 5 AREA PROVIDED BY SOUTHWIND SURVEYING AND ENGINEERING, GARNER, NC, DATED JUNE 16, 2003.

0 300' 600' 900'

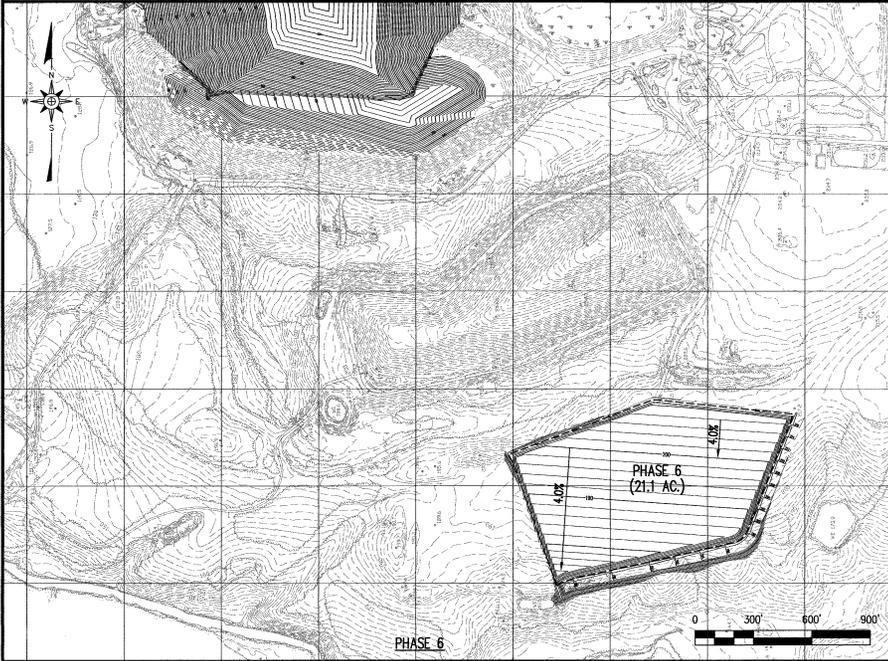
DESIGNED BY:	P.K.S.	DRAWN BY:	J.A.L.
CHECKED BY:		PROJECT NO.:	JOHN-02
SCALE:	AS SHOWN	DATE:	OCT. 2005
FILE NAME:	JOHN020005A		
SHEET NO.	3	DRAWING NO.	S2



PHASE 4A - CELL 3

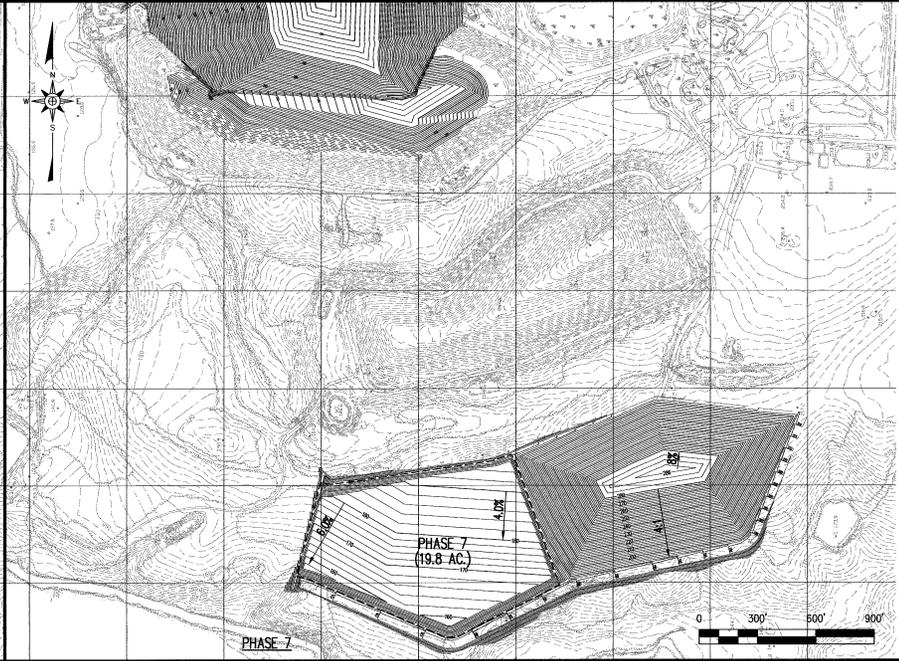


PHASE 4A - COMPLETE



PHASE 6

PHASE 6
(21.1 AC.)



PHASE 7

PHASE 7
(19.8 AC.)

DATE	NO.

G. N. RICHARDSON & ASSOCIATES, INC.
 Engineering and Geotechnical Services
 14 N. Boylan Ave.
 Raleigh, N.C. 27603
 www.gna.com
 ph: 919-838-0576
 fax: 919-838-9396



PROJECT TITLE
**JOHNSTON COUNTY C&D LANDFILL
 AREA 2
 PERMIT DRAWINGS**

DRAWING TITLE	
DESIGNED BY: PK.S.	DRAWN BY: C.T.J.
CHECKED BY: JOHN-22	PROJECT NO.:
SCALE: AS SHOWN	DATE: OCT 2000
FILE NAME: JOHN-00089	DRAWING NO.:
SHEET NO. 24	P2

Subject: Sampson County Closure Pictures

From: Stacey Smith <stacey@rsengineers.com>

Date: Thu, 04 Dec 2008 14:10:55 -0500

To: DONNA WILSON <DONNA.WILSON@ncmail.net>

Donna,

I have attached some pictures of the sampson county closure for your information. Also, please let me know if you would like to take a visit to see both the 82-01 and 82-02 sites which both have a rain gutter type closure.

sas











Subject: Re: Johnston County - Rules References
From: Pieter Scheer <pieter@rsgengineers.com>
Date: Tue, 09 Dec 2008 17:15:12 -0500
To: Donna Wilson <Donna.Wilson@ncmail.net>
CC: Ed Mussler <ed.mussler@ncmail.net>

Donna:

How about the following in response to Comment #23:

"Although Johnston County is not subject to the specifically stated frequencies, which pertain specifically to new facilities (reference Solid Waste Act of 2007 Section 9.(b)), the following provisions for inspection and cleaning have been added:

In addition to a final flushing of collection piping at the end of construction, the County proposes to conduct a video camera inspection to verify that the piping has not been damaged prior to operations. Specification Section 02614 (HDPE Pipe) has been modified to add this requirement (reference Paragraph D.5).

Also, as part of operations, the County proposes to conduct video camera inspection and flushing (if necessary) of collection piping (portion that can be inspected) every 3 years or earlier if an abnormal reduction in leachate production is observed. If the piping is mostly clean at the initial 3 year inspection, the County may petition the DWM to increase the inspection frequency to 5 year intervals. Section 3.3.1.2 (Collection Pipe Cleanout) of the Operations Manual has been updated to reflect these changes."

Note that all Cell 3 leachate collection pipes (as re-designed) will be able to be inspected and cleaned.

Also, did you take a further look at the drainage of the final cover system (Comment #6)?

I'll call to discuss further tomorrow.

Thanks!

Pieter

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

Donna Wilson wrote:

Pieter - The rules reference I was looking for is the leachate management plan, .1626 (12):

The owner or operator of a MSWLF unit designed with a leachate collection system must establish and maintain a leachate management plan which, at a minimum, includes the following:

- (a) Periodic maintenance of the leachate collection system;
- (b) Maintaining records for the amounts of leachate generated;
- (c) Semi-annual leachate quality sampling;
- (d) Approval for final leachate disposal; and
- (e) A contingency plan for extreme operational conditions.

The leachate management plan should be included in the Operating Plan. Cleaning and camera inspections are one acceptable way to meet this, but other ways that can demonstrate that the leachate collection system is clear and properly operating may be proposed. The plan should specify the type of maintenance, frequency, reporting, and recordkeeping. See also my original comment #23.

Thanks, Donna

Pieter Scheer wrote:

Donna:

Per our conversation, the only schedule for cleanout of leachate collection piping I could find is in 130A-295.6 (h)(3) (which originates from the SWA of 2007). Section 9(b) of the SWA of 2007 states that the more stringent criteria do not apply to existing landfills. Thus, it doesn't appear the specified schedule applies to Johnston County.

As far as the Solid Waste Rules, the only reference I could find for cleanout of leachate collection piping is from .1626(12)(a) which requires a plan for periodic maintenance of LCS piping.

I'll call you to discuss further tomorrow.

Pieter

Subject: Johnston County Phase 4A Cell 3 - Updated Responses

From: Pieter Scheer <pieter@rsgengineers.com>

Date: Tue, 06 Jan 2009 09:43:36 -0500

To: "Wilson, Donna" <Donna.Wilson@ncmail.net>

Donna :

Attached is a copy of the revised draft response letter. I updated the responses to #23 & #24 per our discussion. Also attached are revised pages from the Fac. & Eng. Plan (see second paragraph regarding capacity increase) and the Ops. Manual (see first paragraph regarding pipe cleanout). Let me know if you need any additional wording changes or if this is acceptable.

Also, I'm waiting to hear back from the County on a time for the pre-construction meeting. Between us and the contractor were trying for Wed. a.m. (around 10) or Thurs. p.m. (around 1:30).

Thanks!

Pieter

--

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

DWM Response 010609 LET DRAFT.pdf	Content-Type: application/pdf Content-Encoding: base64
--	---

F&EP Plan Page 2.0-4.pdf	Content-Type: application/pdf Content-Encoding: base64
-------------------------------------	---

Ops Manual Page 3.0-4.pdf	Content-Type: application/pdf Content-Encoding: base64
----------------------------------	---

DRAFT

January 6, 2009

Ms. Donna J. Wilson
Environmental Engineer II
NC DENR - Division of Waste Management
401 Oberlin Road, Suite 150
Raleigh, NC 27605

**Re: Johnston County MSW Landfill - Phase 4A - Cell 3 (Permit No. 51-03)
Permit Amendment Application
Response to Review Comments and Additional Changes**

Dear Ms. Wilson:

Richardson Smith Gardner & Associates, Inc. (RSG) appreciates your review of the above referenced plan. We would like to respond to the comments addressed in your letter dated October 16, 2008 (see **attached**), as follows. The plan review comments are repeated below in *italics* and our response follows in **bold**. Note that in response to several comments, the previously submitted "Engineering Plan" (Attachment A in the Permit Amendment Application) has been re-titled "Facility and Engineering Plan". In addition, other revisions to the permit application have been made as discussed below. Note that the revised sections (see attachment list at the end of this letter) are provided as part of a complete copy of the application dated December, 2008. Note also that changes have been made to integrate Cell 3 with the current site topography now that the adjacent Area 1 C&D unit has reached effective capacity. In addition to the revised sections noted below, revisions to **Attachment F** (Erosion and Sedimentation Control Plan) were also made.

- 1. Please provide a summary description of the history at the landfill in the application, to include the progression of the phases and vertical expansions, with dates and a brief identification of liners and final covers for the different phases.*

Section 1.3 (Site History) has been added to the Facility and Engineering Plan to provide this additional information. Please find attached a copy of the revised Facility and Engineering Plan.

- 2. The property line boundary, from Plat Book 59, Page 437, does not appear to match the property line boundary as shown on drawing S1 (in the area of the NCDOT borrow area). Please clarify.*

The property line has been revised to reflect the currently permitted facility boundary on all affected Permit Amendment drawings. Additionally, per your request, Drawing S1 (Existing Conditions) has been revised to show the various parcels which make up the facility. Please find attached a revised set of Permit Amendment drawings.

- 3. The settlement calculations in the Appendix show the calculated settlement at 7 points. Please provide the calculation of the final slope of the liner between each segment to show positive leachate drainage. Please provide confirmation that the post-settlement bottom elevation of the liner system is a minimum of 4 feet above the seasonal high groundwater table.*

Page 9/9 of the settlement calculations for Cross Section 1 (Attachment G - Appendix D), shows the calculated after settlement liner slope and associated strain. Based on the

DRAFT

calculations the minimum slope between any 2 points evaluated will be 2.1%, which exceeds the 2% criteria for base slopes and ensures positive drainage. Additionally, a line has been added to Page 9/14 to show that the 4 foot vertical separation is maintained post-settlement. Based on the revised calculations, a minimum of 4.4 feet will be maintained after settlement.

4. *It appears that the flatter portion of Cell 3 was not included in the original approved plans. Please address why this was changed, and address settlement and differential settlement issues for this flatter portion, to ensure adequate positive drainage of leachate.*

The flatter portion of Cell 3 has been reduced in areal size and the grades generally steepened both toward the north and east as compared to the originally approved plans for Phase 4A (Permit to Construct for Cells 1 and 2). However, Cell 3 is much the same as depicted in the currently approved Facility Plan (plans dated March 2006). Additional settlement evaluation points (#8 - 18) have been added through Cell 3 along the alignment of the leachate collection header pipe to confirm that positive slopes will be maintained toward the north along the leachate collection header running north-south. Attachment G (Slope Stability, Settlement, and Bearing Capacity Evaluation) have been modified accordingly. Based on the calculations a minimum post-settlement slope of 1.0% will be maintained along the header pipe, which is more than sufficient to ensure positive flow. As more settlement typically will occur near the Cell 1/Cell 3 tie-in than along the western side of the flatter portion of Cell 3, the slope from west to east across the flatter portion of Cell 3 will only increase with waste placement (maintaining greater than a 2% post-settlement slope toward the header pipe).

5. *Please provide calculations that demonstrate that the Cell 4A sump is sized to handle the leachate volumes for cells 1, 2, and 3. Please provide a discussion and detail drawing of how the leachate will be moved from the 2 leachate systems to the sump.*

As described in Section 4.5 of the Facility and Engineering Plan, the designed surge event during initial operations of Cell 3 will produce approximately 191,000 gallons of leachate in one day or an average flow of 133 gpm for 24 hours. The 2 existing 100-gpm pumps in the Phase 4A sump (located in Cell 1) will be able to remove this quantity in less than one day when pumping in tandem. Also as described in Section 4.5, the more typical flow rate for Phase 4A should be less than 20,000 gallons per day (or approximately 14 gpm).

As shown on Drawing S4, the leak detection piping will be connected with existing solid piping near the northeast corner of Cell 3 (the piping is placed through the secondary LLDPE geomembrane as shown on Detail 1/LM2. The existing solid piping leads directly to the existing leak detection pump station located to the north of Cell 1.

As shown on Drawing S5, the leachate collection piping will be connected with existing piping in Cell 1 at the northeast corner of Cell 3. Thus, leachate collected in Cell 3 will flow directly via gravity to the Phase 4A sump. No liner penetrations are required for leachate collection piping.

6. *Why is the surface water collection on top of the final cover designed to channel all of the surface water under the geomembrane of the final cover? This contradicts the purpose of the final cover system to prevent infiltration of surface water. If there is a leak, how will it be found? If by*

DRAFT

subsidence, the leak will be present for a long time before it is discovered. Please explain why this design was chosen over a design that involves pipes or drainage channels on top of the final cover. Please address how this would be maintained to prevent clogs from grass, leaves, silt, etc. Please address why this design still leaves exposed pipes on the surface of the landfill for all side slope areas which do not have the geomembrane final cover.

The design configuration of the stormwater down pipes and rain gutters has been successfully utilized at the Sampson County Disposal MSW Landfill both for closure of the Permit 82-01 Landfill in 2001-2002 and the partial closure of the Permit 82-02 Landfill in 2006. Dropping the down pipes below the piping of the rain gutters is essential to both allowing free drainage of the gutters and providing a continuous drainage break for the drainage geocomposite, which is key to maintaining stability of the cover veneer. The down pipes are constructed of welded HDPE piping that is pressure tested to ensure no leaks. Additionally, HDPE pipe is sufficiently flexible to tolerate expected settlement of the underlying waste. The rain gutters are designed with a temporary geotextile cover for preventing short term siltation and larger stone (1.5 to 3"), which is flushed by larger rain events. Of course the gutters must be monitored and maintained over time just as any other means of final cover drainage.

Having piping on top of the final cover geosynthetics can be accomplished using tack on berms. However, the drawbacks to berms is that they are prone to erosion and the side slopes are much more difficult to maintain than the smooth surface profile associated with the rain gutters. Additionally, drainage breaks for the drainage geocomposite are more difficult as well and are likely more prone to clogging.

All long-term down pipes will be buried beneath the surface of the final cover until daylighting at/near the base of each slope. This is also true for existing closed areas that will not receive a geomembrane final cover. Detail 7/FC3 (Typical Down Pipe Section - (Soil-Only Final Cover)) has been added to clarify this.

7. *Drawing FC1 – Please identify the type of final cover that consists on top of Phase 3 for the strip between Phase 4A cell 2 and the C&D Area 2 cell 2. The entire top of Phase 3 should have a final cover with geomembrane.*

The top of Phase 3 already has a final cover consisting of a GCL, a drainage geocomposite, and a minimum of 18-inches of soil cover. This has been clarified in the revised Cross Section B (See Drawing EX2 of the revised Permit Amendment drawings).

8. *Please provide at least one cross-section that shows the bottom and top of Phase 3 and 4 MSW areas, the C&D Area 1 and 2 areas, and the Phase 4A areas.*

Cross Section B has been revised to extend through the Area 2 C&D unit. Please refer to Drawing EX2 of the revised Permit Amendment drawings.

9. *In the text, please describe how all the liner components will be connected from Cell 1 to Cell 3.*

Section 3.2 of the Facility and Engineering Plan has been updated to describe how the liner components will be connected. As for Cell 1 to Cell 2, all components between Cell 1 and

Cell 3 will be connected such that each layer will be continuous across the tie-in.

10. *Drawing FC3 – In text or on the drawing, please explain how the leachate seep collection trenches will be used – in the intermediate cover, after final cover is placed, etc. Leachate outbreaks should not occur through the geomembrane after final cover is placed, as it appears to indicate on the drawing.*

Seep collection trenches can be used at any time prior to placement of final cover to deal with surface seeps. Note 1 of Detail 5/FC3 has been expanded to clarify this.

11. *Please provide a detail drawing of the final cover anchor trench.*

Please refer to Detail 2/FC2, which shows how the final cover geomembrane will be welded to the geomembrane placed as part of the closure of Area 1. In this fashion, an additional anchor trench is not planned.

12. *Drawing detail 2/FC2 – Please clarify where the outlet pipe discharges in relation to Cell 3.*

The referenced outlet pipe (6" diam. CPE (Type S)) is used to drain the drainage geocomposite component at the base of the slope. As noted on the detail, each pipe will be placed at 200-feet on-center (into the page). The flow in each of these pipes should be minimal and will discharge directly to the adjacent drainage channel or slope.

13. *Please indicate the locations of the white goods, tire, battery, and waste oil collection areas on the existing conditions drawing.*

Drawing S1 has been revised to reflect this information.

14. *Please include a drawing that shows all future phases, as was in the March 2006 drawings.*

Drawings P1 through P4 have been added to reflect future development. Drawings P1 through P3 show the phasing of MSW landfill units and Drawing P4 shows the phasing of C&D landfill units.

15. *Operating Plan - Section 2.2.1 - Please correct the reference to the NCAC for the definition of acceptable waste.*

All of Section 2.2 has been updated and corrected.

16. *Operating Plan - Section 2.3.1 – Please correct the reference to the NCAC for the definition of hazardous waste.*

Section 2.3.1 has been corrected.

17. *Operating Plan - Section 2.5.3.2 – Please explain how the geosynthetic rain cover is perforated in a new waste area.*

The thin rain cover material is easily shredded by tracking with a dozer. Additional language has been added to Section 2.5.3.2 to clarify this.

18. *Operating Plan – Please incorporate the details and operating plan of the Tarpomatic alternate daily cover.*

Section 2.5.5.3 has been added to describe the use of the Tarpomatic system.

19. *Operating Plan – Please describe the operation and application of the approved spray irrigation system for reclaimed wastewater in the text of the plan, similar to the discussion of the yard waste processing area, and reference the operating plan in the appendix.*

Section 3.10 has been added to briefly describe the operation of the spray irrigation system and reference Appendix E of the Operations Manual. Appendix E of the Operations Manual has also been revised to reflect that the irrigation system is active (previously called “proposed”).

20. *Operating Plan – Please add discussion of the Bulk Reclaimed Water Transfer Station recently approved on the landfill property. Address site security between the station and the landfill and show the location on the site map.*

The County’s bulk reclaimed water transfer station is located just to the east of the NC Forestry Service Office and south of the County’s Livestock Area and is not within the currently permitted facility boundary. Drawing S1 and Figure 1 of the Operations Manual have been revised to reference this location.

21. *Operating Plan - Please provide a brief discussion of the proposed leachate pond equalization basin modifications.*

Section 3.3.6 has been added to briefly describe the proposed modifications.

22. *Please provide the actual leachate volumes that have been collected in the leak detection system for Phase 4A, historically and currently.*

Data has been collected monthly by the County and a copy is attached. Note that the larger detection flows observed in Sept.-Oct. 2004 and in April-May 2005 were due to surface water infiltration primarily along the eastern most detection trench prior to and during construction of Cell 2. Since completion of Cell 2 in June 2005, the detection flows have been consistently low. During this time, a maximum of 5,900 gallons has been collected in the leak detection system in a one month period which equates to approximately 9 gallons/acre/day for 22 acres. Also during this time, an average of approximately 1,470 gallons per month has been collected which equates to approximately 2 gallons/acre/day for 22 acres. Both values are well below the action leakage rate of 100 gallons/acre/day.

23. *The operating plan should address routine leachate collection line cleaning and inspections. All leachate collection lines shall be designed and constructed to permanently allow cleaning and remote camera inspection. All leachate collection lines shall be cleaned at least once a year, except that the Department may allow leachate collection lines to be cleaned once every two years if the facility has continuous flow monitoring; and the permit holder demonstrates to the*

DRAFT

Department that the leachate collection lines are clear and functional based on at least three consecutive annual cleanings. Remote camera inspections of the leachate collection lines shall occur upon completion of construction, at least once every five years thereafter, and following the clearing of blockages.

Although Johnston County is not subject to the specifically stated frequencies, which pertain specifically to new facilities (reference Solid Waste Act of 2007 Section 9.(b)), the following provisions for inspection and cleaning have been added:

In addition to a final flushing of collection piping at the end of construction, the County proposes to conduct a video camera inspection to verify that the piping has not been damaged prior to operations. Specification Section 02614 (HDPE Pipe) has been modified to add this requirement (reference Paragraph D.5). Please find attached a copy of the revised Specification Section 02614.

Also, as part of operations, the County proposes to conduct video camera inspection and flushing (if necessary) of all leachate collection piping accessible with a cleanout port every 3 years or earlier if an abnormal reduction in leachate production is observed. An abnormal reduction is defined as a drop in monthly leachate production of 30% or more as compared to the monthly average over the prior 6 month period and which does not appear to be the result of a reduction in rainfall, the covering of new cell areas, etc. If the piping is mostly clean at the initial 3 year inspection, the County may petition the DWM to increase the inspection frequency to 5 year intervals. Section 3.3.1.2 (Collection Pipe Cleanout) of the Operations Manual has been updated to reflect these changes. Please find attached a copy of the revised Operations Manual.

Note that all Cell 3 leachate collection pipes have collection ports and will be able to be inspected and cleaned as needed (reference revised Drawing S5).

24. *Engineering Plan – Section 2.3.1 - Please clarify what the cut will be in the earthwork cut and fill.*

For the construction of the Cell 3 subgrade, the cut will be approximately 1,800 CY and the fill will be approximately 28,500 CY. Note that the cut is primarily due to the removal of a small soil berm running just to the west of the Cell 3 - Cell 1 tie-in. These quantities are reflected in Section 2.4.1 and Table 2.3 of the revised Facility and Engineering Plan.

25. *Please clarify if the stormwater/leachate separation system will involve welding flaps to the liner.*

The design of Cell 3 incorporates the use of geosynthetic rain cover instead of welded flaps used on other projects.

26. *Please provide a copy of the facility plan in this report, updated as needed. The plan should describe the increased capacity, and compare the increase to the capacity in the facility plan that was approved in August 2006.*

The Engineering Plan has been revised and re-titled “Engineering and Facility Plan”. This

revised plan includes the updated Facility Plan as Section 2.0. Note that the quantities previously discussed in Section 2.0 have been updated where applicable and are also incorporated therein.

27. *Please include with this application a copy of the approved water quality monitoring plan, following Rule .1623 (b)(3).*

A copy of the currently approved water quality monitoring plan has been added as Attachment I in the revised application.

28. *Closure plan – Please provide a schedule for completing all activities necessary to satisfy the closure criteria in Rule .1627 c.*

A closure schedule was provided as Section 1.6 of the Closure and Post-Closure Plan dated June 2008 submitted as part of the submittal for the continued operations of the C&D landfill. This plan is the most up to date plan for the facility and supercedes the June 2007 version. Section 1 (of the June 2008 plan) has been revised to update the quantities in Section 1.2 and to define the schedule for closure of the Area 1 C&D unit. For this unit, the construction of Phase 4A - Cell 3 will be the initial phase of closure of Area 1. This initial phase will be followed by a second phase of work later in 2009 after completion of Cell 3. Please refer to the revised Closure and Post-Closure Plan.

29. *Please address financial assurance submittal and mechanism in the text of the application. Please update the cost estimates in the application to be consistent with the Closure/Post-closure plan for the C&D units submitted in June 2008. Why have the post-closure costs been reduced from the 2007 submittal (\$8,340,528)?*

Section 3.4 has been added to the revised closure and post-closure plan to state that the Local Government Financial Test will continue to be used as the financial assurance mechanism. The June 2008 plan projected total post-closure costs of \$7,611,945 versus \$5,813,445 in the June 2007 plan. Thus, projected post-closure costs are actually higher than previously estimated.

Ms. Donna J. Wilson
January 6, 2009
Page 8

DRAFT

Please contact me at your earliest convenience with any questions or comments which you may have on this submittal or any further questions or comments you may have on the application.

Sincerely,
Richardson Smith Gardner & Associates, Inc.

Pieter K. Scheer, P.E.
Principal, Project Manager
pieter@rsgengineers.com

Attachments: NC DWM Letter - October 16, 2008
Phase 4A Leachate Generation Records
Revised Permit Amendment Application including:
Revised Facility and Engineering Plan (Attachment A)
Revised Technical Specifications (Attachment B)
Revised Operations Manual (Attachment D)
Revised Closure and Post-Closure Plan (Attachment E)
Revised Erosion and Sedimentation Control Plan (Attachment F)
Revised Slope Stability, Settlement, and Bearing Capacity Evaluation
(Attachment G)
Revised Permit Amendment Drawings (Attachment H)
Approved Water Quality Monitoring Plan (Attachment I)

cc: Haywood Phthisic, Johnston County
Tim Broome, P.E., Johnston County
Rick Proctor, Johnston County

The estimated total gross and net operating capacities, life expectancies, and areas of existing and planned MSW and C&D landfill units are shown in **Tables 2.2A and 2.2B**, respectively. Note that the approximate total capacities and waste footprint areas for closed unlined MSW landfill units are also shown in **Table 2.2A**. The net capacity for waste and corresponding life expectancy of each disposal area accounts for daily and intermediate cover and/or final cover. For MSW landfill units, a range of life expectancies are given to cover projected County-only tonnages (longer life expectancy) through the maximum disposal rates given in **Section 2.2.3.2** (shorter life expectancy). For C&D landfill units, a range of life expectancies are given to cover projected County-only tonnages (longer life expectancy) through projected County-only tonnages plus the anticipated 20% variance (shorter life expectancy).

Note that, although the base and final grades for the MSW and C&D landfill units approximate those shown in the previously approved facility plan, the total gross capacity is approximately 765,800 CY (4.2%) more than reported in the previously approved plan (18,367,420 CY (MSW units - Phases 4A & 5-10)) mainly due to differences in Phase 4A. Thus, this is a minor (less than 10%) change and does not require a new local government approval.

2.3.2 In-Place Ratio of Waste to Soil and Compaction Factors

2.3.2.1 MSW Landfill Units

The capacities obtained above were based on a 15 percent periodic cover ratio and a compaction factor ranging from 1,200 to 1,400 pounds per cubic yard (pcy). The assumed periodic cover ratio is indicative of the County's current practices of using a tarp as an alternative to placing 6 inches of daily cover soil. The assumed compaction factor of 1,200 pcy is based on recent analyses of waste density. A compaction factor of 1,400 pcy was assumed for areas with the greatest height (i.e. Phase 4A - Cell 3, Phase 9, and Phase 10).

2.3.2.2 C&D Landfill Units

The capacities obtained above were based on a 10 percent periodic cover ratio and a compaction factor of 1,200 pounds per cubic yard. The assumed periodic cover ratio is typical for C&D landfills. The assumed compaction factor is based on a recent analysis of waste density in Area 2.

Note that changes in landfill operations (i.e. changes in the use of alternative daily cover and/or compaction equipment/methods) may affect the values assumed above and, thus, alter the life of the various landfill units.

3.3.1.2 Collection Pipe Cleanout

Remote camera inspection and flushing (if necessary) of all leachate collection piping accessible with a cleanout port will be performed every 3 years or earlier if an abnormal reduction in leachate production is observed. An abnormal reduction is defined as a drop in monthly leachate production of 30% or more as compared to the monthly average over the prior 6 month period and which does not appear to be the result of a reduction in rainfall, the covering of new cell areas, etc. If piping is mostly clean at the initial 3 year inspection, the County may petition the DWM to increase the inspection frequency to 5 year intervals.

The locations of the collection system that have sediment or biological growth buildup will be cleaned using high pressure water jetting equipment. The water jetting system should generate greater than 2,000 psi water pressure. Use of the high pressure water jetting equipment should be limited to only those portions of the piping system with buildup.

3.3.1.3 Leachate Removal

As constructed, leachate is collected in one or more sumps at the low points of the landfill and is removed from the landfill via a side riser pump or through a gravity penetration. The leachate is routed to the leachate storage lagoon via a HDPE force main or gravity main.

Under normal conditions, the County will remove (via forcemain) leachate from the storage lagoon at a rate to maintain a typical volume of 3,500,000 gallons (approximate 6.5 foot depth), or less, of leachate in the lagoon (see also **Section 3.3.6**). This allows ample volume in the lagoon to handle the anticipated “surge” event caused by a design storm and minimizes the potential for ponding within the landfill. Additional draw-down of the lagoon will be performed in advance of predicted heavy rainfall (tropical storm, hurricane, etc.).

3.3.1.4 Operation and Maintenance of Leachate Pumps and Storage Lagoon

Operation and maintenance of leachate pumps shall be in accordance with the appropriate manufacturer’s recommendations. If required, the leachate storage lagoon may require cleanout of sediment and/or maintenance of aerators. The County Solid Waste Manager or his designee will be responsible for following and documenting, as required, these activities.

3.3.2 Leak Detection System - Phase 4A MSW Landfill Unit

A leak detection system (LDS) is part of the Phase 4A MSW landfill unit. The purpose of the LDS is to provide rapid detection of a major breach in the primary liner system and to limit the head on the secondary liner to less than the thickness of the LDS.

Subject: Re: Johnston County Phase 4A Cell 3 - Updated Responses

From: Pieter Scheer <pieter@rsgengineers.com>

Date: Fri, 09 Jan 2009 16:48:22 -0500

To: Donna Wilson <Donna.Wilson@ncmail.net>

Donna:

Yes. I think that would be acceptable to the County.

Thanks!

Pieter

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

Donna Wilson wrote:

Pieter - Is a nine month time period, from permit issuance, acceptable to perform the camera inspection on the rest of the facility?

Pieter Scheer wrote:

Ed:

Sorry - I should have clarified further - the plan is to flush and inspect Cell 3 at the end of construction - which should be by the end of this FY. This is already written into the construction contract.

The County would like to delay the remainder of the site so they can put in their budget. The "one year" was just my suggestion - we could say 9 months to allow time for scheduling. In a normal year it's probably not a big deal, but they have seen their tonnage drop and have had to make a loan to the general fund already.

Pieter

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

Ed Mussler wrote:

No, since the new construction should be checked before it is covered by waste, so any damage during construction can be fixed, why would one not want to do all the lines while the contractor is mobilized on site? Further, no one has ever given the agency any costs for this activity, surely in a landfill the size of Johnston the revenue exists to maintain the systems adequately. The question is moot unless the cell will be constructed before next fiscal year. In addition when are we talking about, July 2 or this time in 2010?

Ed

-----Original Message-----

From: Pieter Scheer [<mailto:pieter@rsgengineers.com>] Sent: Friday, January 09,

2009 12:28 PM
To: Donna Wilson
Cc: Mussler, Ed
Subject: Re: Johnston County Phase 4A Cell 3 - Updated Responses

Donna:

Regarding the inspection and cleaning of the other units, the County requests that this be delayed until FY 2009-10 if possible due to budget constraints. Would it be acceptable to say that all collection lines be inspected and cleaned if needed within one year of issuance of the PTC?

Pieter

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

Donna Wilson wrote:

Pieter - The updated specification Section 02614 for the pipe clean and camera wasn't included in the letter.
The initial camera inspection for all lines at the facility should be concurrent with the inspection for Cell 3 construction.
Thanks

Pieter Scheer wrote:

Subject: Johnston County Landfill (Permit No. 51-01) - Response to Review Comments

From: Pieter Scheer <pieter@rsgengineers.com>

Date: Mon, 12 Jan 2009 09:42:37 -0500

To: "Wilson, Donna" <Donna.Wilson@ncmail.net>

Donna :

Attached are copies of our response on the MSWLF and C&DLF units. If you need anything else let me know. Otherwise I'll send over a hard copy of each later today along with a CD containing a pdf copy of the updated permit application for the Phase 4A - Cell 3 unit for which you already have a hard copy.

Thanks!

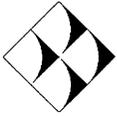
Pieter

--

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

JC DWM Response 011209 MSWLF.pdf	Content-Type: application/pdf Content-Encoding: base64
---	---

JC DWM Response 011209 C&DLF.pdf	Content-Type: application/pdf Content-Encoding: base64
---	---



January 12, 2009

Ms. Donna J. Wilson
Environmental Engineer II
NC DENR - Division of Waste Management
401 Oberlin Road, Suite 150
Raleigh, NC 27605

**Re: Johnston County MSW Landfill - Phase 4A - Cell 3 (Permit No. 51-03)
Permit Amendment Application
Response to Review Comments and Additional Changes**

Dear Ms. Wilson:

Richardson Smith Gardner & Associates, Inc. (RSG) appreciates your review of the above referenced plan. We would like to respond to the comments addressed in your letter dated October 16, 2008 (see **attached**), as follows. The plan review comments are repeated below in *italics* and our response follows in **bold**. Note that in response to several comments, the previously submitted "Engineering Plan" (Attachment A in the Permit Amendment Application) has been re-titled "Facility and Engineering Plan". In addition, other revisions to the permit application have been made as discussed below. Note that the revised sections (see attachment list at the end of this letter) are provided as part of a complete copy of the application dated December, 2008. Note also that changes have been made to integrate Cell 3 with the current site topography now that the adjacent Area 1 C&D unit has reached effective capacity. In addition to the revised sections noted below, revisions to **Attachment F** (Erosion and Sedimentation Control Plan) were also made.

- 1. Please provide a summary description of the history at the landfill in the application, to include the progression of the phases and vertical expansions, with dates and a brief identification of liners and final covers for the different phases.*

Section 1.3 (Site History) has been added to the Facility and Engineering Plan to provide this additional information. Please find attached a copy of the revised Facility and Engineering Plan.

- 2. The property line boundary, from Plat Book 59, Page 437, does not appear to match the property line boundary as shown on drawing S1 (in the area of the NCDOT borrow area). Please clarify.*

The property line has been revised to reflect the currently permitted facility boundary on all affected Permit Amendment drawings. Additionally, per your request, Drawing S1 (Existing Conditions) has been revised to show the various parcels which make up the facility. Please find attached a revised set of Permit Amendment drawings.

- 3. The settlement calculations in the Appendix show the calculated settlement at 7 points. Please provide the calculation of the final slope of the liner between each segment to show positive leachate drainage. Please provide confirmation that the post-settlement bottom elevation of the liner system is a minimum of 4 feet above the seasonal high groundwater table.*

Page 9/9 of the settlement calculations for Cross Section 1 (Attachment G - Appendix D),

shows the calculated after settlement liner slope and associated strain. Based on the calculations the minimum slope between any 2 points evaluated will be 2.1%, which exceeds the 2% criteria for base slopes and ensures positive drainage. Additionally, a line has been added to Page 9/14 to show that the 4 foot vertical separation is maintained post-settlement. Based on the revised calculations, a minimum of 4.4 feet will be maintained after settlement.

4. *It appears that the flatter portion of Cell 3 was not included in the original approved plans. Please address why this was changed, and address settlement and differential settlement issues for this flatter portion, to ensure adequate positive drainage of leachate.*

The flatter portion of Cell 3 has been reduced in areal size and the grades generally steepened both toward the north and east as compared to the originally approved plans for Phase 4A (Permit to Construct for Cells 1 and 2). However, Cell 3 is much the same as depicted in the currently approved Facility Plan (plans dated March 2006). Additional settlement evaluation points (#8 - 18) have been added through Cell 3 along the alignment of the leachate collection header pipe to confirm that positive slopes will be maintained toward the north along the leachate collection header running north-south. Attachment G (Slope Stability, Settlement, and Bearing Capacity Evaluation) have been modified accordingly. Based on the calculations a minimum post-settlement slope of 1.0% will be maintained along the header pipe, which is more than sufficient to ensure positive flow. As more settlement typically will occur near the Cell 1/Cell 3 tie-in than along the western side of the flatter portion of Cell 3, the slope from west to east across the flatter portion of Cell 3 will only increase with waste placement (maintaining greater than a 2% post-settlement slope toward the header pipe).

5. *Please provide calculations that demonstrate that the Cell 4A sump is sized to handle the leachate volumes for cells 1, 2, and 3. Please provide a discussion and detail drawing of how the leachate will be moved from the 2 leachate systems to the sump.*

As described in Section 4.5 of the Facility and Engineering Plan, the designed surge event during initial operations of Cell 3 will produce approximately 191,000 gallons of leachate in one day or an average flow of 133 gpm for 24 hours. The 2 existing 100-gpm pumps in the Phase 4A sump (located in Cell 1) will be able to remove this quantity in less than one day when pumping in tandem. Also as described in Section 4.5, the more typical flow rate for Phase 4A should be less than 20,000 gallons per day (or approximately 14 gpm).

As shown on Drawing S4, the leak detection piping will be connected with existing solid piping near the northeast corner of Cell 3 (the piping is placed through the secondary LLDPE geomembrane as shown on Detail 1/LM2. The existing solid piping leads directly to the existing leak detection pump station located to the north of Cell 1.

As shown on Drawing S5, the leachate collection piping will be connected with existing piping in Cell 1 at the northeast corner of Cell 3. Thus, leachate collected in Cell 3 will flow directly via gravity to the Phase 4A sump. No liner penetrations are required for leachate collection piping.

6. *Why is the surface water collection on top of the final cover designed to channel all of the surface water under the geomembrane of the final cover? This contradicts the purpose of the final cover system to prevent infiltration of surface water. If there is a leak, how will it be found? If by subsidence, the leak will be present for a long time before it is discovered. Please explain why this design was chosen over a design that involves pipes or drainage channels on top of the final cover. Please address how this would be maintained to prevent clogs from grass, leaves, silt, etc. Please address why this design still leaves exposed pipes on the surface of the landfill for all side slope areas which do not have the geomembrane final cover.*

The design configuration of the stormwater down pipes and rain gutters has been successfully utilized at the Sampson County Disposal MSW Landfill both for closure of the Permit 82-01 Landfill in 2001-2002 and the partial closure of the Permit 82-02 Landfill in 2006. Dropping the down pipes below the piping of the rain gutters is essential to both allowing free drainage of the gutters and providing a continuous drainage break for the drainage geocomposite, which is key to maintaining stability of the cover veneer. The down pipes are constructed of welded HDPE piping that is pressure tested to ensure no leaks. Additionally, HDPE pipe is sufficiently flexible to tolerate expected settlement of the underlying waste. The rain gutters are designed with a temporary geotextile cover for preventing short term siltation and larger stone (1.5 to 3"), which is flushed by larger rain events. Of course the gutters must be monitored and maintained over time just as any other means of final cover drainage.

Having piping on top of the final cover geosynthetics can be accomplished using tack on berms. However, the drawbacks to berms is that they are prone to erosion and the side slopes are much more difficult to maintain than the smooth surface profile associated with the rain gutters. Additionally, drainage breaks for the drainage geocomposite are more difficult as well and are likely more prone to clogging.

All long-term down pipes will be buried beneath the surface of the final cover until daylighting at/near the base of each slope. This is also true for existing closed areas that will not receive a geomembrane final cover. Detail 7/FC3 (Typical Down Pipe Section - (Soil-Only Final Cover)) has been added to clarify this.

7. *Drawing FC1 – Please identify the type of final cover that consists on top of Phase 3 for the strip between Phase 4A cell 2 and the C&D Area 2 cell 2. The entire top of Phase 3 should have a final cover with geomembrane.*

The top of Phase 3 already has a final cover consisting of a GCL, a drainage geocomposite, and a minimum of 18-inches of soil cover. This has been clarified in the revised Cross Section B (See Drawing EX2 of the revised Permit Amendment drawings).

8. *Please provide at least one cross-section that shows the bottom and top of Phase 3 and 4 MSW areas, the C&D Area 1 and 2 areas, and the Phase 4A areas.*

Cross Section B has been revised to extend through the Area 2 C&D unit. Please refer to Drawing EX2 of the revised Permit Amendment drawings.

9. *In the text, please describe how all the liner components will be connected from Cell 1 to Cell 3.*

Section 3.2 of the Facility and Engineering Plan has been updated to describe how the liner components will be connected. As for Cell 1 to Cell 2, all components between Cell 1 and Cell 3 will be connected such that each layer will be continuous across the tie-in.

10. *Drawing FC3 – In text or on the drawing, please explain how the leachate seep collection trenches will be used – in the intermediate cover, after final cover is placed, etc. Leachate outbreaks should not occur through the geomembrane after final cover is placed, as it appears to indicate on the drawing.*

Seep collection trenches can be used at any time prior to placement of final cover to deal with surface seeps. Note 1 of Detail 5/FC3 has been expanded to clarify this.

11. *Please provide a detail drawing of the final cover anchor trench.*

Please refer to Detail 2/FC2, which shows how the final cover geomembrane will be welded to the geomembrane placed as part of the closure of Area 1. In this fashion, an additional anchor trench is not planned.

12. *Drawing detail 2/FC2 – Please clarify where the outlet pipe discharges in relation to Cell 3.*

The referenced outlet pipe (6" diam. CPE (Type S)) is used to drain the drainage geocomposite component at the base of the slope. As noted on the detail, each pipe will be placed at 200-feet on-center (into the page). The flow in each of these pipes should be minimal and will discharge directly to the adjacent drainage channel or slope.

13. *Please indicate the locations of the white goods, tire, battery, and waste oil collection areas on the existing conditions drawing.*

Drawing S1 has been revised to reflect this information.

14. *Please include a drawing that shows all future phases, as was in the March 2006 drawings.*

Drawings P1 through P4 have been added to reflect future development. Drawings P1 through P3 show the phasing of MSW landfill units and Drawing P4 shows the phasing of C&D landfill units.

15. *Operating Plan - Section 2.2.1 - Please correct the reference to the NCAC for the definition of acceptable waste.*

All of Section 2.2 has been updated and corrected.

16. *Operating Plan - Section 2.3.1 – Please correct the reference to the NCAC for the definition of hazardous waste.*

Section 2.3.1 has been corrected.

17. *Operating Plan - Section 2.5.3.2 – Please explain how the geosynthetic rain cover is perforated in a new waste area.*

The thin rain cover material is easily shredded by tracking with a dozer. Additional language has been added to Section 2.5.3.2 to clarify this.

18. *Operating Plan – Please incorporate the details and operating plan of the Tarpomatic alternate daily cover.*

Section 2.5.5.3 has been added to describe the use of the Tarpomatic system.

19. *Operating Plan – Please describe the operation and application of the approved spray irrigation system for reclaimed wastewater in the text of the plan, similar to the discussion of the yard waste processing area, and reference the operating plan in the appendix.*

Section 3.10 has been added to briefly describe the operation of the spray irrigation system and reference Appendix E of the Operations Manual. Appendix E of the Operations Manual has also been revised to reflect that the irrigation system is active (previously called “proposed”).

20. *Operating Plan – Please add discussion of the Bulk Reclaimed Water Transfer Station recently approved on the landfill property. Address site security between the station and the landfill and show the location on the site map.*

The County’s bulk reclaimed water transfer station is located just to the east of the NC Forestry Service Office and south of the County’s Livestock Area and is not within the currently permitted facility boundary. Drawing S1 and Figure 1 of the Operations Manual have been revised to reference this location.

21. *Operating Plan - Please provide a brief discussion of the proposed leachate pond equalization basin modifications.*

Section 3.3.6 has been added to briefly describe the proposed modifications.

22. *Please provide the actual leachate volumes that have been collected in the leak detection system for Phase 4A, historically and currently.*

Data has been collected monthly by the County and a copy is attached. Note that the larger detection flows observed in Sept.-Oct. 2004 and in April-May 2005 were due to surface water infiltration primarily along the eastern most detection trench prior to and during construction of Cell 2. Since completion of Cell 2 in June 2005, the detection flows have been consistently low. During this time, a maximum of 5,900 gallons has been collected in the leak detection system in a one month period which equates to approximately 9 gallons/acre/day for 22 acres. Also during this time, an average of approximately 1,470 gallons per month has been collected which equates to approximately 2 gallons/acre/day for 22 acres. Both values are well below the action leakage rate of 100 gallons/acre/day.

23. *The operating plan should address routine leachate collection line cleaning and inspections. All leachate collection lines shall be designed and constructed to permanently allow cleaning and remote camera inspection. All leachate collection lines shall be cleaned at least once a year, except that the Department may allow leachate collection lines to be cleaned once every two years if the facility has continuous flow monitoring; and the permit holder demonstrates to the Department that the leachate collection lines are clear and functional based on at least three consecutive annual cleanings. Remote camera inspections of the leachate collection lines shall occur upon completion of construction, at least once every five years thereafter, and following the clearing of blockages.*

Although Johnston County is not subject to the specifically stated frequencies, which pertain specifically to new facilities (reference Solid Waste Act of 2007 Section 9.(b)), the following provisions for inspection and cleaning have been added:

In addition to a final flushing of collection piping at the end of construction, the County proposes to conduct a video camera inspection to verify that the piping has not been damaged prior to operations. Specification Section 02614 (HDPE Pipe) has been modified to add this requirement (reference Paragraph D.5). Please find attached a copy of the revised Specification Section 02614.

Also, as part of operations, the County proposes to conduct video camera inspection and flushing (if necessary) of all leachate collection piping accessible with a cleanout port every 3 years or earlier if an abnormal reduction in leachate production is observed. An abnormal reduction is defined as a drop in monthly leachate production of 30% or more as compared to the monthly average over the prior 6 month period and which does not appear to be the result of a reduction in rainfall, the covering of new cell areas, etc. If the piping is mostly clean at the initial 3 year inspection, the County may petition the DWM to increase the inspection frequency to 5 year intervals. Section 3.3.1.2 (Collection Pipe Cleanout) of the Operations Manual has been updated to reflect these changes. Please find attached a copy of the revised Operations Manual.

Note that all Cell 3 leachate collection pipes have collection ports and will be able to be inspected and cleaned as needed (reference revised Drawing S5).

24. *Engineering Plan – Section 2.3.1 - Please clarify what the cut will be in the earthwork cut and fill.*

For the construction of the Cell 3 subgrade, the cut will be approximately 1,800 CY and the fill will be approximately 28,500 CY. Note that the cut is primarily due to the removal of a small soil berm running just to the west of the Cell 3 - Cell 1 tie-in. These quantities are reflected in Section 2.4.1 and Table 2.3 of the revised Facility and Engineering Plan.

25. *Please clarify if the stormwater/leachate separation system will involve welding flaps to the liner.*

The design of Cell 3 incorporates the use of geosynthetic rain cover instead of welded flaps

used on other projects.

26. *Please provide a copy of the facility plan in this report, updated as needed. The plan should describe the increased capacity, and compare the increase to the capacity in the facility plan that was approved in August 2006.*

The Engineering Plan has been revised and re-titled “Engineering and Facility Plan”. This revised plan includes the updated Facility Plan as Section 2.0. Note that the quantities previously discussed in Section 2.0 have been updated where applicable and are also incorporated therein.

27. *Please include with this application a copy of the approved water quality monitoring plan, following Rule .1623 (b)(3).*

A copy of the currently approved water quality monitoring plan has been added as Attachment I in the revised application.

28. *Closure plan – Please provide a schedule for completing all activities necessary to satisfy the closure criteria in Rule .1627 c.*

A closure schedule was provided as Section 1.6 of the Closure and Post-Closure Plan dated June 2008 submitted as part of the submittal for the continued operations of the C&D landfill. This plan is the most up to date plan for the facility and supercedes the June 2007 version. Section 1 (of the June 2008 plan) has been revised to update the quantities in Section 1.2 and to define the schedule for closure of the Area 1 C&D unit. For this unit, the construction of Phase 4A - Cell 3 will be the initial phase of closure of Area 1. This initial phase will be followed by a second phase of work later in 2009 after completion of Cell 3. Please refer to the revised Closure and Post-Closure Plan.

29. *Please address financial assurance submittal and mechanism in the text of the application. Please update the cost estimates in the application to be consistent with the Closure/Post-closure plan for the C&D units submitted in June 2008. Why have the post-closure costs been reduced from the 2007 submittal (\$8,340,528)?*

Section 3.4 has been added to the revised closure and post-closure plan to state that the Local Government Financial Test will continue to be used as the financial assurance mechanism. The June 2008 plan projected total post-closure costs of \$7,611,945 versus \$5,813,445 in the June 2007 plan. Thus, projected post-closure costs are actually higher than previously estimated.

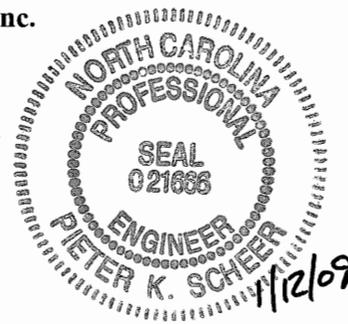
Ms. Donna J. Wilson
January 12, 2009
Page 8

Please contact me at your earliest convenience with any questions or comments which you may have on this submittal or any further questions or comments you may have on the application. Note that we will be forwarding a separate response to your request related to the C&D landfill units.

Sincerely,
Richardson Smith Gardner & Associates, Inc.



Pieter K. Scheer, P.E.
Principal, Project Manager
pieter@rsgengineers.com



Attachments: NC DWM Letter - October 16, 2008
Phase 4A Leachate Generation Records
Revised Permit Amendment Application including:
Revised Facility and Engineering Plan (Attachment A)
Revised Technical Specifications (Attachment B)
Revised Operations Manual (Attachment D)
Revised Closure and Post-Closure Plan (Attachment E)
Revised Erosion and Sedimentation Control Plan (Attachment F)
Revised Slope Stability, Settlement, and Bearing Capacity Evaluation
(Attachment G)
Revised Permit Amendment Drawings (Attachment H)
Approved Water Quality Monitoring Plan (Attachment I)

cc: Haywood Phthisic, Johnston County
Tim Broome, P.E., Johnston County
Rick Proctor, Johnston County



NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

Dexter R. Matthews, Director

Division of Waste Management

Michael F. Easley, Governor
William G. Ross Jr., Secretary

October 16, 2008

Mr. Haywood Phthisic, Director
Johnston County Public Utilities Department
P O Box 2263
Smithfield, North Carolina

Re: Application for Permit to Construct Phase 4A, Cell 3, and Review of Closure/Post-Closure Plan for the C&D unit, in accordance with .0547
Johnston County MSW and C&D Landfill
Permit No. 51-03
Johnston County, Doc ID 6031

Dear Mr. Phthisic:

An application for a Permit to Construct for Phase 4A, Cell 3 has been submitted to the Division of Waste Management, Solid Waste Section (Section) on your behalf by your consultant RSG Engineers. In accordance with GS 130A-295.8(e), the Section has reviewed your application and found it to be complete within the meaning of the statute. A determination of completion means that the application includes all required components but does not mean that the required components provide all the information that is required for the Section to make a decision on the application. We have performed a technical review of the submitted application and request the following:

1. Please provide a summary description of the history at the landfill in the application, to include the progression of the phases and vertical expansions, with dates and a brief identification of liners and final covers for the different phases.
2. The property line boundary, from Plat Book 59, Page 437, does not appear to match the property line boundary as shown on drawing S1 (in the area of the NCDOT borrow area). Please clarify.
3. The settlement calculations in the Appendix show the calculated settlement at 7 points. Please provide the calculation of the final slope of the liner between each segment to show positive leachate drainage. Please provide confirmation that the post-settlement bottom elevation of the liner system is a minimum of 4 feet above the seasonal high groundwater table.
4. It appears that the flatter portion of Cell 3 was not included in the original approved plans. Please address why this was changed, and address settlement and differential settlement issues for this flatter portion, to ensure adequate positive drainage of leachate.
5. Please provide calculations that demonstrate that the Cell 4A sump is sized to handle the leachate volumes for cells 1, 2, and 3. Please provide a discussion and detail drawing of how the leachate will be moved from the 2 leachate systems to the sump.

6. Why is the surface water collection on top of the final cover designed to channel all of the surface water under the geomembrane of the final cover? This contradicts the purpose of the final cover system to prevent infiltration of surface water. If there is a leak, how will it be found? If by subsidence, the leak will be present for a long time before it is discovered. Please explain why this design was chosen over a design that involves pipes or drainage channels on top of the final cover. Please address how this would be maintained to prevent clogs from grass, leaves, silt, etc. Please address why this design still leaves exposed pipes on the surface of the landfill for all side slope areas which do not have the geomembrane final cover.
7. Drawing FC1 – Please identify the type of final cover that consists on top of Phase 3 for the strip between Phase 4A cell 2 and the C&D Area 2 cell 2. The entire top of Phase 3 should have a final cover with geomembrane.
8. Please provide at least one cross-section that shows the bottom and top of Phase 3 and 4 MSW areas, the C&D Area 1 and 2 areas, and the Phase 4A areas.
9. In the text, please describe how all the liner components will be connected from cell 1 to cell 3.
10. Drawing FC3 – In text or on the drawing, please explain how the leachate seep collection trenches will be used – in the intermediate cover, after final cover is placed, etc. Leachate outbreaks should not occur through the geomembrane after final cover is placed, as it appears to indicate on the drawing.
11. Please provide a detail drawing of the final cover anchor trench.
12. Drawing detail 2/FC2 – Please clarify where the outlet pipe discharges in relation to Cell 3.
13. Please indicate the locations of the white goods, tire, battery, and waste oil collection areas on the existing conditions drawing.
14. Please include a drawing that shows all future phases, as was in the March 2006 drawings.
15. Operating Plan - Section 2.2.1 - Please correct the reference to the NCAC for the definition of acceptable waste.
16. Operating Plan - Section 2.3.1 – Please correct the reference to the NCAC for the definition of hazardous waste.
17. Operating Plan - Section 2.5.3.2 – Please explain how the geosynthetic rain cover is perforated in a new waste area.
18. Operating Plan – Please incorporate the details and operating plan of the Tarpomatic alternate daily cover.
19. Operating Plan – Please describe the operation and application of the approved spray irrigation system for reclaimed wastewater in the text of the plan, similar to the discussion of the yard waste processing area, and reference the operating plan in the appendix.
20. Operating Plan – Please add discussion of the Bulk Reclaimed Water Transfer Station recently approved on the landfill property. Address site security between the station and the landfill and show the location on the site map.
21. Operating Plan - Please provide a brief discussion of the proposed leachate pond equalization basin modifications.
22. Please provide the actual leachate volumes that have been collected in the leak detection system for Phase 4A, historically and currently.
23. The operating plan should address routine leachate collection line cleaning and inspections. All leachate collection lines shall be designed and constructed to permanently allow cleaning and remote camera inspection. All leachate collection lines shall be cleaned at least once a year, except that the Department may allow leachate collection lines to be cleaned once every

two years if the facility has continuous flow monitoring; and the permit holder demonstrates to the Department that the leachate collection lines are clear and functional based on at least three consecutive annual cleanings. Remote camera inspections of the leachate collection lines shall occur upon completion of construction, at least once every five years thereafter, and following the clearing of blockages.

24. Engineering Plan – Section 2.3.1 - Please clarify what the cut will be in the earthwork cut and fill.
25. Please clarify if the stormwater/leachate separation system will involve welding flaps to the liner.
26. Please provide a copy of the facility plan in this report, updated as needed. The plan should describe the increased capacity, and compare the increase to the capacity in the facility plan that was approved in August 2006.
27. Please include with this application a copy of the approved water quality monitoring plan, following Rule .1623 (b)(3).
28. Closure plan – Please provide a schedule for completing all activities necessary to satisfy the closure criteria in Rule .1627 (c).
29. Please address financial assurance submittal and mechanism in the text of the application. Please update the cost estimates in the application to be consistent with the Closure/Post-closure plan for the C&D units submitted in June 2008. Why has the post-closure costs been reduced from the 2007 submittal (\$8,340,528)?

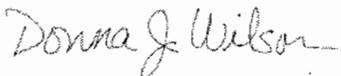
Please submit response to comments as replacement pages to the application report. Only one paper copy is necessary, but an electronic copy is also needed, either sent by email, or on a CD.

We have completed a technical review of the Closure and Post-closure plans and cost estimates for the C&D units, in accordance with Rule .0547, and we request that the CQA plan for closure activities and the water monitoring plan be included in the submittal.

For your reference, the Solid Waste Section rules can be found on the Section's website at <http://www.wastenotnc.org/swhome/rule.asp>; and the North Carolina General Statutes concerning solid waste are located at http://www.ncleg.net/EnactedLegislation/Statutes/HTML/ByArticle/Chapter_130A/Article_9.html.

If you have any questions or comments, please contact me at (919) 508-8510, or by email at donna.wilson@ncmail.net.

Sincerely,



Donna J. Wilson
Environmental Engineer
Solid Waste Section

cc: Pieter Scheer Smith, RSG&A
Rick Proctor, Johnston County Solid Waste Manager
Dennis Shackelford, Central Regional Supervisor, DWM
Mary Whaley, Waste Management Specialist, DWM

Johnston County Landfill - Phase 4A MSW Landfill Unit
Leachate Generation Record

DATE	Leachate Collection System Side Riser Pumps	Leak Detection System Pump Station
	(Gallons)	(Gallons)
Jan-03	0.00	0.00
Feb-03	131,024.00	2,436.00
Mar-03	385,168.00	3,132.00
Apr-03	425,296.00	1,044.00
May-03	147,440.00	2,088.00
Jun-03	98,496.00	0.00
Jul-03	93,632.00	0.00
Aug-03	722,608.00	6,264.00
Sep-03	719,872.00	0.00
Oct-03	93,632.00	0.00
Nov-03	278,464.00	3,480.00
Dec-03	1,520,000.00	9,744.00
Total 03	4,615,632.00	28,188.00

Jan-04	133,760.00	0.00
Feb-04	240,160.00	0.00
Mar-04	50,160.00	2,436.00
Apr-04	46,512.00	0.00
May-04	259,738.00	0.00
Jun-04	90,023.00	0.00
Jul-04	153,042.00	0.00
Aug-04	83,610.00	0.00
Sep-04	65,838.00	40,388.00
Oct-04	44,874.00	15,054.00
Nov-04	81,689.00	1,044.00
Dec-04	68,147.00	6.00
Total 04	1,317,553.00	58,928.00

Likely Stormwater Inflow into Detection System
Likely Stormwater Inflow into Detection System

Jan-05	121,284.00	0.00
Feb-05	51,004.00	0.00
Mar-05	125,956.00	9,216.00
Apr-05	133,524.00	43,916.00
May-05	145,921.00	177,779.00
Jun-05	86,629.00	2,577.00
Jul-05	130,976.00	3,233.00
Aug-05	111,281.00	1,208.00
Sep-05	51,928.00	3,733.00
Oct-05	66,467.00	2.00
Nov-05	148,249.00	4.00
Dec-05	188,701.00	3,321.00
Total 05	1,361,920.00	244,989.00

Stormwater Inflow into Detection System - Cell 2 Construction
Stormwater Inflow into Detection System - Cell 2 Construction

Jan-06	172,109.00	0.00
Feb-06	101,401.00	0.00
Mar-06	95,746.00	1.00
Apr-06	147,057.00	1,100.00
May-06	174,670.00	1.00
Jun-06	257,148.00	1,251.00
Jul-06	86,067.00	1,087.00
Aug-06	167,341.00	11.00
Sep-06	153,974.00	1,141.00
Oct-06	137,181.00	1,530.00
Nov-06	198,076.00	2,643.00
Dec-06	118,764.00	1,390.00
Total 06	1,809,534.00	10,155.00

Jan-07	110,288.00	1,112.00
Feb-07	75,260.00	5,900.00
Mar-07	77,754.00	1,600.00
Apr-07	64,793.00	1,100.00
May-07	62,066.00	547.00
Jun-07	51,580.00	1,075.00
Jul-07	51,815.00	1.00
Aug-07	55,142.00	1.00
Sep-07	44,468.00	1,314.00
Oct-07	51,918.00	1,096.00
Nov-07	50,757.00	0.00
Dec-07	56,582.00	2,206.00
Total 07	752,423.00	15,952.00

Jan-08	64,846.00	1,631.00
Feb-08	65,631.00	250.00
Mar-08	77,975.00	2,426.00
Apr-08	72,826.00	2,514.00
May-08	73,025.00	1,109.00
Jun-08	54,511.00	1,106.00
Jul-08	71,840.00	3,308.00
Aug-08	60,696.00	1,101.00
Sep-08	75,681.00	2,730.00
Oct-08	68,606.00	3,830.00
Nov-08		
Dec-08		
Total 08	685,637.00	20,005.00

Subject: Johnston County application
From: Donna Wilson <Donna.Wilson@ncmail.net>
Date: Tue, 13 Jan 2009 14:47:03 -0500
To: Pieter Scheer <pieter@rsgengineers.com>

Pieter - As we discussed, I have a few more comments on the Johnston County application:

1. The change in volume should be compared to the 19,900,000 cubic yard capacity quoted in the 2006 fact sheet, which is for both the MSW and C&D capacity (18,367,420 cy MSW + 1,487,003 cy C&D = 19,854,423). This was rounded to 19,900,000 in the public notice and fact sheets.
2. Please clarify in the report that the gross capacity numbers include bottom of waste to top of final cover.
3. The application for continued operations of the C&D landfill (.0547 requirements) should state when C&D Area 1 stopped receiving waste, when closure activities began, and when closure activities will be completed.

Thanks, Donna

--

Donna J. Wilson
Environmental Engineer
Solid Waste Section/Division of Waste Management
NC DENR
1646 Mail Service Center
Raleigh NC 27699-1646
Phone 919-508-8510
Section webpage - <http://wastenotnc.org/swhome>

Subject: Re: Johnston County application
From: Pieter Scheer <pieter@rsgengineers.com>
Date: Tue, 13 Jan 2009 19:30:58 -0500
To: Donna Wilson <Donna.Wilson@ncmail.net>

Donna:

Attached is a copy of revised Section 2.0 from the Facility and Engineering Plan. Section 2.3.1 has been revised per your Comments No. 1 & 2 (refer to first 2 paragraphs on Page 2.0-4).

Regarding Comment No. 3, as we discussed earlier, the final waste was disposed of in the Area 1 C&D unit prior to July 1, 2008. I have asked the County for final confirmation of the actual date. Also per our earlier discussion, the closure and post-closure plan, revised as part of the Phase 4A - Cell 3 response to comments (see attached copy) did include information in Section 1.6 (refer to first paragraph on Page 1.0-4) related to the closure schedule for Area 1 unit. The construction of the Phase 4A - Cell 3 MSW landfill unit will be the first phase of closure of the Area 1 C&D landfill unit.

Please let me know if you have any questions or comments on this information.

Pieter

Pieter K. Scheer, P.E.
Principal, Senior Engineer
Richardson Smith Gardner & Associates, Inc.
14 N. Boylan Ave.
Raleigh, NC 27603
Phone: (919) 828-0577 x123
Fax: (919) 828-3899
www.rsgengineers.com

Donna Wilson wrote:

Pieter - As we discussed, I have a few more comments on the Johnston County application:

1. The change in volume should be compared to the 19,900,000 cubic yard capacity quoted in the 2006 fact sheet, which is for both the MSW and C&D capacity (18,367,420 cy MSW + 1,487,003 cy C&D = 19,854,423). This was rounded to 19,900,000 in the public notice and fact sheets.
2. Please clarify in the report that the gross capacity numbers include bottom of waste to top of final cover.
3. The application for continued operations of the C&D landfill (.0547 requirements) should state when C&D Area 1 stopped receiving waste, when closure activities began, and when closure activities will be completed.

Thanks, Donna

F&EP Plan Section 2.0 Rev. 011309.pdf

Content-Type: application/pdf
Content-Encoding: base64

JC Attachment E (Closure & Post Closure Plan).pdf

Content-Type: application/pdf
Content-Encoding: base64

SECTION 2.0 FACILITY REPORT

2.1 OVERVIEW

This section presents a plan for the development of the Johnston County Landfill facility. This report, which updates the previously approved Facility Plan¹, has been prepared in accordance with the requirements of Rule .1619 of the North Carolina Solid Waste Management Regulations.

2.2 FACILITY SERVICES AND WASTE STREAM

2.2.1 Facility Services

Currently, the following activities or services are provided at the Johnston County Landfill facility:

- Scales and scale house facilities
- Administrative offices
- Maintenance building
- Convenience center
- Yard waste processing area
- Lined municipal solid waste (MSW) landfill - (Phase 4A - Cells 1&2) (NC Permit No. 51-03)
- Construction and demolition debris (C&D) landfill - (Area 2 - Cell 1) (NC Permit No. 51-03).

The following facilities are proposed for the facility:

- Lined MSW landfill - Phase 4A - Cell 3 and Phases 6-10
- C&D landfill - Area 2 - Cell 2.

2.2.2 Types of Waste

The Johnston County Landfill accepts mixed municipal solid waste (MSW) originating from residential, commercial, and industrial sources, construction and demolition debris (C&D), and other wastes (i.e. white goods, tires, and yard waste). These wastes are segregated and directed to on-site facilities for disposal/processing as described below.

¹Permit to Construct Application - Johnston County C&D Landfill - Area 2 - Approved August 31, 2006.

2.2.3 Disposal Rates and Estimated Variances

2.2.3.1 Projected County Disposal Rates

Based on the 2005-2006 Solid Waste Management Annual Report information provided by the County, the landfill accepted 113,684 tons of MSW and 40,832 tons of C&D waste from 7/1/06 to 6/30/07 (MSW: average 9,474 tons per month or 364 tons per day based on 312 operating days per year; C&D: average 3,403 tons per month or 131 tons per day based on 312 operating days per year). The population served during this time period was estimated as 151,589 which translates to 0.75 tons/person/year of MSW and 0.27 tons/person/year of C&D waste being disposed of at the landfill. Due to recent decreases in C&D tonnages, the per capita disposal rate was assumed to be 0.20 tons/person/year for the determination of disposal rates.

Based on the anticipated population figures and increases projected through 2030 from the NC Demographics Unit and the current per capita disposal rate, **Table 2.1A and Table 2.1B** give the projected annual and monthly tonnages to be disposed of at the Johnston County Landfill facility (in-County waste only) for MSW and C&D waste, respectively. Note that monthly variances shown in the tables are based on County records which indicate that the maximum anticipated monthly variance is about plus or minus 20 percent from average. Also note that population figures after 2029 are based on an assumed constant percentage increase from 2029 onward.

2.2.3.2 Maximum Disposal Rates

Based upon the projected in-County disposal rates shown in **Tables 2.1A and 2.1B** and the maximum out-of-County disposal rate stated below, the landfill facility will accept waste at the following maximum rates (tons/day is based on 312 operating days per year):

2008-2015	350,000 tons/year (1,122 tons/day)
2016-2025	401,000 tons/year (1,285 tons/day)
2026-2035	452,000 tons/year (1,449 tons/day)
2036-2045	505,000 tons/year (1,619 tons/day)
2046-2055	568,000 tons/year (1,821 tons/day)

Of the rates shown, a maximum of 156,000 tons/year (500 tons/day) will be from outside the County. Note that the above disposal rates are the same as previously approved.

2.2.4 Service Area

The landfill serves the State of North Carolina.

2.2.5 Procedures for Waste Segregation

Procedures for waste segregation at the proposed landfill will be similar to existing operations. A brief description of planned procedures is as follows.

Wastes are segregated at the scales. Operators at the scalehouse are trained to classify and segregate the waste stream. MSW and C&D wastes are directed to the active MSW or C&D landfill unit. Yard wastes are directed toward the yard waste processing area. Tires and white goods are stockpiled temporarily for disposal by private recycling contractors. directed to the white goods processing area. Small loads and recyclables are directed toward the citizen's convenience center.

Employees at the landfill are trained in the safety procedures for the handling and detection of illegal waste. The screening of unacceptable waste is done through the random checking of incoming loads by a County employee at the scale house and at the tipping area. When unacceptable waste is detected at the scale house, the load is rejected and not permitted into the facility. If hazardous waste is found at the tipping area, identification of the truck or persons is made (if possible) and documented, then the hazardous waste is identified and placed in a hazardous waste container and taken to a designated hazardous waste staging area for proper disposal. If this occurs, the event is reported to the appropriate authorities.

2.2.6 Equipment Requirements

The equipment required for operation and maintenance of the proposed landfill units are anticipated to be the same as or similar to those currently used at the facility.

2.3 LANDFILL CAPACITY

2.3.1 Total Operating Capacity and Life Expectancy

2.3.1.1 MSW Landfill Units

Drawings P1 - P3 (MSW Landfill Phasing Plan), show conceptual base and final cover grades for the development of Phases 4A and 6 through 10. The final cover side slopes will be at a 4H to 1V slope, then transition at flatter slopes (5 - 8%) to the peak elevations.

2.3.1.2 C&D Landfill Units

Drawing P4 (C&D Landfill Phasing Plan) identifies the conceptual base and final cover grades for the development of Areas 1 & 2. The final cover side slopes will be at a 4H to 1V slope, then transition at flatter slopes (5 - 8%) to the peak elevations.

The estimated total gross and net operating capacities, life expectancies, and areas of existing and planned MSW and C&D landfill units are shown in **Tables 2.2A and 2.2B**, respectively. Note that the approximate total capacities and waste footprint areas for closed unlined MSW landfill units are also shown in **Table 2.2A**. The gross capacity for each landfill unit reflects the total volume from bottom of waste to the top of the final cover. The net capacity for waste and corresponding life expectancy of each landfill unit accounts for daily and intermediate cover and/or final cover. For MSW landfill units, a range of life expectancies are given to cover projected County-only tonnages (longer life expectancy) through the maximum disposal rates given in **Section 2.2.3.2** (shorter life expectancy). For C&D landfill units, a range of life expectancies are given to cover projected County-only tonnages (longer life expectancy) through projected County-only tonnages plus the anticipated 20% variance (shorter life expectancy).

Note that, although the base and final grades for the MSW and C&D landfill units approximate those shown in the previously approved facility plan, the total gross capacity is approximately 765,800 CY (3.8%) more than reported in the previously approved plan (19.9 MCY (MSW units - Phases 4A & 5-10 and C&D units - Areas 1 and 2)) mainly due to differences in Phase 4A. Thus, this is a minor (less than 10%) change and does not require a new local government approval.

2.3.2 In-Place Ratio of Waste to Soil and Compaction Factors

2.3.2.1 MSW Landfill Units

The capacities obtained above were based on a 15 percent periodic cover ratio and a compaction factor ranging from 1,200 to 1,400 pounds per cubic yard (pcy). The assumed periodic cover ratio is indicative of the County's current practices of using a tarp as an alternative to placing 6 inches of daily cover soil. The assumed compaction factor of 1,200 pcy is based on recent analyses of waste density. A compaction factor of 1,400 pcy was assumed for areas with the greatest height (i.e. Phase 4A - Cell 3, Phase 9, and Phase 10).

2.3.2.2 C&D Landfill Units

The capacities obtained above were based on a 10 percent periodic cover ratio and a compaction factor of 1,200 pounds per cubic yard. The assumed periodic cover ratio is typical for C&D landfills. The assumed compaction factor is based on a recent analysis of waste density in Area 2.

Note that changes in landfill operations (i.e. changes in the use of alternative daily cover and/or compaction equipment/methods) may affect the values assumed above and, thus, alter the life of the various landfill units.

2.4 AVAILABLE SOIL RESOURCES AND REQUIRED SOIL QUANTITIES

2.4.1 Earthwork Quantities

The soils required to construct and operate the existing and planned MSW and C&D landfill units will be removed from on-site borrow sources or will be imported from off-site. The soils removed during excavation of landfill units may be used for structural fill, compacted soil liner, and/or general fill. These excavation (cut) and structural fill (fill) volumes are shown in **Table 2.3**.

2.4.2 Soil Liner

The soil required for the soil liner will be on-site or imported soils. The in-place volume required for each landfill unit is shown in **Table 2.4**.

2.4.3 Leachate Collection System (LCS) and Protective Cover

Overlying the liner system is the leachate collection system and protective cover. This layer is 24 inches thick on both the landfill base and side slopes. The required in-place volume of protective cover for each landfill unit is shown in **Table 2.5**. A portion of this volume will consist of aggregate, which will come from off-site sources.

2.4.4 Daily and Intermediate Cover

Assuming the previously mentioned periodic cover ratios, the required in-place volume for use as daily and intermediate cover during landfill operations is shown in **Table 2.6**.

2.4.5 Vegetative Soil Layer

On the basis of the 2 foot thick vegetative soil layer required for the landfill final cover, the in-place volume required for each landfill unit is shown in **Table 2.7**.

2.4.6 Soil Summary

The above on-site and off-site soil quantities are summarized in **Table 2.8**. Note that, based on the proposed base grades, long-term there is a soil deficit, which will be made up from off-site sources.

2.5 FACILITY DESIGN CRITERIA

2.5.1 MSW Landfill Units

The Johnston County MSW landfill base liner and final cover systems will be constructed in accordance with Section .1624 of the North Carolina Administrative Code, Title 15A, Chapter 13, Subchapter 13B including the following requirements.

2.5.1.1 Horizontal Separation Requirements

The horizontal separation requirement between the disposal boundary (edge of waste) and the property lines is a minimum of 300 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. The proposed design satisfies all buffer requirements.

2.5.1.2 Vertical Separation Requirements

The post-settlement bottom elevation of the base liner system will meet the minimum requirement of four feet above the seasonal high groundwater table and bedrock.

2.5.2 C&D Landfill Units

The Johnston County C&D landfill is designed and operates in accordance with Section .0540 of the North Carolina Administrative Code, Title 15A, Chapter 13, Subchapter 13B including the following requirements.

2.5.2.1 Horizontal Separation Requirements

The horizontal separation requirement between the disposal boundary (edge of waste) and the property lines is a minimum of 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.

2.5.2.2 Vertical Separation Requirements

For Area 2, the post-settlement elevation of the base liner system (as measured from the top of the soil liner or GCL) will meet the minimum requirement of four feet above the seasonal high groundwater table and bedrock.

2.6 CONTAINMENT AND ENVIRONMENTAL CONTROL SYSTEMS

Technical specifications and construction quality assurance requirements for the materials used in the construction of Phase 4A - Cell 3 can be found in **Attachments B and C**, respectively. Geosynthetics used in the construction of Phase 4A - Cell 3 are discussed in greater detail in **Section 3.0** (Geosynthetics Design) of this document.

2.6.1 Landfill Subgrade and Perimeter Berms

The landfill subgrade elevations for lined landfill units have been designed for minimum post-settlement slopes of 2 percent (NCAC .1624(b)(7)). The subgrade elevations will be achieved by excavation or placement of compacted structural fill (embankment). During excavation, a determination of unsuitable soils (i.e. soils which are too soft, wet, or organic) will be made. Where unsuitable soils are found, the soils will be undercut and backfilled with structural fill. Some areas may also require placement of a bridge lift prior to placement of structural fill.

In addition to providing the liner foundation in fill areas, structural fill will be used for berm and roadway construction. Structural fill will consist of on-site soils removed during excavation of the landfill units or imported borrow soils, except that no CH, OL, or OH soils will be allowed.

2.6.2 Base Liner System

The following is a general discussion of the base liner systems for MSW landfill units and lined C&D landfill units. The specific design requirements are discussed in the permit applications for each individual unit.

2.6.2.1 MSW Landfill Units

The base liner areas for Phase 4A - Cell 3, and Phases 6-10 are shown on **Drawing S2** (Site Development Plan - Base Grades). The base liner will consist of either a standard composite liner system or an alternative liner system as allowed under North Carolina regulations. The components of this liner system will consist of the following components (top-down):

Standard Liner System - Phases 6-10:

- a leachate collection system (LCS) consisting of natural and/or geosynthetic drainage media and collection piping;
- a 60 mil HDPE geomembrane liner; and
- a 24 inch thick compacted soil liner with a permeability of no more than 1×10^{-7} cm/sec.

OR

Alternative Liner System - Phase 4A - Cell 3:

- a LCS (components as listed above for the standard liner system);
- a 60 mil HDPE geomembrane liner;
- a geosynthetic clay liner (GCL);
- a drainage geocomposite (leak detection system); and

- a 40 mil LLDPE geomembrane liner.

Alternative Liner System - Phases 6-10:

- a LCS (components as listed above for the standard liner system);
- a 60 mil HDPE geomembrane liner;
- a geosynthetic clay liner (GCL); and
- an 18 inch thick compacted soil liner with a permeability of no more than 1×10^{-5} cm/sec.

2.6.2.2 Lined C&D Landfill Units

The base liner area for Area 2 is shown on **Drawing S5** (Area 2 - Composite Liner Grading and Leachate Collection System Plan). Area 2 will have a liner system consisting of the following components (top-down):

Type 1:

- a leachate collection system (LCS) consisting of:

Base and Side Slopes:

- a drainage geocomposite; and
 - a system of collection pipes and gravel columns.
- a 40 mil LLDPE geomembrane liner; and
 - a 12 inch thick compacted soil liner with a permeability of no more than 1×10^{-5} cm/sec.

OR

Type 2:

- a LCS (components as listed above for the Type 1 liner system);
- a 40 mil LLDPE geomembrane liner;
- a geosynthetic clay liner (GCL); and
- a 12 inch thick layer of structural fill (no permeability criteria).

The compacted soil liner (if used) will consist of compacted on-site or imported borrow soils. The compacted soil liner will be placed and compacted in 6 inch lifts to achieve the required permeability and strength requirements.

The GCL (if used) will consist of a layer of sodium bentonite bonded between two geotextiles. The GCL will provide a maximum hydrated permeability of 5×10^{-9} cm/sec.

The geomembrane components of the liner systems will consist of a 40 mil thick Linear

Low Density Polyethylene (LLDPE) synthetic liner (Phase 4A - secondary geomembrane; Area 2 - primary geomembrane) and/or a 60 mil thick High Density Polyethylene (HDPE) synthetic liner (Phase 4A and Phases 6-10 - primary geomembrane). These geomembranes will be installed by a qualified contractor.

For the Phase 4A - Cell 3 MSW landfill unit, all geosynthetics have been selected to comply with the performance requirements identified in **Section 3.0** (Liner System Design) as well as the Specifications presented in **Attachment B**.

Note that, for the purposes of this report and the calculations of volumes, the above listed Type 1 liner (Area 2 C&D) and alternative liner system (Phase 4A - Cell 3 and Phases 6-10) have been assumed. It is possible that a different alternative liner system will be proposed at a future date for future areas.

2.6.3 Leachate Collection System (LCS)

The LCS will be constructed directly above the geomembrane on both the base and side slopes of the landfill. Components of the LCS will be as listed above (see **Section 2.6.2**). The LCS functions to collect leachate as quickly as is practical and to conduct the fluid out of the landfill via the sumps. The goal of the LCS is to minimize the hydraulic head acting on the liner, thereby reducing the leak potential. For the Phase 4A - Cell 3 MSW landfill unit, a detailed discussion of the LCS can be found in **Section 4.0** (Leachate Management System Design).

2.6.4 Protective Cover

A protective cover layer of soil or stone may be used as the upper component of the LCS. For the Phase 4A - Cell 3 MSW landfill unit, 24 inches of protective cover soil will be placed over the drainage geocomposite of the LCS. Where soil is used, a separator/filter geotextile is required between drainage aggregate and the soil.

2.6.5 Stormwater/Leachate Separation System

In order to increase facility operating efficiency by reducing the leachate treatment quantities, stormwater/leachate separation is planned for each landfill unit. Leachate is considered to be any precipitation or fluid that comes in direct contact with the waste. This liquid will be collected by the LCS and pumped to the leachate storage lagoon. Precipitation that falls in areas where it does not contact waste, such as within inactive areas, does not have to be treated as leachate. This fraction of the precipitation is treated as stormwater - that is, treated for removal of sediment only.

For disposal areas that have waste placed in them, precipitation is allowed to percolate or run-off into the LCS. For areas that have no waste, the percolation or run off to the sump where a pump conducts the water to a perimeter drainage structure. This runoff does not contact waste or leachate. At their discretion, the County may also employ the use of

geosynthetic rain cover (GRC) to further segregate leachate and stormwater. The GRC, if used, is removed (or suitably shredded) and discarded as each portion of an area is placed into active operation. For additional discussion of the leachate-stormwater separation system, see the Operations Manual (**Attachment D**).

2.6.6 Final Cover System

As a minimum, the components of the final cover system (bottom up) will consist of a 6 to 12 inch foundation layer (daily or intermediate cover), 30 mil textured LLDPE geomembrane, drainage geocomposite (pore pressure reduction), and a 24 inch thick vegetative soil layer which includes a 6 inch thick topsoil layer. For the MSW landfill units, this system differs from the standard regulatory final cover in that an 18 inch layer of 1×10^{-5} cm/sec soil below the geomembrane is removed and the drainage geocomposite is added above the geomembrane. The addition of the drainage geocomposite reduces head on the geomembrane for both reduced infiltration through the geomembrane and increased stability of the overlying soil veneer.

For the Phase 4A - Cell 3 MSW landfill unit, a detailed discussion of final cover system design can be found in **Section 5.0** (Final Cover System Design).

2.6.7 Erosion and Sedimentation Control

Erosion and sedimentation control structures provided will be designed and maintained to manage the run-off generated by the 24-hour, 25-year storm event, and conform to the requirements of the North Carolina Sedimentation Pollution Control Law (15A, NCAC, 4).

For the Phase 4A - Cell 3 landfill unit, a detailed discussion of site erosion and sedimentation control can be found in the Project Erosion And Sedimentation Control Plan (**Attachment F**).

2.6.8 Landfill Gas Control

2.6.8.1 MSW Landfill Units

Landfill gas (LFG) control will consist of a series of vertical wells and/or collector trenches which are connected to passive vents or utility flares or to an active gas extraction system. The selected system will be designed to limit the gas pressures on the final cover geosynthetics.

Note that the volume of waste projected in the Phase 4A - Cell 3 unit will cause the total volume of MSW waste at the facility to exceed the 2.75 million ton threshold of the EPA's New Source Performance Standards (NSPS) on landfill gas emissions and will, therefore, bring this facility under these guidelines. In accordance with State requirements, a Title V air quality permit application will

be made once the Phase 4A - Cell 3 unit receives its Permit to Operate. The final design will be made as part of the required Collection and Control System Design Plan.

2.6.8.2 C&D Landfill Units

For the Area 1 C&D landfill unit, which overlies the closed unlined Phase 4 MSW landfill unit, LFG control will consist of a series of vertical wells and/or collector trenches which are connected to passive vents or utility flares or to an active gas extraction system. The selected system will be designed to limit the gas pressures on the final cover geosynthetics. Likewise, a series of collector trenches has been designed to be placed under the portion of the Area 2 C&D landfill unit which overlies the Phase 3 unlined MSW landfill unit. Due to the limited amount of LFG expected from the C&D waste, minimal LFG control features are planned as part of the Area 2 final cover system.

Also refer to the facility Operations Manual (**Attachment D**) for a discussion of LFG monitoring and record keeping requirements.

2.6.9 Access and Roadways

The site has been designed to provide all-weather access to active areas as well as areas under intermediate cover. Access ramps into the lined areas will be provided where necessary.

2.7 **SLOPE STABILITY AND SETTLEMENT**

The slope stability of the overall waste mass and perimeter berms, the protective cover veneer, and the final cover veneer, as well as estimates of foundation settlement are addressed in **Attachment G**. Slope stability analyses indicated that the proposed Phase 4A - Cell 3 landfill configuration will be stable. Veneer stability analyses on the liner system side slopes and final cover showed that for maximum slopes, these areas will be stable.

2.8 **LEACHATE MANAGEMENT**

The general leachate management system includes the collection, storage, treatment (if required), and disposal of the leachate generated. The collection and transmission of leachate to the on-site storage lagoon will be as described above. From the storage lagoon, the leachate will be pumped via force main on a regular basis to a local wastewater treatment plant (WWTP) for disposal. Pretreatment, if required, will be employed on-site to meet the standards for disposal into the WWTP.

For the Phase 4A - Cell 3 MSW landfill unit, a detailed discussion of the leachate management system, including anticipated leachate volumes, can be found in **Section 4.0** (Leachate Management System Design).

2.9 SPECIAL ENGINEERING FEATURES

Special engineering features proposed for Phase 4A - Cell 3 includes an alternative liner system.

2.9.1 Alternative Liner Systems

Alternative liner systems, as described above, are proposed for use at the facility due to the lack of 1×10^{-7} cm/sec soil on-site.

**TABLE 2.1A
PROJECTED (COUNTY-ONLY) MSW TONNAGES**

Year	Population	Projected Annual MSW Tonnage	Projected Average Monthly MSW Tonnage	Projected Monthly Variance (± 20%)
2008	162,609	121,957	10,163	8,130 - 12,196
2009	167,849	125,887	10,491	8,392 - 12,589
2010	172,857	129,643	10,804	8,646 - 12,964
2011	178,094	133,571	11,131	8,905 - 13,357
2012	183,333	137,500	11,458	9,167 - 13,750
2013	188,570	141,428	11,786	9,429 - 14,143
2014	193,808	145,356	12,113	9,690 - 14,536
2015	199,109	149,332	12,444	9,955 - 14,933
2016	204,600	153,450	12,788	10,230 - 15,345
2017	210,092	157,569	13,131	10,505 - 15,757
2018	215,584	161,688	13,474	10,779 - 16,169
2019	221,075	165,806	13,817	11,054 - 16,581
2020	226,622	169,967	14,164	11,331 - 16,997
2021	232,333	174,250	14,521	11,617 - 17,425
2022	238,043	178,532	14,878	11,902 - 17,853
2023	243,755	182,816	15,235	12,188 - 18,282
2024	249,466	187,100	15,592	12,473 - 18,710
2025	255,232	191,424	15,952	12,762 - 19,142
2026	261,161	195,871	16,323	13,058 - 19,587
2027	267,092	200,319	16,693	13,355 - 20,032
2028	273,023	204,767	17,064	13,651 - 20,477
2029	278,953	209,215	17,435	13,948 - 20,921
2030	284,532	213,399	17,783	14,227 - 21,340
2031	290,223	217,667	18,139	14,511 - 21,767
2032	296,027	222,020	18,502	14,801 - 22,202
2033	301,948	226,461	18,872	15,097 - 22,646
2034	307,987	230,990	19,249	15,399 - 23,099

Year	Population	Projected Annual MSW Tonnage	Projected Average Monthly MSW Tonnage	Projected Monthly Variance (± 20%)
2035	314,146	235,610	19,634	15,707 - 23,561
2036	320,429	240,322	20,027	16,021 - 24,032
2037	326,838	245,128	20,427	16,342 - 24,513
2038	333,375	250,031	20,836	16,669 - 25,003
2039	340,042	255,032	21,253	17,002 - 25,503
2040	346,843	260,132	21,678	17,342 - 26,013
2041	353,780	265,335	22,111	17,689 - 26,533
2042	360,855	270,642	22,553	18,043 - 27,064
2043	368,073	276,054	23,005	18,404 - 27,605
2044	375,434	281,576	23,465	18,772 - 28,158
2045	382,943	287,207	23,934	19,147 - 28,721
2046	390,602	292,951	24,413	19,530 - 29,295
2047	398,414	298,810	24,901	19,921 - 29,881
2048	406,382	304,786	25,399	20,319 - 30,479
2049	414,509	310,882	25,907	20,725 - 31,088
2050	422,800	317,100	26,425	21,140 - 31,710
2051	431,256	323,442	26,953	21,563 - 32,344
2052	439,881	329,911	27,493	21,994 - 32,991
2053	448,678	336,509	28,042	22,434 - 33,651
2054	457,652	343,239	28,603	22,883 - 34,324
2055	466,805	350,104	29,175	23,340 - 35,010

**TABLE 2.1B
PROJECTED (COUNTY-ONLY) C&D TONNAGES**

Year	Population	Projected Annual C&D Tonnage	Projected Average Monthly C&D Tonnage	Projected Monthly Variance (± 20%)
2008	162,609	32,522	2,710	2,168 - 3,252
2009	167,849	33,570	2,797	2,238 - 3,357
2010	172,857	34,571	2,881	2,305 - 3,457
2011	178,094	35,619	2,968	2,375 - 3,562
2012	183,333	36,667	3,056	2,444 - 3,667
2013	188,570	37,714	3,143	2,514 - 3,771
2014	193,808	38,762	3,230	2,584 - 3,876
2015	199,109	39,822	3,318	2,655 - 3,982
2016	204,600	40,920	3,410	2,728 - 4,092
2017	210,092	42,018	3,502	2,801 - 4,202
2018	215,584	43,117	3,593	2,874 - 4,312
2019	221,075	44,215	3,685	2,948 - 4,422
2020	226,622	45,324	3,777	3,022 - 4,532
2021	232,333	46,467	3,872	3,098 - 4,647
2022	238,043	47,609	3,967	3,174 - 4,761
2023	243,755	48,751	4,063	3,250 - 4,875
2024	249,466	49,893	4,158	3,326 - 4,989
2025	255,232	51,046	4,254	3,403 - 5,105
2026	261,161	52,232	4,353	3,482 - 5,223
2027	267,092	53,418	4,452	3,561 - 5,342
2028	273,023	54,605	4,550	3,640 - 5,460
2029	278,953	55,791	4,649	3,719 - 5,579
2030	284,532	56,906	4,742	3,794 - 5,691

**TABLE 2.2A
TOTAL OPERATING CAPACITY AND LIFE EXPECTANCY - MSW LANDFILL UNITS**

Landfill Unit	Area (Acres)	Gross Capacity (CY)	Net (Waste) Capacity (CY/Tons)	Life Expectancy (Years)
Unlined Landfill Units				
Phase 1/2	22.1	732,363	495,790 CY 297,474 Tons	Closed
Phase 3	25.4	1,174,139	819,136 CY 491,482 Tons	Closed
Phase 4	37.3	1,631,731	1,133,533 CY 680,120 Tons	Closed
Total (Unlined):	84.8	3,538,233	2,448,459 CY 1,469,076 Tons	Closed
Lined (Subtitle D) Landfill Units				
Phase 5	19.2	1,087,199	884,625 CY 514,181 Tons	Inactive
Phase 4A (Cells 1&2)	22.0	1,111,382	944,675 CY 538,079 Tons	At Capacity (See Note 1)
Phase 4A - Cell 3 (Fill Sequence 1)	7.4	1,420,566	1,207,481 CY 845,237 Tons	3.1 - 5.9 (See Note 2)
Phase 4A - Cell 3 (Fill Sequence 2)	0.0 (See Note 3)	746,481	553,874 CY 387,712 Tons	1.3 - 2.6
Phase 6	21.1	1,402,016	1,167,578 CY 700,547 Tons	2.3 - 4.3
Phase 7	19.8	1,758,991	1,462,230 CY 877,338 Tons	2.8 - 4.8
Phase 8	25.2	1,844,867	1,495,182 CY 897,109 Tons	2.8 - 4.4
Phase 9	22.5	6,684,914	5,611,690 CY 3,928,183 Tons	11.2 - 15.7
Phase 10	17.5	3,075,968	2,524,065 CY 1,766,846 Tons	4.6 - 5.7
Total (Lined):	154.7	19,132,384	15,851,400 CY 10,455,232 Tons	23.7 - 34.9
Total (Overall):	239.5	22,670,617	18,299,859 CY 11,924,308 Tons	23.7 - 34.9

Notes:

1. Current operations in Phase 4A have expanded vertically into the Cell 3 Fill Sequence 1 volume.
2. Life expectancies for the active Phase 4A - Cells 1 & 2 shown above is from June 6, 2008.
3. Fill Sequence 2 is a vertical expansion.

**TABLE 2.2B
TOTAL OPERATING CAPACITY AND LIFE EXPECTANCY - C&D LANDFILL UNITS**

Landfill Unit	Area (Acres)	Gross Capacity (CY)	Net (Waste) Capacity (CY/Tons)	Life Expectancy (Years)
Area 1	16.2	614,472	515,563 CY 304,780 Tons	Inactive
Area 2 - Cell 1	11.9	410,675	353,056 CY 212,920 Tons	4.3 - 5.1 (See Note 1)
Area 2 - Cell 2	3.9	462,658	387,062 CY 232,237 Tons	4.9 - 5.7
Total:	32.0	1,487,805	1,255,681 CY 749,937 Tons	9.2 - 10.8

Notes:

1. Life expectancy for the active Area 2 - Cell 1 unit shown above is from June 6, 2008.

**TABLE 2.3
GENERAL EARTHWORK QUANTITIES**

Landfill Unit ¹	Cut (CY)	Fill (CY)
MSW Landfill Units		
4A - Cell 3	1,824	28,455
Phase 6	279,493	55,613
Phase 7	222,037	85,202
Phase 8	242,630	105,976
Phase 9	68,999	178,758
Phase 10	151,736	21,326
C&D Landfill Units		
Area 2 - Cell 2	0	3,436

Notes:

1. Includes site roads and infrastructure.

**TABLE 2.4
SOIL LINER QUANTITIES**

Landfill Unit	Required Volume (CY)
MSW Landfill Units	
Phase 6	51,062
Phase 7	47,916
Phase 8	60,984
Phase 9	54,450
Phase 10	42,350
C&D Landfill Units	
Area 2 - Cell 2 ¹	6,292

Notes:

1. Or structural fill layer.

**TABLE 2.5
LEACHATE COLLECTION SYSTEM/PROTECTIVE COVER QUANTITIES**

Landfill Unit	Required Volume (CY)
MSW Landfill Units	
4A - Cell 3	23,877
Phase 6	68,083
Phase 7	63,888
Phase 8	81,312
Phase 9	72,600
Phase 10	56,467
C&D Landfill Units	
Area 2 - Cell 2	12,584

**TABLE 2.6
DAILY AND INTERMEDIATE COVER QUANTITIES**

Landfill Unit	Required Volume (CY)
MSW Landfill Units	
4A - Cell 3	199,468 (Fill Seq. 1) 97,743 (Fill Seq. 2) (See Note 1)
Phase 6	206,043
Phase 7	258,041
Phase 8	263,856
Phase 9	990,298
Phase 10	445,423
C&D Landfill Units	
Area 2 - Cell 1	33,130 (See Note 1)
Area 2 - Cell 2	43,007

Notes:

1. Volumes shown above for Phase 4A - Cell 3 and Area 2 - Cell 1 are from June 6, 2008.

**TABLE 2.7
VEGETATIVE SOIL LAYER QUANTITIES**

Landfill Unit	Required Volume (CY)
MSW Landfill Units	
Phase 4A	94,864
Phase 5	61,952
Phase 6	68,083
Phase 7	63,888
Phase 8	81,312
Phase 9	72,600
Phase 10	56,467
C&D Landfill Units	
Area 1	41,624
Area 2	50,981

**TABLE 2.8
SOIL SUMMARY**

Material	Quantity (CY)
Excavation	966,699
Structural Fill	(478,766)
Soil Liner	(263,054)
LCS/Protective Cover ¹	(378,811)
Daily/Intermediate Cover	(2,537,009)
Vegetative Soil Layer	(591,771)
Total ² :	(3,282,712)

Notes:

1. A portion of this material will come from off-site sources.
2. Soil deficit shown will be made up from off-site sources.