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November 17, 2008

Project No. 063-6526.103

Department of Environment and Natural Resources
Division of Waste Management
Solid Waste Section
401 Oberlin Road, Suite 150
Raleigh, North Carolina 27605
919-508-8400



Attention: Ms. Pat Backus, P.E.
Environmental Engineer

**Re: Response to Comments
Application for Permit to Construct, Phase 2 Expansion
WCA of High Point C&D Landfill, Permit No. 41-16
Guilford County, North Carolina**

Dear Ms. Backus,

On behalf of WCA of High Point, LLC, a subsidiary of WCA Waste Corporation, Golder Associates NC, Inc. (Golder) is submitting this response letter to comments presented in the October 17, 2008 letter from the Division of Waste Management, Solid Waste Section regarding the *Application for Permit to Construct, Phase 2 Expansion*, for the WCA of High Point Construction and Demolition Landfill. Your comments are provided below in bold italics followed by our responses:

- 1. The cover sheet of the engineering drawings should include the engineer's seal, the engineer's signature, and the date of the signature. [.0533 (b)(3)(B)].***

The cover sheet of the engineering drawings has been signed, sealed and dated.

- 2. The facility plan should describe the comprehensive development of the C&DLF facility. Therefore, landfill disposal and capacity calculations should include what has been disposed in addition to the projections. Please add a column with the year of operation of the landfill (i.e., 1,2,3...) and provide the waste to soil ratio used for the cover calculation.***

Tables included in the facility plan have been revised to include the year of operation of the facility and historic data. The waste to soil ratio used to estimate cover soil needs is 20:1 and is noted on Table 2.

- 3. Drawing FP-2 does not represent the existing site conditions. Facility drawings should be representative of existing site conditions. [.0537 (d) (1)].***

Drawing FP-2 has been revised to show current conditions at the facility.

- 4. Statements in Section 2.0 Facility Plan Drawings concerning the number of phases, the construction of phases, and the operating life of the phases are confusing. For example, Item 2.2 indicates six phases (Phases 1-6) while item 2.3 states construction is proposed to occur in four phases. Also, Phase 1 is stated as having an expected life of 2.5 years while it has been operating longer than 2.5 years. Please review this and other sections of the application where phases are references for consistency.***

The text has been reviewed for consistency and clarity and edited accordingly. The facility is currently operating in Phase 1. The facility development is expected to include five future Phases, including the proposed Phase 2 Expansion.

- 5. Please change Tables 1 – 4 to reflect the comprehensive development of the landfill starting from Phase 1. Please include all years in the totals.***

Tables 1-4 have been revised to reflect the entire life of the facility from opening day to final closure.

- 6. No borrow or stockpile areas are indicated on the drawings. Table 4 – Soil Balance lists soil will be available onsite. Will this be stockpiled outside?***

Soil stockpile locations are not shown on facility level drawings since construction sequencing has not yet been developed. Surplus soil, when present, will be stockpiled on site at varying locations dependent on the time in the facility's life and construction sequencing of the Phase being built.

- 7. Item 3.1 states an average daily disposal rate of 420 tons per day assuming 285 operating days per year for an average yearly rate of 119,700 tons. The facility permitting annual waste disposal rate is approximately 98,600 tons per year or approximately 315 tons per day with an operation of 6 days per week. Please provide additional information indicating the rates are consistent with the franchise granted by the City of High Point. [.0537 (e) (1) (B)]***

Section 3.1 has been revised to state that the average disposal rate is 315 tons per day assuming 285 operating days per year as referenced in the franchise agreement.

- 8. *The titles for Table 1 and Table 3 for projected disposal rates state the information is “ash” disposal rates.***

The titles of Tables 1 and 3 have been corrected to reference waste disposal rates.

- 9. *Engineering drawings should include access roads on the site. There is no notation in the legend for roads. If there are roads on the property, please modify the drawings. [.539(e)]***

The engineering drawings detail the locations of existing and proposed roads. For clarity, roadbeds have been shaded.

- 10. *Drawing EP-4 references detail 6 on page 9 for the scour hole SH-9. This detail is not on the referenced page.***

The scour hole detail is included on Sheet 9 as detail 3. The call out for scour hole SH-9 on drawing EP-4 has been corrected to reference detail 9/3.

- 11. *The engineering plan must include a map showing the existing ground surface elevations and base grades. The map must include labeled boring locations which indicate seasonal high ground-water level, estimated long term high ground-water level in accordance with Part (b) (2) (E) of Rule .0538 and bedrock level in accordance with Part (b) (2) (F). Also, “separation” is misspelled in several places on Drawing EP-6.***

Drawing EP-6A has been added to the Engineering Plan which details the existing ground surface elevations and proposed base grades; the map also includes labeled boring locations which indicate seasonal high ground-water level, estimated long term high ground-water level, and bedrock level.

Spelling errors on drawing EP-6 have also been corrected.

- 12. *The latitude and longitude, expressed in decimal degrees, must be indicated at the approximate center of the facility. [.0540 (3)]***

The latitude and longitude, expressed in degrees, have been indicated at the approximate center of the facility on the existing conditions drawing (See FP-2, EP-1).

- 13. *The construction quality assurance plan should include a plan for holding progress and troubleshooting meetings as described in 15 A NCAC 13B .0541 (b) (5). The proceedings of these meetings must also be documented.***

Section 1.4, which addresses the holding of preconstruction, progress and troubleshooting meetings and the documentation of the meetings, has been added to the CQA Plan.

- 14. If there is common information for both facilities, i.e., operating hours, site access and safety, recording keeping, or information that would make it easier to understand how the facilities operate together, e.g., section 3.1.1; please put them in the Introduction to the Operation Plan. For example, in the present form, I don't know if the operation hours are the same or if the agreement on emergency response with the City of High Point applies to both facilities.**

Section 1 of the Operations Plan has been modified to include common information for both facilities, including site operating hours and contact information.

- 15. The Section is asking applicants to include contact information in the Introduction. Please include name, address, phone, fax and specific contact and email as appropriate for the owner, operator, design engineer, and DENR. You may use the following for DENR.**

**North Carolina Department of Environment and Natural Resources
Division of Waste Management
401 Oberlin Road, Suite 150
Raleigh, NC. 27605
Phone: (919)508-8400
Fax: (919)715-3605**

**Field Operations Branch Head: Mark Poindexter
Central District Supervisor: Jason Watkins
Waste Management Specialist: Hugh Jernigan**
Also, please include contact for emergencies. If it is calling 911, a sentence stating that is all that is required.

The above contact information has been included as Section 1.2.2 and 1.2.3 of the amended Operations Plan.

- 16. Since the facility has been in operation for several years, please review text to confirm what exist and what is proposed. For example, item 2.1.1 refers to the reclamation area as a proposed site and item 2.1.4 states that a water line and misting system will be installed to control dust during dry periods.**

The Plan has been reviewed to confirm what is existing and what is proposed at the site. Sections 2.1.1 and 2.1.4 of the Plan have been revised accordingly.

- 17. Item 3.1.1 states that approximately 700 tons/day of C&D solid waste are managed at the site and that approximately 40% will be reclaimed. The permitted disposal rate is 315 tons/day. I did not find any references weighing the materials after the initial weigh in at the scale house. How will you determine the amount of waste disposed in the landfill? How will you determine that amount of material reclaimed?**

Section 3.1.1 has been revised to read that approximately 60% will be reclaimed and that the anticipated average disposal rate is approximately 315 tons/day.

The amount of waste disposed in the facility is the amount of materials entering the site less the amount leaving the site as reused/recycled commodities. All trucks are weighed upon entry to the site. Commodities sold (i.e., materials recycled or otherwise reused) are weighed as they leave the site. All remaining materials are landfilled. Therefore, the amount of waste disposed of in the landfill is the amount entering the site less the amount sold as recycled or otherwise reused material.

- 18. Item 3.2.6, paragraph 4 states that “emergency equipment will be called in” in case the fires are too large. I am assuming that you have made arrangements that you have made with local fire protection. Please state that. [.0542 (i) (3)]**

Section 3.2.6 of the Plan has been amended to state that the Pincroft Sedgefield Fire Station No. 22 services the fire district surrounding the site and that it has been contacted regarding the potential need for assistance at the facility.

- 19. Section 2.8 describes ACM management. Please provide a statement referencing that it was reviewed and accepted by the Health Hazards Unit of NC Department of Health and Human Services.**

Section 2.8 has been revised per guidelines received from the Health Hazards Unit of NC Department of Health and Human Services. A copy of the Operations Plan has been forwarded to the Health Hazards Unit for their review and comment. A statement referencing its approval will be added once its approval is obtained.

- 20. Item 2.8.2 describes how you would handle ACM is found at the reclamation area. The plan states that some loads may go directly to the landfill. Asbestos waste, which must be managed in accordance with 40 CFR 61, is not mentioned in the Operation Plan for the landfill. How would the ACM be handled if in loads going directly to the landfill? [.0542 (c) (2)]**

Asbestos containing materials are not to be accepted at the facility. As described in Section 3.3.1d, unacceptable wastes will be loaded back onto the vehicle bring them on site and removed or will be handled by the Guilford County HAZMAT team as necessary.

- 21. Drawings EP-1, EP-2, and EP-3 do not identify on-site roads in the legend. If this is an error, please correct.**

Drawings EP-1, EP-2, and EP-3 detail the locations of existing and proposed roads; for clarity, the roadbeds have been shaded.

- 22. In item 3.2.5b there is a reference to Section 5.3 of the plan. In the revised plan, it is section 3.5.3. Please correct this and review the plan for similar mistakes.**

The reference to Section 5.3 has been revised to reference Section 3.5.3. The Plan has been reviewed for similar mistaken references and corrected as necessary.

- 23. The Waste Acceptance Requirements in 3.3 are more detailed than the requirements for the reclamation area. Would these requirements be common to both facilities or is there a difference?**

The waste acceptance requirements in Section 3.3 are more detailed than those contained in Section 2 for the reclamation area since only loads which are considered to have a relatively high percentage of recoverable materials are sent to the reclamation pad. In addition, all loads sent to the reclamation pad are screened, while a random inspection plan is detailed for materials landfilled at the facility.

For purposes of clarity and since definitions of suitable/unsuitable materials are the same, descriptions of materials which the facility may handle are discussed in Section 1 of the Operations Plan.

- 24. Item 3.5.4, paragraph 2 states that WCA was given approval to use the "fines" from their recycling/processing area for alternate weekly cover." Please provide a copy of that approval.**

WCA was given a verbal approval to use fines from the recycling /processing area for alternate daily cover by Hugh Jernigan. WCA will contact Jason Watkins of the Field Operation Branch in the Winston-Salem office at (336)771-5092 to initiate receipt of a written approval for the use of fines as an alternate cover. Once written approval is received, a copy will be forwarded to you.

- 25. Item 3.5.4, paragraph 3 states that WCA proposes to use mulch mixed with soil as an alternate weekly cover. WCA should contact Jason Watkins of the Field Operation Branch in the Winston-Salem office at (336)771-5092 to initiate the request and discuss what is required.**

WCA will contact Jason Watkins of the Field Operation Branch in the Winston-Salem office at (336)771-5092 to initiate the request and discuss what is required. Once written approval of the proposed alternate cover is received, a copy will be forwarded to you. Mulch mixed with soil will not be used as an alternate cover until approval is received from DENR.

- 26. Please modify 3.2.5c to state that all windblown material must be collected and disposed at the conclusion of each operating day. [(0542 (g) (3)).**

Section 3.2.5c has been modified to state that all windblown material must be collected and disposed at the conclusion of each operating day.

- 27. The Monitoring Plan prepared in accordance with Rule .0544 should be included as an appendix to the Operation Plan. [.0542 (n) (3) (A)] This should be done after approval of the Design Hydrogeologic Report for the final version of the Operation Plan.**

Provision for inclusion of the Groundwater Monitoring Plan and Surface Water Monitoring Plan as appendices to the Operations Plan following the approval of the Design Hydrogeologic Report has been made. The facility operating record will include these plans as an appendix to the final version of the Operation Plan.

- 28. The cap system must be designed and constructed to have a permeability less than or equal to the soils underlying the landfill, or the permeability specified for the final cover in the effective permit, or a permeability no greater than 1.0×10^{-5} cm/sec, whichever is less. Could you state or provide a reference to data that indicates the permeability of the soils underlying the landfill? [.0543 (c) (1) (A)]**

As discussed in Sections 4.2.1 and 4.2.2, and summarized in Table 4 of the *Design Hydrogeologic Report, WCA of High Point Construction and Demolition Landfill, Phase 2*, the permeability of the soils underlying the landfill ranges from 7.94×10^{-4} to 9.58×10^{-8} cm/sec. Therefore, in accordance with Rule .0543 (c) (1) (A), the soil cap proposed for the facility has been designed with a maximum permeability of 1.0×10^{-5} cm/sec.

- 29. The closure and post-closure plan should be a standalone document. Information on the construction of the cap system should be included in the plan rather than referenced to the engineering plan. [.0543(d) (1)]**

Drawing EP-7 referenced in Section 2 has been included as Appendix CP-1.

- 30. In the cost estimate, the topsoil cost was based on the use of on-site material, but in the soil balance table in the facility plan (Table 4) there are soil deficits. The table starts at Phase 3 with a deficit greater than the available on-site soil. Can you explain how this will work? [.0543 (d) (5)]**

The facility frequently accepts waste soils for disposal. In the event that the soils are free of debris, they are stockpiled and are used for weekly cover or other uses as necessary. In addition, alternate weekly covers are expected to extend the availability

of on-site soils for closure purposes. Therefore, for planning purposes, closure top-soil costs were prepared assuming use of on-site materials.

31. Please update cost estimates to current year.

Closure costs have been updated to the current year.

32. In item 3.7.3c, I would prefer that you move the bullet about taking immediate steps to protect human health to the top of the list to prevent any confusion on what should be done first.

Section 3.7.3c of the Facility Plan has been revised so that the bullet referencing taking immediate steps to protect human health is at the top of the list to prevent any confusion on what should be done first.

33. In item 7.3.3, last paragraph – Please add that a copy of the landfill gas remediation plan must be placed in the operating record. [.0544 (d) (3) (D)]

Section 7.3.3c has been revised to note that a copy of the Landfill Gas Remediation Plan, if required, will be placed in the facility Operating Record.

34. Where specifically will you maintain the operating record? Will records for the reclamation area and landfill be kept at the same location?

The operating record for both the landfill and material reclamation facility are kept at the facility scale house.

Three copies of the Facility Plan, Operations Plan, CQA Plan, and Closure/Post Closure Care Plan, plus Drawings (FP-2, EP-0, EP-1, EP-2, EP-3, EP-4, EP-6, EP-6A, and EP-7) revised per the comments as discussed above are attached.

On behalf of WC of High Point, we would like to thank you for your attention to, and assistance with, the Application for Permit to Construct, WCA of High Point C&D Landfill, Phase 2 Expansion. If you have any additional questions, please contact the undersigned at 336-852-4903.

Sincerely,
GOLDER ASSOCIATES NC, INC.



Charles Hiner, P.E.
Senior Consultant

Enclosures

C: Mike McFeeley, Landfill Manager, WCA of High Point, 5830 Riverdale Drive,
Jamestown, NC 27282, 336-886-3560
Nick Marotta, Regional Engineer, WCA Waste Corporation, 40 Estes Plant Road,
Piedmont, SC 29673, 864-845-8355
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FACILITY PLAN
WCA OF HIGH POINT CONSTRUCTION AND DEMOLITION LANDFILL,
PERMIT NO. 41-16
GUILFORD COUNTY, NORTH CAROLINA

Prepared for:



WCA of High Point
5830 Riverdale Drive
Jamestown, North Carolina 27282

Prepared by:



Golder Associates NC Inc.
4900 Koger Boulevard, Suite 140
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Revised November 2008

Project No.: 063-6526

TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION	1
2.0 FACILITY PLAN DRAWINGS	1
2.1. Existing Conditions	1
2.2. Site Development Drawings.....	1
2.3. Landfill Construction Drawings	1
3.0 FACILITY REPORT	1
3.1 Waste Stream.....	1
3.2 Landfill Capacity.....	2

Tables

Table No. 1	Projected Annual Waste Disposal Rates
Table No. 2	Landfill Capacity by Phase
Table No. 3	Projected Cumulative Disposal Rates
Table No. 4	Soil Balance

Figures

Figure No. 1	Site Location Map
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Drawings

Drawing FP-1	Cover Sheet
Drawing FP-2	Existing Conditions
Drawing FP-3	Proposed Facility Base Grades
Drawing FP-4	Transitional Grades: Phase 2 Fill Plan/Phase 3 Base Grades
Drawing FP-5	Transitional Grades: Phase 3 Fill Plan/Phase 4 Base Grades
Drawing FP-6	Transitional Grades: Phase 4 Fill Plan/Phase 5 Base Grades
Drawing FP-7	Transitional Grades: Phase 5 Fill Plan/Phase 6 Base Grades
Drawing FP-8	Proposed Facility Final Grades

1.0 INTRODUCTION

This Facility Plan describes the comprehensive development of the Construction and Demolition (C&D) Landfill facility and includes a set of drawings and a report which present the long-term general design concepts related to construction, operation, and closure of the facility's C&D disposal units.

2.0 FACILITY PLAN DRAWINGS

2.1 Existing Conditions

Existing conditions at the project site are presented on the Existing Conditions Drawing (Drawing FP-2). Drawing FP-2 shows the proposed limits of waste disposal, and the environmental monitoring system. Current topography for the property is shown, as well as the required regulatory buffers (500-foot buffer from residences and wells, 200-foot buffer from the property line), and other physical site features.

2.2 Site Development Drawings

The facility is currently operating in its initial Phase (Phase 1). The proposed site development includes development of 5 future phases as is presented on Drawings FP-3 through FP-8. In addition to the site features shown on the Existing Conditions Drawing (Drawing FP-2), these site development drawings depict the limits of the proposed C&D disposal units for Phases 2 through 6.

2.3 Landfill Construction Drawings

Future landfill construction is proposed to occur in five phases with Phase 1 already constructed. Phase 1 has an expected remaining life of approximately 0.5 years, while the remaining phases (Phases 2-6) have an operating life of approximately twenty six years. Base and final grades for each phase are shown on Drawings FP-3 through FP-7. Base grades are designed to be a minimum of four feet above the seasonal high groundwater table and bedrock. Final grades shown were developed for maximum fill slope of 3 feet horizontal to 1 foot vertical (3H:1V) with ten (10) foot wide horizontal benches approximately every thirty (30) vertical feet along the slope. Drawing FP-7 shows the proposed final grades of the facility. Estimated groundwater and bedrock contours are shown on Drawings DH-3 and 6 (found in the Design Hydrogeologic Report and Groundwater Monitoring Plan for the WCA of High Point C&D Landfill, contained in Volume 2 of this submittal).

3.0 FACILITY REPORT

3.1 Waste Stream

The proposed landfill is to receive C&D waste from Guilford County and portions of Forsyth, Davidson and Randolph Counties. The landfill will accept only C&D waste which, as defined in Rule .0532(8), includes only those solid waste generated solely from the construction, remodeling, repair, or demolition operations on pavement, and buildings or structures. C&D waste does not

include municipal and industrial wastes that may be generated by the on-going operations at buildings or structures.

Generally, wastewater treatment sludge shall not be accepted for disposal. However, wastewater treatment sludge may be accepted, with the approval of the Division, for use as a soil conditioner and incorporated into or applied onto the vegetative growth layer. The wastewater treatment sludge shall not be applied at rates greater than the agronomic application rates or to a depth greater than six inches. Prior to any placement of wastewater treatment sludge, WCA will contact the Division for prior approval. This request will specify the amount of sludge to be applied and where it is desired to apply sludge.

Disposal Rates: The average yearly and daily disposal rates are presented in Table 1. The maximum expected yearly disposal amount is 89,775 tons, as permitted by the facility's Franchise Agreement. The average daily disposal rate is calculated to be 315 tons per day (TPD) assuming 285 operating days per year.

It is important to recognize that the rate of disposal may vary significantly for any given year as opportunities for beneficial use of the C&D materials are identified and implemented.

Area Served: The proposed facility is to receive C&D waste from Guilford County and portions of Forsyth, Davidson and Randolph Counties.

Equipment Requirements: Operation and maintenance of the site will be the responsibility of the landfill owner/operator. The minimum required operational equipment to support landfill operations at the anticipated incoming waste stream rates include:

- 1 - bulldozer
- 1 - water truck
- 1 - steel wheeled compactor
- 1 - tracked excavator
- 1 - tracked loader
- 1 - articulated dump truck

Other equipment will be purchased and/or rented as required for the facility operations.

3.2 Landfill Capacity

Landfill capacity, by phase, was calculated using airspace volumes generated from Autodesk Land Development Desktop (LDD) 2007 and the facility drawings. The data and assumptions used are consistent with the average daily disposal rate discussed in the preceding section, and are representative of the operational requirements and conditions anticipated for the facility.

The facility property totals approximately 154 acres in size, of which approximately 46.1 are proposed for C&D disposal permitting. The disposal capacity for each phase is shown in Table 2. The total anticipated disposal capacity is 4,800,000 cubic yards of gross airspace. The final cover system will consume approximately 350,000 cubic yards, and operational cover soil will consume

approximately 215,000 cubic yards, resulting in a net airspace capacity of nearly 4,250,000 cubic yards for disposal of C&D material.

The soil resources, usage rates and balances are shown by phase in Table 4. Based on the conceptual design volumes, the facility will have a deficit of approximately 145,000 cubic yards of soil.

Final Cover System:

Final grading contours are shown on Drawing No. FP-8. These contours have been designed with post-settlement surface slopes of at least five percent on the top of the landfill. Areas that are at final grades (out board side slope areas), may be capped prior to the completion of filling operations. Cross-sectional details of the proposed final cover system (i.e., closure cap and an alternative cap design) are provided on Drawing No. EP-7 of the facility's Engineering Plan. The following final cover system components are proposed, from bottom to top, as shown on the referenced details (Drawing No. EP-7):

Intermediate Cover and Leveling Course – Local soil will be placed over the monthly cover soil to provide at least 12 inches of intermediate cover and a uniform base for construction of the remainder of the final cover system.

Gas Migration Layer – A geonet composite will be installed between the intermediate cover and the overlying infiltration layer. The geonet composite will provide a pathway for accumulated gas to move laterally and then upward through the landfill gas vents.

Infiltration Layer: Clay Component – The infiltration layer will consist of 18 inches of compacted soil with a permeability no greater than 1.0×10^{-5} cm/sec. The permeability requirement will be achieved using laboratory test data from the borrow source material prior to construction. Installation and testing requirements for the Infiltration Layer are provided in the technical specifications of the facility's Engineering Plan (Appendix EP-1) and the facility's CQA Plan.

Alternate Cap Infiltration Layer: Geomembrane Component – A geomembrane component is proposed as an alternate to the clay infiltration layer. Equivalency of the proposed alternate cap to the regulatory minimum soil cap is included in the facility's Engineering Plan (Appendix EP-3). This demonstration was submitted to show equivalency to the standard regulatory cap design, as required by Rule .0543(c)(3)(A).

Should this alternate cap design be implemented, the geomembrane component serving as the infiltration layer will consist of a dual textured 40 mil flexible geomembrane (LLDPE). This geomembrane component will be in direct contact with the underlying gas migration layer. The testing program and quality assurance requirements for the geomembrane component are described in the facility's CQA Plan.

Alternate Cap Drainage Layer – A geomembrane infiltration layer is proposed as an alternate to the standard clay infiltration layer. Should the alternate cap design be implemented, a geosynthetic drainage layer consisting of a geonet and geotextile composite will be used over the geomembrane component to promote lateral drainage and increase the veneer stability of the protective cover soils.

Protective Layer – A layer consisting of at least 12 inches of local soil will be placed above the compacted soil infiltration barrier, or if the alternate cap is used, the protective layer will be placed above the alternate cap drainage layer to provide a protective cover for the underlying cap components. Compaction of the protective layer will be limited to 90 percent of the Standard Proctor maximum dry density so that the vegetation layer can develop a strong root system as well as to avoid possible damage to the geosynthetic cap components while trying to achieve a higher compaction rate.

Erosion/Vegetative Layer – A layer of topsoil material and/or organically amended local soil will be placed above the protective layer. This soil layer will be at least 6 inches in thickness. The topsoil material will be lightly compacted so that a good stand of vegetation can be established. Soil tests may be conducted prior to seeding to determine if soil additives are needed to establish and maintain the proposed vegetation.

Vegetation – After placement of the erosion/vegetative layer, the area will be seeded. Seeding will be accomplished in accordance with the “North Carolina Erosion and Sediment Control Planning and Design Manual,” and recommendations from the Guilford County Agricultural Extension Office. Mulch and erosion control matting will be used, as needed, to control erosion and promote vegetative growth. The vegetative cover will be inspected regularly during the post-closure care period. Areas found during inspections to be sparsely covered will be revegetated and mulched until a strong stand of vegetation is established.

The stability of the cap system was evaluated under static conditions by examining potential rotational failure surfaces through the exterior slopes, veneer failure of the final soil cover, and tension failure in the geosynthetic components. Calculations for these analyses are found in the facility’s Engineer Plan (Appendix EP-2). These analyses indicate that both proposed final cover systems will be stable under design static conditions.

Although the results of the stability analyses indicate that the proposed final cover systems will be stable under the design static loadings, certain minimum physical properties were assumed in the calculations. These assumptions included interface friction angles and soil properties. Laboratory testing of actual materials proposed for use in constructing the cap will be completed prior to their use to verify that the materials meet the specified parameters for stability.

Additional information on the design, construction, and maintenance of the final cover system can be found in the facility’s Closure and Post-Closure Plan.

Gas Management System:

To protect public health and safety in the vicinity of the landfill, landfill gas produced by the decomposition of C&D waste will be controlled and monitored during the operational, closure, and post-closure periods. A gas management plan and gas monitoring program will be implemented for the purpose of maintaining the concentration of methane gas below the following regulatory levels, if necessary:

- The concentration of methane gas generated is not to exceed 25 percent of the lower explosive limit (LEL) for methane in on-site structures (excluding gas control or recovery system components); and
- The concentration of methane gas is not to exceed the LEL for methane at the facility property boundary.

Landfill gas is a by-product from the decomposition of organic waste in a C&D Landfill. The major components of landfill gas are methane and carbon dioxide. Other gases, such as volatile organic compounds, are present in trace quantities. The landfill gas is proposed to be managed by a passive gas collection system. The gas may be actively recovered in the future if generation rates are sufficient to justify the additional costs of an active system.

Gas monitoring will be performed during the active life of the landfill and throughout the closure and post-closure periods. At a minimum, quarterly monitoring of explosive gases will be conducted at all gas detection probes and in structures at the landfill. If additional structures are built, the monitoring program will be expanded to include the new structures. Gas detection probes will be installed around the boundary of the waste disposal unit. Probes should not be needed where site topography permits gas to be released to the atmosphere before it migrates to the property boundaries, or where the site is bound by surface water features. The facility's Operation Plan contains more detailed information regarding landfill gas management.

Stormwater Management:

High intensity storms can cause temporary flooding and hinder operations in active disposal cells. To minimize these effects, temporary drainage features will be provided to segregate stormwater from coming into contact with the C&D waste where possible. Within each disposal cell, a temporary system of berms, dikes, and temporary culverts and slope drains will be used to divert and transport uncontaminated stormwater from active fill areas. Temporary pumps may be used during the initial fill stages of newly constructed cells.

Inactive areas will be covered with intermediate soil cover and temporary berms, dikes, and slope drains will be used to allow stormwater runoff to collect and be safely transported from the disposal areas. Ultimately, all stormwater runoff will be directed to the facility's permanent sediment basins.

(end)

Table 1
Projected Waste Disposal Rates
WCA of Highpoint Construction and Demolition Landfill
GANCI Project No. 063-6526

YEAR		C&D		
<u>Calendar</u>	<u>Operational</u>	<u>tons</u>	<u>avg. tons/day</u>	<u>cubic yards</u>
2004	1	61,781	217	95,047
2005	2	117,534	412	180,821
2006	3	91,959	323	141,475
2007	4	81,344	285	125,144
2008	5	89,775	315	138,115
2009	6	89,775	315	138,115
2010	7	89,775	315	138,115
2011	8	89,775	315	138,115
2012	9	89,775	315	138,115
2013	10	89,775	315	138,115
2014	11	89,775	315	138,115
2015	12	89,775	315	138,115
2016	13	89,775	315	138,115
2017	14	89,775	315	138,115
2018	15	89,775	315	138,115
2019	16	89,775	315	138,115
2020	17	89,775	315	138,115
2021	18	89,775	315	138,115
2022	19	89,775	315	138,115
2023	20	89,775	315	138,115
2024	21	89,775	315	138,115
2025	22	89,775	315	138,115
2026	23	89,775	315	138,115
2027	24	89,775	315	138,115
2028	25	89,775	315	138,115
2029	26	89,775	315	138,115
2030	27	89,775	315	138,115
2031	28	89,775	315	138,115
2032	29	89,775	315	138,115
2033	30	89,775	315	138,115
2034	31	89,775	315	138,115
Total:		2,334,150	315	4,271,602

Notes:

- *Actual acceptance rates reported for 2004 - 2007
- *projected waste disposal rates for 2008 - 2024 based on acceptance rate of 315 tons per day
- *C&D densities are assumed to be an average of 48 pcf.
- *Avg. tons/day based on 285 working days a year.

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Table 2
Landfill Capacity by Phase
WCA of Highpoint Construction and Demolition Landfill
GANCI Project No. 063-6526

PHASE	AREA (acres)	AIRSPACE (CY)	CAP (CY)	COVER (CY)	C&D VOLUME (CY)	C&D QUANTITY (Ton)
1	12.5	767000	95,651	31,969	639,380	436,377
2	9.4	965412	71,929	42,547	850,936	580,764
3	6.5	563690	49,738	24,474	489,478	334,069
4	5.6	894022	42,851	40,532	810,639	553,261
5	8.5	702871	65,042	30,373	607,456	414,589
6	3.6	923530	27,547	42,666	853,317	582,389
Total:	46.1	4,816,525	352,759	212,560	4,251,206	1,884,307

Notes:

*C&D densities are assumed to be an average of 1300 pounds per cubic yard
 Soil cover assumed to be placed at a ratio of 1 part soil to 20 parts waste

Golder Associates NC, Inc

Table 3
Projected Cumulative Waste Disposal Rates
WCA of Highpoint Construction and Demolition Landfill
GANCI Project No. 063-6526

Calendar Year	Actual/Projected C&D		Projected C&D		Cumulative C&D		Cumulative C&D		Phase Projected
	Tonnage	Volume (CY)	Tonnage	Volume (CY)	Tonnage	Volume (CY)	Tonnage	Volume (CY)	
2004	61,781	95,047	61,781	95,047	61,781	95,047			
2005	117,534	180,821	179,314	275,868	179,314	275,868			
2006	91,959	141,475	271,273	417,343	271,273	417,343			
2007	81,344	125,144	352,616	542,487	352,616	542,487			End of Phase 1
2008	89,775	138,115	442,391	680,602	442,391	680,602			642,296
2009	89,775	138,115	532,166	818,717	532,166	818,717			
2010	89,775	138,115	621,941	956,833	621,941	956,833			
2011	89,775	138,115	711,716	1,094,948	711,716	1,094,948			
2012	89,775	138,115	801,491	1,233,064	801,491	1,233,064			
2013	89,775	138,115	891,266	1,371,179	891,266	1,371,179			End of Phase 2
2014	89,775	138,115	981,041	1,509,294	981,041	1,509,294			1,493,232
2015	89,775	138,115	1,070,816	1,647,410	1,070,816	1,647,410			
2016	89,775	138,115	1,160,591	1,785,525	1,160,591	1,785,525			
2017	89,775	138,115	1,250,366	1,923,640	1,250,366	1,923,640			End of Phase 3
2018	89,775	138,115	1,340,141	2,061,756	1,340,141	2,061,756			1,982,709
2019	89,775	138,115	1,429,916	2,199,871	1,429,916	2,199,871			
2020	89,775	138,115	1,519,691	2,337,987	1,519,691	2,337,987			
2021	89,775	138,115	1,609,466	2,476,102	1,609,466	2,476,102			
2022	89,775	138,115	1,699,241	2,614,217	1,699,241	2,614,217			End of Phase 4
2023	89,775	138,115	1,789,016	2,752,333	1,789,016	2,752,333			2,793,348
2024	89,775	138,115	1,878,791	2,890,448	1,878,791	2,890,448			
2025	89,775	138,115	1,968,566	3,028,564	1,968,566	3,028,564			
2026	89,775	138,115	2,058,341	3,166,679	2,058,341	3,166,679			End of Phase 5
2027	89,775	138,115	2,148,116	3,304,794	2,148,116	3,304,794			3,400,804
2028	89,775	138,115	2,237,891	3,442,910	2,237,891	3,442,910			
2029	89,775	138,115	2,327,666	3,581,025	2,327,666	3,581,025			
2030	89,775	138,115	2,417,441	3,719,140	2,417,441	3,719,140			
2031	89,775	138,115	2,507,216	3,857,256	2,507,216	3,857,256			
2032	89,775	138,115	2,596,991	3,995,371	2,596,991	3,995,371			
2033	89,775	138,115	2,686,766	4,133,487	2,686,766	4,133,487			End of Phase 6
2034	89,775	138,115	2,776,541	4,271,602	2,776,541	4,271,602			4,254,121

Notes:

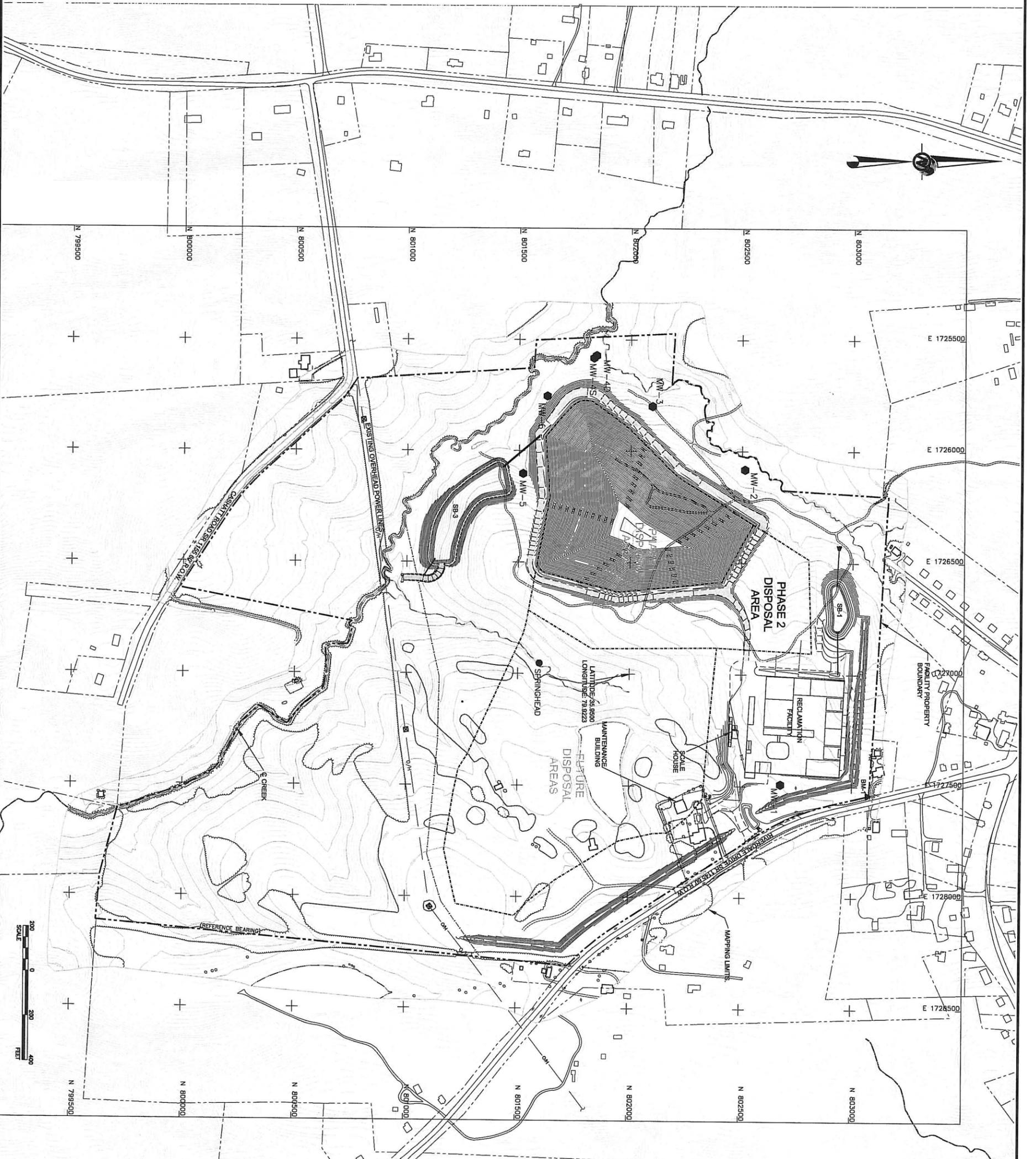
*C&D densities are assumed to be an average of 48 pcf.

Golder Associates NC Inc.

Table 4
Soil Balance
WCA of Highpoint Construction and Demolition Landfill
GANCI Project No. 063-6526

PHASE	AREA (AC)	AVAILABLE ONSITE SOIL (CY)	STRUCTURAL FILL (CY)	CAP (CY)	COVER (CY)	BALANCE (CY)	CUMULATIVE BALANCE (CY)
1	12.5	212,000	45,000	95,651	31,969	39,380	39,380
2	9.4	382,614	56,414	71,929	42,547	211,724	251,104
3	6.5	6,454	74,089	49,738	24,474	-141,847	109,257
4	5.6	57,448	10,354	42,851	40,532	-36,289	72,968
5	8.5	31,266	46,325	65,042	30,373	-110,474	-37,506
6	3.6	8,775	47,753	27,547	42,666	-109,191	-146,697
Total:	46.1	698,557	279,935	352,759	212,560	-146,697	-146,697

Golder Associates NC, Inc



- LEGEND**
- EXISTING 10 FT. CONTOUR
 - EXISTING 2 FT. CONTOUR
 - PROPERTY LINE
 - STREAM
 - TREELINE
 - EXISTING ROAD
 - LIMIT OF WASTE (PERMITTED)
 - MONITORING WELL LOCATION IDENTIFICATION
 - SPRINGHEAD LOCATION AND IDENTIFICATION
 - BENCH MARK
 - SEDIMENT BASIN
 - ACCESS ROADS
- NOTE:**
1. DRAWING BASED ON SITE PLAN PREPARED BY JOYCE ENGINEERING, INC. DATED JULY 7, 2004.
 2. BASE DIGITAL MAPPING WITHIN THE BOUNDARY SHOWN BY SPATIAL DATA CONSULTANTS INC. DATE OF AERIAL FLYOVER 3/27/01.
 3. DIGITAL MAPPING OUTSIDE BOUNDARY PROVIDED BY THE CITY OF HIGH POINT DEPARTMENT OF PLANNING AND DEVELOPMENT. DATE OF AERIAL FLYOVER 1998.
 4. EXISTING CONDITIONS SHOW PHASE 1 FILLED TO PERMITTED GRADES.



REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RW
1.	11/3/08	CH	REVISED PER DENR COMMENTS	LKB		

PROJECT

WCA OF HIGH POINT
CONSTRUCTION AND
DEMOLITION DEBRIS
LANDFILL AND RECLAMATION
FACILITY
GUILFORD COUNTY, NC

EXISTING CONDITIONS PLAN

TITLE

PROJECT No.	063-6526
FILE No.	
REV.	SCALE AS SHOWN
DESIGN	CH 12/19/05
CADD	JOS 12/19/05
CHECK	
REVIEW	

DWG. FP-2

CONSTRUCTION QUALITY ASSURANCE PLAN

**WCA OF HIGH POINT
CONSTRUCTION AND DEMOLITION LANDFILL
PHASE 2 EXPANSION
PERMIT NO. 41-16
GUILFORD COUNTY, NORTH CAROLINA**

Prepared for:



WCA of High Point , LLC
5830 Riverdale Drive
Jamestown, North Carolina 27282

Prepared by:



Golder Associates NC Inc.
4900 Koger Boulevard, Suite 140
Greensboro, North Carolina 27407

Revised November 2008

Project No.: 063-6526

TABLE OF CONTENTS

SECTION		PAGE
1.0	INTRODUCTION.....	1
1.1	Project Description.....	1
1.2	Definitions.....	1
1.3	Parties.....	2
1.4	Site and Project Control	3
2.0	CQA PERSONNEL	4
3.0	CQA LABORATORIES.....	4
3.1	Geotechnical CQA Laboratory	4
3.2	Geosynthetic CQA Laboratory	4
4.0	CQA TESTING AND INSPECTION CRITERIA.....	5
4.1	General Preconstruction Activities	5
4.2	Subgrade	6
4.3	Compacted Clay Cap	6
4.3.1	General.....	6
4.3.2	Material Evaluation.....	6
4.3.3	Subgrade Preparation.....	7
4.3.4	Construction Observation	8
4.3.5	Construction Testing.....	10
4.3.6	Defects and repairs.....	11
4.4	Geomembrane	12
4.4.1	Manufacture of Geomembrane	12
4.4.2	Conformance Testing.....	13
4.4.3	Transportation and Delivery	14
4.4.4	Construction.....	14
4.5	Geonet Composite.....	18
4.5.1	Manufacture of Geonet Composite	18
4.5.2	Conformance Testing.....	19
4.5.3	Transportation and Delivery	20
4.5.4	Construction.....	20
4.6	Soil Protective Cover	21
4.6.1	Construction Observation	21
4.6.2	Construction Testing.....	22
4.6.3	Defects and Repairs	23
4.7	Vegetative Support Layer	23
4.7.1	Quality Control Documentation.....	23
4.7.2	Construction Observation	24
4.7.3	Defects and Repairs	24
5.0	FINAL CERTIFICATION.....	25

5.1	Construction Certification.....	25
5.2	Geosynthetics Certification.....	25
6.0	RECORD DRAWINGS	25

1.0 INTRODUCTION

This Construction Quality Assurance and Quality Control (CQA/QC) Plan (Plan) was prepared by Golder Associates NC Inc. (Golder) to assist WCA of High Point, LLC (WCA of High Point), in performing construction at the WCA of High Point C&D Landfill, Guilford County, North Carolina, according to the Construction Plans and Construction Specifications.

To implement the construction project, a CONTRACTOR, familiar with earthwork and geomembrane construction, will serve as a general contractor (CONTRACTOR) providing construction services. In addition, a CQA Consultant will be retained to serve as an independent third party to ensure project conformance of all construction activities to established CQA standards. In most instances, the CONTRACTOR will perform all earthwork activities, and will retain a geomembrane subcontractor for installation of geosynthetic materials as necessary. The CQA Plan provides guidance information and procedures that should be undertaken by WCA of High Point, the ENGINEER, and the CONTRACTOR, so the work will be of the quality necessary to meet the project objectives and will be responsive to the requirements of WCA of High Point.

This CQA Plan is a supplemental document to the Construction Plans and Specifications for each project. Where a conflict arises, the Contract Documents will govern.

1.1 Project Description

The activities addressed under this CQA Plan include the following activities:

- Placement of structural fill;
- Soil cap construction or Installation of a geosynthetic cap and drainage layer;
- Placement of soil protective cover and vegetative support layer; and
- Seeding.

1.2 Definitions

- **Quality Control:** A planned system of activities, or the use of such a system, whose purpose is to provide a level of quality that meets the needs of users. The objective of quality control is to provide quality that is safe, adequate, dependable, and economical. The overall system involves integrating the quality factors of several related steps including: the proper specification of what is wanted, production to meet the full intent of the specification, inspection to determine whether the resulting material, product, service, etc. is in accordance with the Construction Specifications, and review of usage to determine necessary revisions of the Construction Specifications.

In practice, Quality Control refers to those procedures, criteria, and tests employed and paid for by the CONTRACTOR(s) to confirm that the work satisfies the CONTRACTOR's standards and is in compliance with the Construction Plans and Specifications. This plan does not address quality control procedures, criteria, and/or tests employed by the CONTRACTOR.

- **Quality Assurance:** A planned system of activities whose purpose is to provide assurance that the overall quality control program is in fact being effectively implemented. The system

involves a continuing evaluation of the adequacy and effectiveness of the overall quality control program with the ability to have corrective measures initiated where necessary. For a specific material, product, service, etc., this involves verifications, audits, and the evaluation of the quality factors that affect the specification, production, inspection, and use of the product, service, system, or environment.

In practice, Quality Assurance refers to those procedures, criteria, and tests required and paid for by the OWNER to confirm that the work performed by the CONTRACTOR(s) is in compliance with the approved Construction Plans and Specifications and any additional requirements of this Plan.

- Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of polyethylene geomembrane rolls. The finished roll will be identified by a roll number traceable to the resin lot used.
 - Panel: The unit area of geomembrane that will be seamed in the field. A panel is identified as a roll or portion of a roll that is larger than 100 square feet.
 - Subgrade Surface: The soil layer surface which immediately underlies the structural fill, compacted clay cap, or geomembrane cap.

1.3 Parties

- OWNER: The OWNER is the individual, entity, public body, or authority with whom the CONTRACTOR has entered into the Agreement and for whom the Work is performed. For this project, the OWNER is WCA of High Point, LLC.
- ENGINEER: The ENGINEER is the official representative of the OWNER. The ENGINEER is responsible for the preparation of the Construction Plans and Specifications of the project and for preparation of the CQA Plan. The ENGINEER is also responsible for the interpretation of those documents and for resolution of Construction matters that arise during construction.
- CONTRACTOR: The CONTRACTOR has the primary responsibility for ensuring that the landfill is constructed in accordance with the Construction Plans and Specifications developed by the ENGINEER and approved by the permitting agency. Other responsibilities include the performance of all construction activities at the site including site facilities, administration, material purchasing, procurement, supervision, construction quality control, installation, and subcontracting. The CONTRACTOR is responsible for the protection of completed work until it is accepted by the OWNER. The CONTRACTOR is also responsible for informing the OWNER and CQA Consultants of the scheduling and occurrence of all construction activities.
- CQA Consultant: The CQA Consultant is an agency, independent from the OWNER, CONTRACTOR(s), Manufacturer, and Installer, that is responsible for observing, testing and documenting activities related to the quality assurance at the site. This party will perform laboratory testing of soils and other earth materials for material evaluation and

verification purposes. This party will also observe installation of the geosynthetic cap and coordinate sampling and testing of the geosynthetics with the Geosynthetic CQA Laboratory. The CQA Consultant is also responsible for issuing a certification report, sealed by a registered Professional Engineer, licensed in North Carolina. The OWNER maintains the right to assign the responsibilities of the ENGINEER identified in this Plan to the CQA Consultant.

- Geomembrane Manufacturer (Manufacturer): The party responsible for manufacturing the geomembrane rolls.
- Geosynthetic CQA Laboratory (Testing Laboratory): Party, independent from the OWNER, Manufacturer and Installer, responsible for completing laboratory tests on samples of geosynthetics obtained at the site or during manufacturing usually under the direction of the OWNER or CQA Consultant.
- Geotechnical CQA Laboratory: Party, independent from the OWNER or CONTRACTOR, responsible for completing laboratory tests on soil samples obtained at the site or source usually under the direction of the OWNER or CQA Consultant
- Geomembrane Installer (Installer): The Installer is responsible for field handling, sorting, placing, seaming, loading (against wind), and other aspects of the geosynthetics installation, including geomembranes, geotextiles, geonets, and geonet composites.

1.4 Site and Project Control

To guarantee a high degree of quality during installation, clear, open channels of communication are essential. To that end, the following meetings shall be held as necessary to facilitate communication between parties.

1.4.1 Preconstruction Meeting

A Preconstruction Meeting shall be held at the site. At a minimum, the meeting shall be attended by the Owner, the Engineer, and the General Contractor. The meeting must include a discussion of the construction management organization, respective duties during construction, and periodic reporting requirements for test results and construction activities.

1.4.2 Progress Meetings

Progress meetings shall be held monthly (or more frequently as required to address problems/troubleshoot) and shall be attended by the General Contractor, the Engineer, the Owner, and any other concerned parties. Attendees shall discuss current progress, planned activities for the next week, and any new business or revisions to the work. The Engineer shall log any problems, decisions, or questions arising at these meetings. Any matter requiring action, which is raised in a progress meeting, shall be reported to the appropriate parties.

The meeting shall be documented by the Engineer

2.0 CQA PERSONNEL

WCA of High Point, LLC, (the OWNER) will retain an engineering consulting firm (CQA Consultant) to assure that proper construction techniques and procedures are used and to verify that the materials used meet the Contract Specifications. The CQA Consultant must employ engineers licensed to practice engineering in the State of North Carolina and experienced in the field of solid waste management and landfill construction. At the completion of the work, the program requires certification reports indicating that the facility has been constructed in accordance with the Construction Specifications and approved design. It is the responsibility of the certifying Engineer(s) to prepare these reports.

3.0 CQA LABORATORIES

3.1 Geotechnical CQA Laboratory

Experience and Qualifications

The Geotechnical CQA Laboratory must have experience in testing granular fills and aggregates, and be familiar with ASTM International (ASTM) test standards and other applicable test standards as required in the Construction Specifications. The geotechnical laboratory must have proven their abilities on previous work with the ENGINEER and/or with their Qualifications and Experience (Q&E) package demonstrating their experience as it relates to the Construction Specifications. The Q&E package shall include a project list showing the name, address, and telephone number of the appropriate party to contact. The Geotechnical CQA Laboratory must be capable of providing preliminary permeability test results within 48 hours and final permeability test results within 72 hours of receipt of sample. The laboratory must be capable of providing all other test results within five days of receipt of samples.

The Geotechnical CQA Laboratory shall provide a project manager for the project as the responsible person to contact. This person shall oversee the analytical procedures and testing as well as review and reporting of the results.

Responsibilities

The Geotechnical CQA Laboratory is responsible for performing all geotechnical laboratory tests and formally submitting results to the ENGINEER as required in the Construction Specification. These tests may include, but are not limited to, those indicated in the Construction Specifications.

3.2 Geosynthetic CQA Laboratory

Experience and Qualifications

The Geosynthetic CQA Laboratory must have experience in testing geosynthetics, and must conform to ASTM, National Sanitation Foundation (NSF), Geosynthetic Research Institute (GRI), and other applicable test standards, as required in the Construction Specifications. The geosynthetic laboratory must have proven their abilities on previous work with the ENGINEER or shall provide the ENGINEER with their Qualifications and Experience (Q&E) package demonstrating their

experience as it relates to the Specifications. The Q&E shall include a project list showing the name, address, and telephone number of the appropriate party to contact. The Geosynthetic CQA Laboratory must be capable of providing test results within 48 hours from receipt of samples.

The Geosynthetic CQA Laboratory shall provide a project manager for the project as the responsible person to contact. This person shall oversee the analytical procedures and testing as well as review and reporting of the results.

Responsibilities

The Geosynthetic CQA Laboratory is responsible for performing all geosynthetic material test procedures in accordance with the Construction Specifications and formally submitting results to the ENGINEER. These tests may include, but are not limited to, those indicated in the Construction Specifications.

4.0 CQA TESTING AND INSPECTION CRITERIA

This section of the CQA Plan describes the inspection activities (observations and tests) that will be performed during construction. The scope of this section addresses the construction, including material installation and the manufacture/fabrication of the following specific components:

- Compacted Clay Cap;
- Geomembrane;
- Geonet Composite;
- Soil Protective Cover;
- Vegetative Support Layer; and
- Seeding.

This section addresses the inspection activities that are necessary to ensure that the facility is constructed to meet or exceed all design criteria, plans, and specifications.

4.1 General Preconstruction Activities

Prior to the start of construction, a preconstruction meeting shall be held among the OWNER, the ENGINEER, CQA Consultant, Geomembrane Installer (Installer) and the CONTRACTOR responsible for completing the work. The topics covered at this meeting shall include, but not be limited to:

- Providing each party with all relevant CQA documents and supporting information;
- Familiarizing each organization with the site-specific CQA plan, its role relative to accomplishing the intent of the design, as well as review of the Construction Plans and Specifications;
- Reviewing the responsibilities of each party;
- Reviewing lines of authority and communication for each organization;
- Discussing the established procedures or protocol for construction, change orders, deficiencies, repairs and retesting;
- Reviewing methods of documenting and reporting inspection data;

- Reviewing work area security and safety protocol;
- Discussing procedures for the location and protection of construction materials, and for the prevention of damage of the materials from inclement weather or other adverse events;
- Conducting a site walk to review site conditions as well as material staging and storage locations;
- Discussing the proposed construction plan, schedule and procedures; and
- Clarifying installation, testing, and acceptance criteria and procedures.

4.2 Subgrade

Any earthen surface upon which structural fill, compacted clay cap, or geomembrane cap is to be installed shall be prepared and compacted in accordance with the Construction Plans and Specifications. The surface shall be smooth, firm, unyielding, and free of: vegetation, construction debris, sticks or roots, sharp rocks, void spaces, ice, abrupt elevation changes, standing water, desiccation cracks or other puncture hazards.

Immediately before placement of structural fill, compacted clay cap construction or geosynthetic deployment, grade the subgrade to fill in all voids and cracks, and then smooth-roll to provide the best practicable surface for the geosynthetic. At the completion of this activity, no wheel ruts, footprints or other irregularities shall exist in the subgrade. All protrusions extending more than one-half inch from the surface shall be removed, crushed or pushed into the surface with a smooth-drum compactor.

4.3 Compacted Clay Cap

4.3.1 General

Compacted clay cap material generally consists of native cohesive soils with low hydraulic conductivity used as a barrier element in lining systems. Soils used in compacted clay caps shall consist of clean, select material free of debris, excessive coarse particles or other deleterious matter. Cap material shall be clayey soil, classified according to the United Soil Classification System as SC, CL, CH, SM, ML, or MH (ASTM D2487). This Section does not address quality assurance procedures for bentonite admixtures or geosynthetic clay liners (GCL).

4.3.2 Material Evaluation

Pre-construction material evaluations shall be performed on samples from potential sources to ascertain their acceptability as construction materials. Construction testing shall be performed during the course of the work to verify material compliance with the Construction Specifications.

Criteria to be used for determination of acceptability of materials for use during construction shall be as defined in the Construction Specifications, and/or as detailed in this Plan. All evaluation tests are to be performed in a geotechnical laboratory that has been approved for use by the ENGINEER or CQA Consultant. Test reports will verify compliance with or state deviation from applicable ASTM International, Inc. (ASTM) standards as outlined below.

4.3.2.1 Preconstruction Material Evaluation

Soils proposed for use in construction of the soil cap should be tested in accordance with the Construction Specifications.

At a minimum, the following tests to determine the properties of the soil cap materials shall be completed:

- Soil classification – ASTM D2487;
- Particle size analysis – ASTM D422;
- Atterberg limits – ASTM D4318;
- Hydraulic conductivity – ASTM D5084;
- Moisture-density relationship – ASTM D698; and
- Moisture content – ASTM D2216.

The moisture-density curves shall be developed for each type of soil determined suitable as cap material and shall be used during the construction phase as a performance reference for compaction and moisture control.

As a general rule, a minimum of one series of pre-construction tests (including hydraulic conductivity tests) should be performed for every 20,000 to 25,000 cubic yards of soil to be used in cap construction, unless soil types are limited and easily distinguished. As soil is usually made available subsequent to excavation during cap construction, additional pre-construction samples should be taken and tests performed when soils vary or as soon as the initial pre-construction test results appear inappropriate or questionable. Any time the liquid limit or plasticity index changes by more than 15 points, a new compaction series should be run to determine the density/moisture content/permeability relationship. If and when the same borrow source is used for the soil supply of more than one cap area, results from previous tests may be used to supplement the pre-construction data.

4.3.2.2 Construction Quality Assurance Material Evaluation

Soils used to construct the compacted clay cap should be tested in accordance with the Construction Specifications following schedule during the course of the work to verify material compliance. At a minimum, the following tests shall be used to determine material conformance:

- Soil classification – ASTM D2487;
- Particle size analysis – ASTM D422;
- Atterberg limits – ASTM D4318;
- Hydraulic conductivity – ASTM D5084;
- Moisture-density relationship – ASTM D698; and
- Moisture content – ASTM D2216.

4.3.3 Subgrade Preparation

The CONTRACTOR shall be responsible for preparing the subgrade soil for placement of overlying materials including all fill and recompacted separation layers as applicable. Upon completion of the

subgrade preparation work, the CQA Consultant shall examine the subgrade and verify, at a minimum, that:

- The surveyor has verified all lines and grades; and
- The CQA Consultant has verified that the subgrade soil meets the criteria in the Construction Specifications.

At any time during construction of the cap, the CQA Consultant shall indicate to the ENGINEER any locations which are not adequate for placement of the soil cap. Such defects in the subgrade soil shall be repaired by the CONTRACTOR, at the direction of the ENGINEER, such that the properties of the repaired areas meet the Construction Specifications.

4.3.4 Construction Observation

Observation of the compacted clay cap construction shall be coordinated with construction testing. The CQA Consultant will be on-site at all times during cap construction, to observe and document all relevant activities. The ENGINEER will visit the site periodically as construction progress warrants. Such visits will be frequent enough so that the ENGINEER is fully knowledgeable of the construction methods and performance and can determine that quality assurance monitoring and testing activities are adequate to meet the terms and intent of this Plan.

Acceptance criteria for construction work shall be as identified in the Construction Specifications. At a minimum, the CQA Consultant shall observe and record the following during the construction of soil caps:

- Moisture content and consistency of the soil during processing, placement, and compaction;
- Action of compaction equipment on the soil surface (sheepsfoot penetration, pumping, cracking, etc.);
- Loose and compacted lift thickness;
- Method of bonding lifts together; and
- Areas where damage due to excess moisture, insufficient moisture, freezing, or excessive desiccation may have occurred.

Work Area Selection and Sizing: Work areas for compacted clay cap construction should be selected, sized and sequenced so that work on each lift can begin and be completed in the same day. The area worked at any one time should be of such size that placement, processing and compaction will be uniform, with minimal variation caused by weather conditions. It is critical that completed lifts be tested and covered with the next loose lift before that completed lift dries out or becomes damaged by heavy precipitation. If the surface of the lift will be exposed long enough to become dry or if there is a threat of rain, the lift surface should be compacted using a smooth-drum roller. However, the smooth-rolled surface must be scarified, as described below, prior to placement of a new lift of soil. Furthermore, the selection of size and shape of work areas shall be consistent, so that uniform construction techniques and equipment can be selected. Adequate numbers of CQA personnel will be provided to suit the pace of construction so proper monitoring and documentation is performed.

Lift Placement and Processing: Reduction of soil clods, uniform moisture distribution, and consistent placement thickness are key elements to achieving uniform compaction of soil caps. Soil cap material shall be placed in loose lifts, generally not exceeding 8 inches thick after spreading and leveling and/or processing, with the expectation that the finished lift, following compaction, will be approximately 6 inches thick or less. In no case will the loose lift thickness, after spreading and leveling, be greater than the length of the compactor feet. The intent of limiting the loose thickness is to achieve good interlift bonding and to minimize bridging or layering effects.

The loose lift of soil shall be mechanically processed, either in-place or in a separate processing area, to break down the original soil structure and to reduce clod size. Additional processing, if necessary, will be used to blend variable soil types within the loose lift and incorporate additional water. The goal of processing is to yield a relatively uniform mass of soil that is devoid of original structure that may result in an increase in hydraulic conductivity. Processing may be achieved by discing, grading, compacting, or pulverizing. Pneumatic-tired or tracked equipment will not generally be acceptable to provide processing action, although this equipment may be used to pull the other acceptable implements.

Moisture adjustment may be required, particularly during dry seasons, and reasonable practices shall be used to distribute added water uniformly within the lift. Water hauling trucks with pressure-spray capabilities are preferred over those using simple spray bars. Care shall be taken to prevent over-watering and ponding of water within the loose lift, as this excess water is difficult to redistribute. Drying back of overly wet soils during processing can result in clods having dry, crusting surfaces, which may not bond together adequately. If such drying is allowed, then additional effort will be necessary to assure even moisture distribution and hydration. Hydration times shall be evaluated by CQA Consultant who shall determine if these times are acceptable.

Minimum Compaction Requirements: Processed loose lifts shall be leveled prior to compaction to provide uniform compaction effort over the lift. Each lift shall be compacted to the moisture and density requirements established for the project and as set forth in the provisions of this Plan. Lifts shall be compacted to a density and moisture content required to achieve a permeability detailed in the Construction Specifications.

The compacted clay cap shall not be compacted with a bulldozer or any track-mobilized equipment unless it is used to pull a footed roller; however, this practice is not encouraged. All compacted clay caps shall be compacted with a pad-footed or prong-footed roller only. Bulldozers, pneumatic rollers or scrapers, and flat-wheeled rollers will not be permitted for compaction. Generally, compaction equipment shall be required to provide a minimum of 6 passes across the lift, regardless of equipment size and compaction performance to help ensure adequate remolding and lift bonding of each soil lift.

Lift Bonding and Cap Tie-In: Interlift bonding shall be accomplished by scarifying the top of the finished lift and adjusting the moisture content, if needed, prior to placement of the subsequent loose lift. When soil is scarified it is usually roughened to a depth of about 1 inch. In some cases, the surface may not require scarification if the surface is already rough after compaction of the previous lift. Compactors shall be of sufficient weight and foot length to penetrate the current lift when loose and provide bonding to the previous lift.

When lifts of the compacted clay cap are not constructed continuously, a vertical construction joint may occur. To remove the vertical construction joint(s), the edge of the adjoining cap section shall be cut back to form a "stair step" or flattened, forming a slope, to permit offsetting of the tie-in for subsequent lifts. For each 6-inch lift, the edge should be cut back at least 2.5 feet or graded to a maximum 5:1 slope. The corresponding adjoining lift should be placed against the existing finished lift. The new loose lift and at least 2 feet of the adjoining existing lift will be processed together and recompacted so that the existing cap edge is tied to new construction without superimposed vertical construction joints. This tie-in procedure shall be repeated lift-by-lift until all corresponding adjacent lifts are constructed to the required elevation. The cut back edge of the existing cap may be conducted all at once or one lift at a time. If the 5:1 slope tie-in method is used, the CQA Consultant shall observe that proper compaction and bonding of the tie-in is achieved.

4.3.5 Construction Testing

All construction quality assurance testing shall be conducted in accordance with the Construction Specifications. All field and laboratory tests shall be conducted on samples taken from the compacted clay cap during the course of the construction work. Testing and sampling procedures shall be observed and documented by the CQA Consultant.

Quality assurance of the compacted clay cap shall consist of monitoring the work as compacted clay cap construction proceeds and laboratory and field testing to assure that cap material conformance and construction performance specifications are achieved.

Construction Testing: During compacted clay cap construction, field moisture/density testing will be performed using a nuclear density gauge (ASTM D2922 and D3017) at a minimum frequency of five tests per acre per lift. A minimum of every fifth test completed with a nuclear density gauge shall also be tested in accordance with either the sand cone method (ASTM D1556) or the drive cylinder method (ASTM D2937). In the event of differing results, the results of the field moisture/density testing completed using either the sand cone method or the drive cylinder method shall govern.

The in-place hydraulic conductivity of the constructed cap shall be tested at a minimum frequency of once per acre per lift of soil placed. The lab permeability test shall conform to ASTM D5084. Samples shall be taken in accordance with ASTM D1587.

If a permeability test result fails to meet the permeability requirements, two additional samples shall be taken in the vicinity of the failed sample, and replicate tests conducted. If the replicate tests pass, the section represented by the samples shall be considered as having passed. If either of the replicate tests fails, then the section shall be considered as having failed and shall be removed, replaced and retested.

Compacted Clay Cap Perforations: When taking field densities and undisturbed samples, all holes dug or created in the cap for density probes or samples must be backfilled with bentonite or a 50% bentonite/50% soil mix. The backfill shall be tamped in the hole to remove pockets of air or loose soil, and to assure a tight, compact seal.

Compacted Clay Cap Thickness Verification: Compacted clay cap thickness verification shall be determined by instrument survey method only; no test probes that create holes will be allowed. The verification points for record purposes shall be on a grid not exceeding 10,000 square feet per grid.

If the area under evaluation is less than 10,000 square feet, a minimum of two grid points is required for verification. The selected grid shall be the same for both beginning and finished elevations of the compacted clay cap, so that minimum thicknesses can be calculated and verified.

Post-Construction Care of Compacted Clay Cap: The integrity of the compacted clay cap shall be maintained by moistening the material to prevent desiccation. Conversely, the compacted clay cap shall be kept free of standing water by providing sufficient surface water run-on controls and adequately pumping to remove run-off after rainfall events. Damage caused by rain shall be repaired, and if the lift must be reworked as determined by the CQA Consultant, then appropriate retesting (including field moisture-density and permeability tests) shall be performed.

4.3.6 Defects and repairs

4.3.6.1 Identification

Acceptability criteria for testing shall be as identified in the Construction Specifications. At locations where the testing indicates the requirements of the Construction Specifications are not met, the CQA Consultant shall determine the extent and the nature of the defect and recommend corrective actions to the ENGINEER.

If the compacted clay cap has been subject to adverse weather conditions, the CQA Consultant shall reexamine the soil for possible damage.

4.3.6.2 Notification

After determining the extent and nature of any defect, the CQA Consultant shall promptly notify the CONTRACTOR and ENGINEER.

4.3.6.3 Repairs and Retesting

The CONTRACTOR shall correct all deficiencies to meet the Construction Specifications. The CQA Consultant shall schedule appropriate retests when the work defect has been corrected. All retests by the CQA Consultant shall verify that the defect has been corrected before any additional work is performed by the CONTRACTOR in the area of the deficiency.

The CQA Consultant shall observe any repair and report any noncompliance with the above requirements in writing to the ENGINEER.

Sections of compacted clay cap that do not pass either the density or moisture requirements in the field shall be reworked and retested until the section in question passes. All field density results shall be reported, whether they indicate passing or failing values.

In the event of a failed moisture-density test, additional tests will be performed between the failed test and the nearest adjacent passing test locations. If those additional tests pass, then the area between the failed test and the additional passing tests will be reworked and retested until passing. If the additional tests fail, then additional tests will be performed halfway between the initial additional tests and the adjacent passing tests to further define the failing area. This procedure will be repeated until the failing area is defined, reworked, and retested with passing results. If reworking

consistently fails and the section does not pass the criteria, the non-conforming area will be removed and replaced.

All reworked areas should be tested and confirmed to satisfy the hydraulic conductivity criterion. The reporting of retests should clearly indicate the number and location of the non-conforming test and the subsequent conforming retest. Retests should be taken near the location of the original non-conforming test.

4.4 Geomembrane

Stringent quality assurance and careful documentation are required in the production and installation of all geosynthetic materials. The work addressed under this section shall facilitate proper construction of all geosynthetic components of the cap for the landfill. All work shall be constructed to the lines, grades, and dimensions indicated on the project plans, in accordance with the Construction Specifications, or as required by the OWNER or ENGINEER.

The CQA Consultant shall issue a written daily report of activities to the ENGINEER. These reports shall include, at a minimum, observations and test results as well as problems encountered and solutions achieved. Construction reports summarizing significant events, as well as addressing all problems encountered and their solutions, shall be issued to the ENGINEER. The format of these reports and frequency shall be established prior to the start of construction.

4.4.1 Manufacture of Geomembrane

The Geomembrane Manufacturer shall provide the ENGINEER and the CQA Consultant with a Manufacturer's Installation Guide and a written certification signed by an officer or the Manufacturer's Quality Control Manager indicating that the geomembrane actually delivered has properties which meet or exceed the guaranteed properties for the type of geomembrane specified. The certification shall be signed by a responsible party employed by the Manufacturer shall include the following:

- Product identification,
- Lot number,
- Geomembrane roll numbers, and
- Manufacturer's quality control test results.

The Manufacturer shall perform quality conformance testing on the natural resin for the required physical properties prior to shipping material to the site. At a minimum, the following tests shall be used to determine material physical properties:

- Density – ASTM D792 or D1505
- Melt flow index – ASTM D1238
- OIT – ASTM D3895

In addition, the Manufacturer shall perform quality conformance testing on the geomembrane for the required physical properties indicated below prior to shipping material to the site:

- Minimum Thickness - ASTM D5994
- Minimum Density - ASTM D792 or D1505
- Asperity Height - GRI GM-12
- Carbon Black Content - ASTM D1603
- Carbon Black Dispersion - ASTM D5596
- Tensile Properties - ASTM D6693
 - Strength @ Break
 - Elongation @ Break
- Tear Resistance - ASTM D1004
- Puncture Resistance - ASTM D4833
- Oxidative Induction Time
 - Std. OIT - ASTM D3895
 - High Pressure OIT - ASTM D5885
- Oven aging at 85° C – ASTM D5721
- UV resistance – GRI – GM11
- 2% Secant modulus – ASTM D5323

Prior to the installation, the Manufacturer will provide the CQA Consultant with the following:

- A properties sheet including, at a minimum, all specified properties, measured using test methods indicated in the Construction Specifications or equivalent methods approved by the ENGINEER and CQA Consultant;
- A list of quantities and descriptions of materials other than the base polymer which comprise the geomembrane;
- The sampling procedure and results of testing; and
- A certification that property values given in the properties sheet are minimum or maximum values and are guaranteed by the Manufacturer.

The CQA Consultant will verify that:

- The property values certified by the Manufacturer meet all of the Specifications; and
- The measurements of properties by the Manufacturer are properly documented, the test methods used are acceptable, and the geomembrane meets the Manufacturer specifications and the Construction Specifications.

4.4.2 Conformance Testing

The CQA Consultant or a designated independent Geosynthetics CQA Laboratory will perform quality assurance testing to verify that the geomembrane meets the requirements of the Construction Specifications. These tests are indicated below. Samples of the geomembrane material shall be taken from the leading edge of the roll and shall be three feet wide by the length of the roll. Samples shall be taken at the factory prior to shipment or upon delivery at the site:

- Minimum Thickness - ASTM D5994
- Minimum Density - ASTM D792 or D1505
- Asperity Height - GRI GM-12
- Carbon Black Content - ASTM D1603

- Carbon Black Dispersion - ASTM D5596
- Tensile Properties - ASTM D6693
- Strength @ Break
- Elongation @ Break
- Tear Resistance - ASTM D1004
- Puncture Resistance - ASTM D4833

4.4.3 Transportation and Delivery

All handling on-site is the responsibility of the CONTRACTOR or Installer. The CONTRACTOR or Installer is responsible for the submittal of shipping manifests and all other relevant documents to the CQA Consultant.

Upon delivery at the site, the CQA Consultant shall inventory all rolls and conduct a surface observation of each roll or factory panel for defects or damage. The inspection will be performed without unrolling rolls or unfolding factory panels unless defects or damages are found or suspected. The CQA Consultant will indicate those rolls with severe flaws that should be removed from the site and those rolls with minor flaws.

The CONTRACTOR will be responsible for the storage of the geomembrane on-site upon arriving at the site. The OWNER will provide storage space in a location (or several locations) such that on-site transportation and handling are minimized. Storage space should be protected from theft, vandalism, passage of vehicles, etc.

The CQA Consultant will verify that storage space selected is in a well-drained area and that cribbing techniques have been used as needed to ensure that the materials will not be sitting in ponded water in the event of rainfall.

4.4.4 Construction

The Installer shall submit proposed panel layouts to the CQA Consultant and ENGINEER at least seven days prior to mobilization of installation crews. In general, seams should be oriented parallel to the line of maximum slope, i.e., oriented with, not across, the slope. In corners and other geometrically complex locations, the number of seams should be minimized. No base seam or tee seam will be less than five feet from the toe of slopes, or areas of potential stress concentrations, unless otherwise authorized by the CQA Consultant.

Once the panel layout is approved, the Installer may not substantially change the layout without permission of the CQA Consultant, ENGINEER or OWNER. The Installer shall submit a drawing of proposed seam completion details at panel corners of three or more sheets to the ENGINEER and the OWNER prior to shipment of the geomembrane.

Subgrade surfaces to receive geomembrane installation shall be relatively smooth and even and free of ruts, voids, protrusions, and deleterious material. The Installer shall provide written certification that the subgrade surface on which the geomembrane will be installed is acceptable. During placement, the CQA Consultant will verify that:

- Any equipment used does not damage the geomembrane by handling, trafficking, excessive heat, leakage of hydrocarbons or other means;
- The prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement;
- Any geosynthetic elements immediately underlying the geomembrane are of acceptable cleanliness and are free of debris;
- All personnel working on the geomembrane do not smoke, wear damaging shoes, or engage in other activities which could damage the geomembrane;
- The method used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting soil;
- The method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels);
- Adequate temporary loading and/or anchoring (e.g., sand bags, tires), not likely to damage the geomembrane, has been placed to prevent uplift by wind (in case of high winds, the loading should be continuous along the edges of panels to minimize the risk of wind flow under the panels);
- Direct contact of equipment with the geomembrane is minimized; i.e., the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials, in areas where excessive traffic may be expected; and
- Portable generators may not be placed directly on the geomembrane, but shall be placed on a rub sheet.

The CQA Consultant will notify the ENGINEER and Installer if the above conditions are not fulfilled.

After placement and prior to seaming, the CQA Consultant will visually examine each panel for damage. The CQA Consultant will advise the geomembrane installer which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected will be marked, and their removal from the work area recorded by the CQA Consultant.

Prior to seaming, the CQA Consultant shall verify that the seam area is clean and free of moisture, dust, dirt, debris of any kind, and foreign material. The CQA Consultant shall verify that the bonding surfaces are thoroughly cleaned by mechanical abrasion for extrusion welds. Testing of the seams shall be conducted by the Installer under the observation of the CQA Consultant. The Installer shall supply qualified personnel and testing equipment. The CQA Consultant or Geosynthetic CQA Laboratory may perform additional testing to verify that the seams meet the requirements of the specifications.

4.4.4.1 Trial Seams

Trial seams shall be made each day prior to commencing field seaming. The seams shall be made on fragment pieces of geomembrane under the same surface and environmental conditions as the production seams to verify that seaming conditions are adequate. The trial seams shall be made at the beginning of each seaming period; at changes of equipment, equipment settings, operator, weather, or sheet temperature; at the CQA Consultant's discretion, and at least once every four to six hours during continuous operation of each welding machine; or at change in material type (i.e.,

smooth-to-smooth seam versus smooth-to-textured seam). Each seamer shall make at least two test seams each day.

The trial seam sample shall be at least five feet long by one foot wide with the seam centered lengthwise. For dual track fusion welds nine, one-inch wide by six-inch long test strips shall be cut from the trial seam. Quantitatively test three specimens for inside peel adhesion (peel), three for outside peel, and then three specimens for bonded seam strength (shear). For extrusion welds six, one-inch wide by six-inch long test strips shall be cut from the trial seam. Quantitatively test three specimens for peel and three specimens for bonded seam strength (shear).

A trial seam sample shall pass when the results of the tests shown below are achieved in both peel and shear test and when the break can be described as a film tear bond. A film tear bond is defined as a failure in the ductile mode of one of the bonded sheets by tearing prior to complete separation to the bonded area.

- Peel strength (fusion) – ASTM D6392
- Peel strength (extrusion) – ASTM D6392
- Shear strength (fusion & extrusion) – ASTM D6392

Trial seams shall be repeated, in its entirety, when any of the trial seam samples fail in either peel or shear. If additional trial seams fail, the seaming apparatus or seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful full trial seams are achieved. No welding equipment or welder shall be allowed to begin production welds until equipment and welders have a successfully completed trial seam. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the cap installation. Installer shall demonstrate that acceptable seaming can be achieved by completing passing trial seams.

The remainder of the successful trial seams shall be assigned a number and marked accordingly by the CQA Consultant, who shall also log the date, hour, ambient temperature, number of seaming apparatus, name of seamer, and pass or fail description. The sample itself should be archived until project completion.

4.4.4.2 Non-destructive Testing

Production seams shall be tested by the Installer continuously using non-destructive techniques. The Installer shall perform all air pressure (fusion welded seams) and vacuum testing (extrusion welded seams) under the observation of the CQA Consultant as follows:

- Extrusion Weld Testing – Non-destructive testing of the extrusion weld shall be conducted with a vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft gasket attached to the bottom or valve assembly and a vacuum gauge. The assembly shall be capable of maintaining at least a 5 psi vacuum. A passing extrusion seam shall exhibit at least a 5 psi vacuum for at least 15 seconds when using a soapy solution to seal the gasket to the seam. The presence of soap bubbles in rapid succession is indicative of a leak. The viewing window should be regularly cleaned to ensure a clear view of the seam section being tested. All areas where soap bubbles appear in rapid succession shall be marked, repaired and retested.

- Fusion Weld Testing – Non-destructive testing of the fusion weld shall be conducted with an air pump or tank capable of generating and sustaining pressure over 30 psig; a sharp, hollow needle, or other approved pressure feed device equipped with a pressure gauge; a utility knife with hook blade; hot air gun or other device and clamp to seal the ends of the air channel. After sealing both ends, the fusion seam shall be pressurized to 30 psig and the pressure allowed to stabilize. A passing fusion seam shall have a maximum 4 psig vacuum loss over a five minute time period.

Once the seam passes the opposite end of the seam shall be punctured to release the air, confirming that the entire seam length had been tested. If air is not released once the channel has been punctured, a blockage is present. Locate faulty area where the blockage is and retest seam on both sides of blockage. A pressure gauge at both ends of the seam will also be acceptable.

4.4.4.3 Destructive Testing

Extrusion and fusion welded field seams shall be destructively tested at a minimum frequency of one test per 500 linear feet of seamed length per welding machine. Destructive test samples shall be located by the CQA Consultant as seaming progresses and shall be removed by the Installer to obtain laboratory test results before the geomembrane is covered. Samples shall be 12-inches wide by minimal length (typically 60 inches) with the seam centered lengthwise (minimum of six inches on either side of the seam). The sample shall be cut into five parts for distribution to the Installer for field testing (12-inches), to the Testing Laboratory for conformance testing (12 inches), to the CQA Engineer (12-inches), to the Geosynthetic Installer for off-site testing, and to the OWNER for archive (12-inches). Sample size should be reduced to 12-inches by 48-inches when the Geosynthetics Installer elects not to test off-site.

Each sample shall be tested five times each for outer peel, inner peel, and shear. The average values of each set of five tests must meet the specification, and four of the five tests must meet the specifications for the seam to be considered a passing seam. If the average of the five tests is adequate, but one of the tests is failing, values for the failing test must be at least 80 percent of the values required for the seam for the sample to pass. All tests must exhibit a FTB failure and meet the strength requirements provided in the Construction Specifications.

Samples which do not pass the shear and peel tests shall be re-sampled from locations at least ten feet on each side of the original location. These two re-test samples must pass both shear and peel testing. If these two samples do not pass, then additional samples shall continue to be obtained until the questionable seam area is defined.

4.4.4.4 Repairs

Any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test shall be repaired. Damaged geomembrane shall be removed and replaced with acceptable geomembrane materials if damage cannot be satisfactorily repaired. Installer shall be responsible for repair of damaged or defective areas. Agreement upon the appropriate repair method shall be

decided between the OWNER, ENGINEER or CQA Consultant, and the Installer. Procedures available include the following:

- Patching - Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter;
- Spot Welding - Used to repair pinholes, other localized flaws (minor) or where geomembrane thickness has been reduced;
- Capping - Used to repair large lengths of failed seams; and
- Replacement - Used to remove the unacceptable seam and replace with new material.

In addition, surfaces of the geomembrane which are to be repaired by extrusion welds shall be lightly abraded with disc grinder or equivalent to assure cleanliness. All geomembrane surfaces shall be clean and dry at the time of repair. Patches or caps shall be extended at least six inches for extrusion weld and four inches for wedge weld beyond the edge of the defect. All corners of patch material shall be rounded.

The CQA Consultant shall number and log each patch repair, and the Installer shall non-destructively test each repair using methods specified in this plan.

4.4.4.5 Final Inspection

A final inspection shall be completed by the Installer, ENGINEER, CQA Consultant and OWNER prior to the Installer demobilizing from the site. All identified problem areas shall be repaired by the Installer and accepted by the CQA Consultant prior to the Installer demobilizing from the site.

4.5 Geonet Composite

4.5.1 Manufacture of Geonet Composite

The Geonet Composite Manufacturer shall provide the ENGINEER and the CQA Consultant with a list of guaranteed properties for the type of geonet composite to be supplied. The Geonet Composite Manufacturer shall provide the ENGINEER and the CQA Consultant with a Manufacturer's Installation Guide and a written certification signed by an officer or the Manufacturer's Quality Control Manager indicating that the geonet composite actually delivered has properties which meet or exceed the guaranteed properties for the type of geonet composite specified. The certification shall be signed by a responsible party employed by the Manufacturer shall include the following:

- Product identification,
- Lot number,
- Geonet composite roll numbers affected by shipment, and
- Manufacturer's quality control test results.

At a minimum, the Geonet Composite Manufacturer's quality control testing shall be as follows:

Geonet Composite

- Transmissivity – ASTM D4716
- Ply adhesion – GRI GC-7

Net Component

- Thickness – ASTM D5199
- Density – ASTM D1505
- Tensile Strength – ASTM D5035
- Carbon black content – ASTM D1603

Geotextile Component

- Mass per unit area – ASTM D5261
- Apparent opening size – ASTM D4751
- Flow rate – ASTM D4491
- Grab tensile strength – ASTM D4632
- Puncture strength – ASTM D4833

Geonet Composite Resin

- Density – ASTM D1505
- Melt flow Index – ASTM D1238

The CQA Consultant shall examine all the Geonet Composite Manufacturer's certifications to ensure that the property values listed on the certifications meet or exceed those specified.

4.5.2 Conformance Testing

The CQA Consultant or a designated independent geosynthetics laboratory may perform additional quality assurance testing to verify that the geonet composite drainage fabric meets the requirements of the specifications. The minimum testing is indicated below. Testing frequency shall be as listed in the Construction Specifications. Samples of the geonet composite drainage fabric shall be taken from the leading edge of the roll and shall be three feet wide by the length of the roll. Samples shall be taken at the factory prior to shipment or upon delivery at the site.

Geonet Composite

- Transmissivity – ASTM D4716
- Ply adhesion – GRI GC-7

Net Component

- Thickness – ASTM D5199
- Density – ASTM D1505
- Tensile Strength – ASTM D5035
- Carbon black content – ASTM D1603

Geotextile Component

- Mass per unit area – ASTM D5261
- Apparent opening size – ASTM D4751
- Flow rate – ASTM D4491
- Grab tensile strength – ASTM D4632
- Puncture strength – ASTM D4833

4.5.3 Transportation and Delivery

All handling on-site is the responsibility of the CONTRACTOR or Installer. The CONTRACTOR or Installer is responsible for the submittal of shipping manifests and all other relevant documents to the CQA Consultant.

Upon delivery at the site, the CQA Consultant shall inventory all rolls and conduct a surface observation of each roll or factory panel for defects or damage. The inspection will be performed without unrolling rolls or unfolding factory panels unless defects or damages are found or suspected. The CQA Consultant will indicate those rolls with severe flaws that should be removed from the site and those rolls with minor flaws.

The CONTRACTOR will be responsible for the storage of the geonet composite drainage fabric on-site. The OWNER will provide storage space in a location (or several locations) such that on-site transportation and handling are minimized. Storage space should be protected from theft, vandalism, passage of vehicles, etc.

The CQA Consultant will verify that storage space selected is in a well-drained area and that cribbing techniques have been used as needed to ensure that the materials will not be sitting in ponded water in the event of rainfall.

4.5.4 Construction

During deployment, the CQA Consultant shall inspect the geonet composite for damage due to equipment, deployment across the geomembrane, or other potentially damaging activities. The Installer shall handle all geonet composites in such a manner as to ensure they are not damaged in any way, and the following shall be complied with:

- On slopes, the geonet composites shall be secured and rolled down the slope in such a manner as to continually keep the geonet composite sheet in tension. If necessary, the geonet composites shall be positioned by hand after being unrolled to minimize wrinkles. Geonet composites shall not be placed in the horizontal direction (i.e., across the slope).
- In the presence of excessive wind, geonet composites shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with cover material.

Adjacent geonet composites shall be joined according to the Geonet Composite Manufacturer's recommendations, the Geonet Composite Manufacturer's Installation Guide, Construction Plans and Construction Specifications. At a minimum, the following requirements shall be met:

- Adjacent rolls shall overlap the geonet component by at least 6 in. and shall provide a minimum 2 ft overlap down the slope;
- These overlaps shall be secured by tying;
- Tying can be achieved by plastic fasteners or polymer braids. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed;
- Tying shall be every 5 ft. along the slope or floor and every 6 inches in the anchor trench; and

- The edges of the geotextile component shall be sewn (to ensure no fines get into the drainage medium) using UV stabilized polypropylene thread with chemical properties equal to or exceeding those of the geotextile. A two-thread type 401k double-locked stitch shall be used for all sewing work. The thread color should contrast with the geotextile color.

The CQA Consultant shall verify the above.

Holes or tears in the geonet composite shall be repaired by placing a patch of geonet composite extending a minimum of 2 feet beyond the edges of the hole or tear. The patch shall be fastened to the original roll with approved fasteners spaced every 6 inches around the patch. If the hole or tear width across the roll is more than 50% the width of the roll, the damaged area shall be cut out and the two portions of the geonet shall be tied together every 6 inches

4.6 Soil Protective Cover

Protective soil covers consist of soils used to protect the components of the capping systems. Protective cover soil shall be free of rubble, wood, stumps, brush, metal, cinders, trash, demolition debris, garbage, topsoil, organic soil, loam, sludge and other deleterious materials. The maximum stone size shall be two inches in any dimension and shall not comprise more than five percent of the total soil mass. Protective cover soil shall be classified according to the United Soil Classification System as SC, CL, CH, SM, ML, or MH (ASTM D2487).

4.6.1 Construction Observation

Observation of the soil protective layer shall be coordinated with construction testing. Acceptance criteria for construction work shall be as identified in the Construction Specifications. At a minimum, the CQA Consultant shall observe and record the following during the construction of the soil protective layer:

- Moisture content and consistency of the soil during processing, placement, and compaction;
- Loose and compacted lift thickness;
- Stones which may damage underlying geosynthetic components; and
- Areas where damage due to excess moisture, insufficient moisture, freezing, or excessive dessication may have occurred.

The CQA Consultant shall also verify that:

- Placement of the soil protective layer does not proceed at an ambient temperature below 32°F (0°C) nor above 104 F (40°C) unless otherwise approved;
- Equipment used for placing soil is not driven directly on any underlying geomembrane; and
- A minimum thickness of 12-inches loose or 9 inches compacted soils are between a light dozer, ground pressure of 5 psi (35 kPa) or lighter, and the underlying geomembrane/geonet composite drainage fabric. (or as required by the Construction Specifications).

When placing overlying material on the geonet composite drainage fabric every effort must be made to minimize wrinkle development. Small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the CQA Consultant to ensure that wrinkle formation is minimized and, in all cases that the geonet composite drainage fabric is not folded over on itself. The minimum thickness shall be certified by the surveyor in accordance with the Construction Specifications.

4.6.2 Construction Testing

All construction quality assurance testing shall be conducted in accordance with the Construction Specifications. All field and laboratory tests shall be conducted on samples taken from the soil protective layer materials during the course of the construction work. Testing and sampling procedures shall be observed and documented by the CQA Consultant.

Quality assurance of the soil protective layer shall consist of monitoring the work as soil protective layer construction proceeds and laboratory and field testing to assure that the protective cover layer material conformance and construction performance specifications are achieved.

Construction Observation: The CQA Consultant will be on-site at all times when soil protective layer construction is ongoing, so that all relevant activities can be observed and documented. The ENGINEER will visit the site periodically as construction progress warrants. Such visits will be frequent enough so that the ENGINEER is fully knowledgeable of the construction methods and performance and can determine that CQA observation and testing activities are adequate to meet the terms and intent of this Plan.

Visual observation shall include, but not be limited to, the following:

- Moisture content and distribution, particle size, and other physical properties of the soil during processing, placement, and compaction;
- Maximum clod size and breakdown of soil structure;
- Stones or other inclusions, which may damage underlying geosynthetics components or adversely affect compaction, lift bonding, and in-place testing/sampling; and
- Areas where damage due to excess moisture, insufficient moisture, or freezing may have occurred.

Construction Testing: During protective cover layer construction, field moisture/density testing may be performed using a nuclear density gauge (ASTM D2922 and D3017) at a frequency as detailed in the Construction Specifications.

Protective Cover Layer Thickness Verification: Protective cover layer thickness verification shall be determined by instrument survey method only; no test probes that create holes will be allowed. The verification points for record purposes shall be on a grid not exceeding 10,000 square feet per grid. If the area under evaluation is less than 10,000 square feet, a minimum of two grid points is required for verification. The selected grid shall be the same for both beginning and finished elevations of the soil cap, so that minimum thicknesses can be calculated and verified.

Post-Construction Care of Protective Cover Layer: The integrity of the protective cover layer shall be maintained by moistening to prevent the material from desiccating. Conversely, the protective

cover layer shall be kept free of standing water by providing sufficient surface water run-on controls and adequately pumping to remove run-off after rainfall events. Damage caused by rain shall be repaired, and if the lift must be reworked as determined by the CQA Consultant, then appropriate retesting (including field moisture-density) may be performed.

4.6.3 Defects and Repairs

4.6.3.1 Identification

If a defect is identified in the protective cover layer, the CQA Consultant shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the CQA Consultant shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the CQA Consultant deems appropriate.

4.6.3.2 Notification

After determining the extent and nature of the defect, the CQA Consultant shall promptly notify the CONTRACTOR and the ENGINEER.

4.6.3.3 Repairs and Retesting

The CONTRACTOR shall correct all deficiencies to meet the Construction Specifications. The CQA Consultant shall schedule appropriate retests when the work defect has been corrected. All retests by the CQA Consultant must verify that the defect has been corrected before any additional work is performed by the CONTRACTOR in the area of the deficiency. The CQA Consultant shall observe any repair and report any noncompliance with the above requirements in writing to the ENGINEER.

4.7 Vegetative Support Layer

Vegetative support layer material generally consists of medium-textured soils capable of supporting vegetative growth. Establishment of vegetation reduces cover erosion due to water and wind, and protects the soil and/or geosynthetic cover against damage. Site-specific criteria for the vegetative support layer shall be specified in the Construction Specifications.

4.7.1 Quality Control Documentation

Prior to the construction of a vegetative support layer, any required tests shall be conducted to verify that proposed sources meet the Construction Specifications. Testing shall be performed by the CQA Consultant or other laboratory approved by the ENGINEER.

The CONTRACTOR shall submit the results of these tests to the ENGINEER. The ENGINEER shall accept or reject the material based on these test results.

4.7.2 Construction Observation

The vegetative support layer shall be compacted to the specified thickness. The firmness of the compacted vegetative support layer varies with the type of vegetation specified for the cover, and should be indicated in the Construction Specifications.

The CQA Consultant shall:

- Observe the quantity and the uniformity of any soil amendment incorporated within the tilled depth before seeding;
- Ensure that the seeding application equipment is appropriate for the job. The rate of seed and mulch application, amount and uniformity of coverage, and watering instructions as provided in the Construction Specifications shall be closely observed; and
- Examine the perimeter areas to ensure that no unseeded area remains.

The CQA Consultant shall report any nonconformance to the ENGINEER.

Thickness verification of the vegetative support layer shall be determined by instrument survey method only; no test probes that create holes will be allowed. The verification points for record purposes shall be on a grid not exceeding 10,000 square feet per grid. If the area under evaluation is less than 10,000 square feet, a minimum of two grid points is required for verification. The selected grid shall be the same for both beginning and finished elevations of the vegetative support layer, so that minimum thicknesses can be calculated and verified.

4.7.3 Defects and Repairs

4.7.3.1 Identification

If a defect is identified in the vegetative support layer, the CQA Consultant shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the CQA Consultant shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the CQA Consultant deems appropriate. If the vegetative support layer has been subject to adverse weather conditions during construction, the CQA Consultant shall reexamine the vegetative support layer for possible damage in overly wet or windblown areas.

4.7.3.2 Notification

After determining the extent and nature of the defect, the CQA Consultant shall promptly notify the CONTRACTOR and the ENGINEER.

4.7.3.3 Repairs and Retesting

The CONTRACTOR shall correct all deficiencies to meet the Construction Specifications. The CQA Consultant shall schedule appropriate retests when the work defect has been corrected. All retests by the CQA Consultant must verify that the defect has been corrected before additional work is performed by the CONTRACTOR in the area of the deficiency. The CQA Consultant shall observe any repair and report any noncompliance with the above requirements in writing to the ENGINEER.

5.0 FINAL CERTIFICATION

Certification shall be prepared by the CQA Consultant and submitted upon completion of the work. This report shall include all reports prepared by the CQA personnel, summarize the activities of the project, and document all aspects of the quality assurance program performed. The CQA report shall contain the results of all the construction quality assurance testing, including documentation of any failed test results, descriptions of procedures used to correct the improperly installed material, and the results of all retesting performed. The CQA report shall also contain as-built drawings noting any deviation from the approved plans and shall contain a comprehensive narrative including, but not limited to, regular reports from the project engineer, a series of color photographs of major project features, and documentation of proceedings of all progress meetings. The Certification shall be sealed and signed by a professional engineer registered in the State of North Carolina.

Certification reports required by regulatory agencies will also be prepared and submitted as required. Subconsultants and testing laboratories shall also prepare certification reports for their respective areas of responsibility.

5.1 Construction Certification

The Final Certification Report shall include assessments of the CONTRACTOR's compliance with the Construction Plans and Specifications and physical sampling and testing. The Final Certification Report shall also include statements summarizing the extent of construction, with special attention given to changes from the design plans. The report will certify the results of the various field tests and laboratory tests performed, and assess whether or not the constructed project is in compliance with the Construction Plans and Specifications.

5.2 Geosynthetics Certification

The Final Certification Report shall include as a minimum the following information:

- Personnel involved with the project (with experience listed);
- Scope of work;
- Summaries for the installation of the geosynthetics;
- Conformance test results;
- Trial weld test results; and
- Field seaming test results (including laboratory tests, as applicable);

6.0 RECORD DRAWINGS

The preparation of Record Drawings is the responsibility of the CONTRACTOR. They shall be sealed and signed by a professional engineer or surveyor registered in the State of North Carolina. Also, all drawings shall be included in digital format, prepared in a program agreed upon prior to the start of construction. Record Drawings should be included by the CQA Consultant with the Final Certification Report.

They shall include drawings from the Installer showing:

- Layout of all geomembrane field panels to scale relative to the surveyed anchor trench;
- Identification of all seams and panels with appropriate numbers or "identification codes";
- Location of all patches and repairs; and
- Location of all destructive test samples.

The Record Drawings shall address the geomembrane layer and, if necessary, applicable cross-sections shall show layouts of geosynthetics that are unusual or differ from the Construction Plans.

In addition, Record Drawings shall show:

- Final surveyed construction grades for the different layers of construction including, base grades, intermediate grades and final soil grades, if applicable;
- The as-built thickness of the compacted soil cap throughout the cell;
- Piping and appurtenances; and
- Locations of key features

(end)

OPERATIONS PLAN

WCA OF HIGH POINT

CONSTRUCTION AND DEMOLITION LANDFILL

RECLAMATION AREA AND

PHASE 2 EXPANSION

PERMIT NO. 41-16

GUILFORD COUNTY, NORTH CAROLINA

Prepared for:



WCA of High Point, LLC
5830 Riverdale Drive
Jamestown, North Carolina 27282

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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION	1
1.1 GENERAL OPERATIONS.....	1
1.1.1 General Operating Procedures.....	1
1.1.2 Owner and Operator	1
1.1.3 Operating Hours	1
1.1.4 Site Access and Safety.....	2
1.2 CONTACT INFORMATION	2
1.2.1 Operator.....	2
1.2.2 NC DENR.....	2
1.2.3 Emergency	2
1.3 WASTE ACCEPTANCE	3
1.3.1 Prohibited Wastes.....	3
1.3.2 Acceptable Wastes.....	4
2.0 RECLAMATION AREA OPERATIONS PLAN.....	5
2.1 General Operations.....	5
2.1.1 Conditions of Acceptance:	5
2.1.2 Waste Disposal Sites:	5
2.1.3 Facility Operators:	5
2.1.4 Air Quality:.....	6
2.1.5 Storage of Materials:	6
2.1.6 Separation and Processing of Material:	7
2.1.7 Final Disposition of Unacceptable Material:	8
2.1.8 Final Disposition of By-pass Material:.....	8
2.1.9 Final Disposition of Recyclables:.....	8
2.2 Material Screening Plan:	10
2.2.1 Purpose:	10
2.2.2 Procedure for Visual Inspections:.....	10
2.2.3 Record Keeping:	11
2.3 Management Plan for Unacceptable Materials:.....	11
2.4 Management Plan for By-pass Material:	11
2.5 Management Plan for Recyclable/Reclaimable Material:	11
2.6 Equipment Information:	11
2.6.1 Capability and Arrangement of Processing Equipment:	11
2.6.2 Loading Equipment:	12
2.6.3 Other Equipment:	13
2.7 Fire Department Response:	13
2.8 Asbestos Containing Materials Management:	13
2.8.1 Awareness Training	13
2.8.2 Operations.....	13
2.9 Financial Assurances:.....	14
3.0 PHASE 2 EXPANSION	15
3.1 OPERATION DRAWINGS	15
3.1.1 Existing Conditions	15
3.1.2 Proposed Phase 2.....	15

3.1.3	Proposed Future Development	15
3.2	SITE OPERATION	16
3.2.1	Landfill Equipment.....	16
3.2.2	Dust, Odor, Vector and Litter Control.....	16
3.2.3	Fire Control	16
3.2.4	Open Burning	17
3.2.5	Scavenging/Salvaging	17
3.3	WASTE ACCEPTANCE AND DISPOSAL REQUIREMENTS.....	17
3.3.1	Waste Screening Program	17
3.4	ANNUAL REPORT	19
3.5	WASTE PLACEMENT	20
3.5.1	Cell Progression.....	20
3.5.2	Waste Placement and Compaction	20
3.5.3	Cover Material.....	20
3.5.4	Alternate Cover	21
3.6	EROSION AND SEDIMENT CONTROL	21
3.7	Environmental Monitoring PLANS.....	21
3.7.1	Groundwater Monitoring Plan.....	21
3.7.2	Surface Water Monitoring Plan.....	22
3.7.3	Landfill Gas Control Plan.....	22
3.8	SURVEY FOR COMPLIANCE	24
4.0	RECORDKEEPING REQUIREMENTS	24

DRAWINGS

- OP-1 Existing Conditions Plan
- OP-2 Annual Phasing Plan
- OP-3 Stormwater Management Plan

APPENDICES

- OP-1 Random Waste Inspection Forms
- OP-2 Boundary Gas Probe Monitoring Log
- OP-3 Groundwater Monitoring Plan
- OP-4 Surface Water Monitoring Plan

1.0 INTRODUCTION

The WCA of High Point facility is located along the eastern border of the City of High Point, along the west side of Riverdale Drive, SR 1145, beginning approximately 800 feet south of the intersection of Riverdale Drive and E. Kivett Drive in southern Guilford County, North Carolina (See Drawing OP-1). WCA owns and operates a material recovery center and a construction and demolition (C&D) landfill at the facility. This Operations Plan describes how the Facility, Engineering, and Closure Plans prepared for the WCA of High Point, LLC, Construction and Demolition Landfill will be implemented during the life of the facility. The plan has been prepared in compliance with Rules .0535 and .0542 of the North Carolina Solid Waste Management Regulations and consists of drawings and accompanying text that illustrates existing conditions, cell progression, waste placement and daily operations, stormwater control, special waste management, buffer zones and soil borrow procedures.

This section of the Operations Plan discusses the operations that the WCA of High Point, LLC material recovery facility and the proposed Phase 2 disposal area of the WCA of High Point, LLC facility have in common.

1.1 GENERAL OPERATIONS

1.1.1 General Operating Procedures

All materials enter the site by first passing over the scales, where total weight, source of the load and material type will be noted. After leaving the scales material will either be sent to the landfill for disposal or the reclamation pad. If the incoming load contains large quantities of non-recoverable material it will be taken directly from the scalehouse to the landfill for disposal as detailed in Section 3 of this Plan. Otherwise, materials in the incoming load will be screened and separated for recycling/reuse as detailed in Section 2 of this Plan. Waste materials remaining after the screening process will be sent to the landfill for disposal. Commodities sold (i.e., materials recycled or otherwise reused) are weighed as they leave the site or are otherwise reused.

1.1.2 Owner and Operator

The facility is owned and operated by WCA of High Point, LLC; 5830 Riverdale Drive; Jamestown, North Carolina. WCA of High Point, LLC, will be responsible for operations and notifying the Solid Waste Section of the identity of the operator in charge. Mr. Michael R. McFeeley, a certified landfill operator, will be directing the contained landfill operations; his phone number is 336.886.3560. In accordance with Rule .0542(j)(2) and N.C.G.S.130A-309.25, Mr. McFeeley or another individual trained in landfill operations shall be on duty at the site while the facility is open for public use and at all times during active waste management operations to ensure compliance with operational requirements.

1.1.3 Operating Hours

The facility is open to private waste haulers and the public from 7:00 a.m. to 4:30 p.m., Monday through Friday, and on Saturday from 7:00 a.m. to 1:00 p.m. The facility will be closed on the following major holidays: New Years Day, Memorial Day, Independence Day, Labor Day,

Thanksgiving Day, and Christmas Day. If the facility will be closed during other holidays, third party haulers will be notified in advance.

1.1.4 Site Access and Safety

Access to the facility is controlled through a single access road with a secure gate to prevent access when the facility is not open. A sign containing information required in Rules .0542(j)(5) and .0542(j)(6) (i.e., dumping procedures, hours, permit number, etc.) is posted at the facility entrance. Traffic signs or markers shall be provided as necessary to promote orderly traffic patterns to and from the reclamation pad and/or disposal area and to maintain efficient operating conditions. During operating hours, traffic is routed from the entrance gate and scalehouse to a paved and gravel road leading to the reclamation pad and disposal area. The road is maintained so that it is passable during all weather conditions.

1.2 CONTACT INFORMATION

1.2.1 Operator

Mr. Michael R. McFeeley, a certified landfill operator, will be directing facility operations; his phone number is 336.886.3560

1.2.2 NC DENR

Contact information for NC DENR is as follows:

North Carolina Department of Environment and Natural Resources
Division of Waste Management
401 Oberlin Road, Suite 150
Raleigh, NC. 27605
Phone: (919)508-8400
Fax: (919)715-3605

Field Operations Branch Head: Mark Poindexter
Central District Supervisor: Jason Watkins
Waste Management Specialist: Hugh Jernigan

1.2.3 Emergency

In the event of an emergency beyond the capacity of the facility staff to address, local emergency personnel will be contacted via 911.

1.3 WASTE ACCEPTANCE

The WCA of High Point facility shall only accept those solid wastes which it is permitted to receive. The facility owner or operator shall notify the Division within 24 hours of attempted disposal of any waste the landfill is not permitted to receive, including waste from outside the area the landfill is permitted to serve. Wastes which may be disposed of at the facility as well as prohibited wastes are described as follows.

1.3.1 Prohibited Wastes

The following wastes shall not be handled for reuse/recycling purposes or disposed of in the facility:

- Asbestos,
- Containers such as tubes, drums, barrels, tanks, cans, and bottles unless they are empty and perforated to ensure that no liquid, hazardous or municipal solid waste is contained therein,
- Garbage as defined in N.C.G.S.130A-290(a)(7),
- Hazardous waste as defined in N.C.G.S.130A-290(a)(8), to also include hazardous waste from conditionally exempt small quantity generators,
- Industrial solid waste unless a demonstration has been made and approved by the Division that the landfill meets the requirements of Rule .0503(2)(d)(ii)(A),
- Liquid wastes,
- Medical waste as defined in N.C.G.S.130A-290(a)(18),
- Municipal solid waste as defined in N.C.G.S.130A-290(a)(18a),
- Polychlorinated biphenyls (PCB) wastes as defined in 40 CFR 761,
- Radioactive waste as defined in N.C.G.S. 104E-5(14),
- Septage as defined in N.C.G.S.130A-290(a)(32),
- Sludge as defined in N.C.G.S.130A-290(a)(34),
- Special wastes as defined in N.C.G.S.130A-290(a)(40),
- White goods as defined in N.C.G.S.130A-290(a)(44), and
- Yard trash as defined in N.C.G.S.130A-290(a)(45).
- The following wastes cannot be received if separate from C&D waste: lamps or bulbs including but not limited to halogen, incandescent, neon or fluorescent; lighting ballast or fixtures; thermostats and light switches; batteries including but not limited to those from exit and emergency lights and smoke detectors; lead pipes; lead roof flashing; transformers; capacitors; and copper chrome arsenate (CCA) and creosote treated woods.

Waste accepted for disposal at the WCA of High Point C&D Landfill shall be readily identifiable as C&D waste and shall not have been shredded, pulverized, or processed to such an extent that the composition of the original waste cannot be readily ascertained except, as specified as follows.

C&D waste that has been shredded, pulverized or otherwise processed may be accepted for disposal from a facility that has received a permit from an authorized regulatory authority which specifies such activities are inspected by the authority, and whose primary purpose is recycling and reuse of the

C&D material. A detailed waste screening plan and waste acceptance plan shall be made available to the Division upon request.

Further, the WCA of High Point C&D Landfill shall not knowingly dispose any type or form of C&D waste that is generated within the boundaries of a unit of local government that by ordinance:

- Prohibits generators or collectors of C&D waste from disposing that type or form of C&D waste; or
- Requires generators or collectors of C&D waste to recycle that type or form of C&D waste.

1.3.2 Acceptable Wastes

The facility is to receive C&D waste from Guilford County and portions of Forsyth, Davidson and Randolph Counties. The landfill will accept only C&D solid waste which, as defined in Rule .0532(8), includes only solid waste generated solely from the construction, remodeling, repair, or demolition operations on pavement, and buildings or structures. C&D waste does not include municipal and industrial wastes that may be generated by the on-going operations at buildings or structures.

Generally, wastewater treatment sludge shall not be accepted for disposal. However, wastewater treatment sludge may be accepted, with the approval of the Division, for utilization as a soil conditioner and incorporated into or applied onto the vegetative growth layer. The wastewater treatment sludge shall neither be applied at greater than agronomic rates nor to a depth greater than six inches. Prior to any placement of wastewater treatment sludge, WCA will contact the Division for approval and will detail the amount of sludge to be accepted and the area upon which the sludge will be placed.

2.0 RECLAMATION AREA OPERATIONS PLAN

This section of the Operations Plan discusses the operation of WCA of High Point, LLC material recovery facility. The recovery facility proposes to accept non-hazardous construction and demolition debris for the purpose of screening, separating, redistributing, and marketing certain components of this select waste stream.

2.1 General Operations

2.1.1 Conditions of Acceptance:

The waste accepted at the site will be debris from building construction, remodeling, repair, and structure demolition. Prior to separation, the debris from each load will be screened visually by trained personnel for potential hazardous materials. Haulers will be notified of acceptable or unacceptable loads and materials prior to dumping.

Acceptable materials include wood, roofing, plastic, ferrous & nonferrous metals, drywall, concrete, cardboard, brick, asphalt, carpet, dirt and other miscellaneous construction and demolition materials. Unacceptable wastes include any regulated quantity of hazardous waste, friable asbestos, any liquid waste, or other materials banned from disposal in C&D landfills by North Carolina rules or statutes. By-pass materials are materials that the facility will accept, but cannot be reclaimed, recycled or sold. Examples of by-pass materials include treated wood, asphalt, roofing materials, visqueen and carpet. The by-pass materials will be disposed of in the construction and demolition landfill.

In order to comply with North Carolina's guidelines for treatment and processing facilities, each load entering and exiting the site will be weighed at the scalehouse. This will be done in order to help document the facility's capability to process and remove recyclable material from the waste stream. Records of weight, material type, and use will be made by the scalehouse attendant. The operator of the facility will review these records monthly and submit them to the North Carolina Solid Waste Section for review on an annual basis.

2.1.2 Waste Disposal Sites:

Materials which cannot be reclaimed or recycled will be disposed of in the WCA of High Point, LLC, C&D Landfill; the landfill sharing Permit Number 41-16. The Coble Sandrock Construction and Demolition Landfill located at 5833 Foster's Store Road; Liberty, NC; Permit Number 0105 will be used as an emergency backup facility, should the need arise.

2.1.3 Facility Operators:

Mr. Mike McFeeley, the on-site manager, is responsible for site operations and has received training to recognize hazardous and asbestos-containing material.

2.1.4 Air Quality:

A water line and misting system has been installed to control dust during dry periods. A water truck will also be used as needed. .

2.1.5 Storage of Materials:

The following is a list of materials and maximum capacities for designated storage areas prior to removal. Please see Drawing OP-1 for a layout of the designated storage areas on the 425' x 425' reclamation facility pad:

<u>Material</u>	<u>Area/Quantities</u>
Hazardous Material	As needed basis
C&D Residual/By-pass Material	75' x 150' x 20' / approx 8,330 yd ³
C&D Material (Unprocessed)	125' x 125' x 20' /approx 11,330 yd ³
Clean Wood	
-Unprocessed (Stockpiled)	75' x 75' x 20' / approx 4,166 yd ³
-Processed (shredded chips)	75' x 150' x 20' / approx 8,330 yd ³
Non-Ferrous Metals	
-Insulated Wire	
-UBC (aluminum cans)	50' x 50' x 20' / approx 1,850 yd ³
-Misc. Aluminum	
-Copper	
Ferrous Metals	75' x 75' x 20' / approx 4,166 yd ³
Drywall*	50' x 50' x 20' / approx 1,850 yd ³
Concrete, Asphalt, and Brick	75' x 75' x 20' / approx 4,166 yd ³
OCC (cardboard)	20' x 50' x 15' / approx 1,500yd ³
Fines (RSM – Recovered Screened Material)	75' x 150' x 20' / approx 8,330yd ³
Recoverable Items (doors, lumber, etc...)	25' x 150' x 20' / approx 8,330 yd ³

*Due to market considerations there are no plans currently to recover drywall, but the capacity exists to include this material as conditions warrant.

- Commodities should be stored in designated areas only.
- Commodities recovered have a positive monetary value, and are not considered waste products.
- Recovered commodities are sold when market conditions (commodity price/volume) will maximize the economic return on the cost of reclamation. Therefore the time that each commodity will remain stockpiled varies depending on market conditions.

2.1.6 Separation and Processing of Material:

Material will enter the site by first passing over the scales, where total weight, source of the load and material type will be noted. After leaving the scales material will be unloaded onto a concrete pad where it will be screened for unacceptable wastes. Incoming trucks will be held until their loads can be screened, unless there is a high traffic volume. The reclamation center will be responsible for managing unacceptable waste on-site. Materials placed on the processing pad will be processed within two days under normal operating conditions.

Large quantities of non-recoverable material may be taken directly from the scalehouse to the landfill and not subjected to the screening and picking process.

An initial gross separation will occur in the tipping area where dimensional lumber and recoverable items (doors, competent brick/block, and pipe etc...) will be pulled and placed into a designated storage area (See Drawing OP-1). After this gross sort, material will be moved from the tipping area and loaded into a surge/feed hopper which distributes the waste across the conveyer belt leading to the screener. The conveyor moves the material to a heavy duty screener where material that is less than two (2) inches in diameter (fines) is separated. Fines containing large quantities of dirt may be further screed and resold for use in soil applications. If appropriate markets are not available, excess fines will be placed in the landfill.

After screening, a conveyor moves the "overs" material to the picking stations where hand separation of recyclable materials from by-pass (waste) materials occurs. The picking line will be elevated over five (5) separate steel bins. It is anticipated that the configuration of the bins will be as follows: two (2) for clean wood, and one (1) each for ferrous/non-ferrous metal, cardboard, and concrete/asphalt/brick. Materials such as treated wood (i.e. wood that has stains, varnishes, creosote, etc.), roofing, dirt, carpet and other miscellaneous materials that are not hand separated (by-pass material), are deposited at the end of the picking line. By-pass material will be disposed of in the on-site landfill.

During high winds, snowfall events or other unusual circumstances that endanger the safety of personnel and/or clients, the clients will be notified that operations will be discontinued. When dust emissions are high due to dry weather, steps will be taken to reduce the amount of emissions by wetting access and ancillary roads. During wet conditions waste will not be tipped into accumulated precipitation to avoid compromising product quality.

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2.1.7 Final Disposition of Unacceptable Material:

Because of the possibility that hazardous material could be received at the site, the reclamation center will be considered a small quantity generator, as defined by the United States Environmental Protection Agency (EPA). Under these regulations, the site may accumulate between 100 and 1000 kilograms of hazardous material per month for a 90-day period. The owners plan to contract the transport and disposal of this material to licensed and qualified transporters and permitted treatment, storage and disposal facilities.

2.1.8 Final Disposition of By-pass Material:

By-pass material will be shipped as needed or when over 8,333 cubic yards is accumulated, to the on-site construction and demolition debris landfill associated with this application. In the event of a major disturbance to the on-site landfill, by-pass material will be shipped to Coble's Sandrock, as described in the Section (2.1.2).

2.1.9 Final Disposition of Recyclables:

|

(Continued on following page.)

2.2 Material Screening Plan:

2.2.1 Purpose:

The purpose of this plan is to comply with NCAC T15A.13B.0302(2). The key elements of the plan include:

- 1) Visual inspection of each load that enters the facility,
- 2) Records of all inspections,
- 3) Training of facility personnel to recognize regulated hazardous and unacceptable waste, including asbestos containing materials; and,
- 4) A contingency plan to properly manage any unacceptable wastes.

2.2.2 Procedure for Visual Inspections:

1) Initial visual inspections will begin as each truck unloads their shipment onto a concrete pad, and prior to the shipment being loaded onto the processing equipment. The truck and driver will be detained if unacceptable material is discovered during the unloading process.

2) The shipment will be spread with a Bobcat and/or hand tools as appropriate. Loads that include items such as large, closed containers will be hand-raked to avoid possible rupturing of the containers. Minimum safety equipment will include:

- Leather or Rubber gloves,
 - Safety boots,
 - Safety glasses,
 - Long handled hoe,
 - Hardhats,
 - Dust masks and,
 - Fire Extinguishers.
- 3) The Shipment will be examined for unacceptable and/or hazardous waste and safety hazards. Materials which are deemed unacceptable are detailed in Section 1.3

4) In the event that unacceptable wastes are found in a shipment, the appropriate actions are as follows:

- Hold suspect waste for identification by on-site personnel and, if necessary, confirmation by others such as a contract laboratory, hazardous waste management firm, or state and/or federal regulator,
- Interview driver and hauler to identify the source of suspect waste in the load,
- Hold rejected shipment for generator,
- Arrange for a hazardous or liquid waste collection by a licensed collector and,
- Properly clean the screening area to prevent contamination.

5) Document Actions:

- Record inspection results,
- Retain reports and,
- Report hazardous or unacceptable shipments to the Solid Waste Section – DENR

2.2.3 Record Keeping:

Report forms for record-keeping purposes are included in Appendix OP-1. These forms will be completed when unacceptable materials are observed. All reports and resulting correspondence will be maintained at the WCA of High Point, LLC, facility office..

2.3 Management Plan for Unacceptable Materials:

In the event that unacceptable material is unloaded on the processing pad, the entire shipment will immediately be isolated. The waste will be held until it can be shipped to a hazardous waste disposal unit. During the interim, the waste will be properly secured against unauthorized removal, segregated from all other operations and protected against inclement weather conditions. In addition, proper storage will be dictated by RCRA 40 CFR 264 (Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities) and other applicable regulations. It will be the hauler's responsibility to pay for the disposal of unacceptable materials. It will be the responsibility of the facility owner to contract the proper transport and disposal of the unacceptable material by qualified personnel.

2.4 Management Plan for By-pass Material:

By-pass material includes treated wood, roofing materials, dirt, carpet, wet drywall and other miscellaneous material. The by-pass material will be taken to the on-site landfill.

2.5 Management Plan for Recyclable/Reclaimable Material:

Reclaimable material will include clean wood, plastic, nonferrous metals, ferrous metals, drywall, cardboard, concrete, brick and asphalt. Clean wood products that have been deemed recyclable will be ground for shipment and then shipped as boiler fuel, furniture pressboard or mulch. Concrete and asphalt will be stored on-site and when quantities reach an appropriate level, a mobile crushing unit will be brought to the site for further processing. The crushed material will be stockpiled on site for use as road base material. Other reclaimable material will be shipped off-site as the quantities and market conditions reach an appropriate level.

2.6 Equipment Information:

2.6.1 Capability and Arrangement of Processing Equipment:

The system includes the following equipment or equivalent:

One 15 cubic yard feed hopper – Complete with variable speed hydraulic or electric motor. Hopper consists of an open feed hopper with heavy-duty 3-ply belt and spring loaded impact plate. The support frame and hopper sides will be engineered with heavy-duty materials designed for the C&D application.

One 56'x60" Incline Belt – Hydraulic or electric driven belt will carry material from the hopper to the screen. The feed section will consist of a heavy-duty impact plate to absorb impact of material from the hopper and high skirt boards with 35-degree troughing idlers to prevent spillage.

One 6x20 Step Deck Incline Screen with Punch Plate Screens – Screen box will be mounted in a support tower with walkways for access and maintenance. Approximate weight: 25,000 lbs.

One 4030 Conveyor – Hydraulic/electric powered radial stacking conveyor to stockpile fines from screen.

One 60"x100', 5 bay Elevated Picking Belt – Complete with 20' of transfer belt from screen and 80' of picking belt. Includes roof and walkway with 10-drop chutes for sorting. Safety rails and emergency stop cables included.

Portable Grizzly Grinding Mill (or equivalent) – Vertical grinder processes wood, rigid plastics, and other commodities to 4" minus.

The throughput capacity for the recycling equipment is 60 tons per hour. This would give the facility the ability to process approximately 480 tons during an eight-hour shift. A general schematic of the picking line is attached.

2.6.2 Loading Equipment:

1) Caterpillar 322 Hydraulic Excavator or equal: The primary function of this equipment will be to load material from the tipping area to the feed hopper.

Pertinent specifications of this equipment include:

- Maximum operating weight: 35,900 lbs.
- Gross diesel engine power: 102 HP
- Minimum bucket size: 0.48 cy
- Shipping length: 27' -9 ½"
- Shipping height: 9' -1 25/64"
- Maximum loading height is approximately 28'
- Track-based undercarriage

2) Caterpillar Wheel Loader 938 & 950 or equal: The primary function of this piece of equipment will be to push material on the tipping pad towards the excavator and presorted material away from the excavator. In addition, it will be used to load reclaimed and by-pass material on to receiving trucks to be shipped from the site.

Pertinent specifications of this equipment include:

- Maximum operating weight: 27,510 lbs.
- Gross diesel engine power: 137 HP
- Maximum shipping length with bucket: 24' – 5"
- Shipping height: 10' – 8"
- Maximum loading height is 16' -8"
- Wheel-based undercarriage

2.6.3 Other Equipment:

- 1) A mobile crushing unit will be brought on-site on an as needed basis for crushing concrete.
- 2) 330-gallon portable water tank: Provide water at various locations.

2.7 Fire Department Response:

A letter from the City of High Point's Fire Department concerning the ability of the department to respond to an emergency at the facility is included in the Construction Plan Application.

2.8 Asbestos Containing Materials Management:

The purpose of this section is to describe the asbestos awareness training, and handling of asbestos-containing materials (ACM's) that potentially are in the C&D waste stream when processing construction and demolition materials.

2.8.1 Awareness Training

All employees associated with C&D processing will undergo awareness training, and there will be an onsite employee/representative who will have completed an approved Contractor/Supervisor training class. The components of the processing employee's Asbestos Awareness Training shall include (1) types of asbestos, (2) health effects of asbestos, and (3) common uses in building materials. Onsite employees will also take annual refresher training courses.

2.8.2 Operations

Operation of the reclamation facility as related to management of ACM is outlined as follows:

- Upon receipt of waste, all trucks will be properly covered until such time that unloading is required.
- All incoming loads to the processing area will be examined by the pre-sort area employee.
- Initial visual inspection will occur when the vehicles dump their loads onto the waste receiving pad and pre-sort area.

- The pre-sort area employee will serve as the asbestos inspector whose duties include checking each load for possible asbestos containing materials.
- The equipment operator responsible for loading material from the processing area into the feed hopper will perform another visual inspection during the loading process.
- Appropriate facilities and operations will be in place to minimize dust. A hydrant and a hose bib are located at the processing area, and misters will be provided at the loading hopper.
- All screening employees will be provided protective breathing masks for use while processing/screening waste.
- Should suspected ACM be observed, the material will be immediately dampened until there is no visible dust and will then be covered or bagged and segregated from all activities. Even wetted, the suspected ACM should not be crushed, shredded or otherwise processed prior to transport for disposal,
- A licensed asbestos inspector will take a sample for analysis.
- Upon discovery of regulated asbestos, the reclamation facility will alter operations as necessary for the asbestos to be properly removed by a licensed company.
- The designated licensed company is Demolition & Asbestos Removal Inc. (DARI) located in Greensboro, NC.

2.9 Financial Assurances:

The facility proposes to use a financial assurance bond with a company acceptable to the State. This bond will be issued with the Division of Waste Management – Solid Waste Section as the benefactor for the purpose of remedial clean up at the site and will include the on-site landfill.

3.0 PHASE 2 EXPANSION

This section of the Operations Plan discusses the operation of the proposed Phase 2 disposal area of the WCA of High Point, LLC facility. The facility proposes to accept non-hazardous construction and demolition debris for disposal.

3.1 OPERATION DRAWINGS

3.1.1 Existing Conditions

WCA of High Point, LLC owns and operates the WCA of High Point C&D Landfill in Guilford County. Approximately 315 tons of C&D solid waste is managed daily at the site, which is located at 5830 Riverdale Drive; High Point, NC. Based on their experience at the facility, approximately 60% of the C&D waste brought to the facility will be reclaimed; the remaining 40% will be disposed of in the proposed Phase 2 Expansion. The facility began accepting waste in February 2001 and contains a 12.1-acre, active, unlined landfill (Phase 1).

On-site development consists of a C&D disposal area, a main entrance road, access roads, scale and scalehouse, recycling processing area, material storage area, and erosion and sediment control features. See Drawing OP-1 for an illustration of existing conditions at the site.

3.1.2 Proposed Phase 2

The Phase 2 disposal area described in the Engineering Plan consists of 9.4 acres immediately north and east of the active Phase 1 area. The Phase 2 area shall be filled using the area method. The initial waste placement area, transition contours, cell access, and final contours for Phase 2 are detailed on Drawing OP-2.

Uncontaminated stormwater will be collected and conveyed along the perimeter of the active cells to the existing sediment basin and proposed sediment trap(s) as shown on Drawing OP-3.

3.1.3 Proposed Future Development

Four additional phases of development for C&D solid waste disposal are proposed for the site. The proposed development is located in areas that have previously been designated as suitable for landfill development and has been described in more detail in the previously submitted Site Plan Application (Joyce Engineering, Inc, last revised April 2003). Development of subsequent phases (3 through 7) will progress west to east.

3.2 SITE OPERATION

3.2.1 Landfill Equipment

Operation and maintenance of the site will be the responsibility of the landfill operator. The minimum operations heavy equipment available to support landfill operations is as follows:

- Dozer
- Water truck
- Steel wheel compactor
- Track excavator
- Track loader
- Articulated on-site truck

Other equipment will be purchased or rented as required for the facility operations.

3.2.2 Dust, Odor, Vector and Litter Control

3.2.2a Dust Control

Dust will be controlled by wetting or placing stone in areas susceptible to dusty conditions. Oil cannot be used for dust control.

3.2.2b Odor and Vector Control

Odors and disease vectors will be controlled in order to protect human health and the environment by minimizing the working face size and by the use of weekly cover. Cover requirements are described in more detail in Section 3.5.3 of this plan.

3.2.2c Litter Control

Prompt compaction of waste at the working face is the primary method used to control blowing litter. Temporary fencing and/or diking may be provided to contain windblown waste during operations. In addition, windblown material resulting from the operation shall be collected and disposed of properly by the owner and operator at the conclusion of each operating day.

3.2.3 Fire Control

Incoming waste loads shall be observed by site operators for evidence of fire, such as flames, smoke, or the odor of burning material. Burning loads will be extinguished before dumping, if possible. If there is evidence of fire in the landfill itself, the landfill operator will be notified immediately. If possible, the waste will be removed or segregated from other waste in the disposal area. The landfill operator will evaluate the situation to determine whether the fire can be extinguished using fire extinguishers or equipment present at the site, or if off-site equipment will be needed. If necessary, the local fire department will be called to render assistance in extinguishing the fire. Pinecroft

Sedgefield Fire Station No. 22 services the fire district surrounding the site and has been contacted regarding the potential need for assistance at the facility.

If there is a fire or explosion at the landfill, the operator must notify the Division of Solid Waste Management and report whether the fire has been controlled and what (if any) environmental damage may have occurred. The Division of Waste Management Rule .0542(i)(4) requires that fires or explosions that occur at the landfill be reported verbally to the Division within 24 hours and in writing within 15 days. Written notification shall include the suspected cause of fire or explosion, the response taken to manage the incident, and the action(s) to be taken to prevent the future occurrence of fire.

Fire extinguishers shall be located on each piece of equipment on site. Equipment operators shall be trained in the use of these extinguishers. Fire extinguishers will be used for small, localized fires. A stockpile of soil shall be maintained near the working face to be used for extinguishing small surface fires that may be too large to control with the fire extinguishers carried on the landfill equipment.

Emergency equipment will be called in the case of fires too large to be extinguished with fire extinguishers or soil as described above. Water contained in the sedimentation ponds or inactive borrow areas can be used in an emergency to aid local firefighters in extinguishing large fires.

3.2.4 Open Burning

Open burning of solid waste, except for the approved burning of land clearing debris generated on-site or debris from emergency clean-up operations is prohibited. (See Division of Waste Management Rule .0542(i)(2).) No instance of such burning may be undertaken without prior approval from the Division.

3.2.5 Scavenging/Salvaging

The unauthorized removal of waste and scavenging at the landfill is prohibited by Rule .0542(j)(8). Removal of recyclable or reusable items may be authorized by the Division when recovery of such items can be accomplished with no risk to landfill staff or the general public and must be completed prior to disposal on the working face. No removal/scavenging of recyclable or reusable items will be permitted from the working face.

3.3 WASTE ACCEPTANCE AND DISPOSAL REQUIREMENTS

The WCA of High Point C&D Landfill shall only accept those solid wastes which it is permitted to receive. The landfill owner or operator shall notify the Division within 24 hours of attempted disposal of any waste the landfill is not permitted to receive, including waste from outside the area the landfill is permitted to serve. Wastes which may be disposed of at the facility as well as prohibited wastes are detailed in Section 1.3 above. The landfill waste screening program is described as follows.

3.3.1 Waste Screening Program

WCA of High Point has developed a waste screening program in accordance with North Carolina's Solid Waste Management Regulations, Rule .0544(e). This Rule states that owners/operators of a

C&D Landfill must implement a program at the facility for detecting and preventing the disposal of industrial, hazardous, liquid, municipal solid waste and excluded wastes, except as specifically authorized by the effective facility permit or by the Operating Plan. This program shall include, at a minimum:

- Random inspections of incoming loads or other comparable procedures;
- Records of any inspections;
- Training of facility personnel to recognize industrial, hazardous, liquid, municipal and excluded waste; and
- Development of a contingency plan to properly manage any identified industrial, hazardous, liquid, municipal or excluded waste. The plan must address identification, removal, storage and final disposition of the waste.

3.3.1a Random Selection

Random inspection of vehicles will be conducted on a regular basis. The selection must be at least one vehicle per week, but not less than one percent by weight of the waste stream based on the previous week's total. The personnel conducting the inspection will randomly select the load at the working face of the landfill; the inspection will be completed in a designated area near the working face. A random truck and time will be selected (e.g., the second load after 8:00 a.m.) on the day of inspections.

3.3.1b Record Keeping

Results of random inspections shall be recorded; sample report forms are included in Appendix OP-1. One form shall be completed for each inspection. All reports and resulting correspondence are to be maintained at the WCA of High Point C&D Landfill office for the life of the landfill and during the post-closure period. The presence of any industrial, hazardous, liquid, municipal solid waste or otherwise prohibited wastes identified during random inspections shall be reported to DENR Solid Waste Section.

3.3.1c Training

Inspections will be carried out and supervised by landfill staff trained to identify and manage hazardous and liquid waste.

3.3.1d Random Waste Inspection

The following action plan required by Rule .0544(e)(4) details the procedure for conducting random waste inspections.

- Stop the selected vehicle prior to the working face of the landfill.
- Notify the driver of the inspection.

- Direct the vehicle to the inspection area. The inspection area may be either a permanently designated location or a temporary location adjacent to the working face.
- If possible, perform a visual observation of the waste prior to unloading. If unauthorized waste is observed, or suspected, the vehicle shall be prohibited from unloading, and shall be directed out of the facility.
- If no unauthorized waste is observed or suspected from the visual observation, or if a visual observation is not possible, the vehicle shall discharge the load at the inspection area. The driver shall remain at the inspection area while the inspection is performed, unless a safety concern requires evacuation of the area. Equipment shall spread and turn the waste to facilitate a visual observation of the load contents. If no unauthorized waste is identified, the waste shall be transferred to the working face for disposal.
- If unauthorized waste is identified in the load, and the unauthorized waste is not a regulated hazardous waste, a regulated medical waste, a regulated toxic waste, a regulated nuclear waste, or a waste which requires special handling, the waste shall be loaded back into the vehicle and removed from the facility.
- If acceptability of the waste cannot be determined by visual observation, the waste can either be rejected and loaded back into the vehicle and removed from the facility, or samples of the waste can be taken to determine acceptability. Testing shall be selected based on the reason for the suspicion of unacceptability.
- Unauthorized wastes suspected of being a regulated hazardous waste, a regulated medical waste, a regulated toxic waste, or a regulated nuclear waste shall be managed in accordance with all applicable federal, state and local regulations. WCA will contact the Guilford County HAZMAT by calling 911. Response personnel shall have all appropriate licenses and/or certifications and will respond within 24 hours.
- Should suspected ACM be observed, the material will be immediately dampened until there is no visible dust and will then be covered or bagged and segregated from all activities. A licensed asbestos inspector will take a sample for analysis. If regulated asbestos is discovered, the landfill will alter operations as necessary for the asbestos to be properly removed by a licensed company (The designated licensed company is Demolition & Asbestos Removal Inc. (DARI) located in Greensboro, NC.)

3.4 ANNUAL REPORT

In accordance with NCGS 130A-309.09D, on or before August 1 of each year, WCA of High Point will report to the Solid Waste Section the amount of waste received in tons at this facility and disposed in the landfill units. Data will be transmitted on forms prescribed by the Section. The reporting period shall be for the previous year beginning July 1 and ending on June 30 and shall detail the amount of waste received and disposed in the landfill in tons, compiled on a monthly basis by county or transfer station of origin and by specific waste type if diverted to a specific unit within the

permitted facility. The completed report shall be forwarded to the Regional Waste Management Specialist for the facility.

3.5 WASTE PLACEMENT

3.5.1 Cell Progression

The Phase 2 area will be filled using the area method in general accordance with the Annual Phasing Plan (Drawing OP-2).

Uncontaminated stormwater will be collected and removed along the western portion of the active cells as shown on Drawing OP-3. Stormwater will be diverted or pumped from the collection area into the stormwater channels that convey flow into the sediment basin or sediment traps that support the facility.

3.5.2 Waste Placement and Compaction

Solid wastes will be tipped as closely as possible to the working face of landfill, then spread. The size (length and width) of the working face will vary depending on the rate of waste acceptance on a given day, weather conditions and other factors, but will be maintained as small as possible. Compactors will be used to maximize in-place waste density by compacting wastes in thin flat lifts, typically less than ten (10) feet thick.

Previous estimates have determined that the approximate in-place density of waste and soil achieved at the site is approximately 1,300 pounds per cubic yard. The waste density calculation will be reviewed periodically, and operational procedures may be revised to improve the efficiency of the site.

3.5.3 Cover Material

3.5.3a Weekly Cover

As required by Rule .0542(f), the owners or operators of all C&D Landfills must cover disposed solid waste with either six (6) inches of earthen material or an approved alternate daily cover when the waste disposal area exceeds one-half acre and at least once weekly. Cover shall be placed at more frequent intervals if necessary to control disease vectors, fires, odors, blowing litter, and scavenging. A notation of the date and time of the cover placement shall be recorded in the operating record as specified in Rule .0542(n).

3.5.3b Intermediate Cover

Areas which will not have additional wastes placed on them for three (3) months or more, but where final termination of disposal operations has not occurred, shall be covered and stabilized with vegetative ground cover or other stabilizing material as approved by the Division as specified in Rule .0542(f)(2).

3.5.4 Alternate Cover

Alternative materials of an alternative thickness (other than at least six inches of earthen material) may be approved by the Division if the owner or operator demonstrates that the alternative material and thickness control disease vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment.

Proposed alternate cover includes 'fines' from WCA of High Point's material recovery facility (operations described in Section 2.0) for alternate weekly cover. These fines are a material generated during processing of C&D material and are largely composed of soil and minor fractions of the C&D waste stream. In addition, WCA of High Point proposes to use mulch mixed with soil as an alternate weekly cover. If a mixture of mulch and soil is used as an alternate cover, the mulch content of the weekly cover shall not exceed fifty percent (50%).

3.6 EROSION AND SEDIMENT CONTROL

Erosion and sediment will be controlled on the site to prevent the discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act. This includes, but is not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements, Section 402. In addition, the site shall not cause the discharge of nonpoint sources of pollution to waters of the United States, including wetlands, that violates any requirement of an area-wide or State-wide water quality management plan that has been approved under Section 208 or 319 of the Clean Water Act, as amended. Surface water shall be diverted from the operational area and shall not be impounded over or in waste.

All vegetative and structural erosion and sediment control practices have been designed to prevent excessive on-site erosion and to control sediment from leaving the facility. All sediment control devices shall be constructed and maintained according to the North Carolina Erosion and Sediment Control Planning and Design Manual. A copy of the *WCA of High Point C&D Landfill, Phase 2 Expansion, Erosion and Sediment Control Plan* has been prepared and sent to the Land Quality Section for approval. A copy of the Plan is included as Appendix EP-4 of the Engineering Plan, with drainage structures, slope drains, diversion berms and other pertinent details shown on drawings EP-4 and EP-8 through EP-10.

3.7 Environmental Monitoring PLANS

Rule .0544 requires preparation of a Monitoring Plan which addresses groundwater monitoring, surface water monitoring, landfill gas monitoring, and waste acceptability program. The Monitoring Plan consists of individual plans discussed as follows:

3.7.1 Groundwater Monitoring Plan

A Groundwater Monitoring Plan, including information on the proposed ground-water monitoring system(s), sampling and analysis requirements, and detection monitoring requirements that fulfills the requirements of Part (1)(A) through (1)(E) of Rule .0544(b) is included as Appendix OP-3 of this Plan and as the *WCA of High Point C&D Landfill Water Quality Monitoring Plan*, Appendix DH-E of the *Design Hydrogeologic Report*, prepared for the Phase 2 Expansion.

3.7.2 Surface Water Monitoring Plan

A Surface Water Monitoring Plan has been designed to detect the effects of the facility on surface water in the area in general accordance with Rule .0544(c). This plan is included as Appendix OP-4 of this Plan and as the WCA of High Point C&D Landfill *Water Quality Monitoring Plan*, Appendix DH-E of the *Design Hydrogeologic Report*, prepared for the Phase 2 Expansion.

3.7.3 Landfill Gas Control Plan

Landfill gas is a by-product from the decomposition of organic waste in a landfill. To protect public health and safety in the vicinity of the landfill, landfill gas produced by the decomposition of C&D waste will be controlled and monitored during the operational, closure, and post-closure periods. A gas management plan, including gas monitoring, will be implemented for the purpose of maintaining the concentration of methane gas below the following regulatory levels:

- 1) The concentration of methane gas generated is not to exceed 25 percent of the lower explosive limit (LEL) for methane in on-site structures (excluding gas control or recovery system components);
- 2) The concentration of methane gas is not to exceed the LEL for methane at the facility property boundary; and
- 3) The facility does not release methane gas or other explosive gasses in any concentration that can be detected in off-site structures.

The landfill gas management plan is currently proposed to include monitoring and passive gas vents in the landfill. Remedial measures will be implemented as required to mitigate a potential gas migration problem.

3.7.3a General

Landfill gas monitoring at the WCA of High Point C&D Landfill will be performed during the active life of the landfill and throughout the post-closure care period. At a minimum, quarterly monitoring will be conducted at all subsurface gas detection probes and in all structures located on the landfill property.

Gas detection probes will be installed on the site as shown on Drawing No. EP-5; additional probes shall be installed as additional phases are constructed. Gas detection probes will be installed to a depth at least equal to the maximum depth of waste in the area of the monitoring point or the water table, whichever is encountered first. Probe locations will likely be field engineered due to varying topography adjacent to expansion areas that may limit access with a drill rig. A gas detection probe detail can be found on Drawing No. EP-7. Construction records for the gas probes will be submitted to the Division upon completion.

Passive landfill gas vents will be installed along with the final cover system to allow release of gas to the atmosphere. These vents will be installed at a density of approximately one per two acres of cap surface area. A construction detail of these vents is included on Drawing No. EP-7.

3.7.3b Landfill Gas Monitoring Procedure

Record Keeping: The operator will record the date, time, location, sampling personnel, atmospheric temperature, reported barometric pressure, and general weather conditions at the time of sampling, in addition to the concentration of combustible gases (See Boundary Gas Probe Monitoring Log, Appendix OP-2). The records will be maintained in the landfill operating record.

On-site Structures: Gas monitoring in on-site structures will be conducted during regular quarterly monitoring events at the earliest possible time after the structure has been unused (e.g., morning). The monitoring locations will be in corners along floors and ceilings, at cracks in the floor, and at other areas likely to accumulate gas. Gas monitoring will also be conducted in any confined space requiring the entry of personnel for maintenance or inspection. The monitoring will take place prior to entry by personnel, and entry into confined spaces will be conducted in accordance with OSHA's confined space entry regulations.

Gas Detection Probes: Gas monitoring in detection probes will consist of attaching the monitor to each tubing within the probes, and recording both the initial concentration and steady state concentration of combustible gases. Solid Waste Association of North America (SWANA) guidelines for purging wells and other monitoring procedures will be followed.

Equipment: A portable combustible gas monitor, measuring the concentration of combustible gases in units of percent of lower explosive limit, shall be used to conduct gas monitoring. Lower explosive limit (LEL) means the lowest percent by volume of a mixture of combustible gas in air that will propagate a flame at 25 degrees Celsius and atmospheric pressure. The gas monitor shall be calibrated to methane using the manufacturer's calibration kit and procedure before the monitoring activities begin.

3.7.3c Response to Landfill Gas Exceedances

The regulatory maximum levels for methane gas are the LEL at the facility boundary and 25% LEL in on-site structures. At a minimum, the following actions will be taken if methane gas levels exceed those standards:

- Immediate steps necessary to protect human health will be identified and implemented. If the standard in structures is exceeded, these will include:
- Elimination of smoking materials and all ignition sources;
- Evacuation of all personnel;
- Ventilation of the structure;
- Personnel will not be allowed to reenter the building except to perform gas monitoring until the results of additional monitoring indicate that methane concentrations are stabilized below 25% LEL; and
- Assess the origin and pathways of the gas migration.
- The Solid Waste Section will be notified immediately;

Within seven days of detection, the monitoring results will be placed in the Operating Record and WCA of High Point will indicate actions taken and actions proposed to resolve the problem. Within 60 days of detection, WCA of High Point will develop and implement a landfill gas remediation plan

for the combustible gas releases and notify the Division that the plan has been implemented. The plan will describe the nature and extent of the problem and the proposed remedy, and, if required, a copy of the Plan will be placed in the facility Operating Record.

3.8 SURVEY FOR COMPLIANCE

Within 60 days of the permittee's receipt of the Division's written request and as may be required by Rule .0542(m), WCA of High Point shall conduct a survey of active or closed portions of unit or units at the facility in order to determine whether operations are being conducted in accordance with the approved design and operational plans. The permittee shall report the results of such survey, including a map produced by the survey, to the Division within 90 days of receipt of the Division's request. The survey shall be performed by a registered land surveyor duly authorized under North Carolina law to conduct such activities.

The survey may be required by the Division:

- 1) If there is reason to believe that operations are being conducted in a manner that deviates from the plan listed in the effective permit, or
- 2) As a verification that operations are being conducted in accordance with the plan listed in the effective permit.

4.0 RECORDKEEPING REQUIREMENTS

The owner and operator of a C&D Landfill shall record and retain at the facility, or in an alternative location near the facility approved by the Division, in an operating record the following information which shall be furnished to the Division according to the permit or upon request, or be made available for inspection by the Division:

- Records of random waste inspections, monitoring results, certifications of training, and training procedures required by Rule .0544 and Sections 2.3 and 3.3 of this Plan;
- Amounts by weight of solid waste received at the facility to include, County or transfer station of generation, consistent with NCGS 130A-309.09D and as required by Section 3.4 of this Plan;
- Any demonstration, certification, finding, monitoring, testing, or analytical data required by Rules .0544 through .0545 and the facility *Water Quality Monitoring Plan*;
- Any closure or post-closure monitoring, testing, or analytical data as required by Rule .0543 and the facility *Closure/Post-Closure Care Plan*;
- Any cost estimates and financial assurance documentation required by Rule .0546;
- Notation of date and time of placement of cover material; and
- All audit records, compliance records and inspection reports.

The operating record shall also include:

- A copy of the approved operation plan required by 15A NCAC 13B .0542 and the engineering plan required by Rule .0539 of this Section;
- A copy of the current Permit to Construct and Permit to Operate; and
- The Monitoring Plan, in accordance with Rule .0544 of this Section, included as appendices to the Operation Plan

(end.)

CLOSURE/POST CLOSURE CARE PLAN

**WCA OF HIGH POINT
CONSTRUCTION AND DEMOLITION LANDFILL
PHASE 2 EXPANSION
PERMIT NO. 41-16
GUILFORD COUNTY, NORTH CAROLINA**

Prepared for:



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**CLOSURE/POST CLOSURE PLAN
WCA OF HIGH POINT C&D LANDFILL
CONSTRUCTION AND DEMOLITION LANDFILL**

TABLE OF CONTENTS

Table of Contents i

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION	1
2.0 CAP DESIGN	1
3.0 CAP STABILITY	2
3.1 Stability	2
3.2 Settlement	2
3.3 Freeze Thaw	2
3.4 Inspection	2
4.0 WASTE VOLUME	2
5.0 CLOSURE	3
5.1 Closure Schedule	3
5.2 Certification.....	3
5.3 Recordation	4
5.4 Closure Cost Estimate	4
6.0 POST-CLOSURE ACTIVITIES	4
6.1 Contact	4
6.2 Post-Closure Maintenance.....	4
6.3 Inspection Plan	4
6.4 Cap System Integrity	5
6.5 Monitoring Plan.....	5
6.5.1 Groundwater Monitoring Plan	5
6.5.2 Surface Water Monitoring Plan.....	5
6.5.3 Gas Monitoring Plan	5
6.6 Post Closure Land Use	6
6.7 Post Closure Care Costs	6
6.8 Completion of Post Closure Care	6

APPENDICES

APPENDIX CP-1	Cap Details
APPENDIX CP-2	Waste Inventory Estimates
APPENDIX CP-3	Closure Cost Estimate
APPENDIX CP-4	Post-Closure Inspection Forms
APPENDIX CP-5	Post Closure Care Cost Estimate
	Golder Associates NC Inc

1.0 INTRODUCTION

Pursuant to the North Carolina Solid Waste Management Rules (15A NCAC 13B), this Closure and Post-Closure Plan is submitted as part of the permit amendment application to construct Phase 2 of the WCA of High Point C&D Landfill in Guilford County, North Carolina.

The permitted WCA of High Point C&D Landfill encompasses approximately 154 acres, 49.2 of which are approved for unlined capacity by the Solid Waste Section of North Carolina (Division). The approved lined capacity acreage has been subdivided into seven (7) five-year Phases. The facility is currently operating in Phase 1. Construction of Phase 1 was completed in phases; construction of the last cell of Phase 1 was completed on April 2006.

The facility will be closed in accordance with the requirements of Rule .0543 of the North Carolina Solid Waste Management Rules (15A NCAC 13 B). The facility may be capped in one construction event or in phases as described below.

2.0 CAP DESIGN

The proposed closure cap has been designed to minimize infiltration and erosion. Components of the proposed closure cap are discussed as follows. Cross sectional details of the proposed cap and the alternate cap are provided on Drawing No. EP-7 (see Appendix CP-1)

Intermediate Cover: On-site soils will be used to provide a minimum 12 inches of intermediate cover over landfilled materials and a base for cap construction.

Passive Gas Vents – Passive gas vents will be installed at a frequency of one per two acres of cap. A typical passive gas vent is detailed on Drawing No. EP-7. Passive venting of landfill gas will protect the integrity of the cap by preventing excessive pressure buildup beneath the cap.

Gas Migration Layer – A geonet composite will be installed between the intermediate cover and the overlying infiltration layer. The geonet composite will provide a pathway for accumulated gas to move laterally and then upward through the vents at the landfill surface.

Infiltration Barrier: The infiltration layer is proposed to consist of either (1) 18 inches of compacted soil with a permeability no greater than 1×10^{-5} cm/sec, or (2) a 40-mil FML cap (alternate cap). This layer will be constructed over the geonet composite that will serve as the gas migration layer. In the case of soil, the permeability requirement will be achieved using laboratory test data for borrow soil material, and construction specifications developed prior to construction. Installation and testing requirements for the infiltration barrier are provided in the Specifications and the CQA Plan.

Drainage Layer: A geomembrane cap is proposed as an alternate to a soil cap. If the geomembrane alternate is used, a geosynthetic drainage layer consisting of a geonet and geotextile composite will be placed over the geomembrane to promote drainage.

Erosion Layer: The erosion layer will consist of a minimum eighteen (18) inches of moderately compacted soil. The final six inches of material will consist of topsoil or organically amended soil capable of sustaining native plant growth.

Vegetation - After placement of the erosion layer, the area will be seeded. Seeding will be accomplished in accordance with the "North Carolina Erosion and Sediment Control Planning and Design Manual", and recommendations from the Cooperative Extension Office. Mulch and erosion matting will be used as needed to control erosion and promote vegetative growth. The vegetative cover will be inspected regularly. Areas found to be sparsely covered will be revegetated.

3.0 CAP STABILITY

Stability of the final cover system will be affected by material selection, settlement, and freeze thaw and is discussed below:

3.1 Stability

Stability of the proposed cap and alternate cap was evaluated as discussed in the Engineering Plan. The proposed design was found to be stable at slopes as steep as 3 Horizontal to 1 Vertical (3H:1V).

3.2 Settlement

Non-uniform settlement can be expected over the entire waste footprint. The primary mechanism of settlement is waste consolidation due to decomposition of the landfilled material. According to Daniel, et al, long-term settlement is typically 5 to 15 percent over 20 to 30 years; however, the majority of this settlement (approximately 5%) is expected to occur in the first few months following waste placement. Post settlement slopes have been designed to be a minimum of five percent.

3.3 Freeze Thaw

Based on a published map of frost depths throughout the United States (EPA, November 1993: A530-R-93-017), the anticipated maximum depth of freeze/thaw effects on the site is less than or equal to 18 inches. Since the thickness of erosion layer is a minimum of 18 inches, freeze/thaw is not expected to affect the performance of the proposed cap or alternate cap.

3.4 Inspection

Quarterly inspections of the final cover will be conducted to look for areas of the cap that might be damaged. Should these inspections indicate problem areas, (ponding, erosion rills, cap displacement, etc.), repairs will be initiated as soon as practical.

4.0 WASTE VOLUME

The total footprint of Phase 1 is 12.1 acres. The total airspace of Phase 1 has been estimated as 797,243 cubic yards. An estimate of the total airspace in Phase 2 is 907,155 cubic yards. After allowing for daily/intermediate cover, cap and soil protective cover, an estimated total of 1,466,551 cubic yards of waste will have been disposed of at the facility. Supporting calculations are included in Appendix CP-2. The calculation is based on the volume between proposed top of base grades and final grades, and assumptions regarding the density of waste and cover soil in the fill.

5.0 CLOSURE

5.1 Closure Schedule

Prior to beginning closure of any portion of the facility, WCA of High Point will notify the Division that a notice of intent to close the facility or portion of the facility has been placed in the operating record.

WCA of High Point shall begin closure activities of each C&D landfill (LF) unit as required by Rule .0543(c)(5) no later than 30 days after the date on which the C&DLF unit receives the known final receipt of wastes, no later than 30 days after the date that a 10 acre or greater area of waste is within 15 feet of design grades, or no later than one year after the most recent receipt of wastes, if the C&DLF unit has remaining capacity. Extensions beyond the deadline for beginning closure may be granted by the Division if the owner or operator demonstrates that the portion of the C&DLF unit has the capacity to receive additional wastes and the owner and operator has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the unclosed C&DLF unit.

WCA of High Point shall complete closure activities of each C&DLF unit in accordance with this Plan within 180 days following the beginning of closure as specified above. Extensions of the closure period may be granted by the Division if the owner or operator demonstrates that closure will, if necessary, take longer than 180 days and that they will continue to take all steps necessary to prevent threats to human health and the environment from the unclosed C&DLF unit.

An itemized list of closure activities and a proposed schedule follow.

Activity	Proposed Timeframe (in days following last receipt of waste)
Grade Intermediate Cover	0 - 30
Survey	15 - 45
Place Cap	45 - 135
Place Erosion Layer	75 - 150
Seeding (Permanent)*	100 - 180
Prepare and Submit Closure Certification	150-210

*Depending on the time of year, permanent seeding may need to be delayed up to three months. In that event, temporary seeding shall be placed within the specified time frame.

5.2 Certification

Following closure of each unit or portions of units, the owner and operator shall notify the Division that a certification, signed by the project engineer verifying that closure has been completed in accordance with the closure plan, has been placed in the operating record. This Certification will state that the site was closed in accordance with the Closure Plan and applicable solid waste regulations and laws as required by Rule .0543(c)(7).

5.3 Recordation

Following closure of all C&DLF units, the owner and operator shall record a notation on the landfill facility property deed, or some other instrument that is normally examined during a title search, and notify the Division that the notation has been recorded and a copy has been placed in the operating record. The notation on the deed shall in perpetuity notify any potential purchaser of the property that the land has been used as a C&DLF unit or facility and its use is restricted under the Closure Plan as required by Rule .0543(c)(8).

5.4 Closure Cost Estimate

An estimate of closure costs is provided in Appendix CP-3. All costs are given in 2006 dollars.

6.0 POST-CLOSURE ACTIVITIES

Post-closure activities will be conducted at the landfill in accordance with Rule .0543 for a period of 30 years following closure of the landfill. The Division may decrease the length of the post-closure period if the owner or operator demonstrates that the reduced period is sufficient to protect human health and the environment, and the Division approves this demonstration. The period might be increased by the Division if the Division determines that the lengthened period is necessary to protect human health and the environment.

6.1 Contact

The person responsible for the facility during the post-closure care period is:

Site Manager
5830 Riverdale Drive;
Jamestown, North Carolina 27282
336.886.3560

6.2 Post-Closure Maintenance

Post-closure maintenance and monitoring will be conducted at the WCA of High Point C&D Landfill for a period of 30 years after final closure. Monitoring will include semi-annual sampling of groundwater and surface water, quarterly gas monitoring and quarterly inspection of the final cover and monitoring and control systems. Maintenance needs identified through the monitoring program will be initiated no later than 60 days after the discovery, and within 24 hours if a danger or eminent threat to human health or the environment is indicated.

6.3 Inspection Plan

Routine inspections will be conducted throughout the post-closure care period. These inspections will be carried out quarterly unless problems are detected that indicate that more frequent visits are warranted. Potential impacts to the public and environment will be considered in determining the inspection frequency. Items to be included in the monthly inspection will be as follows:

- Access and security control;
- Cap System;

- Stormwater management;
- Erosion and sediment control;
- Gas management;
- Groundwater and landfill gas monitoring systems;
- Integrity of site benchmarks; and
- Vector control.

Sample inspection forms that can be used during each inspection are included as Appendix CP-4. Completed copies of the inspection forms will be kept by the owner, and copies will be forwarded to the Division for its records.

6.4 Cap System Integrity

WCA of High Point shall maintain the integrity and effectiveness of any and all cap systems including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the cap system.

6.5 Monitoring Plan

Rule .0544 requires preparation of a Monitoring Plan which addresses groundwater monitoring, surface water monitoring, landfill gas monitoring, and waste acceptability program. The Monitoring Plan has been broken into several separate plans which are discussed as follows.

6.5.1 Groundwater Monitoring Plan

A Groundwater Monitoring Plan, including information on the proposed ground-water monitoring system(s), sampling and analysis requirements, and detection monitoring requirements that fulfills the requirements of Part (1)(A) through (1)(E) of Rule .0544(b) has been prepared. This plan is included as the WCA of High Point C&D Landfill *Water Quality Monitoring Plan*, Appendix DH-E of the *Design Hydrogeologic Report*, prepared for the Phase 2 Expansion. Groundwater monitoring shall continue throughout the Post-closure period in accordance with the approved Plan.

6.5.2 Surface Water Monitoring Plan

A Surface Water Monitoring Plan has been designed to detect the effects of the facility on surface water in the area in general accordance with Rule .0544(c). This plan is included as the WCA of High Point C&D Landfill *Water Quality Monitoring Plan*, Appendix DH-E of the *Design Hydrogeologic Report*, prepared for the Phase 2 Expansion. Surface Water monitoring shall continue throughout the Post-closure period in accordance with the approved Plan.

6.5.3 Gas Monitoring Plan

A Gas Control Plan is included as Section 3.7.3 of the facility *Operations Plan*. Landfill Gas monitoring shall continue throughout the Post-closure period in accordance with the approved Plan.

6.6 Post Closure Land Use

The primary land use for the site after closure of the landfill will be open dormant green space. Limited passive recreational uses may be proposed at a later time. Post-closure use of the property shall not disturb the integrity of the cap system, base liner system, or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in the Solid Waste Management Rules. The Division may approve disturbance if the owner or operator demonstrated that disturbance of the cap system, base liner system, or other component of the containment system, including removal of waste, will not increase the potential threat to human health or the environment.

6.7 Post Closure Care Costs

An estimate of post-closure care costs is provided in Appendix CP-5. All costs are given in 2008 dollars.

6.8 Completion of Post Closure Care

Following completion of the post-closure care period for the facility, WCA of High Point shall notify the Division that a certification, signed by a registered professional engineer licensed in the state of North Carolina, verifying that post-closure care has been completed in accordance with the post-closure plan, has been placed in the operating record.

(end)

Facility Name: WCA of High Point C&D Landfill
Phase 2 Expansion
 Permit No.: 41 - 16
 Facility Address: 5830 Riverdale Drive
Jamestown, North Carolina 27282
 Facility Owner: WCA of High Point, LLC

Date: 11/11/08
 Calculated By: CDH
 Reviewed By: SKS
 Revision No.: 1
 Project No.: 063-6526
 Phase No.: 101



CLOSURE COSTS:

I. Native Soil for Slope and Fill (Site Preparation)

	Notes & Guidance Values	
a. Area to be capped	<u>21.5</u> acre	22 acre
b. Unit cost for recompacting and grading	<u>500</u> / acre	500.00 / acre
c. Cost for recompacting and grading	(a x b)	\$10,750
d. Unit cost for subgrade preparation	<u>500</u> / acre	500.00 / acre
e. Cost for subgrade preparation	(a x d)	\$10,750.00 /yd ³
f. Total native soil cost	(c + e)	<u>\$21,500.00</u>

II. Topsoil

a. Area to be capped	<u>21.5</u> acres x 4840 yd ² /acre =	104,060 yd ²
b. Depth of topsoil needed	<u>6</u> inches x 1 yd ³ /36 inches =	0.17 yd
c. Quantity of topsoil needed	(a x b)	17,343 yd ³
d. Percentage of soil from off-site	0	0%
e. Excavation unit cost (on-site material)	\$3.25	\$3.25 /yd ³
f. Purchase unit cost (off-site material)	-	- /yd ³
g. Delivery Cost (off-site material)	\$8.00/yd ³ for 5 mil RT	\$8.00 /yd ³
h. Placement/Spreading unit cost	included in e.	included in e. /yd ³
i. Compaction unit cost	included in e.	included in e. /yd ³
j. Total on-site topsoil unit cost	(e + h + i)	\$3.25 /yd ³
k. Total off-site topsoil unit cost	(f + g + h + i)	- /yd ³
l. Total on-site topsoil cost	[j x (1-d) x c]	\$56,366
m. Total off-site topsoil cost	(k x d x k)	\$0
n. Percent compaction	10%	10%
o. Total topsoil cost	(l + m) * (1 + n)	<u>\$62,002.42</u>

III. Drainage Layer

a. Area to be capped	acres x 4840 yd ² /acre =	0 yd ²
b. Depth of sand or gravel needed	inches x 1 yd ³ /36 inches =	0.00 yd
c. Quantity of sand or gravel needed	(a x b)	0 yd ³
d. Purchase unit cost	\$6.90	\$6.90 /yd ³
e. Delivery cost (for off-site material)	\$7.85/yd ³ for 10 mil RT	\$7.85 /yd ³
f. Spreading unit cost	\$1.39	\$1.39 /yd ³
g. Compaction unit cost	\$0.12	\$0.12 /yd ³
h. Percent compaction	sand = 10%, gravel = 5%	10 %
i. Total drainage layer unit cost	(d + e + f + g)	\$16.26 /yd ³
j. Total drainage layer cost	[c x i x (1+h)]	<u>\$0.00</u>

IV. On-Site Clay

a. Area to be capped	<u>0.0</u> acres x 4840 yd ² /acre =	0 yd ²
b. Depth of clay needed	<u>18</u> inches x 1 yd ³ /36 inches =	0.50 yd
c. Quantity of clay needed	(a x b)	0 yd ³
d. Excavation unit cost	\$2.50	\$2.50 /yd ³
e. Placement/Spreading unit cost	\$1.25	\$1.25 /yd ³
f. Compaction unit cost	\$0.85	\$0.85 /yd ³
g. Total on-site clay unit cost	(d + e + f + g)	\$4.60 /yd ³
h. Percent compaction	25%	25 %
i. Total on-site clay cost	[c x g x (1 + h)]	<u>\$0.00</u>

V. Off-Site Clay

a. Area to be capped (1acre=4840yd ²)	acres x 4840 yd ² /acre =	0 yd ²
b. Depth of clay needed (6" = 0.16 yd)	inches x 1 yd ³ /36 inches =	0.00 yd
c. Quantity of clay needed (a x b)	(a x b)	0 yd ³
d. Purchase unit cost	\$5.35	\$5.35 /yd ³
e. Delivery cost (for off-site material)	\$7.85/yd ³ for 10 mil RT	\$7.85 /yd ³
f. Spreading unit cost	\$1.39	\$1.39 /yd ³
g. Compaction unit cost	\$0.82	\$0.82 /yd ³
h. Total off-site clay unit cost	(d + e + f + g)	\$15.41 /yd ³
i. Percent compaction	25%	25 %
j. Total off-site clay cost	[c x h x (1 + i)]	<u>\$0.00</u>

VI. Drainage Pipe

a. Length of pipe needed	5900	5900 LF
b. Pipe unit cost	\$25.00	\$25.00 /LF
c. Trenching and backfilling cost	\$8.00	\$8.00 /LF
d. Total drainage pipe unit cost	(b + c)	\$33.00 /LF
e. Total drainage pipe cost	(a x d)	<u>\$194,700.00</u>

VII. Synthetic Membrane

a. Area to be capped with FML	<u>21.5</u> acres x 43560 ft ² /acre =	936,540 ft ²
b. Purchase unit cost	\$0.29	\$0.29 /ft ²
c. Taxes unit cost	\$0.02	\$0.02 /ft ²
d. Installation unit cost	\$0.12	\$0.12 /ft ²
e. Total synthetic membrane unit cost	(b + c + d)	\$0.43 /ft ²
f. Total synthetic membrane cost	(a x e)	<u>\$402,712.20</u>

VIII. Geotextile Filter Fabric

a. Quantity of filter fabric needed	<u>0.0</u> acres x 43560 ft ² /acre =	0 ft ²
b. Purchase unit cost	\$0.20	\$0.20 /ft ²
c. Taxes unit cost	\$0.00	\$0.00 /ft ²
d. Installation unit cost	\$0.00	\$0.00 /ft ²
e. Total synthetic membrane unit cost	(b + c + d)	\$0.20 /ft ²
f. Total geotextile filter fabric cost	(a x e)	<u>\$0.00</u>

VIII-a. Geonet Composite

	Notes & Guidance Values	
a. Quantity of Geonet Composite needed	<u>43.0</u> acres x 43560 ft ² /acre =	1,873,080 ft ²
b. Purchase unit cost	\$0.25	\$0.25 /ft ²
c. Taxes unit cost	\$0.02	\$0.02 /ft ²
d. Installation unit cost	\$0.11	\$0.11 /ft ²
e. Total geonet composite unit cost	(b + c + d)	\$0.38 /ft ²
f. Total geonet composite cost	(a x e)	<u>\$711,770.40</u>

VIII-b. Geosynthetic Clay Liner

a. Quantity of GCL needed	<u>0.0</u> acres x 43560 ft ² /acre =	0 ft ²
b. Purchase unit cost	\$0.00	\$0.00 /ft ²
c. Taxes unit cost	\$0.00	\$0.00 /ft ²
d. Installation unit cost	\$0.09	\$0.09 /ft ²
e. Total GCL unit cost	(b + c + d)	\$0.09 /ft ²
f. Total GCL cost	(a x e)	<u>\$0.00</u>

IX. Soil Admixture

a. Area to be capped	acres x 4840 yd ² /acre =	0 yd ²
b. Soil admixture unit cost	\$2.57	\$2.57 /yd ³
c. Total soil admixture cost	(a x b)	<u>\$0.00</u>

X. Protective Soil Cover / Vegetative Cover

a. Area to be capped	<u>21.5</u> acres x 4840 yd ² /acre =	104,060 yd ²
b. Depth of soil needed	<u>18</u> inches x 1 yd ³ /36 inches =	0.50 yd
c. Quantity of soil needed	(a x b)	52,030 yd ³
d. Percentage of soil from off-site	0	0%
e. Excavation unit cost (on-site material)	\$3.25	\$3.25 /yd ³
f. Purchase unit cost (off-site material)	-	- /yd ³
g. Delivery Cost (off-site material)	\$8.00/yd ³ for 5 mil RT	\$8.00 /yd ³
h. Placement/Spreading unit cost	included in e.	included in e. /yd ³
i. Compaction unit cost	included in e.	included in e. /yd ³
j. Total on-site soil unit cost	(e + h + i)	\$3.25 /yd ³
k. Total off-site soil unit cost	(f + g + h + i)	\$8.00 /yd ³
l. Total on-site soil cost	[j x (1-d) x c]	\$169,098
m. Total off-site soil cost	(k x d x k)	\$0
n. Percent compaction	10%	10%
o. Total protective soil cover cost	(l + m) * (1 + n)	<u>\$186,007.25</u>

XI. Soil Testing / Construction Quality Assurance

a. Number of acres to be capped	21.5	21.5 acres
b. Testing unit cost		
(Includes density & permeability tests and technician)	\$5,000.00	\$5,000.00 /acre
c. Total Soil Testing Unit Cost	(a x b)	<u>\$107,500.00</u>

XII. Vegetative Cover

a. Number of acres to be vegetated	21.5	21.5 acres
b. Unit cost for preparation, seeding, and fertilization	\$1,250.00	\$1,250.00 /acre
c. Total Vegetative Cover Cost	(a x b)	<u>\$26,875.00</u>

XIII. Landfill Gas (LFG) Management System

a. Number of acres of landfill to be closed	21.5	21.5 acres
b. Number of LFG detection probes to be installed	0	0 probes
c. Average number of LFG vents required per acre	0.5	0.5 /acre
d. Length of LFG detection probe in linear feet	0	100 LF
e. Average cost per LFG vent	\$5,000.00	\$5,000 /event
f. LFG detection probe unit cost	\$40.00	\$40.00 /LF
g. Total cost for LFG vents	(a x c x e)	\$53,750
h. Total cost for LFG detection probes	(b x d x f)	\$0
i. Total gas management cost	(g + h)	<u>\$53,750.00</u>

XIV. Groundwater monitoring system

a. Hydrogeologic study	\$10,000 or as needed	\$0
b. Monitoring well construction/well	\$1,225 per well	\$1,225.00 /well
c. Number of wells to be installed	0	0 wells
d. Additional well length of 50'	0	0 LF
e. Unit cost for additional well length over 50'	\$22.00	\$22.00 /LF
f. Total additional cost for well length over 50'	(e x d)	\$0
g. Total monitoring well construction cost	(b x c)	\$0
h. Total Groundwater monitoring system cost	(a + e + f)	<u>\$0.00</u>

XV. Mobilization/demobilization

a. Cost for mobilization/demobilization	assumes 1 event	<u>\$50,000.00</u>
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XVI. Survey and deed notation

a. Cost for survey and deed notation	assumes \$2,500/acre	<u>\$53,750.00</u>
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XVII. Closure Certification

a. Closure certification costs	\$35,500 or as needed	<u>\$35,000.00</u>
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XVIII. Miscellaneous Costs to Close

a. Erosion Control	\$50,000 or as needed	<u>\$50,000.00</u>
b. Storm Water Control (diversion berms and drainage ditches)		<u>\$50,000.00</u>
c. Drainage Layer Piping		<u>\$0.00</u>
d. Anchor Trench		<u>\$0.00</u>
e. Tie-in Seams		<u>\$0.00</u>
f. Geosynthetic Boots		<u>\$5,375.00</u>

Total Construction Closure Costs

Total Unadjusted Closure Costs	<u>\$1,766,817</u>
City Cost Index (CCI)	100.0
Total Adjusted Closure Costs	<u>\$1,766,817</u>
CCI x (I..XIV)	
Closure Cost-Estimate Subtotal	<u>\$2,010,942</u>
(Total adj. closure costs +XV + XVI + XVII + XVIII)	
Contingency (10%)	\$201,094
Engineering Fees	
Permitting and Construction Documents	\$50,000
Total 2008 Closure Cost (through Phase 2)	<u>\$2,262,036</u>
Total Area to be capped	21.5 acres
Approximate closure cost per acre	<u>\$105,211 /acre</u>

Notes:

Guidance values attained from similar projects.
 Material Costs for Geosynthetics include Delivery.

Facility Name: WCA of High Point C&D Landfill
Phase 2 Expansion
 Permit No.: 41 - 16
 Facility Address: 5830 Riverdale Drive
Jamestown, North Carolina 27282
 Facility Owner: WCA of High Point, LLC

Date: 11/11/08
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 Revision No.: 1
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 Phase No.: 101



4900 Koger Blvd, Suite 140
 Greensboro, North Carolina 27407
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 fax - 336.852.4904
 www.golder.com

POST-CLOSURE COSTS:

	<u>Notes & Guidance Values</u>	
I. Groundwater Monitoring		
a.	Total number of monitoring wells	15 8 wells
b.	Number of sampling events per year	2 sampling events per year 2 events
c.	Monitoring and analysis costs per sample	\$1,500 \$1,500 /sample
d.	Miscellaneous Engineering Fees	\$10,000 or as required \$10,000 /year
e.	Total annual monitoring costs	$[(a \times b \times c) + d]$ \$34,000 /year
f.	Post-closure period	30 30 years
g.	Total cost for post-closure period	$(e \times f)$ <u>\$1,020,000.00</u>
II. Landfill Gas Monitoring		
a.	Frequency of testing	(4 events per year) 4 events/year
b.	Cost of sampling per event	\$1,000.00 \$1,000.00 /event
c.	Total LFG Monitoring unit cost per year	$(a \times c)$ \$4,000.00 /year
d.	Post-closure period	30 30 years
e.	Total cost for post-closure period	$(d \times e)$ <u>\$120,000.00</u>
III. Leachate Management		
a.	Private disposal unit cost	\$0.00 \$0.00 /gal
b.	POTW disposal unit cost	\$0.10 \$0.10 /gal
c.	Direct discharge to a POTW unit cost	\$0.00 \$0.00 /gal
d.	Amount of leachate generated	0.00 0 gal/yr
e.	Load/unload unit cost	\$150 \$150.00 /truck
f.	Capacity of truck	5,500 5,500 gallons
g.	Number of trucks required per year	$(d \div f)$ 0 trucks/year
h.	Distance over 5 miles of hauling (one way)	10 10 miles
i.	Cost of hauling per mile	\$1.50 \$1.50 /mile
j.	Total cost for loading / unloading and hauling	$[(e \times g) + (h \times i)]$ \$15.00 /year
k.	Total annual cost for Private Disposal	$(a \times d)$ \$0.00 /year
l.	Total annual cost for POTW Disposal (delivered)	$[(b \times d) + j]$ \$0.00 /year
m.	Total annual cost for POTW Disposal (direct)	$(c \times d)$ \$0 /year
n.	Total leachate management cost	$(k \text{ or } l \text{ or } m)$ \$0.00 /year
o.	Post-closure period	5 5 years
p.	Total cost for post-closure period	$(n \times o)$ <u>\$0.00</u>
IV. Routine Maintenance and Repairs		
a.	Mowing frequency	2 2 visits/year
b.	Area to be maintained (acres)	21.5 21.5 acres
c.	Mowing unit cost per visit	\$80 \$80 /acre/visit
d.	Total mowing cost per year	$(a \times b \times c)$ \$3,440 /year
e.	Fertilizer unit cost	\$500 \$500 /acre
f.	Total fertilizer cost per year	$(b \times e)$ \$10,750 /year
g.	Number of years to reseed (max 3 years)	3 3 years
h.	Area to reseed (acres)	7.17 7.17 acres
i.	Reseeding unit cost	\$1,786 \$1,786 /acre
j.	Total reseeding cost	$(g \times h \times i)$ \$38,399
k.	Mobilization/demobilization cost per year	\$150 \$150 /year
l.	Total maintenance and repairs cost per year	$(d + f + k)$ \$14,340.00 /year
m.	Post-closure period	30 30 years
n.	Total cost for post-closure period	$[(m \times l) + j]$ <u>\$468,599</u>
V. Vector and Rodent Control		
a.	Total vector and rodent control costs per year	\$2,000 or as required \$2,000.00 /year
b.	Post-closure period	30 30 years
c.	Total cost for post-closure period	$(a \times b)$ <u>\$60,000</u>

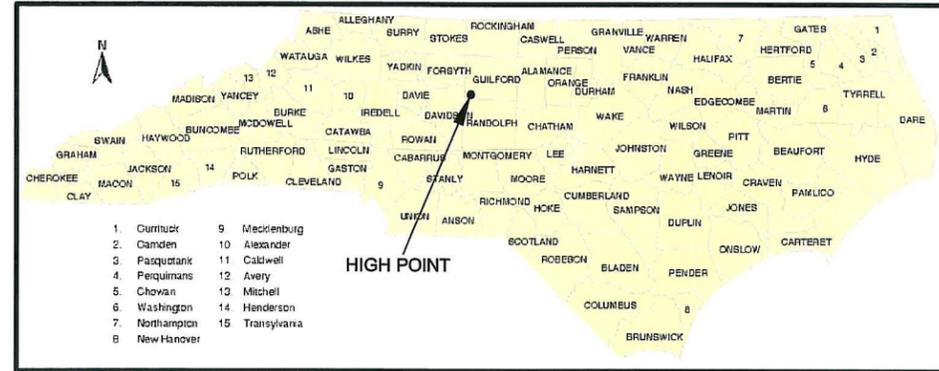
Total Post-Closure Costs

Total Unadjusted Post-Closure Costs	\$1,668,599.00
City Cost Index (CCI)	100
Total Adjusted Post-Closure Costs CCI x (I..V)	\$1,668,599.00
Contingency (10%)	\$166,859.90
Total Post-Closure Cost-Estimate (through Phase 2)	<u>\$1,835,459</u>

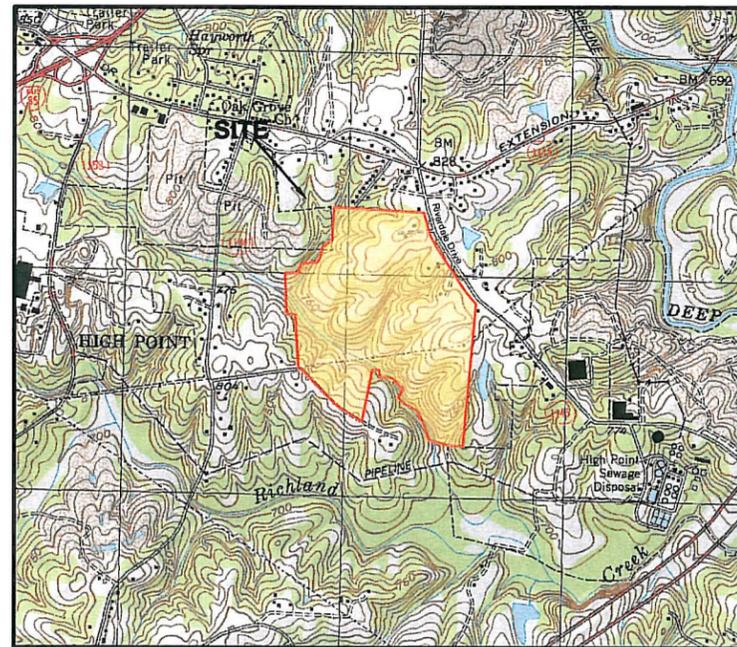
WCA OF HIGH POINT C&D LANDFILL

GUILFORD COUNTY, NORTH CAROLINA

APPLICATION FOR PERMIT TO CONSTRUCT PHASE 2 EXPANSION ENGINEERING PLAN



NORTH CAROLINA
COUNTY LOCATION MAP

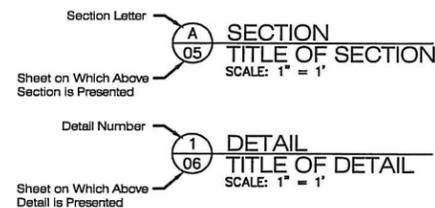


VICINITY MAP
NOT TO SCALE



SATELLITE IMAGE
1" = 500'

DETAIL/SECTION IDENTIFICATION LEGEND



NOTES: ABOVE REFERENCING SYSTEM ALSO APPLIES TO PLAN IDENTIFICATIONS.

DRAWING NO.	DESCRIPTION
EP-0	COVER SHEET
EP-1	EXISTING CONDITIONS PLAN
EP-2	GRADING PLAN: TOP OF SUBGRADE
EP-3	GRADING PLAN: FINAL GRADING PLAN
EP-4	EROSION AND SEDIMENT CONTROL
EP-5	ENVIRONMENTAL MONITORING PLAN
EP-6	CROSS SECTIONS
EP-6A	PROPOSED PHASE 2 BASE GRADES WITH ESTIMATED SEASONAL HIGH GROUNDWATER TABLE AND BEDROCK SURFACE
EP-7	FINAL COVER AND MISCELLANEOUS DETAILS
EP-8	EROSION AND SEDIMENT CONTROL DETAILS SHEET 1 OF 3
EP-9	EROSION AND SEDIMENT CONTROL DETAILS SHEET 2 OF 3
EP-10	EROSION AND SEDIMENT CONTROL DETAILS SHEET 3 OF 3



REV	DATE	CH	DES	CHK	RW
1.	11/2/08				

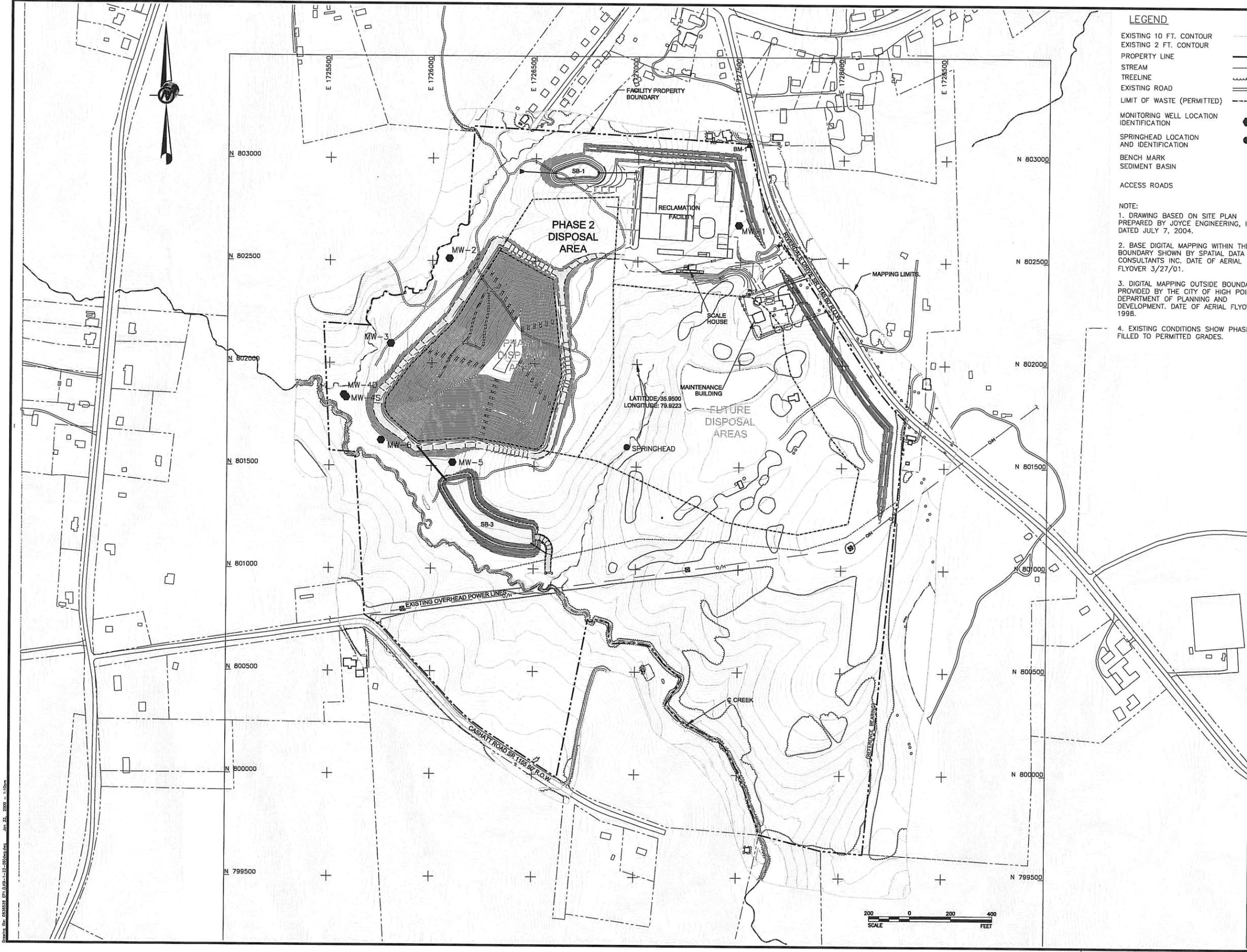
WCA OF HIGH POINT
CONSTRUCTION AND
DEMOLITION DEBRIS
LANDFILL AND RECLAMATION
FACILITY
GUILFORD COUNTY, NC

COVER SHEET

PROJECT No.	063-8828
FILE No.	
REV. 1	SCALE AS SHOWN
DESIGN	CH 12/19/08
CADD	JDS 12/19/08
CHECK	
REVIEW	

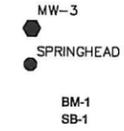
DWG. EP-0





LEGEND

- EXISTING 10 FT. CONTOUR
- EXISTING 2 FT. CONTOUR
- PROPERTY LINE
- STREAM
- TREELINE
- EXISTING ROAD
- LIMIT OF WASTE (PERMITTED)
- MONITORING WELL LOCATION IDENTIFICATION
- SPRINGHEAD LOCATION AND IDENTIFICATION
- BENCH MARK
- SEDIMENT BASIN
- ACCESS ROADS



NOTE:
 1. DRAWING BASED ON SITE PLAN PREPARED BY JOYCE ENGINEERING, INC. DATED JULY 7, 2004.
 2. BASE DIGITAL MAPPING WITHIN THE BOUNDARY SHOWN BY SPATIAL DATA CONSULTANTS INC. DATE OF AERIAL FLYOVER 3/27/01.
 3. DIGITAL MAPPING OUTSIDE BOUNDARY PROVIDED BY THE CITY OF HIGH POINT DEPARTMENT OF PLANNING AND DEVELOPMENT. DATE OF AERIAL FLYOVER 1998.
 4. EXISTING CONDITIONS SHOW PHASE 1 FILLED TO PERMITTED GRADES.



REV	DATE	DES	CHK	APP	BY
1.	11/2/06	CH	JDS		

PROJECT
**WCA OF HIGH POINT
 CONSTRUCTION AND
 DEMOLITION DEBRIS
 LANDFILL AND RECLAMATION
 FACILITY**
 GUILFORD COUNTY, NC

EXISTING CONDITIONS PLAN

REV.	SCALE	AS SHOWN
DESIGN	CH	12/19/06
CADD	JDS	12/19/06
CHECK		
REVIEW		

DWG. EP-1

Plot File: 0636526 EP-1 (063-6526) 12/19/06 11:00am

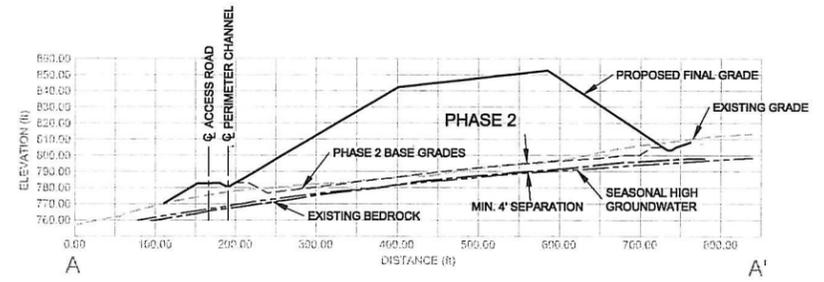
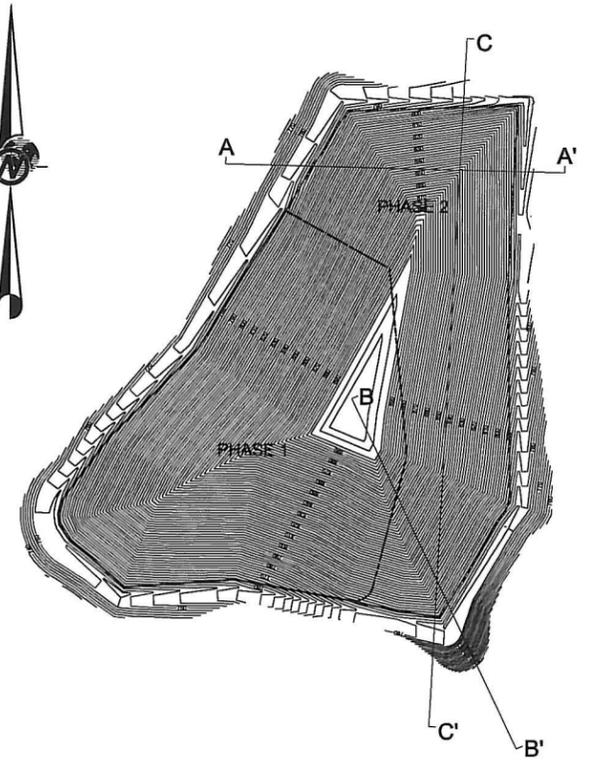
REV.	DATE	DES.	DESCRIPTION	CADD	CHK.	RW.

PROJECT
**WCA OF HIGH POINT
 CONSTRUCTION AND
 DEMOLITION DEBRIS
 LANDFILL AND RECLAMATION
 FACILITY**
 GUILFORD COUNTY, NC

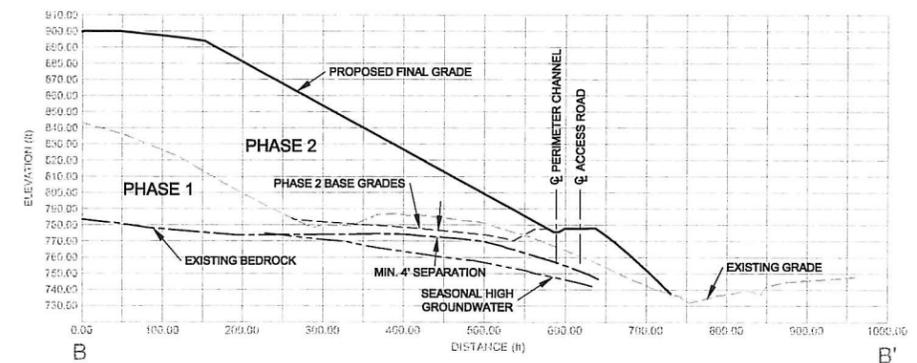
CROSS SECTIONS

TITLE

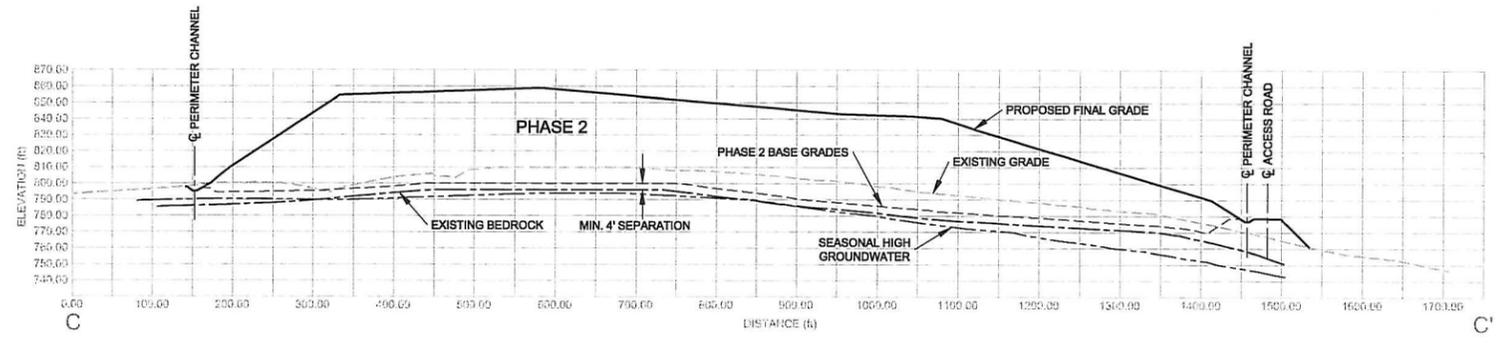
PROJECT No.	063-6526
FILE No.	
REV.	SCALE AS SHOWN
DESIGN	CH 12/19/06
CADD	JDS 12/19/06
CHECK	
REVIEW	



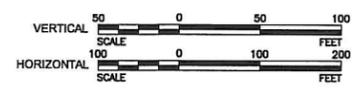
A CROSS SECTION A-A'



B CROSS SECTION B-B'

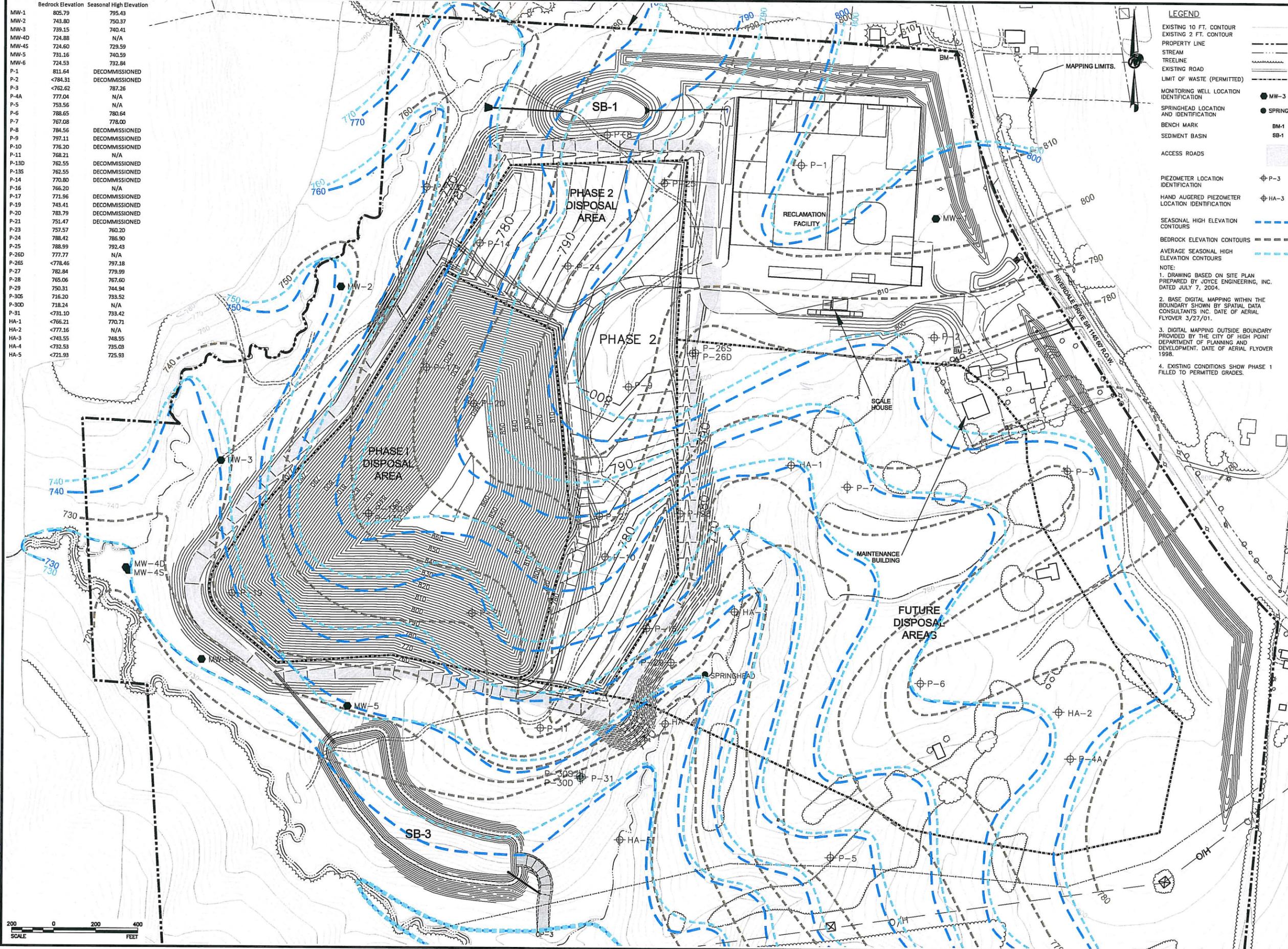


C CROSS SECTION C-C'



Drawing File: 03/03/06 EP6 (06-1) 22-001.dwg Date: 12/19/06 11:32am

	Bedrock Elevation	Seasonal High Elevation
MW-1	805.79	795.43
MW-2	743.80	750.37
MW-3	739.15	740.41
MW-4D	724.88	N/A
MW-4S	724.60	729.59
MW-5	731.16	740.59
MW-6	724.53	732.84
P-1	811.64	DECOMMISSIONED
P-2	<784.31	DECOMMISSIONED
P-3	<762.62	787.26
P-4A	777.04	N/A
P-5	753.56	N/A
P-6	788.65	780.64
P-7	767.08	778.00
P-8	784.56	DECOMMISSIONED
P-9	797.11	DECOMMISSIONED
P-10	776.20	DECOMMISSIONED
P-11	768.21	N/A
P-13D	762.55	DECOMMISSIONED
P-13S	762.55	DECOMMISSIONED
P-14	770.80	DECOMMISSIONED
P-16	766.20	N/A
P-17	771.96	DECOMMISSIONED
P-19	743.41	DECOMMISSIONED
P-20	783.79	DECOMMISSIONED
P-21	751.47	DECOMMISSIONED
P-23	757.57	760.20
P-24	788.42	786.90
P-25	788.99	792.43
P-26D	777.77	N/A
P-26S	<778.46	797.18
P-27	782.84	779.99
P-28	765.06	767.60
P-29	750.31	744.94
P-30S	716.20	733.52
P-30D	718.24	N/A
P-31	<731.10	733.42
HA-1	<766.21	770.71
HA-2	<777.16	N/A
HA-3	<743.55	748.55
HA-4	<732.53	735.03
HA-5	<721.93	725.93



LEGEND

EXISTING 10 FT. CONTOUR	---
EXISTING 2 FT. CONTOUR	----
PROPERTY LINE	---
STREAM	~~~~~
TREELINE	
EXISTING ROAD	---
LIMIT OF WASTE (PERMITTED)	---
MONITORING WELL LOCATION IDENTIFICATION	● MW-3
SPRINGHEAD LOCATION AND IDENTIFICATION	● SPRINGHEAD
BENCH MARK	BM-1
SEDIMENT BASIN	SB-1
ACCESS ROADS	---
PIEZOMETER LOCATION IDENTIFICATION	⊕ P-3
HAND AUGURED PIEZOMETER LOCATION IDENTIFICATION	⊕ HA-3
SEASONAL HIGH ELEVATION CONTOURS	---800
BEDROCK ELEVATION CONTOURS	---810
AVERAGE SEASONAL HIGH ELEVATION CONTOURS	---810

NOTE:
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REV	DATE	DES	CHK	DESCRIPTION
1.	11/2/06	CH		REVISED PER DEIR COMMENTS

PROJECT
 WCA OF HIGH POINT
 CONSTRUCTION AND
 DEMOLITION DEBRIS
 LANDFILL AND RECLAMATION
 FACILITY
 GUILFORD COUNTY, NC

TITLE
 PROPOSED PHASE 2 BASE
 GRADES WITH SEASONAL
 HIGH GROUNDWATER TABLE
 AND BEDROCK SURFACE

PROJECT No.	063-6526
FILE No.	
REV.	SCALE AS SHOWN
DESIGN	CH 12/19/06
CADD	JOS 12/19/06
CHECK	
REVIEW	

DWG. EP-6A