

**CONSTRUCTION QUALITY ASSURANCE REPORT  
PHASE 2 CELL 2**

**CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL FACILITY  
PERMIT No. 92-30**

**Prepared For:**

**GREENWAY WASTE SOLUTIONS OF APEX, LLC**

**Prepared By:**

**CIVIL & ENVIRONMENTAL CONSULTANTS, INC.  
CHARLOTTE, NORTH CAROLINA**

**CEC Project 111-370.003**

**July 22, 2014**

North Carolina Board of Examiners

For

Engineers and Surveyors

License No. C-3035



July 22, 2014

A handwritten signature in blue ink that reads "Scott L. Brown".



Civil & Environmental Consultants, Inc.

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## **1.0 INTRODUCTION**

This report describes the results of the construction quality assurance (CQA) for cell construction of Cell 2 of Phase 2 (6.48 acres) at the Greenway Waste Solutions of Apex, LLC facility (Landfill) located in Apex, NC. Specifically, this report will summarize the construction activities and certify that the construction was completed in accordance with:

1. The CQA Plan.
2. The conditions of the Permit to Construct.
3. The Requirements of 15A NCAC 13B .0541.
4. Acceptable engineering practices

## **2.0 EARTHWORK**

The cell subgrade was in cut and no soil testing was required per the CQA Plan. Though no soil testing was required in the CQA Plan, five soil samples were taken to establish permeability of the subgrade. The permeability of the soil samples were measured by TerraTech Engineers, Inc. (TerraTech) with a resulting average value of  $1.1 \times 10^{-7}$  cm/sec at 20°C (Appendix A). Also, TerraTech performed a Particle Size Distribution (USCS) to determine the Grain Size classification of lean clay (CL). The cap system will be designed and constructed to a permeability less than or equal to these soils underlying the landfill, but not more permeable than  $1 \times 10^{-5}$  cm/sec. Visual inspection by CEC of the prepared subgrade verified that:

1. Angular or sharp rocks, rocks larger than the specified diameter, and other debris are not present on the surface.
2. There are no soft or yielding areas.

## **3.0 SURFACE WATER DRAINAGE STRUCTURES**

The Soil Erosion & Sedimentation Control Plan for all of Phase 2 (Cells 1 and 2 total 19.3 Acres) was submitted and approved by the Town of Apex. The design was based on calculations for Phase 2 at build-out, along with the Construction Plans for Phase 2. The erosion control structures were inspected by the Town of Apex and deemed to be constructed in compliance with the approved plans.

#### 4.0 AS-BUILT DRAWINGS

An as-built drawing performed by Patterson Land Surveying, PA is located in Appendix B. Subgrade elevations were verified on a 100-ft grid. Phase 2 Cell 2 will utilize the existing haul road. All locations met the minimum permitted subgrade elevations. Appendix C contains a certification that construction was completed in accordance with:

1. The CQA Plan.
2. The conditions of the Permit to Construct.
3. The Requirements of 15A NCAC 13B .0541.
4. Acceptable engineering practices

#### 5.0 LANDFILL CAPACITY

The following table lists the acreage and capacity for the landfill, both existing and planned. Total gross capacity is defined as the volume measured from the bottom of waste through the top of final cover. The total disposal area of Phases 1 through 3 is 43.8 acres.

Area	Gross Capacity (cy)	Acreage
Phase 1	858,000	17.8
Phase 2 – Total, including Cell 1A, Cell 1B and Cell 2	1,100,000	14.8 <sup>a</sup>
Cell 1A only	49,360	1.83
Cell 1B only	240,810	4.32
Cell 2	809,830 <sup>b</sup>	6.48
Phase 3	900,000	11.2
Totals	2,858,000	43.8

Total constructed capacity 1,958,000 cy

<sup>a</sup> – Total constructed Phase 2 area is 12.63 acres. This difference is attributed to the approximate nature of the initial permit drawings and the addition of sediment control measures after the issuance of permit.

<sup>b</sup> – Includes layover onto Phase 1 and Phase 2, Cell 1A and Cell 1B.

## **6.0 MAJOR PROJECT FEATURES**

Appendix D consists of pictures of major project features across the 6.48 acre expansion.

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## **APPENDIX A**

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July 18, 2014

Mr. John Brown  
Greenway Waste Solutions  
5940 Old Smithfield Road  
Apex, NC 27539

**Report of Laboratory Testing  
Greenway Waste of Apex  
5940 Old Smithfield Road  
Apex, North Carolina  
Our Project Number 121-14-74610**

Gentlemen:

A representative of TerraTech Engineers, Inc. was present onsite on June 2, 2014 to extract samples of the soils located at the bottom of Phase 2 Cell 1 at the above referenced project. We extracted 5 samples in random locations in a grid pattern throughout the cell bottom to determine the encountered soil types. We understand that the cell bottom was at or near finished grade elevation at the time of our sampling. Our laboratory testing consisted of classification of the soils in accordance with the Unified Soil Classification System (ASTM D-2487), Atterberg Limits Testing (ASTM D-4318) to determine the soil classification of each sample, and flexible wall permeability sampling (ASTM 5084-10) on a representative sample. The results of our testing are indicated below:

Sample #	Location	Liquid Limit	Plastic Limit	USCS Classification
1	NW corner of cell	25	16	CL
2	SW corner of cell	28	16	CL
3	NE corner of cell	30	16	CL
4	SE corner of cell	26	15	CL
5	Center of cell	29	16	CL

The results of our flexible wall permeability sampling indicated an average permeability of the encountered soils of  $1.1 \times 10^{-07} \text{ cm/sec @ } 20^\circ\text{C}$ .

If you have any questions concerning this information, please contact us.

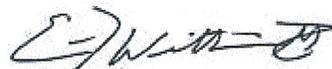
Sincerely,

TerraTech Engineers, Inc. (C-1356)



Christopher Pilz  
2014.07.18  
08:36:02 -0400'

Christopher S Pilz, P.E.  
Principal Geotechnical Engineer

Erwin T. Williams III, P.E.  
Senior Principal Geotechnical Engineer

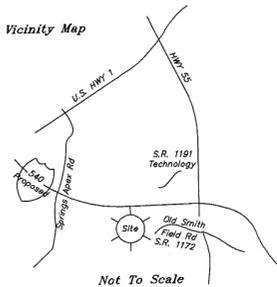
CSP/sk

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## **APPENDIX B**

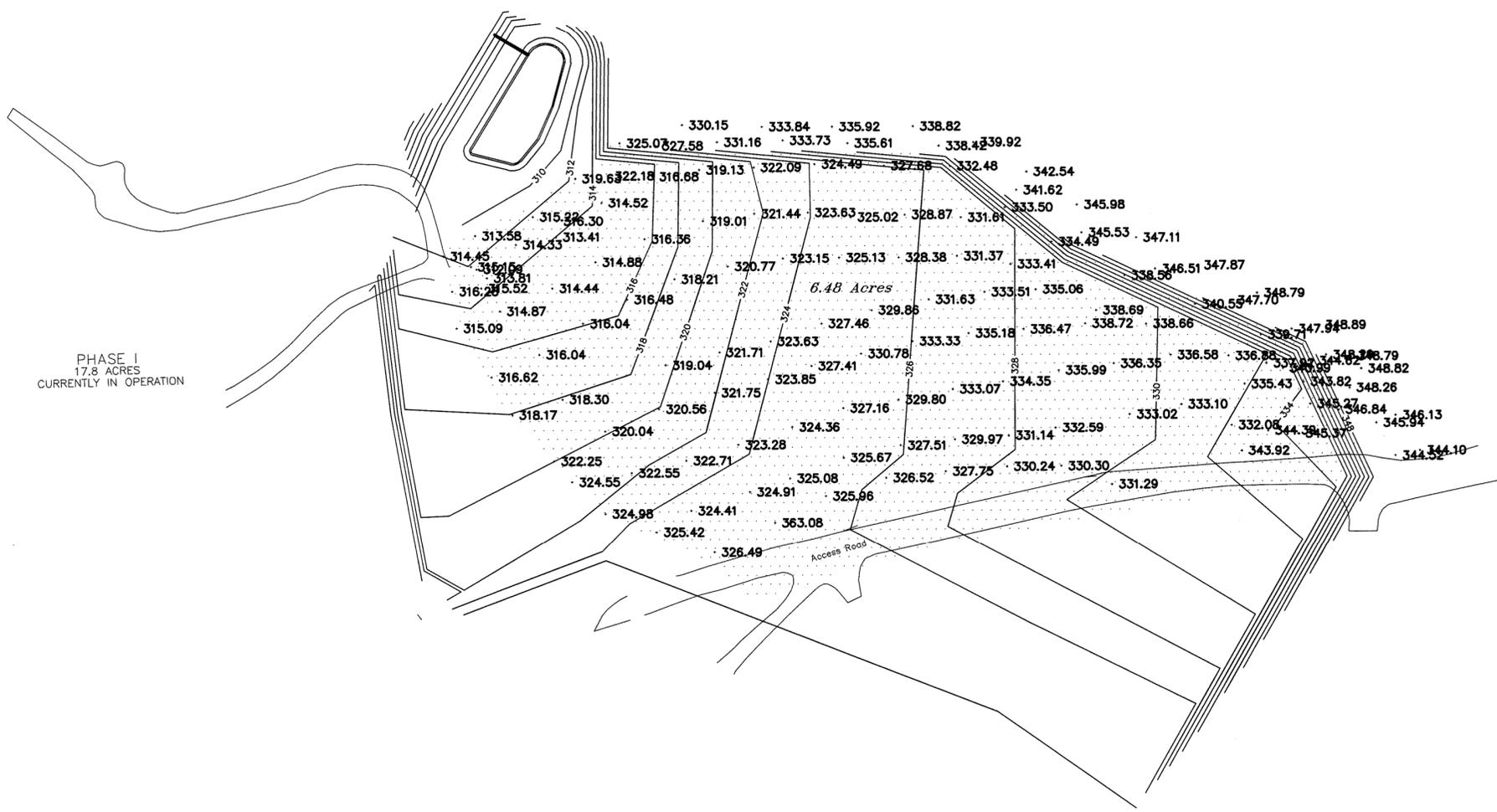
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Vicinity Map



Not To Scale

I Joel H. Patterson III, certify that this plat was drawn under my supervision from an actual topographical survey made under my supervision that the ratio of precision is one half the contour interval as shown. Witness my original signature, registration number and seal. This 12 day of MAY, 2014.



PHASE I  
17.8 ACRES  
CURRENTLY IN OPERATION

GRAPHIC SCALE



( IN FEET )  
1 inch = 100 ft.

Land Surveying by:  
**PATTERSON LAND SURVEYING, PA**  
C-3390  
P.O. Box 5010, Mooresville, NC 28117  
704/361-0415 \* Fax 704/799-8565

JOB NAME:		TOPOGRAPHICAL SURVEY OF A PORTION OF CELL 1 OF <b>"GREENWAY WASTE OF APEX"</b>	
LOCATION:	WAKE COUNTY, NORTH CAROLINA	DRAWN BY:	JHP
		CHECKED BY:	JHP
OWNER:	GREENWAY OF APEX 19109 W. CATAWBA AVE. SUITE 200 CORNELIUS, NC 28031-5611	SCALE:	1" = 100'
		DATE OF FIELD SURVEY:	MAY, 2014
		DATE OF MAP:	MAY 12, 2014
		JOB NUMBER:	10006_CELL1-AS-BUILT5_12_14

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## **APPENDIX C**

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July 22, 2014

John Murray, PE  
NC DENR – DWM  
610 East Center Avenue, Suite 301  
Mooresville, NC 28115  
Phone: (704) 235-2163

Dear John:

Subject: Certification Phase 2, Cell 2  
Greenway Waste Solutions of Apex, LLC  
Permit No. 92-30  
CEC Project No. 111-370

Civil & Environmental Consultants, Inc. has verified subgrade elevations on a 100-ft grid of the as-built survey for the 6.48 acre cell. All point locations met the minimum permitted subgrade elevations. The construction was completed in accordance with:

1. The CQA Plan.
2. The conditions of the Permit to Construct.
3. The Requirements of 15A NCAC 13B .0541.
4. Acceptable engineering practices

Please let me know if you have any questions or comments. I can be reached at (704) 773-6465.

Sincerely,

Civil & Environmental Consultants, Inc.

Scott L. Brown, PE  
Project Manager



cc: Mr. John Brown, Greenway Waste Solutions of Apex, LLC.

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## **APPENDIX D**

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**Photo Number: 1**



**Description:**

Phase 2 Cell 2 certification area, looking northeast from the haul road.

**Photo Number: 2**



**Description:**

Phase 2 Cell 2 certification area, looking northeast from the haul road.



**Civil & Environmental Consultants, Inc.**

Charlotte, NC

Ph: 980-224-8124 Toll Free: 855-859-9932

[www.cecinc.com](http://www.cecinc.com)

**Greenway Waste Solutions of Apex, LLC**  
**Phase 2 Cell 2 Certification**

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 3**



**Description:**

Phase 2 Cell 2 certification area looking north from the haul road.

**Photo Number: 4**



**Description:**

Phase 2 Cell 2 certification area looking north-east from the haul road.



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**Greenway Waste Solutions of Apex, LLC**  
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**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 5**



**Description:**

Phase 2 Cell 2 certification area and haul road looking east.

**Photo Number: 6**



**Description:**

Phase 2 Cell 2 certification area and haul road looking east.



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**Greenway Waste Solutions of Apex, LLC**  
Phase 2 Cell 2 Certification

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 7**



**Description:**

Phase 2 Cell 2 certification area looking northwest from the haul road.

**Photo Number: 8**



**Description:**

Phase 2 Cell 2 certification area looking northwest from the haul road.



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**Greenway Waste Solutions of Apex, LLC**  
Phase 2 Cell 2 Certification

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 9**



**Description:**

Phase 2 Cell 2 certification area and haul road looking east.

**Photo Number: 10**



**Description:**

Phase 2 Cell 2 certification area looking north-east from Phase 1.



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**Greenway Waste Solutions of Apex, LLC**  
Phase 2 Cell 2 Certification

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 11**



**Description:**

Berm constructed along southern end of Phase 2 Cell 1, looking west. Edge of waste stake.

**Photo Number: 12**



**Description:**

Phase 2 Cell 2 certification area looking south-west from the composting area.



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**Greenway Waste Solutions of Apex, LLC**  
Phase 2 Cell 2 Certification

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 13**



**Description:**

Berm constructed along southern end of Phase 2 Cell 1, looking west. Edge of waste stake.

**Photo Number: 14**



**Description:**

Phase 2 Cell 2 certification area looking north-east from the haul road.



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**Greenway Waste Solutions of Apex, LLC**  
**Phase 2 Cell 2 Certification**

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 15**



**Description:**

Phase 2 Cell 2 certification area looking north-east from the haul road.

**Photo Number: 16**



**Description:**

Phase 2 Cell 2 certification area looking north-east from Phase 1.



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**Greenway Waste Solutions of Apex, LLC**  
Phase 2 Cell 2 Certification

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014

**Photo Number: 17**



**Description:**

Phase 2 Cell 2 certification area looking north-east from the haul road.

**Photo Number: 18**



**Description:**

Phase 2 Cell 2 certification area looking north-east from the haul road.



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**Greenway Waste Solutions of Apex, LLC**  
Phase 2 Cell 2 Certification

**Client Name:** GWS of Apex

**Project Number:** 111-370.003

**Author:** T. Gingerich

**Photographs Taken on:** April/May 2014