SMITH+GARDNER
ENGINEERS

ADDRESS
14 N. Boylan Avenue, Raleigh NC 27603

TEL
919.828.0577

WEB
www.smithgardnerinc.com

May 8, 2013

Ms. Christine Ritter
Hydrogeologist
NCDENR
1646 Mail Service Center
Raleigh, NC 27699-1646

RE: Halifax County C&D Landfill
Area 2 – Permit No.42-04

Dear Ms. Ritter:

Smith Gardner, Inc. (S+G) is pleased to submit the following responses to your 4-19-13 comments regarding the Design Hydrogeologic Report, the Water Quality Monitoring Plan and the Landfill Gas Monitoring Plan (**attached**). For ease in review, we have included your comments with our responses below.

Attachment H Design Hydrogeologic Report

Comment: Page 4, last paragraph, typo: souls (should be soils).

Response: The text has been revised.

Comment: Missing boring logs for BP-13, GY-1, GY-2, GY-3.

Response: Boring logs for BP-13, GY-1, GY-2 and GY-3 could not be located, therefore were not included.

Comment: Page 10, Section 3.0 Water Quality Monitoring Plan, No. 7: need to clarify whether surface water sampling location CDSW-2 is the same as SW-3 or in addition to SW-3. See comments for Water Quality Monitoring Plan and Landfill Gas Monitoring Plan below. If CDSW-2 is the same as SW-3, eliminate the reference to CDSW-2.

Response: Text on page 10 has been updated to reflect only one proposed surface water location, CDSW-1. CDSW-1, monitored in conjunction with SW-3, will provide ample surface water coverage both up and downgradient of the C&D landfill. The report now reflects only surface water sampling points CDSW-1 and SW-3.

Attachment I Water Quality Monitoring Plan

Comment: Page 4, Section 2.0 Monitoring System:
*In the table labeled **MSW Landfill Monitoring Network**, there are 2 surface water sampling locations listed: CDSW-1 and SW-3 (existing location). The corresponding Figure 1 in the WQMP displays those 2 surface water sample locations.*

Response: No changes were made to the Water Quality Monitoring Plan because it reflected CDSW-1 and SW-3, as the surface water sampling points for Area 2.

Attachment J Landfill Gas Monitoring Plan

Comment: Figure 2, Proposed Landfill Gas Monitoring Network, shows three proposed surface water sampling locations labeled as CDSW-1, CDSW-2 AND SW-3.

Response: CDSW-2 has been removed from **Figure 2** to reflect only two surface water sampling points, CDSW-1 and SW-3.

Based on these comments, the following revised items are submitted with this letter for inclusion in the Permit Application:

- Revised Design Hydrogeologic Report text – Pages 4 and 10 only;
- Revised Landfill Gas Monitoring Plan Figure 2

Thank you for your review of this Permit to Construct Application. If you have any questions or require additional information, please contact us at 919-828-0577 or by e-mail (below).

Sincerely,
SMITH GARDNER, INC.

Madeline German, P.G.
Project Geologist
madeline@smithgardnerinc.com

Joan A. Smyth, P.G.
Senior Hydrogeologist
joan@smithgardnerinc.com

Attachments

Cc: Larry Frost, NCDENR
Larry Garriss – Halifax County

Attachment 1

Joan Smyth

From: Ritter, Christine
Sent: Friday, April 19, 2013 4:10 PM
To: madeline@smithgardnerinc.com; Joan Smyth
Cc: Frost, Larry
Subject: Halifax County C&D Landfill - Area 2 Permit No. 42-04

DIN 18830

Hi Madeline and Joan-

I have completed a technical review of the Design Hydrogeologic Report including Water Quality Monitoring Plan and Landfill Gas Monitoring Plan for Halifax County C&D Landfill – Area 2 and my comments are listed below.

Halifax County C&D Landfill – Area 2

Attachment H Design Hydrogeologic Report

Page 4, last paragraph, typo: souls (should be soils).
Missing boring logs for BP-13, GY-1, GY-2, GY-3.
Page 10, Section 3.0 Water Quality Monitoring Plan, No. 7: need to clarify whether surface water sampling location CDSW-2 is the same as SW-3 or in addition to SW-3. See comments for Water Quality Monitoring Plan and Landfill Gas Monitoring Plan below. If CDSW-2 is the same as SW-3, eliminate the reference to CDSW-2.

Attachment I Water Quality Monitoring Plan

Page 4, Section 2.0 Monitoring System:
In the table labeled **MSW Landfill Monitoring Network**, there are 2 surface water sampling locations listed: CDSW-1 and SW-3 (existing location). The corresponding Figure 1 in the WQMP displays those 2 surface water sample locations.

However in Attachment J Landfill Gas Monitoring Plan

Figure 2, Proposed Landfill Gas Monitoring Network, shows three proposed surface water sampling locations labeled as CDSW-1, CDSW-2 AND SW-3.

Please clarify location and labeling of CDSW-2. If the figure in the LFG Monitoring Plan is correct and CDSW-2 is proposed in addition to CDSW-1 and SW-3, please revise the table and the figure included in the WQMP to include surface water sampling location CDSW-2. If the table and corresponding figure in the WQMP is correct, please revise the figure in the LFG Monitoring Plan to eliminate CDSW-2.

Thank you,
Christine

Christine Ritter (Christine.Ritter@ncdenr.gov)
Hydrogeologist
NC Dept of Environment and Natural Resources
Division of Waste Management/Solid Waste Section
Tel: (919) 707-8254
web: http://portal.ncdenr.org/web/wm/sw

PHYSICAL ADDRESS:	MAILING ADDRESS:
217 WEST JONES ST.	1646 MAIL SERVICE CENTER
RALEIGH, NC 27603	RALEIGH, NC 27699-1646

Attachment 2

Revised Pages for Design Hydrogeologic Report

Loamy Udorthents are also well drained soils with capacity to transmit water that ranges from moderately high to high; slopes range from zero to six percent.

The site stratigraphy is based more on the in-situ weathering patterns than actual depositional units. The upper soils are stiff, reddish-orange clayey silt and silty clay, extending to depths of 10 to 15 feet bgs. These soils are moist and often exhibit mottling. Occasional dark brown iron and/or manganese staining along joint surfaces, noted in the boring logs, provide evidence of water movement through the soils.

The upper soils are underlain by a pink-white and gray sandy silt that exhibits relic texture derived from the parent bedrock (saprolite), resembling the nearby granite outcrops. These soils grade with depth to a coarse-grained silty sand, often containing angular quartz or feldspar gravel and mica. Weathered soil and saprolite eventually transition into weathered rock and bedrock. The test borings and piezometers used for this design study were constructed in upper soils with SPT values less than 100 blows per foot (bpf).

2.4 Regional and Site Geology

2.4.1 Regional Geologic Characteristics

Geologic mapping[2] indicate that the proposed C&D landfill site situated on the eastern edge of the Eastern Piedmont Physiographic Province, just west of the Coastal Plain overlap. Western Halifax County is underlain by early to late Paleozoic age, felsic to intermediate crystalline igneous and metamorphic rocks.

Eastern Piedmont[3] rocks exhibit a northeast strike and gently dip eastward resulting from regional metamorphism and folding that produced a broad plunging anticline. The area was simultaneously intruded by a number of felsic (granite) plutons. The rock formation underlying the subject site is a granitic pluton, identified as the Butterwood Creek intrusive.

A few miles east of the site, the crystalline Piedmont rocks plunge beneath unconsolidated fluvial and deep-marine Coastal Plain[4] deposits. During the late Tertiary, portions of the eastern Piedmont were over washed by deltaic streams and shallow seas, resulting in a thin clayey sand and rounded quartz gravel veneer still visible along the site uplands. The deeper soils are chiefly in-situ weathering products of granitic origin.

---

[2] Generalized Geologic Map of North Carolina, 1991.

[3] Maher, Harmon D. Jr,, Sacks, Paul E, and Secor, Donald T. Jr. The Eastern Piedmont in North Carolina, Geology of the Carolinas, Horton and Zullo, University of Tennessee Press, p79.

[4] Sohl, Norman F, and Owens, James P. Cretaceous Stratigraphy of the Coastal Plain, The Geology of the Carolinas, Horton and Zullo, University of Tennessee Press, 1991, p191.

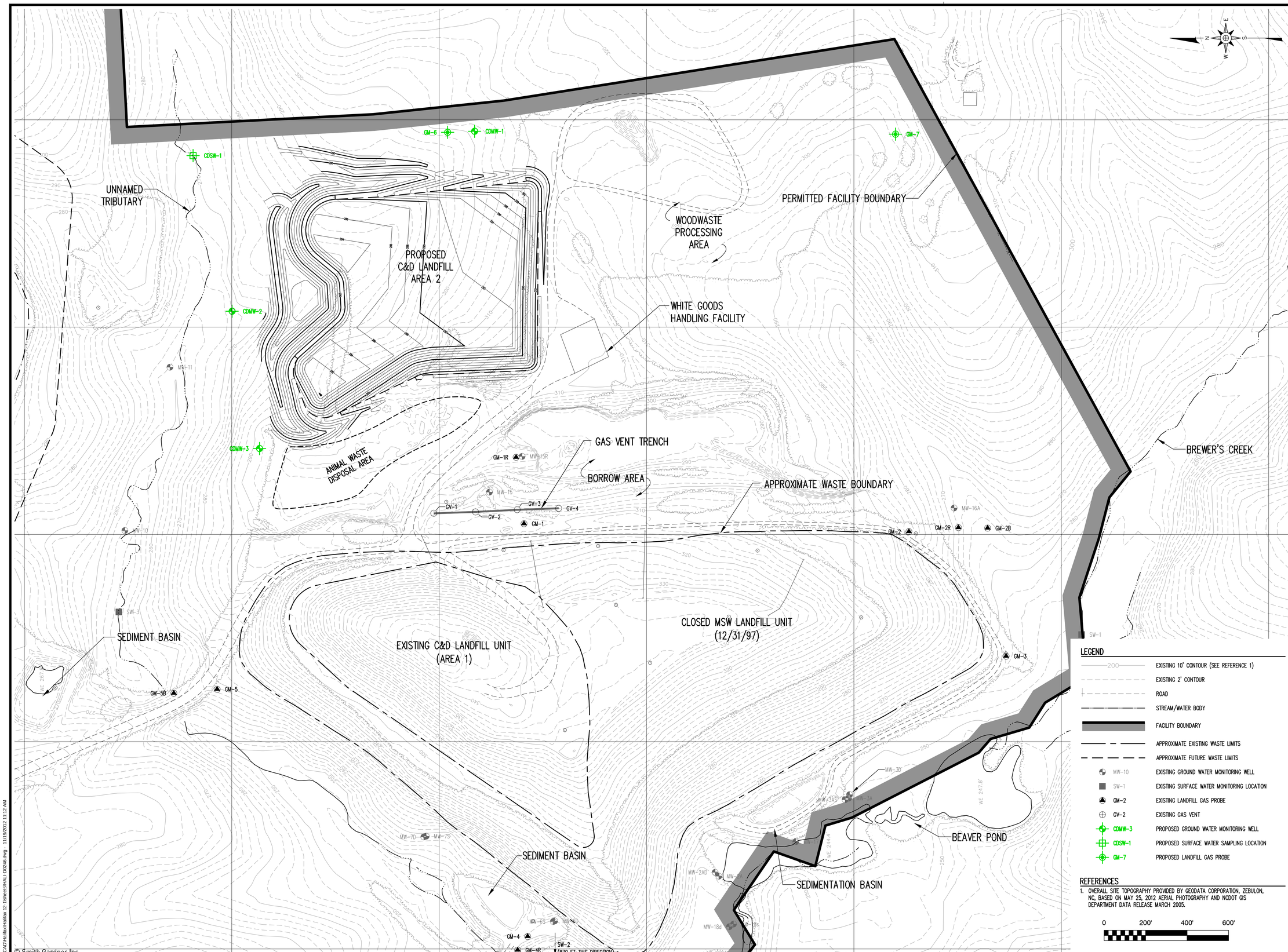
3.0 WATER QUALITY MONITORING PLAN

The water quality monitoring system is designed to effectively detect a hazardous constituent release into the uppermost aquifer. The Water Quality Monitoring Plan (WQMP) is included as **Attachment I** to this report. This section summarizes that proposed plan.

Three groundwater monitoring wells (CDMW-1, CDMW-2 and CDMW-3) and two surface water monitoring locations (CDSW-1and CDSW-2) are proposed. Monitoring network details incorporated into the Water Quality Monitoring Plan are presented in **Attachment I**.

In summary, the following actions are proposed for the Area 2 C&D water quality monitoring plan.

1. Properly abandon piezometers in the C&D Area 2 footprint. (BP-8, BP-9, BP-10, BP-11, BP-12 & GY-2).
2. Utilize BP-7 as up-gradient monitoring well CDMW-1
3. Advance two new monitoring locations, CDMW-2 and CDMW-3 into the monitoring plan.
4. Maintain MW-11, BP-3, BP-4, BP-6 and BP-13 for water level monitoring only.
5. Properly abandon GY-1, GY-3 and BP-14 due to dry or invalid water level data.
6. Monitor C&D Phase 2 monitoring wells semi-annually in conjunction with other Halifax County Water Quality Monitoring.
7. Add surface water monitoring location CDSW-1.



LEGEND

200	EXISTING 10' CONTOUR (SEE REFERENCE 1)
	EXISTING 2' CONTOUR
	ROAD
	STREAM/WATER BODY
	FACILITY BOUNDARY
	APPROXIMATE EXISTING WASTE LIMITS
	APPROXIMATE FUTURE WASTE LIMITS
MW-10	EXISTING GROUND WATER MONITORING WELL
SW-1	EXISTING SURFACE WATER MONITORING LOCATION
GM-2	EXISTING LANDFILL GAS PROBE
GV-2	EXISTING GAS VENT
CDMW-3	PROPOSED GROUND WATER MONITORING WELL
CDSW-1	PROPOSED SURFACE WATER SAMPLING LOCATION
GM-7	PROPOSED LANDFILL GAS PROBE

REFERENCES

1. OVERALL SITE TOPOGRAPHY PROVIDED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON MAY 25, 2012 AERIAL PHOTOGRAPHY AND NCDOT GIS DEPARTMENT DATA RELEASE MARCH 2005.

0 200' 400' 600'

PREPARED FOR:

DEPARTMENT OF PUBLIC WORKS

PREPARED BY:

NC LIC. NO. C-0828 (ENGINEERING)
SMITH+ GARDNER ENGINEERS
14 N. Boylan Avenue, Raleigh NC 27603 | 919.828.0577

SEAL

SEAL

REV.	DATE	DESCRIPTION

Electronic files are instruments of service provided by Smith Gardner, Inc. for the convenience of the intended recipient(s), and no warranty is either expressed or implied. Any reuse or redistribution of this document in whole or part without the written authorization of Smith Gardner, Inc., will be at the sole risk of the recipient. If there is a discrepancy between the electronic files and the signed and sealed hard copies, the hard copies shall govern. Use of any electronic files generated or provided by Smith Gardner, Inc., constitutes an acceptance of these terms and conditions.

PROJECT TITLE:

HALIFAX COUNTY, NORTH CAROLINA C&D LANDFILL - AREA 2 LANDFILL GAS MONITORING REPORT

DRAWING TITLE:

PROPOSED LANDFILL GAS MONITORING NETWORK

DESIGNED: JAS	PROJECT NO: HALIFAX 12-1
DRAWN: JAL	SCALE: AS SHOWN
APPROVED:	DATE: OCT. 2012
FILENAME: HALI-D0246	
SHEET NUMBER:	DRAWING NUMBER: FIG. 2

© Smith Gardner Inc.

G:\CAD\Halifax\Halifax 12-1\Sheets\HALI-D0246.dwg - 11/8/2012 11:12 AM