

Permit No.	Date	DIN
57-04	August 26, 2013	21250

Gaither, Allen

From: Chris Stahl <cstahl@maconnc.org>
Sent: Monday, August 26, 2013 10:13 AM
To: Werner, Elizabeth
Cc: jhorton@maconnc.org; mark.cathey@mcgillengineers.com; Scott, Michael; Mussler, Ed; Gaither, Allen; Harrison, Troy; Lane, Ervin
Subject: Review of Landfill Gas Investigation at Highlands C&D Landfill - Closed; Permit #57-04
Attachments: Elizabeth Werner Letter 8-13.pdf; Highlands LF Gas Investigation Review 8-26-13.pdf

Elizabeth;

Please find the attached letter regarding landfill gas investigation at the closed Highlands C&D Landfill. Also attached is a review by Mark Cathey of McGill Associates, including a letter; aerial photo; and landfill cross-sections demonstrating topography at the site. I will be at a SWANA conference this week, but if you need more information, please let me know and I will get back with you as soon as possible.

Thank you.
Chris Stahl
Director of Solid Waste Management



Macon County Department of Solid Waste Management

109 Sierra Drive, Franklin, North Carolina 28734

Phone: (828) 349-2100; Fax: (828) 349-2185

Email: cstahl@maconnc.org

August 22, 2013

Elizabeth Werner
Permitting Hydrologist
NC DENR Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Ms. Werner:

This letter and attachments are submitted in response to correspondence from you, dated July 3, 2013, requesting an explanation and support of a landfill gas investigation that I performed in April, 2011, and submitted to Troy Harrison in the Asheville Regional Office on April 29, 2011. The investigation was performed to demonstrate compliance with Rule 15A NCAC 13B .0503(2)(a) and included one on-site structure (scalehouse); four groundwater monitoring wells; and seven temporary landfill gas probes. Please refer to the referenced submittal to Mr. Harrison for a more complete description of the investigation and results.

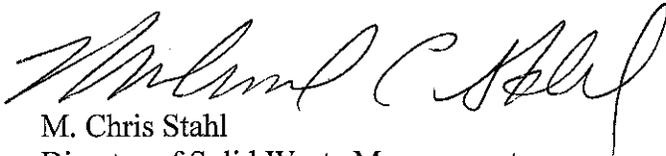
In your letter, you requested that I provide you an explanation of how and why the sampling points were chosen in the investigation. Below, I will outline the general considerations that went into my decision in development of the Landfill Gas Assessment Workplan. Additionally, I requested the aid of Mark Cathey, with McGill Associates to assist me in a review of the sample locations and depths, as well as a general overview of his opinion of gas migration potential from the closed Highlands C&D Landfill. Mr. Cathey's review and comments are attached for your consideration.

With regards to development of my plan, I began with some general assumptions that due to the nature of the waste and distance to the property boundary that I was not likely to find levels of landfill gas approaching the regulatory limits. Therefore, I did not concern myself greatly with distance from waste or compliance boundary, but rather, simply selected locations that were easily accessible and that could be identified should future sampling events be requested. Also due to conditions at the site, I assumed the greatest potential for landfill gas migration would be along the eastern property boundary. This is because the topography of the landfill and groundwater flow generally follow this direction, and because it is the closest distance between the waste limits and property boundary. As to the number of sampling points; based on the size of the landfill, I felt that two sampling points along each side of the landfill would be sufficient; again seeking locations along the northern and southern boundaries that were also near the toe or eastern boundary of the landfill. For several of the locations, I selected points that were adjacent to groundwater sampling points so that I could sample multiple depths at the same location, and again, so that I could find the locations again should repeat sampling be requested. As for the depth of the temporary probes; I simply dug as deep as I could with the equipment I had available and that I could carry to the sampling locations.

I believe the technical review, attached, of the sampling plan by Mr. Cathey demonstrates general support of my assumptions and adequacy of the plan with regards to being demonstrative of the landfill gas migration conditions and potential at the site. For the sake of your time, I have not attempted to summarize McGill's findings in this letter, but will let it stand alone as an attachment to this response.

Thank you for your time and consideration in this matter. I look forward to continuing to work with you and the Solid Waste Section in the resolution of this issue. Should you require additional information from me, please do not hesitate to contact me at your convenience.

Sincerely,



M. Chris Stahl
Director of Solid Waste Management

CC: Jack Horton, Macon County Manager
Mark Cathey, McGill Associates
Michael Scott, Section Chief, SWS
Ed Mussler, Permitting Branch Head, SWS
Allen Gaither, Permitting Engineer, SWS
Troy Harrison, Environmental Specialist, SWS
Ervin Lane, Compliance Hydrogeologist, SWS



August 13, 2013

Mr. Chris Stahl, Director
Solid Waste Department
Macon County
109 Sierra Drive
Franklin, North Carolina 28734

RE: Landfill Gas Investigation Review
Closed Highlands C&D Landfill
Macon County, North Carolina

Dear Mr. Stahl:

Pursuant to your request, McGill Associates has reviewed the landfill gas monitoring investigation that you prepared and then submitted to Mr. Troy Harrison on April 25, 2011. The sampling data which supported the submittal was collected on April 8, 2011. In accordance with our previous conversations, the objective of our review is to provide a professional opinion relative to the adequacy of the gas investigation that was performed in meeting the requirements of 15A NCAC 13B .0503(2)(a). Our evaluation included a review of existing site conditions and details of the closed C&D landfill construction, including a site visit to inspect the cap and buffer areas, review of the original permit drawings and permit renewal drawings, and conducting research of the property boundary.

McGill Associates visited the site on July 11, 2013 to inspect the landfill cap and adjacent buffer areas to look for any apparent signs that methane gas may be present and to review the locations of the previously installed temporary gas probes TGP-1 thru TGP-7. No signs of methane were found to be present at the site and we documented the approximate probe locations and discussed that the County would locate these locations at a later date via handheld GPS survey equipment. We also reviewed the original permit drawings and the permit renewal drawings (prepared for the facility in 2003) with Mr. Chris Stahl and Mr. Tommy Keener. The original permit drawings showed the original property line for the property transferred to Macon County in January 1992. The permit renewal drawings showed the general location and orientation of the waste trenches, which was confirmed with Mr. Keener, who has worked at the facility since 1993. We concluded our visit by locating the approximate property boundary and deed information from the County GIS System.

The GPS-surveyed probe locations were provided to our office on July 22, 2013 and were found to be in close proximity to the locations that had been located in the field during our

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828-252-0575 • Fax: 828-252-2518

previous site visit. The property information shown on the original permit drawings generally matched the parcel represented by the County GIS System and the recorded exchange deed.

Equipped with the above-referenced information, McGill Associates prepared a "Gas Sampling Closure Compliance Plan" (attached Sheet C-101). This Plan includes an aerial photograph of the property and shows the property boundary, LIDAR contours of the property, C&D Landfill waste limits, final cap grades of the closed C&D landfill, locations of the temporary gas probes, and locations of pertinent groundwater monitoring wells. This Plan allows us to show the general horizontal and vertical relationships of the temporary gas monitoring locations relative to the landfill waste limits and the compliance boundary. Cross sections A-A (attached Sheet C-102) and B-B (attached Sheet C-103) were developed to show the relationship of the waste to the temporary gas monitoring locations.

Based on our compilation and analysis of this information, we provide the following conclusions:

1. The compliance boundary (property line) is approximately 225 feet from the C&D landfill waste limits at its closest proximity along the eastern property line. The compliance boundary is approximately 690 feet from waste along the western property line. The compliance boundary is approximately 300 feet from waste at its closest proximity along the northern property line, but averages approximately 700 feet. The compliance boundary is approximately 700 feet at its closest proximity along the southern property line. There are two streams bordering the landfill that run between the landfill waste limits and the property boundary outside the northern, southern, and eastern borders of the closed landfill.
2. TGP-1 and TGP-2 are located along the western compliance boundary (+/- 690 feet). MW-3A is also located adjacent to TGP-2 and was sampled in conjunction with the probe locations. No methane was detected at the time of sampling. Although the previous monitoring at these locations does show compliance to the depth tested, these probes are likely not highly efficient at monitoring landfill gas migration from the C&D landfill. However, it is our opinion that landfill gas would not migrate beyond the existing cut bank located along the western side of the closed landfill. Please refer to Sheet C-102. The soils at the site are sandy silts and have a relatively high permeability compared to clays and fine silts. Based on the soil type available for constructing the base liner and final cap of this facility and the shallow depth at which the waste was placed, it is illogical for this landfill, which contains a relatively modest volume of C&D waste, to produce methane in sufficient quantity to force migration beyond the areas immediately adjacent to the landfill waste limits. We are of the opinion that it is not physically possible for landfill gas to migrate to the western compliance boundary of this facility.

3. TGP-3 is located approximately 195 feet south of the landfill waste limits, with a stream located between the landfill and TGP-3. MW-4 is also located south/southwest of the landfill, but approximately 450 feet from the landfill limits. MW-4 was sampled for methane at the time the other temporary probes were sampled. No methane was detected at the time of sampling. TGP-3 has a sufficient depth relative to the bottom of waste depth and should provide a representative sample for gas migration in the southern direction. MW-4 is too far from the C&D waste limits to be a representative methane sampling location for the facility. Any gas migration in this direction would likely occur through the cap and/or the down-gradient slope located between the southern waste limits and the stream. Please refer to Sheet C-103.
4. TGP-4 and TGP-5 are located along the eastern compliance boundary and adjacent to Rich Gap Road and monitoring wells MW-A & MW-B. They are located approximately 300 feet and 165 feet respectively from the waste limits and approximately 50 feet from the eastern compliance boundary. In addition to these temporary locations, MW-A and MW-B were also sampled for methane. No methane was detected at the time of sampling. The exact waste depths of the easternmost waste trenches are unknown. However, we have estimated the waste depths near the northeast corner of the cell to be the deepest in the landfill relative to adjacent grade, and approximately 15 feet deep. Therefore, we have estimated the bottom of waste elevation to be approximately 2980-2985 along the eastern side of the landfill. The temporary probe locations are located at an elevation of approximately 2970 and are located in an area where groundwater is approximately 5 feet deep. These probes should provide a representative sample of gas migration from the closed landfill.
5. TGP-6 is located approximately 70 feet from the northern waste limits of the cell. TGP-6 did show a 0.4% methane concentration (8% LEL) at the time of sampling. This concentration is well within the compliance range of < 5.0% methane, which is required at the compliance boundary, some 300+ feet away. Installing TGP-6 at a greater depth would have potentially improved its effectiveness for monitoring migration to the north, but the compliance boundary is located 300+ feet away from the waste limits and is located beyond a stream that is located north of the cell limits. Any gas migration in this direction would likely occur through the cap and/or the down-gradient slope located between the northern waste limits and the stream. Please refer to Sheet C-103.
6. TGP-7 is located approximately 125 feet northwest of the northwest corner of the landfill. No methane was detected at this location at the time of sampling. Installing TGP-7 at a greater depth would have potentially improved its effectiveness for monitoring migration to the northwest, but the compliance boundary is located 700+ feet away in this direction. Any gas migration in this direction would likely occur

through the cap and/or the down-gradient slope located between the northern waste limits and the stream.

To summarize, we are of the opinion that the soil properties of the existing landfill cap at Highlands would not promote migration of methane gas beyond the areas immediately adjacent to the landfill. In addition, the waste was placed in relatively shallow trenches, unlike many landfills located in mountainous regions of North Carolina. Also, the compliance boundary for this facility is 225 feet at its closest point along the eastern property boundary and TGP-4 and TGP-5 provide sufficient sampling depth based on the groundwater depth in this area of the site. The landfill is also bordered by streams on three sides (north, south, east) which typically provides a natural cutoff of gas migration, and there is a 30-foot cut bank located on the west side of the landfill. The site conditions would promote methane gas being vented through the cap or immediately adjacent slopes and the compliance boundary of this facility is simply too far from the C&D landfill for it to be a potential contributor to methane migration from the site. In addition, the closest receptor to this site is located approximately 1,350 feet southwest of the site. Based on these site conditions and our evaluation of the sampling points and monitoring results, we are of the opinion that the gas investigation performed in April 2011 provided an adequate representation that the closed C&D landfill facility met the requirements of 15A NCAC 13B .0503(2)(a).

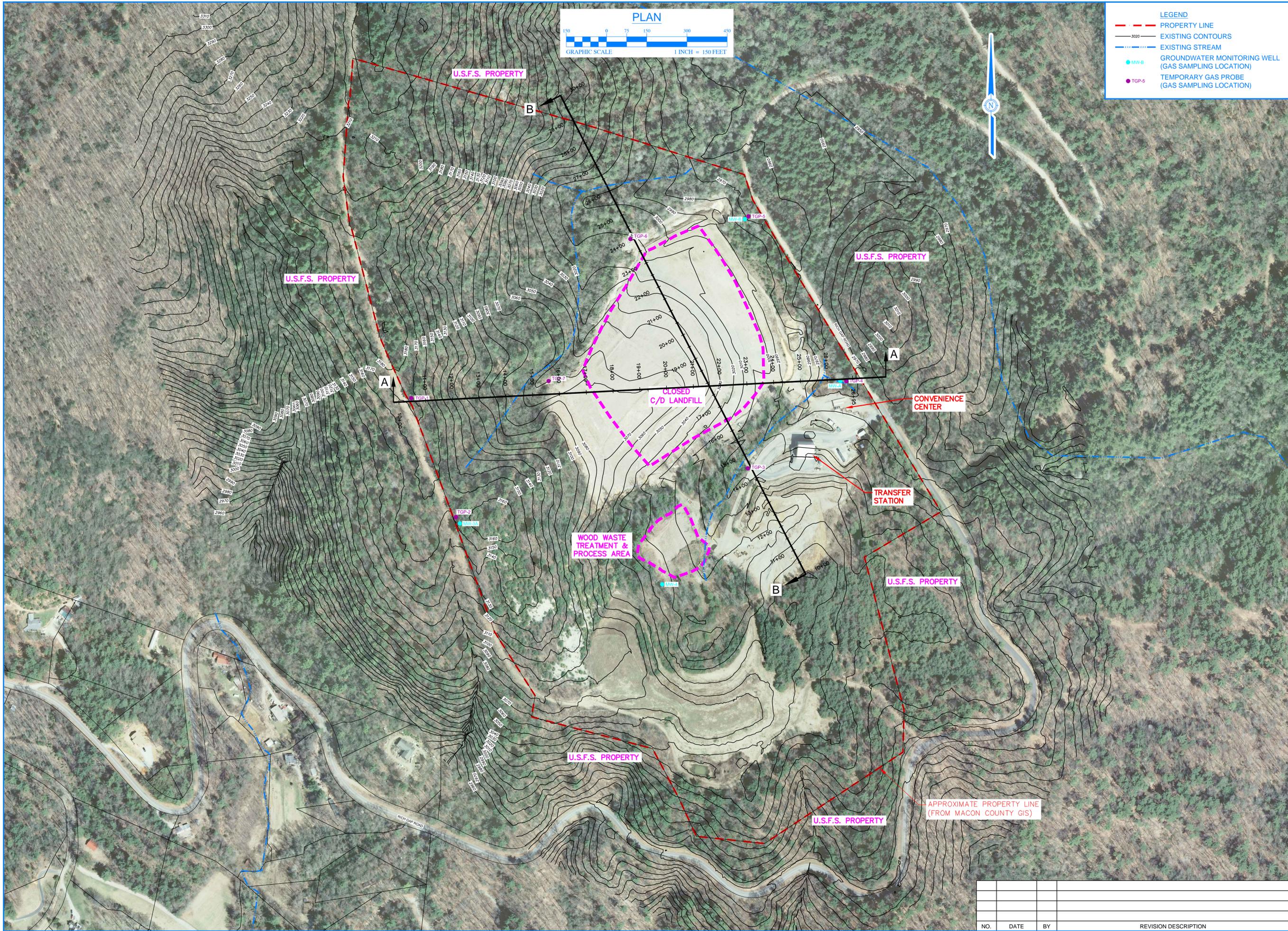
Chris, we thank you for the opportunity to provide assistance to Macon County on this project. Please review this information and give me a call if you have any questions.

Sincerely,
McGILL ASSOCIATES, P.A.



MARK D. CATHEY, PE
Senior Project Manager

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LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- EXISTING STREAM
- MW-B
GROUNDWATER MONITORING WELL
(GAS SAMPLING LOCATION)
- TGP-5
TEMPORARY GAS PROBE
(GAS SAMPLING LOCATION)

PLAN

GRAPHIC SCALE 1 INCH = 150 FEET

FOR REVIEW ONLY

HIGHLANDS CONSTRUCTION/DEMOLITION LANDFILL
MACON COUNTY
MACON COUNTY, NORTH CAROLINA

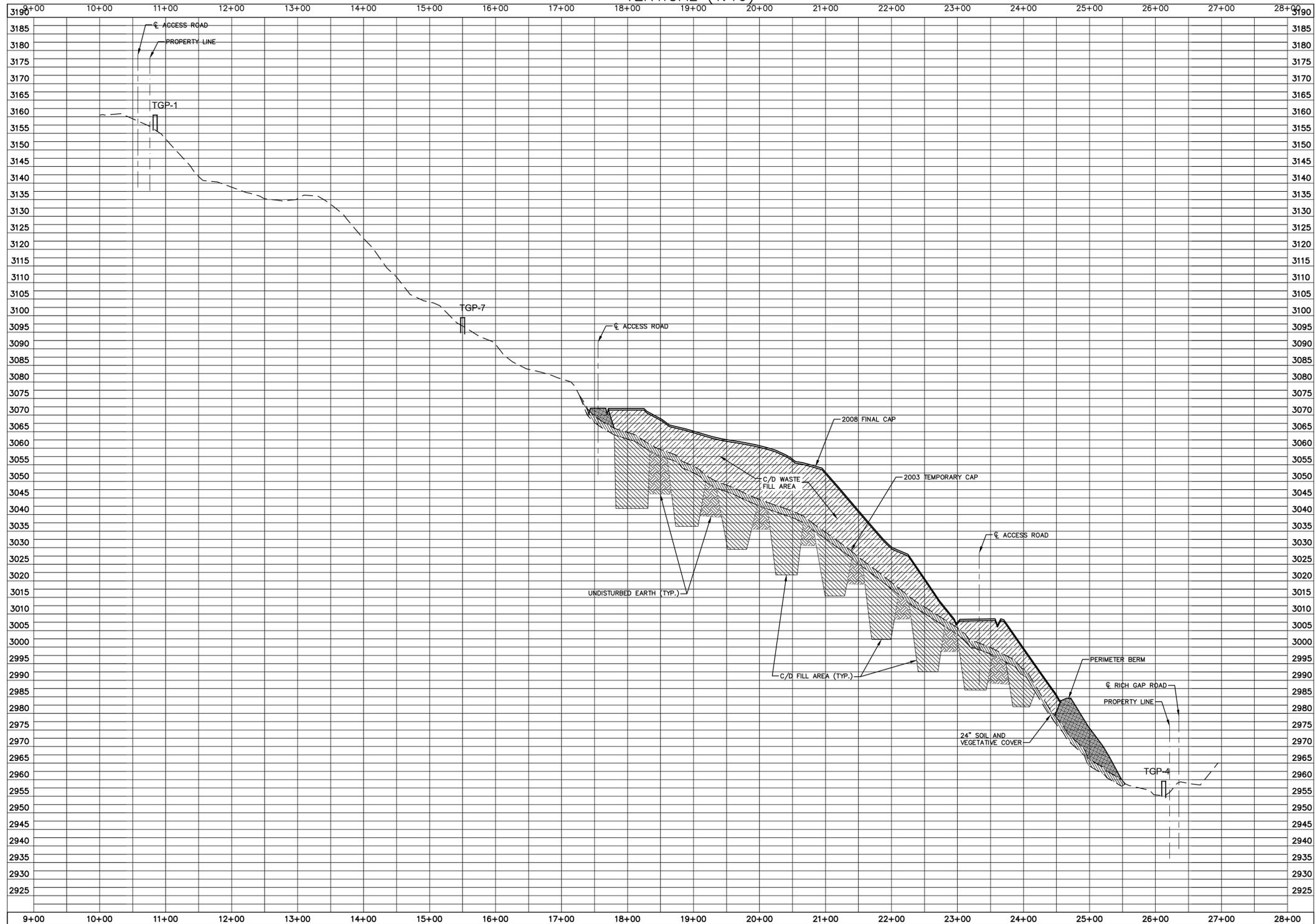
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DATE: MARCH 2013
DESIGNED BY: SB
CADD BY: BW
DESIGN REVIEW:
CONST. REVIEW:
FILE NAME:
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GAS SAMPLING
CLOSURE COMPLIANCE
PLAN

SHEET
C-101

NO.	DATE	BY	REVISION DESCRIPTION

SECTION: AA
 SCALE: HORIZONTAL (1:80)
 VERTICAL (1:16)



FOR REVIEW ONLY

HIGHLANDS CONSTRUCTION/DEMOLITION LANDFILL
MACON COUNTY
 MACON COUNTY, NORTH CAROLINA

JOB NO.: 13.00703
 DATE: MARCH 2013
 DESIGNED BY: SB
 CADD BY: BW
 DESIGN REVIEW:
 CONST. REVIEW:
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SECTION A-A

SHEET
C-102

NO.	DATE	BY	REVISION DESCRIPTION

FOR REVIEW ONLY

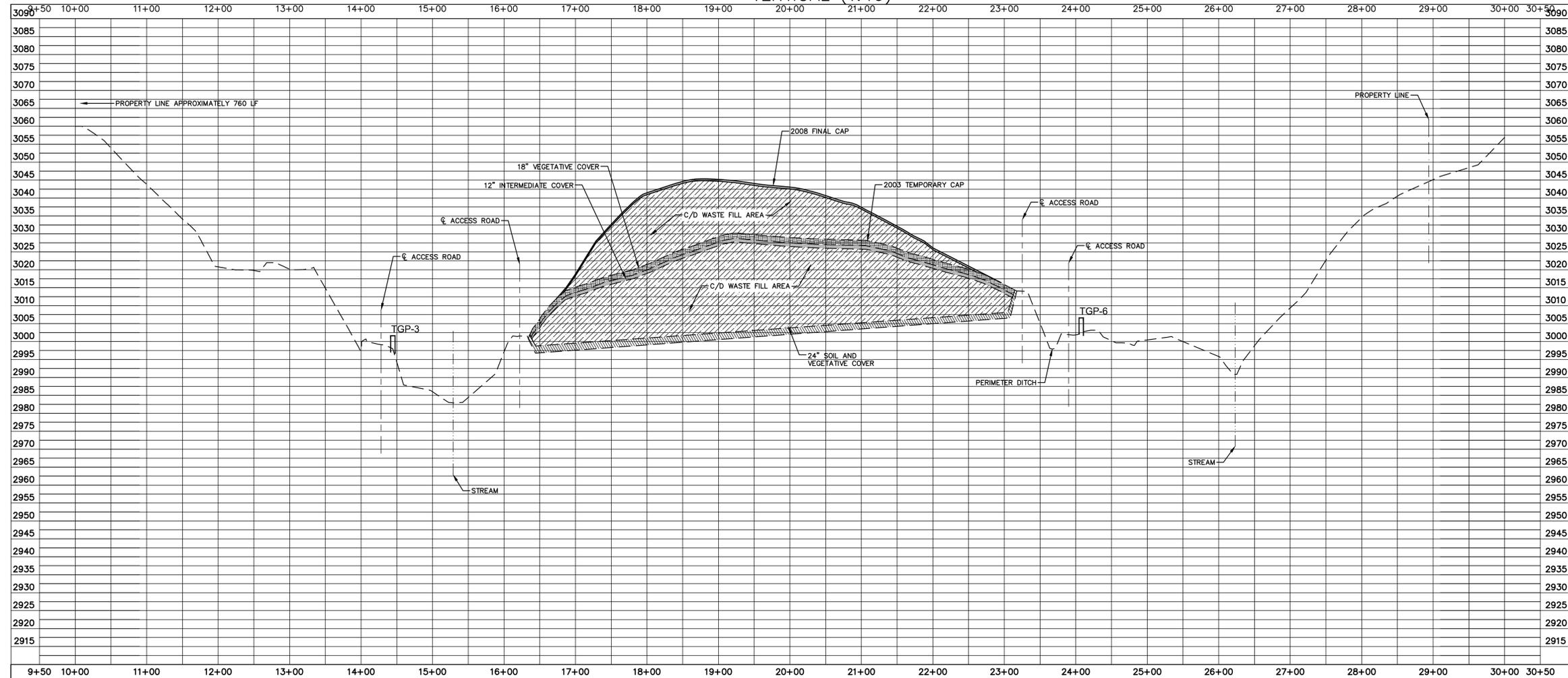
HIGHLANDS CONSTRUCTION/DEMOLITION LANDFILL
MACON COUNTY
 MACON COUNTY, NORTH CAROLINA

JOB NO.: 13.00703
 DATE: MARCH 2013
 DESIGNED BY: SB
 CADD BY: BW
 DESIGN REVIEW: _____
 CONST. REVIEW: _____
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SECTION B-B

SHEET
C-103

SECTION: BB
 SCALE: HORIZONTAL (1:80)
 VERTICAL (1:16)



NO.	DATE	BY	REVISION DESCRIPTION