

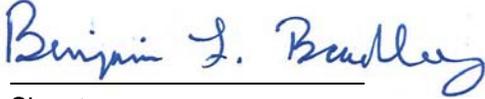
REMEDIAL INVESTIGATION - SUMMARY REPORT

**Cumberland County Landfill
NONCD0000741
Smoky Canyon Road, Hope Mills, NC
Cumberland County
State Contract No: N10004S
Task Order: 741SUM**



**December 5, 2014
Revised March 18, 2015**

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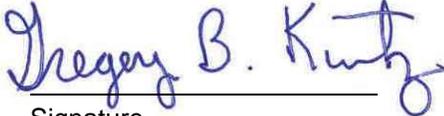

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ACRONYMS

BLS - Below land surface
C&D – Construction and demolition
EPA – Environmental Protection Agency
IHSB – Inactive Hazardous Sites Branch
IMAC – Interim Maximum Allowable Concentration
LCID – Land clearing inert debris
MCL – Maximum Contaminant Level
NC2L - North Carolina Title 15A NCAC Subchapter 2L Groundwater Quality Standards
PSRG – Preliminary Soil Remediation Goal
RVIST – Residential Vapor Intrusion Screening Table
SGSL – Exterior Soil Gas Screening Level
SRG – Soil Remediation Goal
SVOC – Semi-Volatile Organic Compound
USEPA – United States Environmental Protection Agency
VOC – Volatile Organic Compound

1.0 INTRODUCTION

This summary report briefly describes the results of the remedial investigations to delineate areas of concern at Cumberland County Landfill and their relevance to the implementation of the Site remedy. Previous remedial investigation reports are referenced in Section 7.0.

The Site is located on a single 144.5 acre parcel (Tax Pin 0441-89-9174) and can be accessed at the end of Smoky Canyon Road (Latitude 34.90485 and Longitude -78.83735) in Hope Mills, Cumberland County, North Carolina (Figure 1). The closest residence is 55 feet west of the Waste Disposal Area on Smoky Canyon Road. The residences that share a boundary with the Property are built on a crawl space.

The waste disposal area is approximately 0.96 acres, comprised of wooded areas with thick underbrush, and is zoned agricultural. Figure 2 shows the remedial investigation estimated Waste Disposal Area perimeter with sampling locations.

2.0 HISTORIC OPERATIONS AND DATA

Documentation from the State Board of Health and review of historical aerial photographs indicate that the landfill began operation in about 1975 and closed operation in about 1976 and was operated by Cumberland County. A permit was granted in 1998 to use a portion of the Property for disposal of land clearing inert debris (LCID). Surface LCID was removed by the property owner prior to beginning remedial investigation activities. The remedial investigations showed that the waste types at the Site primarily consist of LCID material near the surface and municipal waste/C&D material at deeper depths. An area located to the south of the waste disposal area is used as a shooting range.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

The Site is located in the Inner Coastal Plain physiographic province. Soils from borings were generally classified as brownish Silt with areas of brown to reddish brown Lean and Fat Clay and areas of dark Sands of the Tar Heel Formation. Bedrock was not encountered during field investigations.

The sand layers are the principal aquifers and are confined by layers of clay and silt. Local recharge to the groundwater system occurs in topographically higher areas by downward percolation and where sand layers crop out. Shallow groundwater moves down dip through the sand layers and discharges to surface water.

Groundwater was encountered at depths that ranged from 30.6 to 50.8 feet bls. Surface water features are not located within 500 feet of the disposal area. An unnamed branch of Grays Creek flows east through the central portion of the Property, joining a second unnamed branch in the southeast corner of the Property.

4.0 SENSITIVE ENVIRONMENTS

No documented sensitive environments were reported within 500 feet of the Waste Disposal Area.

5.0 WASTE DISPOSAL AREA

5.1 Waste Boundary

An electromagnetic induction survey was conducted to identify the extent of the waste disposal area and shows that waste is contained within the Property.

The perimeter of the waste disposal area is marked by a scarp face on the west and the top of the second steep slope to the east. Waste boundary determination borings were advanced into waste beneath the surficial LCID material and outside of waste along the northern, eastern, southern, and western boundaries of the waste disposal area.

5.2 Soil Cover

Twelve borings were advanced to characterize the cover soils at the Site. The cover soils ranged in thickness from six inches to about 3 feet and were classified as a dark grayish brown fine to medium grained Sandy Silt.

6.0 MEDIA CHARACTERIZATION

6.1 SOIL

About 64 soil borings were advanced within the waste and near the waste disposal perimeter to evaluate waste types, extent and thickness. In addition, one background boring was advanced on the adjacent property in an up-gradient direction north of the Site. Additional subsurface soil samples were collected from 4 to 5, 9 to 10, and 14 to 15 feet at a background boring location north of the Site; at 0 to 0.5, 4 to 5, 9 to 10, and 14 to 15 feet at three soil borings just outside of the south, southeast and northeast waste disposal area perimeter; 0 to 0.5 feet at three soil borings outside the waste near the northern Property boundary, and; 0 to 0.5 feet at three soil borings where firing guns for target practice south of the Waste Disposal Area may have occurred.

The soil samples were analyzed for volatile organic compounds (VOCs) by Method 8260B, semi-volatile organic compounds (SVOCs) by Method 8270D, total metals (15) by Method 6020A/7471A, nitrate, sulfate, and ammonia.

Soil analytical results were initially compared to the Preliminary Soil Remediation Goals (PSRGs) established by the North Carolina Inactive Hazardous Sites Branch (IHSB). If PSRGs were exceeded, the data was provided to the IHSB Superfund Section's Toxicologist for calculation of site specific Soil Remediation Goals (SRGs). The following site-specific health-based SRBs were provided by the Superfund Sections Toxicologist:

- Arsenic - 22 mg/Kg
- Cadmium - 17.5 mg/Kg
- Iron - 55,000 mg/Kg
- Manganese - 1,800 mg/Kg
- Thallium - 0.8 mg/Kg

No constituents were detected above the SRG in these additional borings near the waste disposal boundary, near the northern Property boundary or in the target practice area.

Cover soil was sampled at 0.5 and 1.5 feet across the Waste Disposal area.

Background samples are those collected at the Site in areas not influenced by the waste disposal area. Soils collected in background locations will show concentrations of naturally occurring materials. To determine whether impact from the disposal area has occurred, constituents in the waste disposal area soil samples were compared to the background data.

6.2 WASTE

Five borings advanced through the LCID area and into waste had a waste thickness up to 26 feet deep. Other borings advanced through the lower waste area showed waste up to 11 feet thick. LCID material and some C&D material was observed at depths that ranged from surficial to about 13 feet bls. Waste observed at depths of 13 to 26 feet bls included hard plastic, plastic sheeting, glass, wood, metal, fabric, Styrofoam, brick, asphalt, shingles, cardboard, carpet, ceramic, yarn, and trash bags.

There was no significant surficial debris during the time of investigation.

It is estimated that there is approximately 43,000 cubic yards (61,000 tons) of waste located at the site. It is also estimated that an additional 4,900 cubic yards (6,800 tons) of cover soil is present at the site.

6.3 WATER

6.3.1 *Groundwater Wells*

Eight temporary groundwater monitoring wells and two permanent groundwater monitoring wells were installed on the Site just outside the Waste Disposal Area.

Groundwater samples were analyzed for volatile organic compounds (VOCs) by Method 8260B, semi-volatile organic compounds (SVOCs) by Method 8270D, total metals (15) by Method 6020A/7470A, nitrate, sulfate, and ammonia. Results were compared to the North Carolina Groundwater Quality Standards (NC 2L) and Environmental Protection Agency Maximum Contaminant Levels (MCLs).

Iron was detected above the North Carolina Groundwater Standard (NC 2L) and the United States Environmental Protection Agency Maximum Contaminant Level (USEPA MCL) in the groundwater monitoring wells, however, it was below background concentrations and not related to landfill activities. The USEPA MCL for iron is a Secondary Standard for drinking water, which includes cosmetic and aesthetic effects in drinking water. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States (Shacklette and Boerngen, 1984) shows that the median range of iron in soils in the eastern United States is 100-10,000 (mg/Kg).

Refer to Figure 3 for the Groundwater and Flow Direction Map.

6.3.2 *Water Supply Wells*

Nine water supply wells located within 500 feet of the waste disposal area perimeter were sampled.

Water supply well samples were analyzed for volatile organic compounds (VOCs) by Method 8260B, semi-volatile organic compounds (SVOCs) by Method 8270D, total metals (15) by Method 6020A/7470A, nitrate, sulfate, and ammonia.

Iron, was detected in the water supply wells at concentrations that exceed the NC 2L and EPA MCL. Iron was below background concentrations. The USEPA MCL for iron is a Secondary Standard for drinking water, which includes cosmetic and aesthetic effects in drinking water. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States (Shacklette and Boerngen, 1984) shows that the median range of iron in soils in the eastern United States is 100-10,000 (mg/Kg).

If the concentration of an analyte detected in a groundwater sample collected from a supply well exceeds the USEPA MCL the analyte concentration is then compared to the NC 2L Groundwater Standard. If the analyte concentration exceeds the NC 2L, the groundwater analytical data is provided to the IHSB

Superfund Section's Toxicologist for calculation of a health-based concentration. The following health-based concentration was provided by the Superfund Section's Toxicologist:

- Iron – 2,500 ug/L

6.3.3 Groundwater Flow Direction

Based on site topography and groundwater well data, it is estimated that groundwater flows in an approximate easterly direction.

6.4 LANDFILL GAS

Above ground landfill gas screening for methane, carbon dioxide, hydrogen sulfide, and VOCs was conducted on the landfill surface but were not detected.

One gas probe (GP-1) was installed inside and two gas probes (GP-2 and 3) were installed outside of the Waste Disposal Area to evaluate and monitor subsurface vapors. Subsurface screening of the gas probes detected elevated levels of methane and carbon dioxide in GP-1.

A gas sample collected from GP-1 and analyzed for TO-15 (VOCs) showed benzene, cis-1,2-dichloroethylene, 1,2,4-trimethylbenzene, and vinyl chloride at concentrations that exceeded the June 2014 Residential Vapor Intrusion Screening Table Exterior Soil Gas Screening Level (RVIST SGSL). Refer to Figure 4 and Table 1 for the landfill gas results.

7.0 REFERENCES

Marshall Miller and Associates, August 2006, Cumberland County Landfill, Site Summary Report

Marshall Miller and Associates, November 2007, Cumberland County Landfill, Water Supply Well Sampling

Marshall Miller and Associates, August 2008, Cumberland County Landfill, Water Supply Well Confirmation Sampling

Schnabel Engineering South, July 2010, Cumberland County Landfill, Site Assessment First Phase Report

Schnabel Engineering South, October 2011, Cumberland County Landfill, Remedial Investigation-Contaminant Delineation Phase Report

Schnabel Engineering South, September 2012, Cumberland County Landfill, Remedial Investigation-Delineation Phase (Media Sampling and Landfill Gas)

Schnabel Engineering South, July 2013, Cumberland County Landfill, Remedial Investigation-Media Sampling

Schnabel Engineering South, October 2013, Cumberland County Landfill, Cover Soil Thickness and Analysis

Schnabel Engineering South, May 2014, Cumberland County Landfill, Eastern Waste Boundary Delineation and Topographic Survey

Shacklette, H. and Boerngen, J., 1984, Element Concentrations in Soils and Other Surficial Material of the Conterminous United States, US Geological Survey Professional Paper 1270.

Marshal Miller and Associates, Inc., August 2012, Cumberland County Landfill, Water Supply Well Sampling Report

This report was prepared specifically for the use of the Pre-Regulatory Landfill Unit of the Inactive Hazardous Sites Branch under our contract dated October 27, 2009 as defined in the scope of work for Task Order 741SUM. Use of this document for other purposes or by other parties is at the sole risk of the user.

Table 1
Landfill Gas Results
Cumberland County Landfill
NONCD0000741

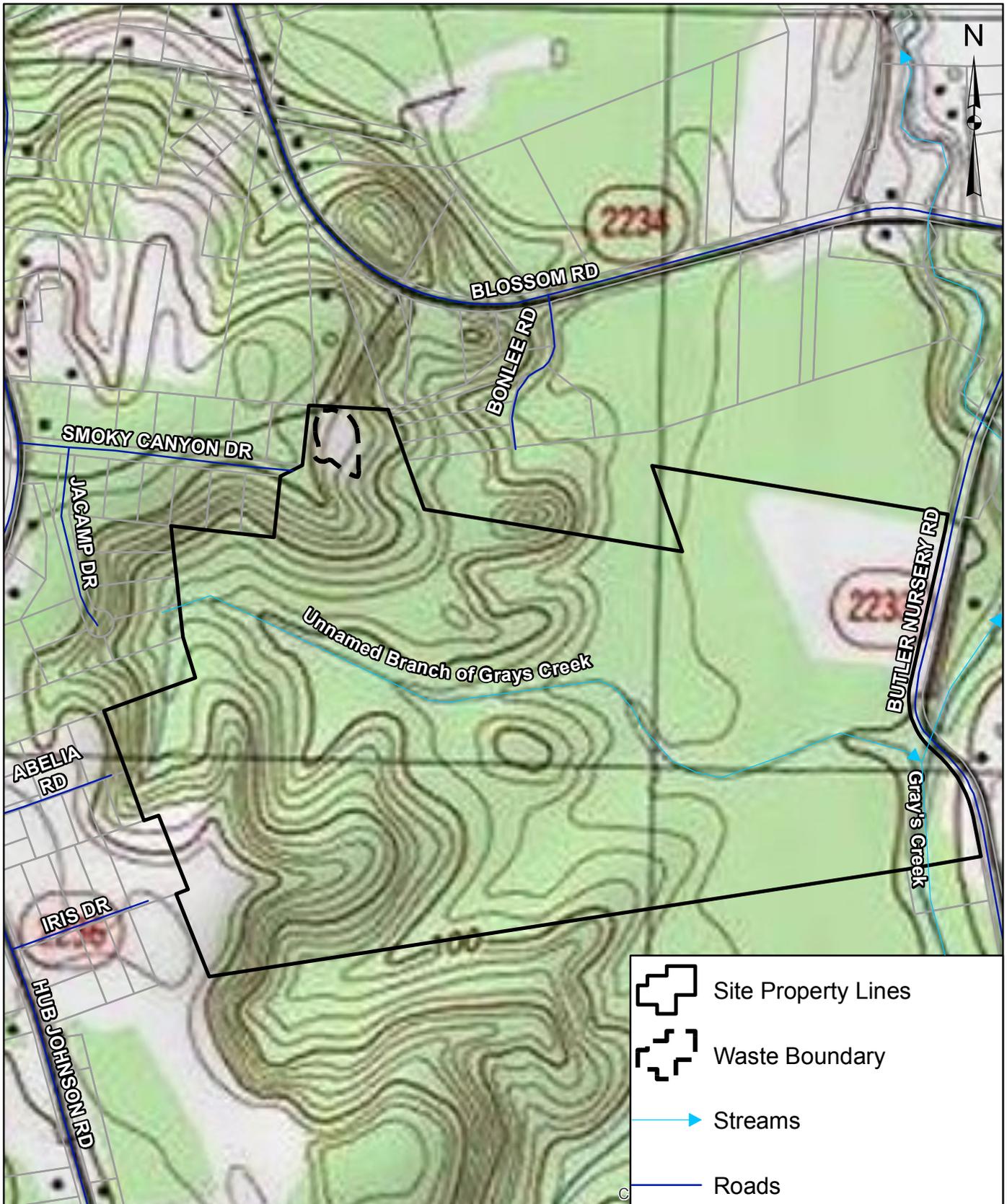
Sample ID:	Exterior Soil Gas Screening Level (SGSL) ug/m ³	GP-1	GP-1 DUP Duplicate of GP-1
Matrix:		Gas	Gas
Sampled Date:		4/3/2013	4/3/2013
EPA TO-15			
Benzene	120	210	210
cis-1,2-Dichloroethylene	36.0	330	330
1,2,4-Trimethylbenzene	48.7	46	63
Vinyl Chloride	55.9	240	220
Gas Probe Screening	Date Collected	GP-1	2nd reading
Methane (% Volume)	4/3/2013	31.1	30.2
Carbon Dioxide (% Volume)	4/3/2013	23.7	23.5

Notes:

Units in ug/m³ unless otherwise noted

IHSB Residential Vapor Intrusion Screening Table (RVIST), June 2014

Bold Font: Sample concentration greater than the limit



Source: USGS 7.5' Quadrangle, Cedar Creek NC, 1986
 Topography Based on Aerial Photos Taken 1979
 Contour Interval = 10 ft

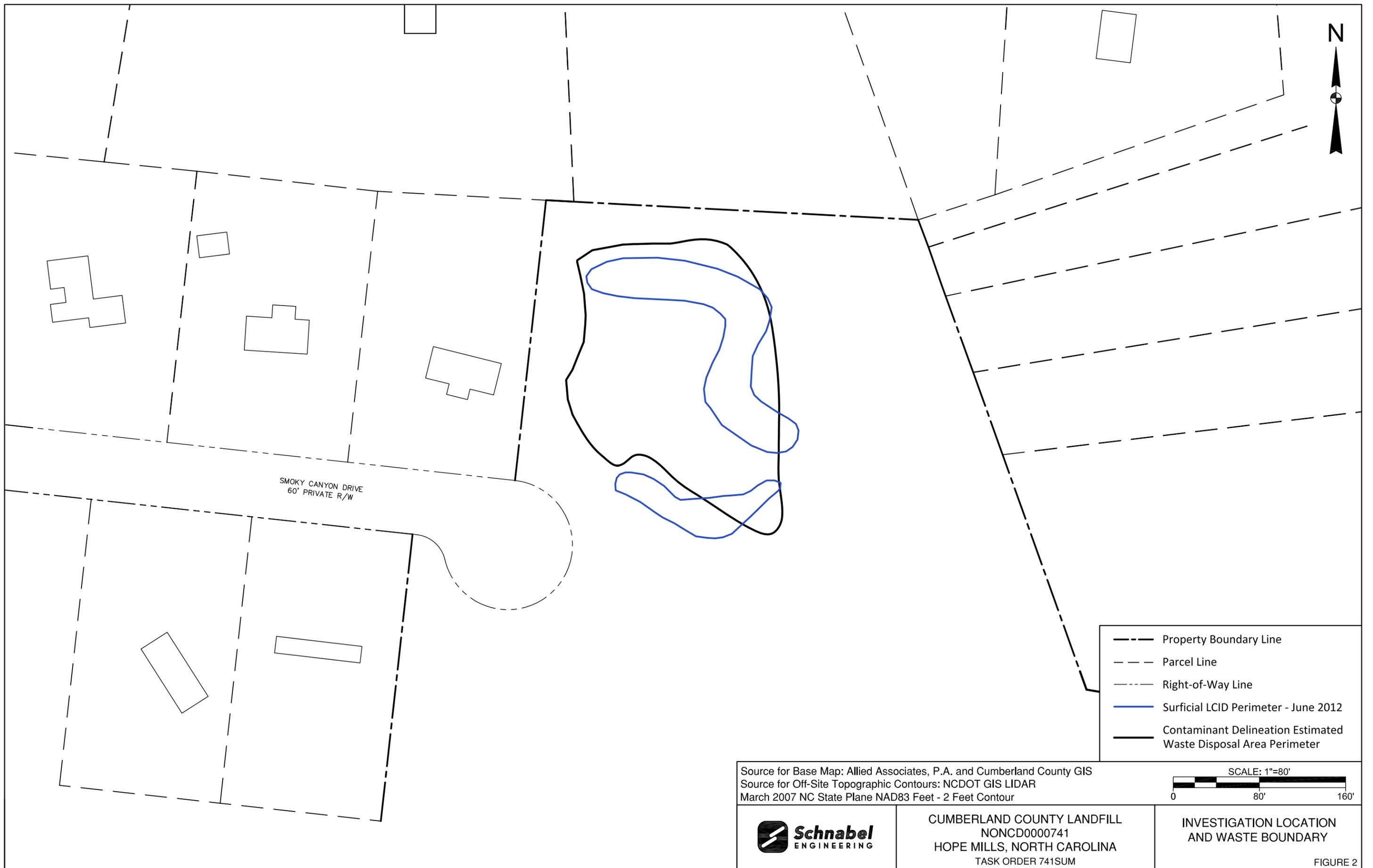
600 300 0 600 Feet
 Scale: 1:7,200



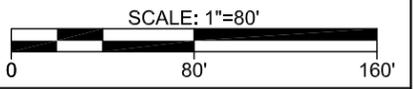
CUMBERLAND COUNTY LANDFILL
 NONCD0000741
 HOPE MILLS, NORTH CAROLINA
 TASK ORDER 741SUM

TOPOGRAPHIC
 SITE LOCATION

Figure 1



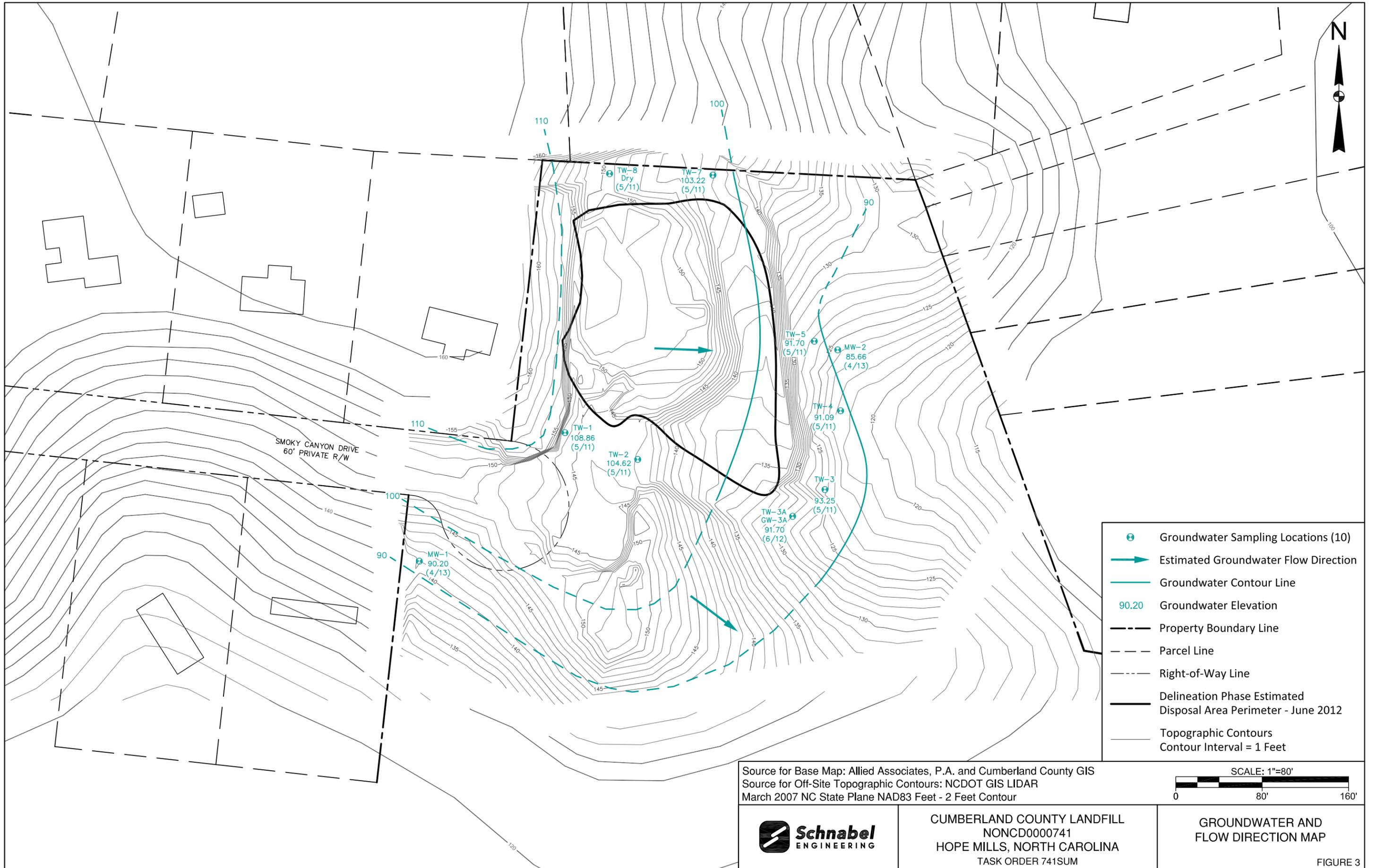
Source for Base Map: Allied Associates, P.A. and Cumberland County GIS
 Source for Off-Site Topographic Contours: NCDOT GIS LIDAR
 March 2007 NC State Plane NAD83 Feet - 2 Feet Contour



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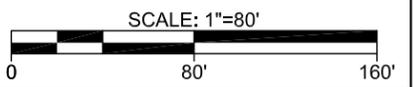
INVESTIGATION LOCATION
 AND WASTE BOUNDARY

FIGURE 2

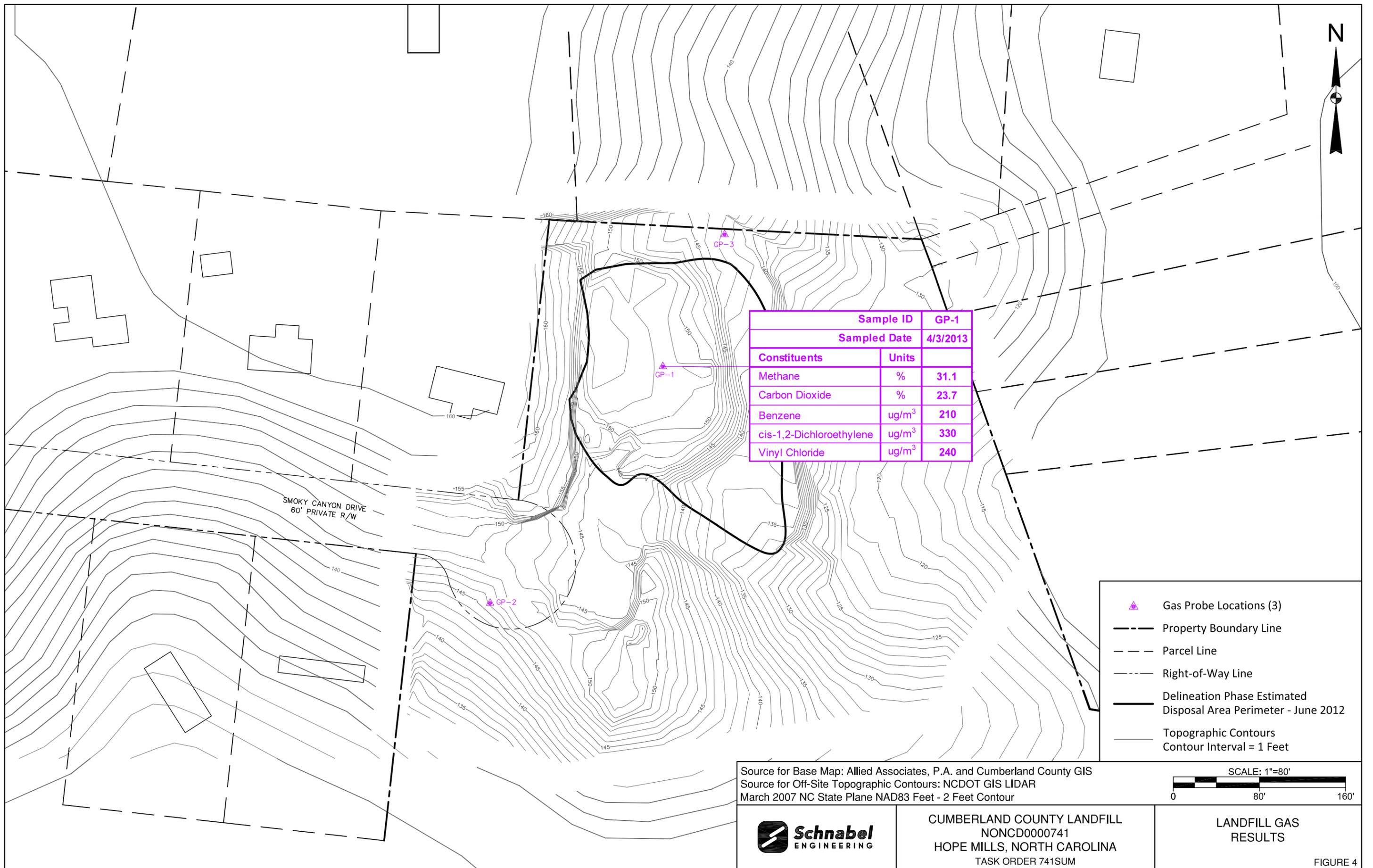


- ⊕ Groundwater Sampling Locations (10)
- ➔ Estimated Groundwater Flow Direction
- Groundwater Contour Line
- 90.20 Groundwater Elevation
- Property Boundary Line
- Parcel Line
- Right-of-Way Line
- Delineation Phase Estimated Disposal Area Perimeter - June 2012
- Topographic Contours
Contour Interval = 1 Feet

Source for Base Map: Allied Associates, P.A. and Cumberland County GIS
 Source for Off-Site Topographic Contours: NCDOT GIS LIDAR
 March 2007 NC State Plane NAD83 Feet - 2 Feet Contour



	<p>CUMBERLAND COUNTY LANDFILL NONCD0000741 HOPE MILLS, NORTH CAROLINA TASK ORDER 741SUM</p>	<p>GROUNDWATER AND FLOW DIRECTION MAP</p> <p style="text-align: right;">FIGURE 3</p>
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SMOKY CANYON DRIVE
60' PRIVATE R/W

- Gas Probe Locations (3)
- Property Boundary Line
- Parcel Line
- Right-of-Way Line
- Delineation Phase Estimated Disposal Area Perimeter - June 2012
- Topographic Contours
Contour Interval = 1 Feet

Source for Base Map: Allied Associates, P.A. and Cumberland County GIS
 Source for Off-Site Topographic Contours: NCDOT GIS LIDAR
 March 2007 NC State Plane NAD83 Feet - 2 Feet Contour

SCALE: 1"=80'



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LANDFILL GAS
 RESULTS
 FIGURE 4