Carenjohnson
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92-09

SCS ENGINEERS

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LANDFILL GAS REMEDIATION PLAN

NORTH WAKE COUNTY LANDFILL
RALEIGH, NORTH CAROLINA

SOLID WASTE PERMIT NO. 92-09

Prepared for:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Division of Waste Management
Solid Waste Section
401 Oberlin Road, Suite 150
Raleigh, North Carolina 27605
(919) 733-4996

Submitted by:

SCS ENGINEERS, PC
3229 Anderson Highway
Suite 100
Powhatan, Virginia 23139
(804) 598-9480

On Behalf of:

NORTH WAKE COUNTY LANDFILL
9004 Deponie Drive
Raleigh, North Carolina 27615
(919) 856-5634

Received
NOV 2006
Solid Waste Section

November 17, 2006
File No. 02199312.01

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INTRODUCTION AND OBJECTIVES

This Landfill Gas (LFG) Remediation Plan has been prepared for the North Wake County Landfill (Landfill) in accordance with the North Carolina Department of Environment and Natural Resources (NCDENR) regulations under 15A NCAC 13B.1626(4)(c)(iii), which require that a remediation plan for methane gas releases be prepared, implemented, and a copy of the plan placed in the operating record when the results of gas monitoring indicate concentrations of methane in excess of the compliance levels. This LFG Remediation Plan describes the nature and extent of the problem and the proposed remedy.

The Landfill is owned by Wake County, North Carolina. A private company, Santek Environmental, Inc., manages landfill operations under a contract agreement with Wake County. The LFG collection and control system operator is Wake Gas Producers, LLC (WGP). The Landfill currently accepts municipal solid waste (MSW) from the Raleigh-Wake County Metropolitan area. The site is located on Deponie Drive near Raleigh, North Carolina.

The Landfill is comprised of a Closed (Unlined) Landfill and an Active (Lined) Landfill. The Active Landfill is divided into 11 cells covering approximately 69 acres in area. The Closed Landfill is located in the northeast portion of the Landfill property. It is approximately 36 acres in area and has approximately 1.4 million Mg of refuse in-place. The Closed Landfill opened in 1986 and closed in 1997, at which time a final cover system was installed.

The facility performs routine quarterly monitoring at the perimeter LFG monitoring probes. The methane concentration measured at probe M-10 on 9/20/06 exceeded the regulatory compliance threshold of the lower explosive limit (LEL), which is 5 percent by volume. The Landfill notified NCDENR regarding the methane exceedance at probe M-10 in correspondence dated 9/22/06.

This LFG Remediation Plan is intended to address the discrete area surrounding probe M-10, which exhibited elevated methane concentrations. The objectives of this Plan are as follows:

- Identify the nature and the extent of LFG migration in the vicinity of probe M-10;
- Present the proposed approach for reducing methane concentrations to below the regulatory threshold and controlling migration;
- Outline the proposed monitoring program to verify mitigation of the LFG migration; and,
- Present the proposed schedule for implementation of corrective actions and on-going monitoring events.

NATURE AND EXTENT OF LANDFILL GAS MIGRATION

The nature and extent of LFG migration at the Closed Landfill is well-documented in multiple reports and plans submitted to NCDENR dating back to around 2000. The historical LFG remediation activities and corrective actions are filed in the facility's operating record and the existing LFG collection and control systems at the site are operated to control subsurface LFG migration, maintain regulatory compliance, and protect human health and the environment.

The impacted probe is located approximately 200 feet northeast of the Active Cell's waste limits and 300 feet south of the Closed Cell. A site plan showing the location of the impacted probe and the general facility features is included in Exhibit 1. Historical and recent monitoring data for probe M-10 is presented in Exhibit 2.

There is a residential development within 600 feet to the northwest of the impacted probe. Wake County owns the land directly west of the impacted area for approximately 500 feet. The LFG blower/flare station operated by WGP is located 500 feet southeast of the impacted probe. An existing sanitary sewer positioned between the Active and Closed Cells is located approximately 50 feet north of the impacted probe.

Wake County and SCS met on 9/26/06 to discuss the detection of methane in monitoring probe M-10. The location of the probe, methane concentrations, proximity of the residential structures, and historical remediation efforts were discussed during the meeting. Based on site conditions and historical data, Wake County and SCS believe the source of the methane is LFG generated in the Closed Landfill. Due to the proximity of the impacted probe to residential structures and infrastructure, the potential risk to human health and the environment warrants further investigation regarding the extent of the LFG migration. Wake County and SCS have developed a general approach to continue monitoring the methane concentration in the probe and conduct further investigations to identify the potential of off-site LFG migration beyond the facility boundary.

LFG is a product of the natural biological decomposition of organic material contained in wastes deposited in landfills. The production of methane gas (a principal component of LFG) by methanogenic bacteria usually begins after oxygen contained in the refuse is depleted. The LFG that results from anaerobic decomposition is predominantly methane (CH_4) and carbon dioxide (CO_2).

Production of LFG creates a positive pressure within the landfill as void spaces are filled. This pressure acts as a driving force (convection), causing LFG migration through cover soils to the atmosphere and into surrounding soils. In addition, a concentration gradient causes diffusive flow of LFG away from the landfill to off-site areas, meaning LFG flows from areas of high concentration into areas of low concentration.

LFG migration can create a hazard, since the methane present in LFG is combustible. Methane can cause an explosion when allowed to accumulate in an enclosed area at concentrations between 5 and 15 percent by volume in air (the explosive limits for methane gas) and when in the presence of oxygen and a source of ignition.

HISTORICAL LANDFILL GAS REMEDIATION ACTIVITIES

The historical LFG remediation activities and detailed documentation pertaining to the existing LFG control systems installed at the site is well-documented in multiple reports and plans submitted to NCDENR dating back to around 1997. The facility has extensive LFG collection system infrastructure installed in and around the Closed Landfill as well as portions of the Active Landfill.

LANDFILL GAS REMEDIATION APPROACH

The initial step for the remediation approach is to initiate operational adjustments to the existing LFG collection and control systems in an effort to increase applied vacuum to the Closed Landfill, and, thereby, control subsurface LFG migration in the vicinity of probe M-10. The effectiveness of such operational adjustments will be evaluated based on monitoring at existing LFG monitoring probes along the southern limits of the Closed Cell.

The County will coordinate with WGP to implement measures to enhance LFG control along the southern boundary of the Closed Cell and in the vicinity of probe M-10. The County will also evaluate potential improvements and upgrades to the existing system infrastructure as warranted to adequately control LFG migration in this portion of the site.

LANDFILL GAS MONITORING PROGRAM

The frequency for monitoring the impacted LFG probe M-10 will be monthly and will continue until such time that the probe has demonstrated compliant methane concentrations for ~~three~~ consecutive months. At that time the probe will be monitored quarterly in accordance with the Gas Management Plan.

Wake County may elect to monitor select probes on a more frequent basis for informational purposes. If any future quarterly monitoring results indicate non-compliant methane concentrations (above the LEL), the frequency will be increased to monthly until the probe(s) have demonstrated compliant readings.

The monitoring results for probe M-10 are presented in Exhibit 2, which indicates the methane concentration has decreased since the initial sampling event on 9/20/06 and had reduced to below the compliance limit as of the monitoring event performed on 10/24/06.

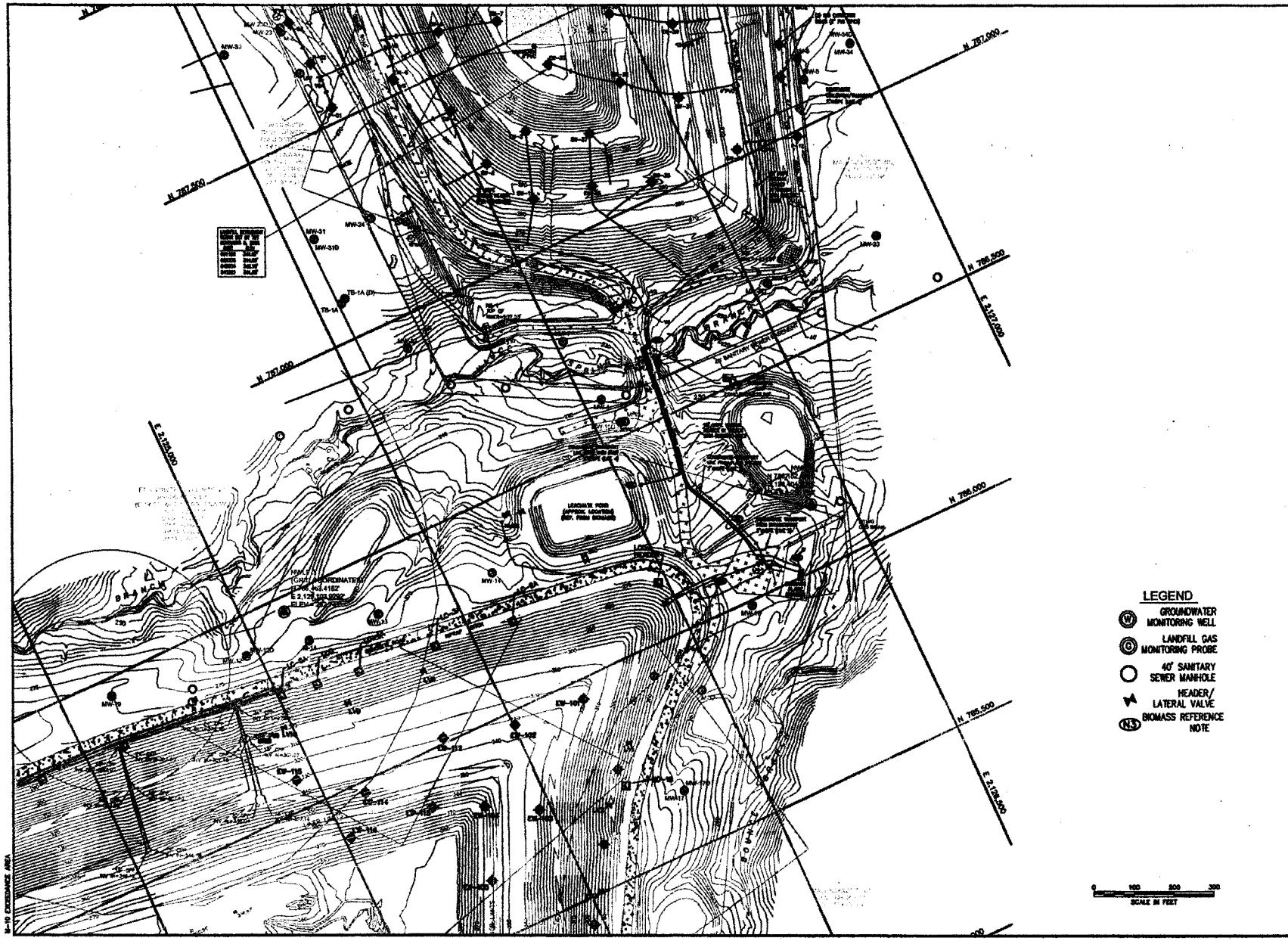
As part of the continued investigation regarding subsurface methane levels in the vicinity of probe M-10, the County intends to monitor for methane content in the headspace of groundwater wells MW-4, MW-7, MW-15, and MW-15D. Based on the results compiled, further monitoring and investigations may be initiated.

IMPLEMENTATION SCHEDULE FOR PROPOSED CORRECTIVE ACTIONS

Wake County plans to implement and complete the proposed LFG remediation efforts in accordance with the following schedule:

	Complete By:
Routine LFG Monitoring at Probe M-10	Ongoing on Monthly Basis
Implement Operational Adjustments to Existing LFG Control System	12/31/06
Conduct LFG Monitoring at Adjacent Groundwater Wells	12/31/06
Continued LFG Migration Investigations & Supplemental LFG Controls	To Be Determined Based on Field Data

EXHIBITS



M-10 EXCEDANCE AREA

NO.	REVISION	DATE

SHEET TITLE
LFG REMEDIATION PLAN

PROJECT TITLE
M-10 LANDFILL GAS PROBE
NORTH WAKE COUNTY LANDFILL

CLIENT
WAKE COUNTY
SOLID WASTE DIVISION
P.O. BOX 550
RALEIGH, NC 27602

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS, INC.

CADD FILE: M-10
DATE: 11/17/06
SCALE: NA
DRAWING NO. 1 of 1

EXHIBIT 2.
HISTORICAL METHANE CONCENTRATION AT MONITORING PROBE M-10

2nd Qtr 2002	5/2/2002	0.0%
3rd Qtr 2002	9/26/2002	0.0%
4th Qtr 2002	12/4/2002	0.1%
1st Qtr 2003	3/4/2003	0.0%
2nd Qtr 2003	6/26/2003	0.1%
3rd Qtr 2003	9/17/2003	0.2%
4th Qtr 2003	11/18/2003	0.2%
1st Qtr 2004	3/18/2004	0.0%
2nd Qtr 2004	6/22/2004	0.0%
3rd Qtr 2004	9/30/2004	0.0%
4th Qtr 2004	11/30/2004	0.0%
1st Qtr 2005	1/23/2005	0.0%
2nd Qtr 2005	6/14/2005	0.0%
3rd Qtr 2005	9/29/2005	0.0%
4th Qtr 2005	12/14/2005	0.0%
1st Qtr 2006	3/7/2006	0.0%
2nd Qtr 2006	6/26/2006	0.0%
3rd Qtr 2006	9/20/2006	**9.7%**
Retest	10/9/2006	**7.4%**
Retest	10/24/2006	0.5%

Environmental Consultants

3229 Anderson Highway
Suite 100
Powhatan, VA 23139-7308

804 598-9480
FAX 804 598-9485
www.scsengineers.com

SCS ENGINEERS

September 22, 2006
File No. 02199312.02-2

Mr. Dennis Shackelford
NCDENR, Division of Waste Management
Solid Waste Section
401 Oberlin Road, Suite 150
1646 Mail Service Center
Raleigh, NC 27699-1646

Subject: Notification of Methane Exceedance at Landfill Gas (LFG) Monitoring Probe M-10 at the North Wake County Landfill -- Raleigh, NC

92-09

Dear Mr. Shackelford:

On behalf of Wake County (County), SCS Engineers, PC (SCS) is submitting this letter to notify you of a methane exceedance detected at the perimeter landfill gas (LFG) monitoring probe M-10 at the North Wake County Landfill (Landfill). Under 15A NCAC 13B Section .1626(4)(c)(ii), the County must place in the operating record the methane gas levels recorded within seven days of detection. The methane exceedance at probe M-10 was detected during routine quarterly monitoring on September 20, 2006.

During the Third Quarter 2006 monitoring event involving the perimeter methane monitoring probes at the Landfill, probe M-10 exhibited a methane concentration of 9.7 percent by volume, which is equivalent to 194 percent of the lower explosive limit (LEL) for methane. Probe M-10 is located on the northeast side of the active, lined cell.

Also, as required by 15A NCAC 13B Section .1626(4)(c)(iii), the County plans to implement a remediation plan within 60 days of the initial exceedance (prior to November 19, 2006).

The County appreciates your attention to this matter. If you have any questions or comments regarding the County's notification, please feel free to call Johnny Beal of Wake County at (919) 856-5634 or Bob Dick at (804) 598-9480.

Sincerely,

D. Brandon King

D. Brandon King
Associate Staff Scientist
SCS ENGINEERS, PC

Robert E. Dick

Robert E. Dick, P.E.
Project Director
SCS ENGINEERS, PC

cc: Dan LaMontagne - Wake County
Johnny Beal -- Wake County

Johnny C Beal

11/17/2006 02:30 PM

To: dennis.shackelford@ncmail.net
cc: Dan J LaMontagne/Wake County@Wake County, bdick@scsengineers.com
Subject: Landfill Gas Remediation Plan

Dennis, this afternoon I will deliver the remediation plan from our consultants, SCS Engineers, to the DENR Oberlin Road offices, with the packet to your attention. The plan concerns Methane Monitoring Well # 10, which we discussed during our meeting and landfill audit at North Wake Landfill yesterday. We reported an exceedance at this well in September, another in the October retest, and submission of this plan meets the compliance requirement of submission of a remediation plan within 60 days of the initial exceedance date. If you have questions, please contact me at 919-856-5634. Thanks. JB

COPY

NOV 2006

Received
2006
Waste

SCALE: 1" = 2000'

0 1000 2000 4000

FALLS LAKE

NEUSE RIVER

CSX RAILROAD

US#1

DUNN RD

FALLS OF NEUSE RD.

RAVEN RIDGE RD

UNLINED M.S.W. LANDFILL

UNLINED C & D LANDFILL

92-09

SUBTITLE "D" LANDFILL

DURANT RD

DURANT ROAD

CAPITOL BLVD.

I-540

NORTHERN WAKE EXPRESSWAY

GIS EXHIBIT PLAN

1-MILE RADIUS AROUND THE NORTH WAKE LANDFILL (PROPERTIES OF WAKE COUNTY)

THIS PLAN WAS PREPARED FOR REFERENCE PURPOSES ONLY. IT IS BASED UPON GIS INFORMATION TAKEN FROM THE WAKE COUNTY GIS WEBSITE ON NOVEMBER 4, 2002 AND IS ONLY ACCURATE AS OF THAT DATE.

PREPARED BY:

TAYLOR WISEMAN & TAYLOR

ENGINEERS ▮ SURVEYORS ▮ SCIENTISTS

SUBSURFACE UTILITY ENGINEERS

3500 REGENCY PARKWAY, SUITE 160, CARY, NC 27511

PHONE (919) 297-0085 FAX (919) 297-0090

PREPARED FOR:

WAKE COUNTY SOLID WASTE MANAGEMENT DIVISION

P.O. BOX 550

RALEIGH, NC 27602

(919) 856-6186

N C Grid

NAD 83

N E S W

N C Grid - NAD 83
SCALE: 1" = 400'

WESCOTT DR
STILL CREEK CT
SILVERWOOD CREEK DR
RIVER FOREST
CRISP DR
COOPER FALLS LN
CHELTON OAKS PL
HALLINGDALE CT
ROSEBANK LN
FALLS RIVER AVENUE
ASHMEAD LN
ABBOTT'S CREEK
DUNN RD
FALLS
SMITH BASIN LN
BRANDERMILL DRIVE
DUVAL STREET
OAKBORO DRIVE
SORRILLS CREEK LN
FALLS RIVER AVENUE
HALLBERG LN
FARMINGTON GROVE DRIVE
NANCE SPRING BRANCH
BOUNCE BRANCH

CLOSED MUNICIPAL SOLID WASTE LANDFILL (33 ACRES)

GATE

LEACHATE LAGOON

DTE BIOMASS FLARE STATION

CLOSED C&D LANDFILL (5.5 ACRES)

SUBTITLE "D" LANDFILL (70 ACRES)

MULT-MATERIAL RECYCLING CENTER

HOUSEHOLD HAZARDOUS WASTE

SCALE HOUSE

DROP OFF CENTER

CONVENIENCE CENTER

WAKE COUNTY FIELD SERVICES

SANTEK OFFICE

DEPONIE DR

STOCKPILE & BORROW AREA (42.95 ACRES)

DAY CARE

FALLS RIVER AVE

DURANT ROAD (SR-2006)

DOUBLEBIT DRIVE
TENDERFOOT TR.
SPRING WILLOW
DEERLAND GROVE

DURANT ROAD MIDDLE SCHOOL

DURANT ROAD ELEMENTARY SCHOOL

CAMP DURANT

SCALE:	1" = 400'
MAP DATE:	7/05/06
DRAWN BY:	C. HOWARD, PLS
CHECKED BY:	R. BOHN, PLS
PROJECT:	70310.0001.00
SHEET:	1 / 1

LAND USE EXHIBIT

MULTIPLE PROPERTIES OF WAKE COUNTY
NORTH WAKE LANDFILL
DePONIE DRIVE
WAKE COUNTY, RALEIGH, NORTH CAROLINA

PREPARED BY:
TAYLOR WISEMAN & TAYLOR
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Received
2006
Solid Waste
Section

N C Grid - NAD 83
SCALE: 1" = 400'

ABBOT'S CREEK
DUNN RD
WESCOTT DR
STILL CREEK CT
ASHMEAD LN
SILVERWOOD CREEK DR
AVENUE
RIVER
RIVER FOREST
CRISP DR
FALLS
HALLINGDALE CT
ROSEBANK LN
SMITH BASIN LN
COOPER FALLS LN
CHELTON OAKS PL
BRANDERMILL
DRIVE
DUVAL
STREET
OAKBORO
SORRILLS
RIVER
AVENUE
FALLS
CREEK LN
HALLBERG LN
FARMINGTON GROVE
DRIVE
BRANCH
SPRING
NANCE
BOUNCE BRANCH

CLOSED
MUNICIPAL SOLID
WASTE LANDFILL
(33 ACRES)

GATE
LEACHATE
LAGOON
DTE BIOMASS
FLARE
STATION

CLOSED
C&D
LANDFILL
(5.5 ACRES)

SUBTITLE "D"
LANDFILL
(70 ACRES)

MULT-MATERIAL
RECYCLING
CENTER
HOUSEHOLD
HAZARDOUS
WASTE
SCALE
HOUSE
DROP OFF
CENTER

WAKE
COUNTY
FIELD
SERVICES
CONVENIENCE
CENTER
DEPONIE DR
SANTEK
OFFICE

STOCKPILE
&
BORROW AREA
(42.95 ACRES)

DAY
CARE

FALLS RIVER AVE
DURANT ROAD (SR-2006)
DOUBLEBIT DRIVE
TENDERFOOT TR.
SPRING WILLOW
DEERLAND GROVE
CAMP DURAN

DURANT ROAD
MIDDLE SCHOOL

DURANT
ROAD
ELEMENTARY
SCHOOL

SCALE:	1" = 400'
MAP DATE:	7/05/06
DRAWN BY:	C. HOWARD, PLS
CHECKED BY:	R. BOHN, PLS
PROJECT:	70310.0001.00
SHEET:	1 / 1

LAND USE EXHIBIT

MULTIPLE PROPERTIES OF WAKE COUNTY
NORTH WAKE LANDFILL
DePONIE DRIVE
WAKE COUNTY, RALEIGH, NORTH CAROLINA

PREPARED BY:
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