Permit No.	Date	DIN
97-04	**October 21, 2011**	**15477**

RECEIVED
October 21, 2011
Solid Waste Section
Asheville Regional Office

PREPARED FOR:
WILKES COUNTY DEPARTMENT OF SOLID WASTE
9219 ELKIN HIGHWAY
ROARING RIVER, NORTH CAROLINA 28669

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA
PERMIT No. 97-04

PHASE 4 EXPANSION

VOLUME 1
SITE PLAN APPLICATION
SECTION I – GENERAL
SECTION II – FACILITY PLAN

JANUARY 2011

PREPARED BY:

JOYCE ENGINEERING, INC.

2211 WEST MEADOWVIEW ROAD SUITE 101
GREENSBORO, NORTH CAROLINA 27407
PHONE: (336) 323-0092
FAX: (336) 323-0093
WWW.JOYCEENGINEERING.COM
JEI PROJECT NO. 356.1002.11.01
NORTH CAROLINA CORPORATE LIC: C-0782

NORTH CAROLINA PROFESSIONAL SEAL 035644 ENGINEER STEPHEN J. COWIE
1/27/11

VOLUME 1, SECTION I
GENERAL

This report was prepared on behalf of Wilkes County in accordance with the North Carolina Solid Waste Management Rules, 15A NCAC 13B, Section .1600. The intent is to demonstrate compliance with the applicable permit application requirements therein so that a Permit to Construct and Permit to Operate may be issued for a expansion to the Wilkes County's Roaring River Landfill.

The Roaring River Landfill is owned and operated by Wilkes County. The landfill property is located near the town of Roaring River, North Carolina. The property boundary and disposal area are indicated on an excerpt from an enlarged USGS topographic map combining the quadrangle maps of Ronda, North Carolina (Figure No. FP-T). The landfill facility boundary includes most of the area between the disposal cells and the Yadkin River.

The Roaring River Landfill is currently operating under North Carolina Solid Waste Permit No. 97-04. The landfill property covers approximately 145 acres. Wilkes County submitted the original Construction Plan Application in 1993. Waste disposal began in October 1993 in the western end of the landfill and has progressed to the east. The first three phases comprise approximately 25.4 acres. Based on the current waste stream and a capacity analysis performed by Joyce Engineering, Inc. in 2010, the life of the existing permitted phase is projected to extend into 2013. In order for Wilkes County to continue to provide for the waste management needs of its residents, a new permitted area within the facility is needed for waste disposal.

In addition to disposing of solid waste in a lined landfill cell, various waste recovery and processing activities are carried out at the site. These include temporary storage of wood waste, collection of recyclable materials, and collection of scrap tires and white goods for off-site recycling or disposal. Ancillary facilities such as a scalehouse and maintenance building are also located on the site. Currently, an average of 187 tons of municipal solid waste is managed daily, based on a six-day week, at the landfill.

This report contains information pertinent to landfill siting requirements, the design and construction of a vertical expansion of the current active unit, as well as information related to overall site development, operations, and closure. Information related to landfill siting requirements was submitted and approved previously, and is therefore not included in the scope of this report except as may be necessary to clarify or support the new design. This permit application is intended to provide the information necessary to allow the Solid Waste Section to issue a permit to construct the vertical phase (Phase 4) of the expansion. The estimated operating life for Phase 4 is five years.

This application contains seven sections as follows:

- Section I - General
- Section Il - Facility Plan
- Section III - Engineering Plan
- Section IV - Construction Quality Assurance Plan
- Section V - Operations Plan
- Section VI - Closure and Post Closure Plan
- Section VII - Water Quality Monitoring Plan

Each section contains tables, figures, drawings and appendices specific to its content. These are provided at the end of each of the sections behind identifying tabs. There are three sets of drawings referenced in the report: Facility Plan drawings; Engineering Plan drawings; and Operation Plan drawings. These drawings are included with their respective sections.

The Design Hydrogeologic Report required to support a request for a Permit to Construct was previously submitted to the Solid Waste Section. The *Design Hydrogeologic Report and Groundwater Monitoring Plan for the Wilkes County Roaring River Landfill Phase 3 & 4 Expansion,* dated April 2004, documents the results of an intensive hydrogeologic investigation conducted in and around the approximately 6.7 acre (Phase 3) of landfill development. Phase 4 of the waste disposal unit will be a vertical expansion of the Phase 3 area.

PREPARED FOR:
WILKES COUNTY DEPARTMENT OF SOLID WASTE
9219 ELKIN HIGHWAY
ROARING RIVER, NORTH CAROLINA 28669

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA
PERMIT NO. 97-04

PHASE 4 EXPANSION

FACILITY PLAN

GREAT STATE OF WILKES
IMPERIUM INTRA IMPERIO

NORTH CAROLINA PROFESSIONAL SEAL 035644 ENGINEER STEPHEN J. COWIE
9/1/11

JANUARY 2011
REVISED MAY 2011

PREPARED BY:

JOYCE ENGINEERING, INC.

2211 WEST MEADOWVIEW ROAD SUITE 101
GREENSBORO, NORTH CAROLINA 27407
PHONE: (336) 323-0092
FAX: (336) 323-0093
WWW.JOYCEENGINEERING.COM
JEI PROJECT NO. 356.1002.11.01
NORTH CAROLINA CORPORATE LIC: C-0782

VOLUME 1, SECTION II
FACILITY PLAN

TABLE OF CONTENTS

1.0 INTRODUCTION AND OVERVIEW 1
2.0 FACILITY DRAWINGS 1
2.1. Existing Conditions 1
2.2. Site Development 1
2.3. Landfill Construction 2
2.4 Landfill Operation 2
3.0 FACILITY REPORT 2
3.1 Waste Stream 2
3.2 Landfill Capacity 4
3.3 Containment and Environmental Control Systems 4

Tables

Table No. 1 Yearly Disposal Rates
Table No. 2 Projected Yearly Disposal Rates
Table No. 3 Soil Balance

Drawings

Drawing No. FP-T Title Sheet
Drawing No. FP-L Legend and General Notes
Drawing No. FP-01 Existing Conditions
Drawing No. FP-02 Site Development Plan
Drawing No. FP-03 Site Development Plan: Base Grading Plan
Drawing No. FP-04 Site Development Plan: Final Grading Plan
Drawing No. FP-05 Site Development Plan: Phasing Plan

1.0 INTRODUCTION AND OVERVIEW

The facility plan describes the comprehensive development of the Wilkes County Roaring River Landfill as required by Subsection .1619 of the North Carolina Solid Waste Management Rules. The plan includes drawings and a report that present the long-term conceptual design for the landfill facility.

The Wilkes County Roaring River Landfill is owned and operated by Wilkes County under Permit No. 97-04. The landfill property is located near the town of Roaring River, North Carolina. The site is located on a group of knolls rising over 150 feet above the floodplain of the Yadkin River. The property boundary and disposal area are indicated on an enlarged portion of the USGS 7 ½ minute topographic map for Ronda, North Carolina (Figure No. FP-T). The landfill facility boundary includes most of the area between the disposal cells and the Yadkin River.

The existing MSW landfill (Permit No. 97-04) was designed with a liner and leachate collection system. The landfill is presently in Phase 3. Based on the current waste stream and a capacity analysis performed in 2010, the life of Phase 3 is projected to extend into FY2013. The proposed landfill expansion is for a vertical expansion upon the active phase.

2.0 FACILITY DRAWINGS

2.1. Existing Conditions

Existing conditions at the project site is presented on Drawing No. FP-01. Drawing No. FP-01 shows the property boundaries, limits of the existing waste disposal areas, the existing environmental monitoring system, the landfill entrance road, landfill access and perimeter roads, scalehouse and office, and the convenience center. Current topography for the property is shown, as well as the 300-foot buffer from the property line and other site features.

2.2. Site Development

The Site Development Plan is presented on Drawing No. FP-02. In addition to showing many of the site features on Drawing No. FP-01, Drawing FP-02 shows the phase limits of the previous (Phases 1 and 2), active (Phase 3), and proposed disposal areas (Phases 4 through 6), as well as, the location the existing leachate line and collection pond.

Site suitability has previously been established, and therefore information regarding site suitability is not provided in this application for a permit to construct Phase 4. A previously permitted C&D unit was planned west of the Phase 6, but never constructed; therefore the unit is no longer shown as a viable disposal area.

2.3. Landfill Construction

Landfill construction is proposed to occur in three phases (4-6) beyond the current phase, with a projected operating life of approximately 20 years. Base grades were designed to be a minimum of four feet above groundwater and bedrock. Additional information and drawings related to groundwater and bedrock can be found in the *Design Hydrogeologic Report and Groundwater Monitoring Plan for the Wilkes County Roaring River Landfill Phase 3 & 4 Expansion,* dated April 2004. Drawing No. FP-04 shows final grades which were developed for fill slopes of 3 horizontal to 1 vertical (3H:1V).

2.4 Landfill Operation

Phasing for the facility is included on Drawing No. FP-05. The phasing plans include transitional contours for each phase of development. Stormwater control features are included in the Erosion and Sediment Control plans found in the *Design Hydrogeologic Report and Groundwater Monitoring Plan for the Wilkes County Roaring River Landfill Phase 3 & 4 Expansion,* dated April 2004, and *Erosion and Sediment Control Plan Revision to Phase 3 Expansion,* dated May 2008; and Engineering Plan (included with this submittal).

3.0 FACILITY REPORT

3.1 Waste Stream

Types of Waste Specified for Disposal: The facility will accept residential, commercial, and industrial waste, wastewater treatment sludges, and construction and demolition (C&D) debris for disposal. Hazardous waste as defined within 15A NCAC 13A, polychlorinated biphenyls (PCBs) wastes as defined in 40 CFR 761, and liquid waste will be prohibited from disposal in the landfill. Liquid waste is defined as any waste material that is determined to contain "free liquids" as defined by Method 9095 Paint Filter Liquids Test (SW-846), unless the waste is household waste other than septic waste, waste oil, leachate, or gas condensate derived from the landfill. Waste acceptance is further discussed in the Operations Plan.

Disposal Rates and Estimated Variances: Table 1 presents the Roaring River Landfill's annual waste disposal quantities for FY1993 through FY2009. As indicated in the table, MSW quantities fluctuated from a low of 32,925 tons (108 Tons per Day assuming a 6 day workweek TPD_6) in FY1993 to a high of 233 TPD_6 in FY1999. The high and low disposal quantities are within twenty five percent of the average annual disposal quantity of 56,705 tons (186 TPD_6). The amount of MSW disposed over this period has fluctuated from year-to-year. The annual increase in the amount of total waste disposed from FY93 through FY2009 averaged 1% over the 16 year period.

Data from Table 1 and information on demographic and waste generation trends in Wilkes County have been used to estimate the growth rate for the amount of waste disposed at the facility. For planning purposes, the base annual waste stream is assumed equal to 50,984 tons, the quantity received in FY2009. A steady growth rate of 1% per year has been assumed to represent the change

in the waste stream over the future life of the facility. Using this growth rate, the projected disposal rate per year and cumulative totals, beginning with the year that the new phase is assumed to become operational (FY2013-2014) are given for each phase in Table 2.

Facility Service Area: The facility receives waste generated within the boundaries of Wilkes County. At this time, Wilkes County has no plans to request a larger service area. The present population of Wilkes County specified herein is estimated to be about 67,300 people.

Waste Management Procedures: The following procedures are in use at the existing MSWLF unit and are proposed to continue following the expansion. During operating hours, traffic is routed from the entrance gate to the scalehouse along a paved road. From the scalehouse, traffic is routed to a gravel road leading to the disposal area. Employees at the landfill are trained in the safety procedures for handling and detection of unapproved waste. The screening of unacceptable waste is done through the random checking of incoming loads by a landfill employee at the scalehouse and at the active tipping area. When unacceptable waste is detected at the scalehouse, the load is rejected and not permitted into the landfill. If unapproved waste is found at the tipping area, identification of the truck or persons is made (if possible) and documented. The waste is then identified and placed into an appropriate container and taken to a facility specifically approved to accept that type of waste for proper disposal. When this occurs, the event is reported to the appropriate authorities.

A convenience center and facility for the collection of hazardous household waste are provided near the scalehouse. These facilities enable residential users to dispose waste without having to drive to the working face of the landfill. White goods are collected in a separate area west of the landfill, and are removed by a metal recycling contractor, which is handled through a bid process. Tires are disposed of by customers onto the ground in the designated tire disposal area as shown on Drawing No. EP-01. At the end of each work week, usually Friday (no more than 10 days), landfill personnel load the tires into an open-top trailer located adjacent to the tire disposal area. Wilkes County contracts with a private hauler to transport the tires to Concord, North Carolina. The following materials are collected for recycling at the landfill: cardboard, mixed paper, old newsprint, aluminum, steel cans, used motor oil and plastic. The approximate locations of these features are indicated on Drawing No. FP-01.

Equipment Requirements: The Roaring River landfill personnel will maintain on-site equipment required to perform the necessary landfill activities. Periodic maintenance of all landfilling equipment will either be performed on-site or at designated maintenance facilities outside of the landfill.During the operational life of the facility, equipment needs will be reviewed annually, and additional equipment purchased or leased as needed. New equipment will be phased in as older equipment is retired.

A detailed list of equipment is included in the Operations Plan for the facility submitted with this Permit to Construct Application.

3.2 Landfill Capacity

Landfill capacity, by phase, was calculated using airspace volumes obtained using AutoDesk Civil3D/Survey software. The data and assumptions used are consistent with the disposal rates discussed in the preceding section, and are representative of the operational requirements and conditions anticipated for the new facility.

Operating Capacity: The operating gross capacities, by phase and total, are shown in Table 2 and listed below. The estimated operating life of the facility is approximately 23 years.

Phase	Area (Acres)	Gross Capacity (cubic yards)	Status
1	11.7	1,534,786	inactive
2	7.0		inactive
3	6.7	664,167	active fill area
4	vertical	888,804	proposed
5	5.6	798,379	not constructed
6	12	970,911	not constructed
Total	**43**	**4,854,047**	

Soil Resources: The in-place ratio of waste to soil used to calculate the operating life and operating soil requirements for each phase was assumed to be 7 to 1 which is generally consistent with results observed from air space utilization studies. This assumes an operating plan designed to minimize soil usage, and use of an alternate daily cover. The on-site soil resources, usage, and balances are shown by phase in Table 3. The deficit of soil during the operation of Phase 4 (and future Phases 5 and 6) can be satisfied by borrowing soil from other locations within the limits of the facility property or from off-site sources. Based on the conceptual design volumes, the total soil requirement over the life of the facility is approximately 185,547 cubic yards.

3.3 Containment and Environmental Control Systems

Base Liner Systems:

No lateral expansion is proposed at this time, the Phase 4 expansion is vertical in nature. The current liner system consists of the following components from top to bottom:

- 12-inch granular protective and/or drainage layer with 12-inch tire chip layer;
- Non-woven geosynthetic cushion;
- 60 mil high density polyethylene (HDPE) textured geomembrane;
- Geosynthetic clay liner (GCL); and
- 18-inch compacted soil layer having a permeability no greater than $1x10^{-5}$cm/sec.

Leachate Management System:

The leachate collection and removal system (LCRS) was designed to meet the requirements of the North Carolina Solid Waste Management Regulations. The LCRS will include the following components:

- Drainage layer;
- Leachate collector and header pipes; and
- Leachate holding pond.

Leachate is conveyed through the drainage layer consisting of at least 24 inches of free-draining granular material. Within the drainage layer, a network of perforated collector pipes intercepts the leachate, conveying the leachate by gravity to the leachate header pipe. The header pipe discharges to a sump at the downgradient end of the landfill cell. Cleanouts are provided for all leachate collector lines and the leachate header pipe to provide access for video inspection and to clean out the pipes. Leachate is pumped from the sump to a holding pond outside of the cell. Leachate from the storage pond is periodically transported by tanker truck to the local wastewater treatment plant. More details on the leachate collection system are included in the Engineering Plan and in the application for permit to construct for Phase 3.

Cap System:

The cap system is described from bottom to top in the following paragraphs.

Subgrade: Additional soil will be placed as needed over the 12 inches of intermediate cover to provide a uniform base for construction of the final cap.

Gas Collection Layer: A geonet composite (geonet with geotextile fabric heat-bonded to both sides) will be placed directly on the intermediate cover. The geonet composite will serve as a migration zone for the lateral movement of landfill gas. The geotextile component will prevent the migration of soil into the geonet so that gas migration will not be impeded.

Infiltration Barrier: A composite infiltration barrier will consist of a textured 40 mil flexible membrane cap (FMC) placed on top of a geosynthetic clay layer (GCL), as discussed in the Engineering Plan of this report. The low-permeability soil layer, or the GCL, will lie directly above the gas collection layer. The FMC will consist of a linear low-density polyethylene (LLDPE) or PVC membrane.

Drainage Layer: A geonet composite will be placed directly on top of the flexible membrane cap. The geonet will promote drainage away from the infiltration barrier and towards the perimeter ditches. It will also help to protect the FMC from puncture.

Erosion Control Components (Protective Layer and Erosion Layer): A protective layer consisting of at least 18 inches of local soil will be placed on top of the drainage layer. A layer of topsoil material

or organically amended local soil at least 6 inches in thickness will be placed on top of the protective layer. The erosion and protective layers will not be heavily compacted so that vegetative growth will be promoted. Soil tests will be conducted prior to seeding to determine if amendments to the soil are needed to establish a healthy stand of vegetation.

Vegetative Cover: After placement of the erosion layer, the area that has been closed will be seeded with a grass mixture. Mulch and erosion control matting will be used as needed to further minimize erosion.

Gas Management System:

To protect public health and safety in the vicinity of the landfill, landfill gas produced by the decomposition of refuse will be controlled and monitored during the operational, closure, and post-closure periods. A gas management plan and gas monitoring program will be implemented for the purpose of maintaining the concentration of methane gas below the following regulatory levels:

- The concentration of methane gas generated is not to exceed 25 percent of the lower explosive limit (LEL) for methane in on-site structures (excluding gas control or recovery system components); and

- The concentration of methane gas is not to exceed the LEL for methane at the facility property boundary.

Landfill gas is a by-product from the decomposition of organic waste in a sanitary landfill. The major components of landfill gas are methane and carbon dioxide. Other gases, such as volatile organic compounds, are present in trace quantities. The landfill gas is proposed to be managed by a passive gas collection system. The gas may be recovered in the future with an active system if generation rates are sufficient to justify the additional costs.

Gas monitoring will be conducted during the active life of the landfill and throughout the closure and post-closure periods. At a minimum, quarterly monitoring of explosive gases will be conducted at all gas detection probes and in structures at the landfill. If additional structures are built, the monitoring program will be expanded to include the new structures. Gas detection probes will be installed around the boundary of the waste disposal unit. Probes should not be needed where site topography permits gas to be released to the atmosphere before it migrates to the property boundaries, or where the site is bounded by water. The Operation Plan contains more detailed information regarding landfill gas management.

(End)

TABLES

Table 1:
Roaring River Landfill Yearly Disposal Rate

Fiscal Year	Tons/year
FY93-94	32925
FY94-95	53892
FY95-96	41372
FY96-97	57827
FY97-98	58196
FY98-99	63,217
FY99-00	71,136
FY00-01	59,143
FY01-02	60,635
FY02-03	60,114
FY03-04	61,686
FY04-05	61,649
FY05-06	57,391
FY06-07	58,121
FY07-08	58,220
FY08-09	57,484
FY09-10	50,984

Total	963,992	**Tons**
Annual Average	56,705	**Tons/year**
Daily Average	186	**Tons/day**

Notes:

1. Information on yearly tonnages and totals was obtained from NCDHEC Division of Solid Waste disposal reports for 1993 to 2008. Information obtain from Wilkes County Landfill scalehouse records for 2009.

2. Daily average is based on a six day per week work week and 7 holidays.

Table 2
Projected Yearly Disposal Rates

FY YEAR[1]	Projected MSW (ton)	Total Projected Waste (cy)	Cumulative Waste Total (cy)	Projected Phase Capacity (cy)	Active Phase
1993	32925	62,064	62,064	2,198,953	Phase 1-3
1994	53892	101,587	163,651		
1995	41372	77,987	241,638		
1996	57827	109,005	350,643		
1997	58196	109,700	460,343		
1998	63,217	119,165	579,508		
1999	71,136	134,092	713,600		
2000	59,143	111,485	825,086		
2001	60,635	114,298	939,384		
2002	60,114	113,316	1,052,699		
2003	61,686	116,279	1,168,978		
2004	61,649	116,209	1,285,188		
2005	57,391	108,183	1,393,370		
2006	58,121	109,559	1,502,929		
2007	58,220	109,746	1,612,675		
2008	57,484	108,358	1,721,033		
2009	50,984	96,106	1,817,139		
2010[3]	58,059	109,442	1,926,580		
2011	58,639	110,536	2,037,116		
2012	59,226	111,642	2,148,758		
2013	59,818	112,758	2,261,516	888,804	Phase 4
2014	60,416	113,886	2,375,401		
2015	61,020	115,024	2,490,426		
2016	61,631	116,175	2,606,600		
2017	62,247	117,336	2,723,937		
2018	62,869	118,510	2,842,446		
2019	63,498	119,695	2,962,141		
2020	64,133	120,892	3,083,033		
2021	64,774	122,101	3,205,134	798,379	Phase 5
2022	65,422	123,322	3,328,455		
2023	66,076	124,555	3,453,010		
2024	66,737	125,800	3,578,811		
2025	67,405	127,058	3,705,869		
2026	68,079	128,329	3,834,198		
2027	68,759	129,612	3,963,811	970,911	Phase 6
2028	69,447	130,908	4,094,719		
2029	70,141	132,218	4,226,937		
2030	70,843	133,540	4,360,476		
2031	71,551	134,875	4,495,351		
2032	72,267	136,224	4,631,575		
2033	72,989	137,586	4,769,161		
2034	73,719	138,962	4,908,123		

TOTAL:	**2,603,759**	**4,908,123**	**4,857,047**
YEARLY AVERAGE (tons):	**61,994**		
AVERAGE (TPD[2]):	**203**		
PERCENTAGE INCREASE	**1.01%**		

NOTES:
1. Information on yearly tonnage and totals were obtained from the ncdenr website "Data, Statistics, Reports, and Maps"
2. Averages are based on a six day per week work week and 7 holidays.
3. Projected quantity based on a 1% increase from FY 2009
4. Projected volume based on an in-place density of: 1061 lb/cy

Table 3
Soil Balance

LANDFILL PHASING - SOIL BALANCE

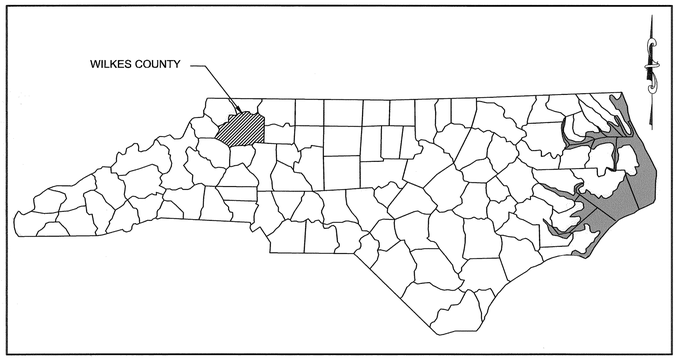
MSW PHASE	AREA (acres)	NET GRADING (cy)	AIRSPACE (Gross Capacity) (cy)	SOIL LINER (cy)	CAP (cy)	WASTE CAPACITY (cy)	DAILY COVER (-) (cy)	BALANCE (cy)
Phase 1	11.7		895,734	-65,942	-37,681	999,357	-142,765	-246,389
Phase 2	7	43,016	639,052	-39,452	-22,544	701,049	-100,150	-119,131
Phase 3	6.7	-99,741	664,167	-37,762	0	701,929	-100,276	-237,778
Phase 4	0	0	888,804	0	-21,578	867,226	-123,889	-145,468
Phase 5	5.6	27,070	798,379	-31,562	-18,035	748,782	-106,969	-129,496
Phase 6	12	319,306	970,911	-67,633	-38,647	864,631	-123,519	89,507
Total	**43**	**289,651**	**4,857,047**	**-242,351**	**-138,486**	**4,882,973**		
							Total	**-788,754**

DESIGN VALUES (MSW)	
MSW LINER SYSTEM SOIL THICKNESS (ft):	**3.5**
MSW CAP SYSTEM SOIL THICKNESS (ft):	**2.0**
MSW: SOIL COVER RATIO	**7:1**

DRAWINGS

ROARING RIVER LANDFILL
PHASE 4 EXPANSION

WILKES COUNTY, NORTH CAROLINA



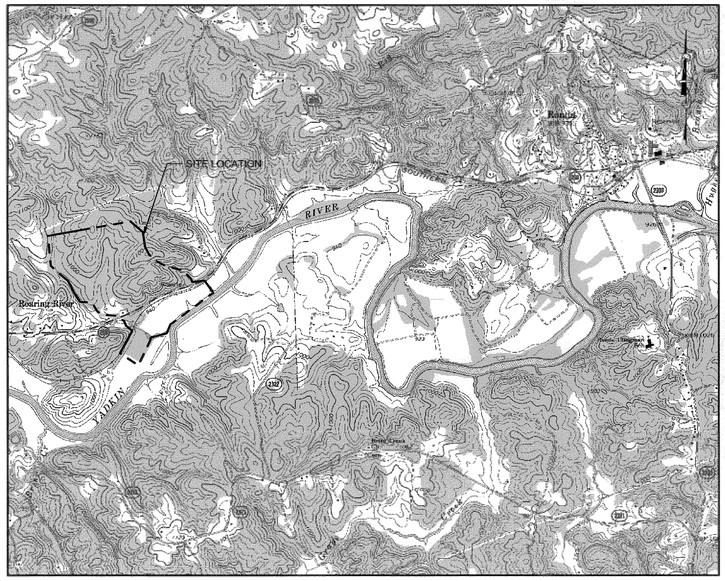
NORTH CAROLINA
COUNTY LOCATION MAP

OWNER INFORMATION

PREPARED FOR:	WILKES COUNTY DEPARTMENT OF SOLID WASTE
ADDRESS:	9219 ELKIN HIGHWAY ROARING RIVER, NORTH CAROLINA, 28669
CONTACT:	KENT BRANDON (336) 696-5806 (336) 927-4117

PROPERTY INFORMATION

ADDRESS:	9219 ELKIN HIGHWAY ROARING RIVER, NORTH CAROLINA, 28669
NCDENR PERMIT:	97-04
ACREAGE:	145 ACRES



VICINITY MAP

DRAWING INDEX

SHEET	DESCRIPTION
FP-T	TITLE SHEET
FP-L	LEGEND AND GENERAL NOTES
FP-01	EXISTING CONDITIONS
FP-02	SITE DEVELOPMENT PLAN
FP-03	SITE DEVELOPMENT: BASE GRADING PLAN
FP-04	SITE DEVELOPMENT: FINAL GRADE
FP-05	SITE DEVELOPMENT: PHASING PLAN

FACILITY PLAN
JANUARY 2011

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED SJC
DRAWN RWH
CHECKED SJC
APPROVED EEA
DATE 1/27/11

© 2011 Joyce Engineering, Inc.
All rights reserved.

JOYCE ENGINEERING, INC.
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0392
NC CORP LIC: C-0782

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA

TITLE SHEET

PROJECT NO.
356.10.02

SCALE
N.T.S.

DRAWING NO.
FP-T

L:\Wilkes\dwg\2010 PERMIT MODIFICATION\FACILITY PLAN UPDATE\SHEET SET\FP-T TITLE SHEET.dwg LayoutnLayout1

CONVENTIONAL SYMBOLS AND GENERAL NOTES

ENVIRONMENTAL MONITORING FEATURES

MW-X	EXISTING GROUNDWATER MONITORING WELL
MW-#	PROPOSED GROUNDWATER MONITORING WELL
MW-OW-#	EXISTING OBSERVATION WELL
MW-OW-X	PROPOSED OBSERVATION WELL
NES-OW-X	EXISTING NES WELL
NES-OW-#	PROPOSED NES WELL
MW-PW-X	EXISTING PERFORMANCE WELL
MW-PW-#	PROPOSED PERFORMANCE WELL
MW-X	EXISTING SENTINEL WELL
MW-#	PROPOSED SENTINEL WELL
EW-X	EXISTING EXTRACTION WELL
EW-#	PROPOSED EXTRACTION WELL
PZ-#	WETLANDS PIEZOMETER
PZ-X	PIEZOMETER
GP-X	GAS PROBE
GV-X	EXISTING GAS VENT
GV-#	PROPOSED GAS VENT
GW-X	EXISTING GAS WELL
GW-#	PROPOSED GAS WELL
SMP-X	SURFACE WATER MONITORING POINT
LMP-1	LEACHATE MONITORING POINT
B-X	BORE HOLE LOCATION
C-X	CORING LOCATION
SS-X	SOIL SAMPLING LOCATION
TP-X	TEST PIT LOCATION
W	WELL LOCATION
S-X	SPRINGHEAD LOCATION

SURVEY FEATURES

BM	BENCHMARK
CP	CONTROL POINT
	PROPERTY LINE
	EASEMENT
R/W	RIGHT OF WAY
X	FENCE LINE
	RAILROAD
	GUARDRAIL
	RESOURCE PROTECTION AREA

UTILITIES

	UTILITY POLE
	HYDRANT
	LIGHT POLE
	TANK (SIZE VARIES)
	TRANSFORMER
M	MANHOLE
	CLEANOUT
	VALVE
OHE	OVERHEAD ELECTRIC
UGE	UNDERGROUND ELECTRIC
OHT	OVERHEAD TELEPHONE
UGT	UNDERGROUND TELEPHONE
FM	LEACHATE FORCE MAIN
DCFM	DUAL CONTAINED LEACHATE FORCE MAIN
SS	SANITARY SEWER
PS	PROCESS SEWER
G	LANDFILL GAS LINE
UGG	NATURAL GAS LINE
W	POTABLE WATER
	SOLID PIPE (TYPE NOTED)
	PERFORATED PIPE (TYPE NOTED)
	CULVERT (SIZE NOTED)

LANDFILL AND ROAD FEATURES

	PAVED ROAD
	GRAVEL/DIRT ROAD
	EDGE OF PAVEMENT
	LIMIT OF WASTE/EDGE OF LINER
	FACILITY BOUNDARY/CELL LIMITS/PHASE LIMITS

BUILDINGS AND STRUCTURES

	BUILDING
	DAM
	FOUNDATION

HYDROLOGY

	APPROXIMATE 100 YEAR FLOOD PLAIN
	DITCH FLOW
	STREAM OR RIVER

VEGETATION

	SINGLE TREE
	TREE LINE
	SHRUB

EROSION AND SEDIMENT CONTROL FEATURES

SF SF	SILT FENCE
IP	INLET PROTECTION
	OUTLET PROTECTION (SIZE VARIES)
	DIVERSION BERM

TOPOGRAPHICAL FEATURES

100	EXISTING 10' TOPO CONTOUR
	EXISTING 2' TOPO CONTOUR
100	PROPOSED 10' TOPO CONTOUR
	PROPOSED 2' TOPO CONTOUR
100	GROUNDWATER SURFACE CONTOUR (FT ABOVE MEAN SEA LEVEL)
100	BEDROCK SURFACE CONTOUR (FT ABOVE MEAN SEA LEVEL)
100.00	SPOT ELEVATION

HATCHING

	WETLANDS
	RIPRAP
	WASHED STONE
	BUFFER AREA
	PROPOSED ROAD
	COMPACTED BACKFILL

SURVEY NOTES:

1. TOPOGRAPHIC CONTOUR INTERVAL = 2 FEET, UNLESS INDICATED OTHERWISE.
3. ON-SITE TOPOGRAPHY PROVIDED BY SPATIAL DATA CONSULTANTS, INC. , 1008 HUTTON LANE, HIGH POINT, NORTH CAROLINA 27262, DATED MARCH 19, 2010.
4. FEDERAL INSURANCE ADMINISTRATION, FLOOD INSURANCE RATE MAP, WILKES COUNTY, NC, INDICATES NO 100 YEAR FLOOD PLAINS ON SITE.
5. PROPERTY BOUNDARY BEARING AND DISTANCES PROVIDED BY TOM FRAZIER, R.L.S 1286 NC. ON MAY 8, 1989.
6. SITE CONTROL INFORMATION UPDATED BY SPATIAL DATA CONSULTANTS, INC. , 1008 HUTTON LANE, HIGH POINT, NORTH CAROLINA 27262, DATED MARCH 19, 2010.
5. THE SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE SEARCH AND ALL EASEMENTS AND ENCUMBRANCES MAY NOT BE SHOWN.

GENERAL NOTES:

1. SITE LIGHTING IS NOT PROPOSED FOR THIS PROJECT.
2. LANDSCAPING IS NOT PROPOSED FOR THIS PROJECT. HOWEVER THE BUFFER AREA SHOWN ON DRAWINGS WILL REMAIN UNDISTURBED EXCEPT FOR THE INSTALLATION OF UTILITIES, STORMWATER DRAINAGE FEATURES AND ACCESS TO THE SITE. WHEN POSSIBLE CLEARING WITHIN THE BUFFER WILL BE ALIGNED TO MINIMIZE VISUAL IMPACTS.
3. SOIL STOCKPILE AREAS WILL BE ESTABLISHED TO FACILITATE PHASED CONSTRUCTION. STOCKPILE LOCATIONS AND SIZE MAY VARY AND MAY NOT BE LIMITED TO THE AREAS SHOWN. SILT FENCE WILL BE INSTALLED AROUND THE BASE OF THE STOCKPILE.

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

NORTH CAROLINA PROFESSIONAL SEAL 035644 ENGINEER STEPHEN T. JOYCE

DESIGNED SJC
DRAWN RWH
CHECKED LBB
APPROVED EEA
DATE 1/27/11

© 2011 Joyce Engineering, Inc. All rights reserved.

JOYCE ENGINEERING, INC.
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA

LEGEND AND GENERAL NOTES

PROJECT NO. 356.10.02

SCALE N.T.S.

DRAWING NO. FP-L

L:\Wilkes\dwg\2010 PERMIT MODIFICATION\FACILITY PLAN UPDATE\SHEET SET\FP-L LEGEND AND GENERAL NOTES_recover.dwg Layout=Layout1

DESIGNATION	NORTHING	EASTING	ELEVATION
BM-1	900380.982	1413671.867	966.22

PROPERTY BOUNDARY INFORMATION

LINE	LENGTH	BEARING
L1	783.33	S02°16'26"E
L2	364.97	S51°59'07"E
L3	384.09	S44°50'19"E
L4	232.98	S32°55'19"E
L5	430.34	S31°16'36"E
L6	232.44	S89°26'08"E
L7	158.45	S63°41'08"E
L8	243.85	S33°41'13"E
L9	127.53	S57°38'18"E
L10	228.75	S86°57'01"E
L11	160.00	S80°57'35"E
L12	569.61	N69°25'34"E
L13	289.95	N61°59'14"E
L14	470.66	N60°09'52"E
L15	209.89	N67°26'41"E
L16	567.86	N71°38'28"E
L17	217.04	N71°34'34"E
L18	303.05	N71°34'34"E
L19	261.04	N87°49'27"W
L20	143.96	N85°27'28"W
L21	164.71	N22°59'38"W
L22	196.05	N46°54'20"W
L23	214.23	N55°22'15"W
L24	171.39	N62°08'46"W
L25	424.41	N71°23'03"W
L26	80.17	N70°36'24"W
L27	100.32	N30°42'05"W
L28	130.02	N46°07'41"W
L29	42.10	N13°44'33"W
L30	73.52	N29°57'55"W
L31	149.15	N19°39'34"W
L32	211.05	N14°35'19"W
L33	77.45	N00°52'23"E
L34	207.16	N50°04'05"W
L35	107.11	N36°07'58"W
L36	105.58	N41°00'08"W
L37	81.60	N62°17'08"W
L38	1075.15	S80°14'35"W
L39	62.84	N56°39'59"E
L40	71.45	N67°44'08"W
L41	18.87	N61°24'41"W
L42	1285.43	S80°14'35"W

NO	BY	CK	APP
1	CTM	CTM	SJC

DATE	REVISIONS AND RECORD OF ISSUE
5/27/2011	REMOVAL OF MW-14, MW-15, AND MW-16

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035644 STEPHEN J. COMIE

DESIGNED SJC
DRAWN RWH
CHECKED LBB
APPROVED EEA
DATE 1/27/11

© 2011 Joyce Engineering, Inc. All rights reserved.

JOYCE ENGINEERING, INC.
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA

EXISTING CONDITIONS

PROJECT NO.
356.10.02

SCALE
AS SHOWN

DRAWING NO.
FP-01

L:\Wilkes\dwg\2010 PERMIT MODIFICATION\FACILITY PLAN UPDATE\SHEET SET\FP01-EXISTING CONDITIONS-RTC.dwg Layout=Layout1

NO	BY	CK	APP
1	CTM	CTM	SJC

DATE	REVISIONS AND RECORD OF ISSUE
5/27/11	REMOVAL OF MW-14, MW-15, AND MW-16

DESIGNED SJC
DRAWN RWH
CHECKED LBB
APPROVED EEA
DATE 1/27/11

© 2011 Joyce Engineering, Inc.
All rights reserved.

ENGINEERING, INC.
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA

SITE DEVELOPMENT PLAN

PROJECT NO.
356.10.02

SCALE
AS SHOWN

DRAWING NO.
FP-02

L:\Wilkes\dwg\2010 PERMIT MODIFICATION\FACILITY PLAN UPDATE\SHEET SET\FP02 site development-RTC.dwg Layout=Layout1

NO	BY	CK	APP
1	CTM	CTM	SJC

DATE	REVISIONS AND RECORD OF ISSUE
5/27/11	REMOVAL OF MW-14, MW-15, AND MW-16

DESIGNED SJC
DRAWN RWH
CHECKED LBB
APPROVED EEA
DATE 1/27/11

© 2011 Joyce Engineering, Inc.
All rights reserved.

JOYCE ENGINEERING, INC.
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA

SITE DEVELOPMENT: BASE GRADING PLAN

PROJECT NO.
356.10.02

SCALE
AS SHOWN

DRAWING NO.
FP-03

L:\Wilkes\dwg\2010 PERMIT MODIFICATION\FACILITY PLAN UPDATE\SHEET SET\FP03 site development subgrade-RTC.dwg Layout=Layout1

FUTURE PHASE 6
12.0 ACRES

FUTURE PHASE 5
5.6 ACRES

PHASE 3 & 4
6.7 AC

PHASE 2

PHASE 1

MW-13
MW-17
MW-5
MW-2 (ABANDONED)
MW-2R (ABANDONED)
GP-5
EXISTING LEACHATE LINE
LEACHATE COLLECTION POND
MW-9
WHITE GOODS
MW-7
MW-8
GLASS
TIRES
SCALEHOUSE
CONVENIENCE CENTER
MW-6
PERIMETER ROAD
GP-6
MW-10
MW-11S
MW-11D
MW-12D
MW-12S
GP-1
GP-2
GP-3
LANDFILL ENTRANCE
MAINTENANCE BUILDING
PROPERTY LINE
300'-0" PROPERTY BUFFER
LAND CLEARING PROCESSING
COMPOST WONDROWS
MULCH STOCKPILE

GRAPHIC SCALE
0 50 100 200
(FEET)

NO	BY	CK	APP
2	RWH	CTM	SJC
1	CTM	CTM	SJC

DATE	REVISIONS AND RECORD OF ISSUE
5/27/11	REVISED FINAL GRADING PLAN
5/27/11	REMOVAL OF MW-14, MW-15 AND MW-16

DESIGNED SJC
DRAWN RWH
CHECKED LBB
APPROVED EEA
DATE 1/27/11

© 2011 Joyce Engineering, Inc.
All rights reserved.

JOYCE ENGINEERING, INC.
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA

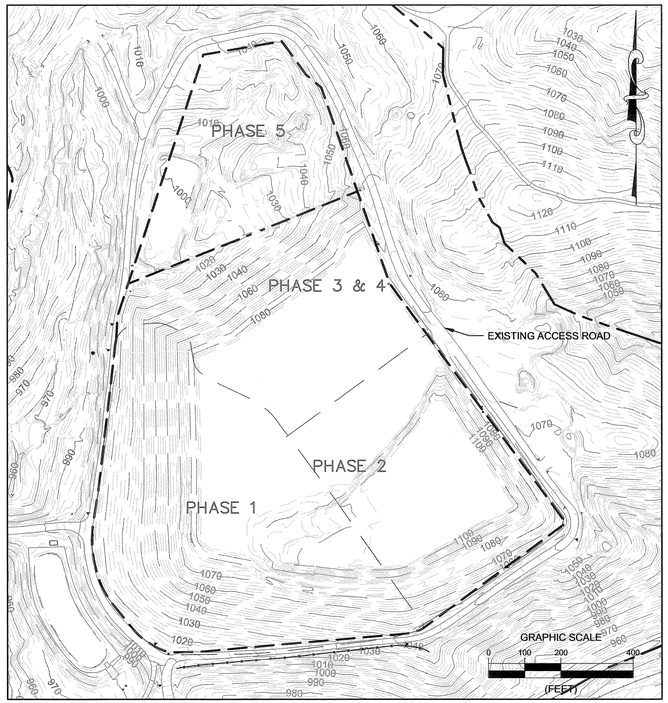
SITE DEVELOPMENT:
FINAL GRADING PLAN

PROJECT NO.
356.10.02

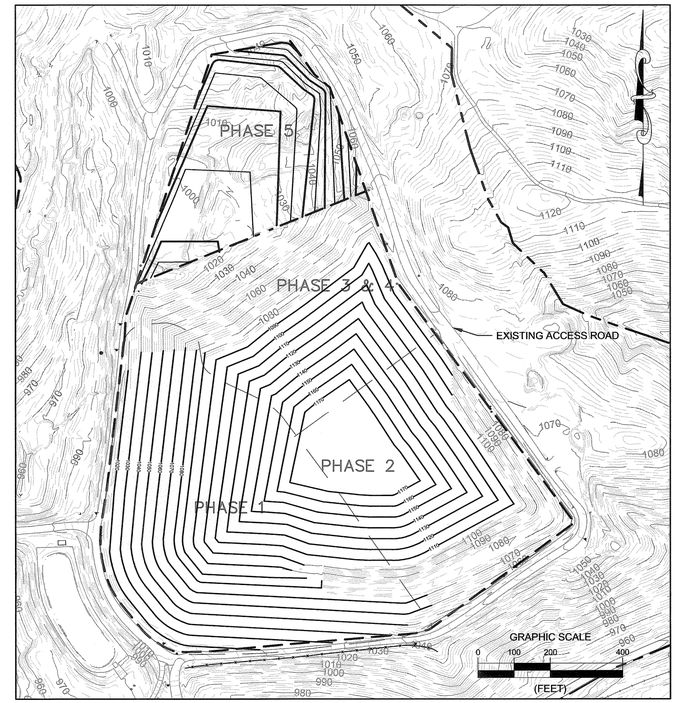
SCALE
AS SHOWN

DRAWING NO.
FP-04

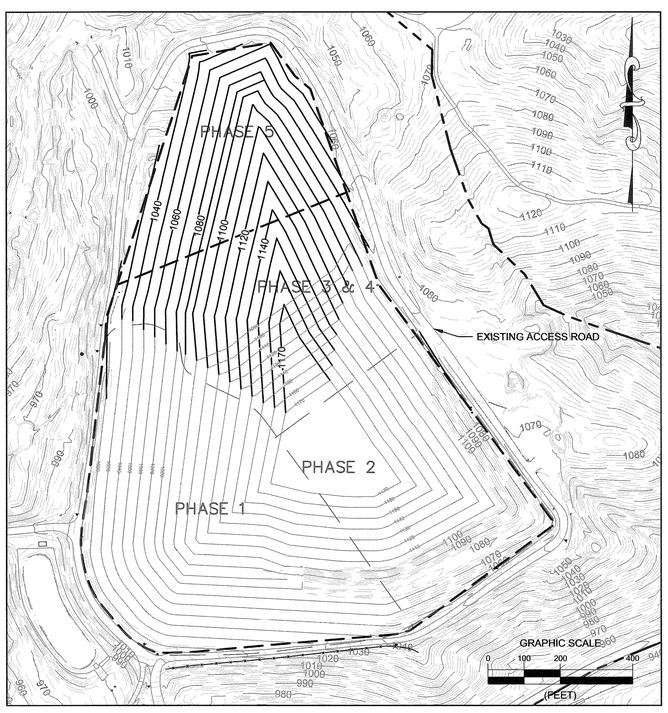
L:\Wilkes\dwg\2010 PERMIT MODIFICATION\FACILITY PLAN UPDATE\SHEET SET\FP04 site development final grade modified cap rtc.dwg Layout=Layout1



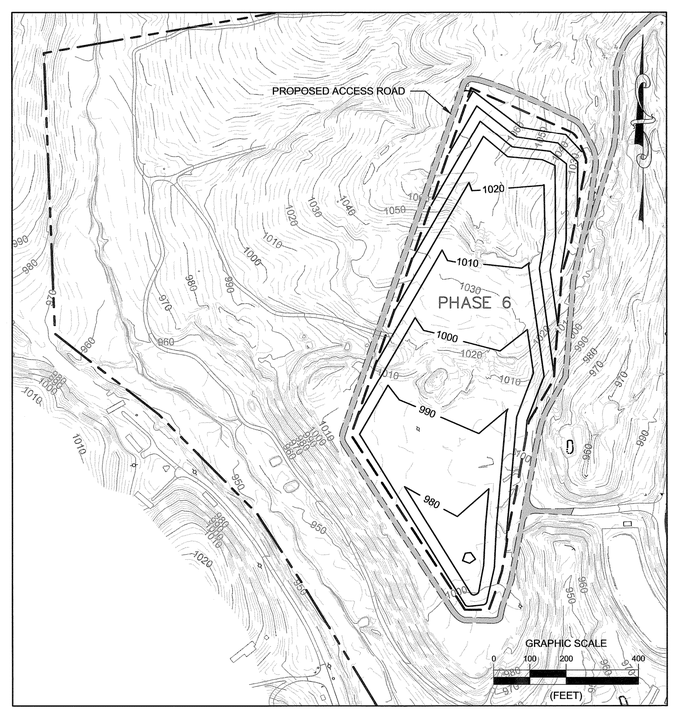
PHASE 3 INTERMEDIATE GRADE - PHASE 4 BASE GRADE



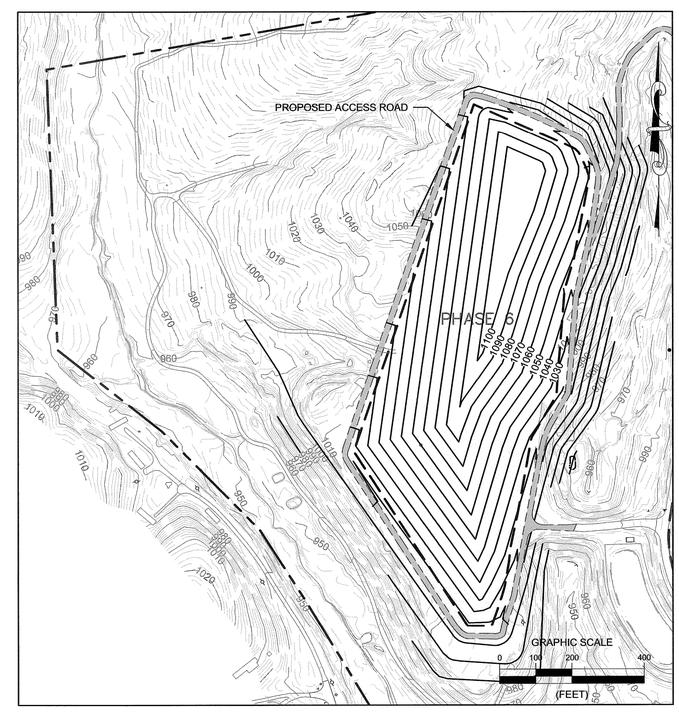
PHASE 4 INTERMEDIATE GRADE - PHASE 5 BASE GRADE



PHASE 5 INTERMEDIATE GRADE



PHASE 6 BASE GRADES



PHASE 6 INTERMEDIATE GRADES

NO	BY	CK	APP
1	RWH	CTM	SJC

REVISED GRADING PLANS

DATE	REVISIONS AND RECORD OF ISSUE
5/27/11	

DESIGNED SJC
DRAWN RWH
CHECKED LBB
APPROVED EEA
DATE 1/27/11

© 2011 Joyce Engineering, Inc.
All rights reserved.

JOYCE ENGINEERING, INC.
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

ROARING RIVER LANDFILL
WILKES COUNTY, NORTH CAROLINA

SITE DEVELOPMENT:
PHASING PLAN

PROJECT NO.
356.10.02

SCALE
AS SHOWN

DRAWING NO.
FP-05

L:\Wilkes\dwg\2010 PERMIT MODIFICATION\FACILITY PLAN UPDATE\SHEET SET\FP05 site development phasing plan JEI.dwg Layout=Layout1