

A. R. Rubin  
192 Fearington Post  
Pittsboro, NC, 27312



Chester Cobb, Septage and Land Application Branch

NCDWM

401 Oberlin Rd

Raleigh, NC

Dear Mr. Cobb;

Subject: Craven Ag Service Compost Site

Mr. Billy Dunham has been operating his compost site for several years and we began the process of site approval in December, 2010. Mr. Scott assessed the site previously this year and introduced several issues which set us back. Initially Mr. Dunham wished to permit the entire River Road property, but Mr. Scott indicated the soil texture and the site location may be problematic. We have assessed the site and found the soil material to be sandy, hence the application will be held until the entire area can be modified with ash fill. In addition, the area was surveyed and found to be largely above the flood elevation. This will allow us to proceed with the entire application in the coming year.

In the interim, please consider this application to continue with the ongoing operation at the designated site. Mr. Dunham, Mr. MacConnell and I have developed this initial submittal for your review. This is for the existing site only. A follow-up application will be submitted by July 2012 to include the entire site. This time is required to place the approved ash fill onto the site to create an area acceptable for the operation. Attached please find a site map, a proposed operations plan, and a site application.

Thank you for your time and attention to this request.

Sincerely,

A handwritten signature in black ink, appearing to read "A. R. Rubin".

A. R. Rubin

15 May, 2011

Mr. J. W. Dunhan  
President  
Craven Ag Service , LLC  
Box 1184  
New Bern, NC,

Dear Mr. Dunham:

Please find herein the permit application package for the operation of a commercial compost facility on River Road in Craven County, NC. The facility is intended as a large type III facility as described in North Carolina Solid Waste Rule. The compost facility operation proposes to handle and utilize a variety of regulated waste materials and processes in excess of 1000 cubic yards of compost per quarter; consequently the operation will be classified as a large Type III facility under North Carolina General Statute. A permit application must be submitted by an engineer licensed in North Carolina. This application was developed in cooperation with Gary MacConnell, P.E.; Robert Rubin; and representatives from Craven Ag Service.

The materials contained herein should be reviewed and submitted along with the Operation and Maintenance manual to Michael Scott, NCDENR – DWM.

Sincerely;

A. R. Rubin, Professor Emeritus, NCSU-BAE

# CRAVEN AG SERVICE COMPOST SITE APPLICATION FOR LARGE TYPE III FACILITY

31 May, 2011

PREPARED FOR:

CRAVEN AG SERVICE  
RIVER ROAD  
NEW BERN, NC

DEVELOPED BY:

GARY MACCONNELL, P.E.  
President, MacConnell and Associates

ROBERT RUBIN  
President, A. R. Rubin and Associates

**Background and Introduction:** Materials Contained herein are derived from North Carolina Administrative Code (NCAC) and the compost requirements contained in 15 A NCAC 13B 1400 et seq. and are intended to support the application to permit and operate a Compost Production facility in Craven County, NC.

The project proposal consists of two parts. The initial effort involves permitting the existing compost demonstration as a valid operation on the existing site footprint. The second phase of the operation involves expanding the operation to the west of the current site and developing a more permanent operation. The initial effort is intended to allow Craven Ag Service (CAS) to remain in operation while the activities on the expansion site occur. The operations on the existing site have demonstrated to CAS the viability of a compost operation. The existing site has capacity to function satisfactorily for approximately 18 additional months while the expansion area is developed.

This application is intended to support requirements in the .1400 rule to permit a septage/FOG/MSW compost facility. A supplemental permit application will be submitted for the expanded compost facility to be located immediately west of the current site.

#### A. Site Location (.1405 (b)(1))

The Craven Ag Service, LLC Compost Facility is currently operating through a demonstration permit. The site is located on River Road in Craven County, NC. The site is located between River Road and the Neuse River. The location of the compost facility is shown on a site map and aerial photographic maps included in Attachment 1. The Craven Ag Service, LLC Compost Site is located so as to meet or exceed all the applicable buffers for a Large Type 3 composting facility posed in NC Rule. The applicable buffers are shown on the site map in provided in Attachment 1.

The application for the compost site permit does include feedstocks from the septage and grease trap operation. These activities have been ongoing as a part of a pre-existing, permitted septage operation.

#### B. Letter from Craven County Planning (1405(a)(2))

The Craven County Zoning letter, 12 May, 2011 is attached as appendix A.

#### C. Compliance: (.1405(b)(3) and .1404 (a))

- (1) The Craven Ag site is located on a terrace landscape position adjacent to the Neuse River in Craven County, NC. Portions of the property are in designated 100 year flood elevation areas and designated as AE in the FEMA flood maps (FIRM Map, Map Number 37205544001, 2 July, 2004). The areas designated as Zone AE or the AE floodway are not intended to host compost operations.

- (2) The site map attached identifies property boundaries and demonstrates compliance with mandated buffer requirements.
- (3) The site map attached indicates adequate buffer between site operations and adjacent residences or dwellings.
- (4) The site map attached indicates adequate buffer between site operations and wells.
- (5) The site map attached indicates adequate buffer between compost operations and waterways.
- (6) There is no direct discharge of pollutants from the site. An assessment by Ken Pickel, NCDENR - DWQ indicates no direct runoff. Water quality standards apply to discharge systems; non-point sources of discharge have been addressed through the operations plan.
- (7) No portion of the operation is located over a closed solid waste operation.
- (8) No portion of the operation is located within 25 feet of a berm or swale.
- (9) No discharge of pollutants will impact section 404 waters or areas or violate water quality standards.
- (10) Site assessments confirm no groundwater within 24 inches of soil surface.

Compliance: 1404(b)

1. Not applicable

Compliance: .1404(c)

1. Access to the site is controlled at locked gate along River Road
2. Effective sediment control practices are in place and practiced
3. Air emissions are controlled by turning appropriately and maintaining required buffers
4. Odor emissions are controlled by managing compost turning operations and feedstock management

D. Operational Details:

1. Waste types: The compost is manufactured from a mixture of hardwood and softwood sawdust, animal bedding, ground corn cobs, ground and un-ground yard waste, Septage and FOG wastes (dewatered grease trap residuals and septage) and floating, fatty solids from animal processing or transportation operations such as Dissolved Air Flotation (DAF) skimmings, construction debris (clean, unfinished wallboard, wood pallets where nails can be removed, clean wood scrap from construction operations), pre and post consumer, source controlled food wastes, vegetative agricultural/agribusiness wastes such as wet, indigestible hay or forage, corn stover, cotton gin trash, or peanut hulls, land clearing debris material, lime mud from water treatment operations and non-toxic/non-hazardous coal combustion dust.
2. Site assessment: evaluations indicate seasonal groundwater elevations at a depth of well over 24 inches. Soil evaluation indicated the predominant soil texture in the expansion area as loamy sand. The soil materials in this area will be modified by addition of coal

dust to introduce fine particles and modify soil texture in the control zone. The current permitted area has been modified over the last two (2) through continued use as a compost production facility and the natural and planned addition of compost fines and coal combustion dust to the site. The soil texture in the existing compost manufacturing area is fine sandy loam to sandy loam as determined by hand-texture method and to be confirmed by laboratory analysis. This meets requirements contained in DWM Rule NCAC.1404 10 b.

E. Site Plan: Site plan is attached, see attachment 1

F. Compost Facility Permittee

(1) Mr. J. W. (Billy) Dunham is the Permittee for this facility. The Craven Ag operation is a family business. Personnel involved in the compost operation are:

- a. J. W. (Billy) Dunham, Operator in responsible charge
- b. Mack Dunham, Assistant Facility Operator
- c. Maintenance crew
- d. Equipment crew
- e. Transportation crew (over-the-road crew)

(2) Operations Schedule: The Craven Ag compost operation may be open between 7:00 am through 7:00 P.M. Monday through Saturday depending on the need to process and move compost. These operating hours will accommodate inflow, outflow of finish product and required compost production operations. Hours of operation may be less than reported here. Upon completion of a typical work day, the compost windrows will be checked to assure proper cover is in-place and the gate will be closed and locked as staff exit the site.

(3) HHW - Household hazardous Wastes are not composted at the site. If these materials are ever received on the site, they will be removed and handled through approved HHW operations.

(4) Special precautions: during inclement weather (excessive rain, severe winds, snow, ice, or weather warning associated with tornado or hurricane), the facility will not actively mix or blend incoming feedstock materials. Compost windrow turning may proceed if site and soil conditions permit access to the site and the operation can be conducted safely without generating runoff or endangering staff.

(5) Vector and nuisance conditions will be addressed by maintaining proper cover over windrows to prevent vector attraction. Noise associated with equipment operations will be controlled by operating only during posted hours of operation, no Sunday morning operation, and by controlling vehicle speed along River Road. Dust control if needed will

be achieved by wetting roadways and other surfaces generating dust.

(6) Finished compost will be utilized as a component of bioretention mix in stormwater systems, as a medium for plant growth, as a landscape material and for agricultural, horticultural, and silvicultural operations and as substrate for plant growth. All compost materials will be certified as PFRP and representative samples of the material will be tested as accomplished by NCDA for organic matter, nutrient, regulated metal, and salt levels as required in rule.

An operations and maintenance manual is provided. The Operations manual lists activities of individuals involved, operational requirements during normal operations and adverse weather, turning frequencies, temperature monitoring requirements, product quality testing and disposition for the compost.

#### G. Compost Facility Design

(1) The Craven Ag, LLC Compost Facility consists of a series of compacted marl gravel and compacted soil/ash pads each of varying size. The site contains several distinct areas. These are:

**Area 1** – material receiving and mix pit

**Area 2** – material processing area to assure PFRP and VAR compliance, these are active compost production areas

**Area 3** – screening and material curing

**Area 4** - Outside storage and staging – areas suited for storing finished compost or dry feedstock materials and for short term storage while materials are held waiting disposition

In addition to these defined areas, the site may also contain temporary tank trucks for storage and treatment of the raw materials to be processed and composted. These consist of above ground portable tanks ranging from 1500 to 6500 gallons capacity.

The compost is manufactured from a mixture of hardwood and softwood chips and sawdust, animal bedding, ground corn cobs, ground yard waste, FOG wastes (dewatered grease trap residuals and DAF skimmings), construction debris (clean, unfinished wallboard, construction debris such as saw wood or pallets), pre and post consumer, source controlled food wastes, vegetative agricultural/agribusiness wastes such as wet, indigestible hay or forage, corn stover, cotton gin trash, or peanut hulls, and land clearing debris material. New feedstock sources will be tested to determine levels of nutrients, regulated metals, organic carbon and salt prior to receipt. No new feedstock will be allowed if regulated metal levels exceed the Table 1 values listed in 40 CFR Part 503.

All of the putrescible material is mixed and blended with a suitable substrate on the

compacted pad on the day of arrival to prevent nuisance problems. As the facility expands, a concrete pad will be developed. On day of arrival, the non-putrescible materials are stored in the raw material storage areas for subsequent use as needed for staging purposes. Raw feedstock materials are initially mixed and blended on the existing compacted pad using a front-end-loader. A mixer with a feed auger is used to combine the blended raw materials, which are then placed into the windrow compost production area. The windrow compost process continues in these open windrows for approximately 60 days from placement to product. At the end of the composting process, the PFRP/VAR compliant compost is moved by loader onto the compacted finished compost storage pad for curing. The finished compost is to be stored for a period of not less than 120 days and not to exceed 270 days for curing. A maturity test will be used to assess the stage of maturity of the compost. The finished compost may be sold in bulk as a soil amendment, blended with topsoil or sand marketed as finish compost, topsoil or bio-retention blend.

The facility is intended to accommodate up to 50,000 tons per year of compostable materials. These materials will be received on a varying schedule and daily receipts may exceed 100 tons, while annual processing will not exceed 50,000 tons. This schedule supports 300 days of active operation per year. Compost mixes or blends will be developed each day based on incoming feedstocks and ultimate market opportunity. Coarse materials will be used to produce silvicultural product while the finer textured materials will be mixed and blended for the horticulture and bioretention blend markets.

## 2. Compost Recipes

The exact blends and mixtures are developed based on proprietary mixes and blends developed by Craven Ag Service, LLC, for specific end uses or general compost production. The compost is made from a mixture of hardwood sawdust and animal bedding from livestock operations, untreated wallboard and other untreated construction debris, land clearing debris, yard and leaf waste, dewatered grease trap wastes and vegetative wastes from food operations. The ground yard waste, ground corn cobs and land clearing debris material are may be incorporated into the compost recipes to increase levels of solids and decrease moisture levels. Table 1 shows the characteristics of a portion of the raw materials used for compost mixture calculations.

**Table 1. Raw Material Characteristics**

<b>Raw Material<sup>1</sup></b>	<b>% N</b>	<b>C:N Ratio</b>	<b>% Moisture Content</b>
Septage	1.0	40:1	95
Dewatered Grease Trap	1.0	60:1	70
Hardwood Sawdust	0.09	560	10
Sawdust Bedding	0.24	442	20
Ground Corn Cobs	.6	98	15
Animal Bedding	.5	120	40
Yard Waste	.9	54	40
Land Clearing Debris	.09	560	5
Food waste	1	30	95

<sup>1</sup>Nitrogen and Carbon Information based on data from "On-Farm Composting Handbook"

The composting operation serves primarily to receive septage and dewatered grease trap wastes in order to allow an increase in the hydraulic loads onto the land treatment operation permitted for Craven Ag Service and to provide an outlet for solids produced in dewatering operations operated by CAS. The mixtures of substrate and waste should result in an initial C:N ratio of ~30:1 and a moisture content of ~75%.

### 3. Availability of Raw Materials Protocol For Compost

The waste production assumptions for the compost operation are as follows:

- a. 50,000 gallons grease trap waste processed 5 days per week (10 to 20 dry tons/day after dewatering)
- b. 50,000 gallons of septage processed 5 days per week (10 to 20 dry tons per day after dewatering)
- c. 5,000 gallons of portable toilet waste processed 5 days/week (0.5 DT/D)
- d. 20,000 pounds (10 tons) of vegetative waste per day received
- e. 100,000 pounds (50 tons) per day feedstock from municipal, commercial, agricultural/agribusiness, and industrial sources.

These volumes will vary seasonally, but total production from all sources will not exceed 50,000 tons annually.

The solids portion of the processed liquid waste is to be composted. The liquid will be accommodated through land application, transport to a separate and properly permitted land treatment facility or to a permitted POTW (such as Kinston POTW). In addition to the nitrogen sources available from the septage and dewatered grease trap waste, several sources of carbonaceous bulking materials are readily available for utilization in the composting process. These materials include hardwood and softwood sawdust from a local manufacturing plants, mixed wood chips and sawdust from ground pallets (nail free), animal transport bedding materials from livestock operations, straw bedding material from the on-site free-stall dairy, horse, or cattle barns, poultry litter from local poultry growers, untreated wallboard from home/mobile home construction/manufacture, pre and post consumer food waste and hay/straw harvested from the land application fields.

#### 4. Flow Diagram

The composting process at the Craven Ag Service Compost Facility is depicted on the site plan showing the processing area, the compacted mixing pad, the compost production windrows, the curing area and the screening/mixing area and may be described as follows: dry raw materials such as sawdust, wood chips, bedding material and ground pallet materials (wooden pallets) are received and stored prior to use in the “dry material” storage areas. These materials are combined with a daily delivery of wet raw materials and the dewatered materials generated off-site at the Craven Ag dewatering facility. The dry materials are placed directly onto the pad and the dewatered or processed septage/grease trap materials are placed over the top of the material, these materials are mixed and blended using a loader in an approximate 50/50 ratio. These raw feedstock materials are loaded via loader into the bulk mixer. The proper ratio of material introduced onto the mixing pad is determined by the number of “buckets” of material placed by the loader. The bulk mixing operation thoroughly combines the raw material and “mixed” raw materials are transferred to the compost production area. After initial treatment in the compost windrows for PFRP and VAR compliance, the compost is removed to the initial storage or curing area, where it is allowed to complete the compost curing process. A **Solvita** test will be used to assess the maturity of the compost.

A process flow diagram, showing the equipment and flow of materials through the composting system is included in Attachment 2. The critical flow duration in the active windrow is 15 days at required temperature with 5 consecutive turnings as required in rule. Typical time in an active windrow will be 4 to 6 weeks to allow for temperature rise from ambient to thermophilic and required mixing. Mixing and blending will be accomplished in a single day. Composting will require an estimated 21 days. Curing may require between 2 and 3 months depending on end use and Solvita test results. Storage can be accomplished following a Solvita test indication that the material is stable. Storage will be dependent on end use and may require up to 9 months depending on users.

#### 5. Leachate Collection and Recycle System

The site plan indicates that compost production areas/pads are sloped toward a runoff collection area which is intended to hold and treat a small volume of liquid and provide a sink to return liquid to the active compost areas. Runoff will be returned to the compost windrow areas as liquid and any excess runoff will be transported off site to the City of Kinston Wastewater facility. Contents of the collection area or shallow basin are removed as needed and are normally incorporated back into compost batch as a liquid and nitrogen source or are allowed to evaporate. Any addition of leachate back to the windrow is carried out in the primary loading of the windrow and results in an additional full processing and heat cycle which results in the Process to Further Reduce Pathogens (PFRP) to be repeated. In very wet conditions or in an emergency, such as a sustained power outage or equipment breakdown, the collected leachate will be transferred to the nearby wastewater treatment facility in Kinston, NC.

#### 6. Preliminary Compost Analysis/Quality

Detailed compost characterizations have been performed previously by NCDA on several samples of the finished compost. All units in the analysis are measured on a dry weight basis (mg/kg). Table 3 shows a summary of the results from NCDA sampling. The finished compost does not exhibit high concentration of regulated or heavy metals. The raw material sources are primarily agricultural in nature and do not have significant heavy metal concentrations.

## 7. Pathogen Reduction Verification

Pathogens are to be reduced as required in the NC Solid Waste Compost Rules, Section .1406. The Stanley Environmental Facility shall maintain the compost process at a temperature above 55 degrees C (131 degrees F) for 15 days or longer and the average temperature for an additional 14 days shall be higher than 45 degrees C (113 degrees F) for the PFRP and VAR compliance.

The completed compost from the Stanley Environmental Compost Facility will have a fecal coliform density of less than 1000 colonies Most Probable Number (MPN) per gram of dry solids. The materials will demonstrate pathogen reduction requirements by process monitoring (time and temperature).

## 8. Protocol For Compost Which does not Meet Pathogen Reduction Level

All finished compost which does not meet the time temperature requirements listed in rule( 131 degrees F for 15 days) or tested fecal coliform level of 1,000 colonies per gram of dry material are to be returned to the windrow and subjected to an additional, high heat cycle (up to 131 degrees Fahrenheit for 15 or more days). Temperature probes will be calibrated annually to assure reliable measures. In the event that this process does not reduce the fecal coliform count or the manager/operator decides that the additional composting is of no value, then the material will be land applied to an appropriate, permitted off-site disposal area (permitted for class B material through NCDWQ or NCDWM) or transported to a permitted landfill.

## 9. Contingency Plans for the Operation

An operating manual detailing the composting facility operations and procedures, including recipes, equipment, monitoring, maintenance, and record keeping is included as Attachment 4.

Contingency plans for operation in the event of equipment breakdown or temporary power failure or inclement weather essential operations will be accomplished with alternative equipment; for example, if turning is required and the turner is inoperable, turning will be accomplished with front end loader.

Problems with operation of the composting facility during extreme weather conditions such as heavy rain or high winds will be minimized because of limited ingress to the site. Essential operations will be accomplished as required with equipment available.

In freezing conditions, it may be necessary to modify the compost cycle to assure

temperatures are maintained adequately. This may require turning during late morning and early afternoon hours to take advantage of warmer day-time temperatures. This practice should allow the temperature to reach and maintain the desired level in excess of 131 degrees Fahrenheit for at least 15 days with the required turnings to meet the PFRP requirements. Special caution will need to be taken with the operation of skid loader equipment in any areas where the small amount of leachate could freeze and present a slippage hazard. Operators will be trained in proper operation of all equipment to assure a safe and sound operation.

#### 10. Compost Equipment

*Tractor:*

*Loader*

Two high capacity rubber tired front end loader/mixers (T1500) are used to mix the compost feedstock materials on the pad prior to introduction into the windrow. The capacity of the loader bucket is approximately 6 to 8 cubic yards. Product is moved through the operation with the loader.

*Windrow turning:*

Windrow turning accomplished by T1500 bucket loader

*Truck:*

A dump bed truck or a loader will be used internally to move compost materials, feedstocks, and other materials through the site.

*Screen:*

Ultra Screen

*Mixer:*

Knight

These activities are detailed in the operation and maintenance plan.

#### 11. Vector Reduction

On day of arrival, putrescible materials will be mixed, blended and prepared for

composting, then placed into the compost windrow on that same day to reduce nuisance vectors. These materials will be covered with 3 to 6 inches of finished compost, 3 to 6 inches of a carbon rich material such as sawdust or a layer of plastic as described in the operation and maintenance manual to prevent escape of odor. Other component materials such as sawdust, bulking agents such as ground corn cobs or yard waste may be stored for longer periods. The VAR requirements established in rule shall be met through compost temperatures of 105 degrees for 15 days and 115 degrees for 5 of those days as established in 40 CFR Part 503 Rules.

## 12. Traffic Flow

Based on the maximum throughput production of the compost operation a maximum of two tractor trailer loads of compost per day would leave the facility on average. The over the road tractor trailers are anticipated to move on the gravel access road leading from the facility to River Road, thence to NC Highways and roads for ultimate distribution in the area. Given the existing truck traffic from the facility, the additional effect on local traffic of a maximum of two trucks of finish compost per day, 4 to 5 loads of dry feedstock materials, and 2 to 3 loads of dewatered material on average will be negligible.

## H. Marketing Plan and Materials

A portion of the finished compost has normally been sold by bulk to local buyers. At present, CAS Compost Facility has established a strong working relationship and goodwill with growers and producers in the area to continue with expansion of markets for soil amendment, compost and bioretention area soil mixes.

Copies of the previous communication from the NC Division of Solid Waste regarding the Compost Facility are included as Attachment 9.

## I. SUBMITTAL

Gary MacConnell with MacConnell and Associates and I, appreciate the opportunity to compile this permit application for the CAS Compost Facility. Initial development and final review of these materials was provided by Billy Dunham, Gary MacConnell, and A. R. Rubin. If either you or the NC DENR have any questions regarding this report, please contact us directly.

Sincerely,

Gary MacConnell, P.E.

A. R. Rubin

attachments

## List of Attachments

Attachment 1. Site and Topographic Maps of the Compost Facility

Attachment 2. Design Schematics

Attachment 3. Compost Analysis Report

Attachment 4. Composting Operations Manual

Attachment 5. Equipment Specifications

Attachment 6. Buffer Maps

Attachment 7. Craven County Zoning Letter

Attachment 8. Marketing Information Sheets

Attachment 9. Division of Solid Waste Communications

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## Attachment 2. Design Schematics

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Attachment 6. Buffer Maps

Attachment 7. Craven County Zoning Letter

Attachment 8. Marketing Information Sheet

# **Craven Ag Service, LLC Compost Facility Operations Guide For Large Type III Facility**

**May 31, 2011**

**Prepared for: Craven Ag Service, LLC  
River Road  
New Bern, NC**

**Developed by: J. W. (Billy) Dunham  
Craven Ag Service, LLC  
2115 W. Highway 55  
New Bern, NC 28562**

**Dr. A. R. Rubin,  
A. R. Rubin & Associates  
195 Fearington Post  
Pittsboro, NC 27312**

**Gary S. MacConnell, P.E.  
MacConnell & Associates, P.C.  
1903 North Harrison Ave., Suite 102  
Cary, NC 27513**

## **Craven Ag Service Large Type III Compost Facility Information**

**Owner:** J. W. (Billy) Dunham

**Location:** Site Location: River Road

Office Location:

2115 W. Highway 55

New Bern, NC 28562

**Permit:** Pending

**Primary Contact:** J. W. (Billy) Dunham

**Office:** 252-633-5334

**Cell:** 252-670-8530

**Regulatory Agency Emergency Contact:**

NCDWM, Eastern Region: Joe Gallo

**Hours of Operation:**

Monday to Friday: 7:00 AM – 7:00 PM

Saturday: 7:00 am – 3:00PM

Sunday: Closed

**Prohibited Feedstock:**

Hazardous waste

Infectious waste

# Craven Ag Service Compost Facility - Operations Guide

## 1.0 Introduction

The Craven Ag Service Compost Facility is located in the northern part of Craven County, North Carolina, near the intersection of River Road and Highway 4, approximately 5 miles southwest of Vanceboro, NC. This facility currently operates in accordance with a demonstration permit, and will be permitted by NCDENR-DWM as a Large Type 3 composting operation. The purpose of this operations guide is to comply with Section 1406 of the DWM regulations. Key personnel involved in the production of compost at this facility will acknowledge reading of this manual to assure a basic understanding of the policies and procedures contained herein. Key employees have acknowledged reading this guide or manual by signing and dating a statement to that effect. Copies of this acknowledgement are contained at the back of this guidance document.

The raw feedstock materials for the composting operation will come from permitted sources. These include:

### Permitted Materials:

- Dewatered Septage
- Dewatered Grease trap wastes
- Material from permitted waste sources such as scrapped manure or litter from local animal operations
- DAF Skimmings
- Sawdust from local wood products manufacture
- Ground yard waste
- Agribusiness residues or vegetative agricultural wastes and by-products (such as waste cotton fiber or gin trash, corn stover, tobacco dust, straw or wet hay)
- Land clearing debris
- Shavings and animal waste from any local livestock trailer wash
- Pre and post consumer food wastes from source controlled operations
- Untreated, unpainted new construction wallboard or gypsum-board, wood pallets
- Seafood processing waste
- Ash from wood burning operations or coal facilities

### Prohibited Materials:

- Municipal sludge
- Hazardous waste
- Infectious waste

Materials composted must be permitted in the DWM permit. New feedstocks will be tested and approved by consultants to Craven Ag Service or DWM prior to receipt.

The composting operation will be conducted in open windrows specifically designed for compost production. Feedstock storage and final composting/curing will occur on compacted clay, fly ash, and/or lime pads. The windrows are fed from a concrete bunker mixing pad and fresh compost is discharged following the PFRP and VAR compliance stage of the windrow process to a second portion of the compacted pad. During Phase 1 of the project, the mixing of materials will take place directly on the pads. The compacted pads will also help prevent introduction of undesirable material such as stones into the compost. Liquid generated during the compost feedstock mixing, compost windrow operation, the initial curing operation and/or following precipitation events will be collected naturally and accommodated through a combined infiltration basin – wetland cell for treatment and reuse in the process. Excess moisture will be treated on a portion of the site currently permitted for land application of septage and FOG. The existing permit will be modified to preclude commingling the liquid waste from the compost site and the septage/FOG.

### 1.1 Composting Requirements and General Operations

Compost is defined by the U.S. Composting Council as “the product resulting from the controlled biological decomposition of organic matter that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.” Composting is accomplished by mixing an energy source (carbonaceous material) with a nutrient source (nitrogen and phosphorus containing materials) in a prescribed manner to meet microbial requirements necessary to support metabolic processes. Moisture levels, solids levels, and nutrient levels in the compost feedstocks are controlled to assure the process reaches the required temperatures for the time prescribed by rule (15 days above 131 degrees F with 5 turnings in that 15 day time). The process is carried out under specific moisture and temperature conditions for a specified period of time. Certain steps and procedures are necessary to ensure that the composting process proceeds properly with a minimum of odors, adverse environmental impacts, and other process related problems.

The facility will be divided into four (4) distinct areas. These are receiving Area 1, where raw materials are received, this does include the mix bin at the entrance to the process (note that during Phase 1 the materials are mixed directly on the pad(s)); here incoming materials are mixed and blended in preparation for subsequent placement in the windrows; Area 2, where the mixed/blended materials from area 1 are placed into the long windrows for compost operations and where Process to Further Reduce Pathogens (PFRP) and Vector Attraction Reduction (VAR) compliance will take place; Area 3 where composted materials and inert bulking material are stored or cured, screened and prepared for distribution; and Area 4, where finished, screened materials are stored prior to transport off site. This is a compacted, exterior storage area where finish compost is field stored and awaiting transport to various markets.

Materials permitted for receipt at the facility will be received at Area 1. Solid and semi-dry materials from off-site sources (litter, shavings, etc) will be stored on the compacted pad waiting blending with the dewatered septage and FOG. Dewatered Grease Trap and Septic Waste that has been processed through the Dewatering box at the Craven Ag Dewatering facility off Highway 55 will be dumped onto the mixing pad for proper mixing with the dry bulking materials. A volume of wood shavings or litter equal to the volume of dewatered material will

be placed on the pad. The dewatered material and the dry bulking material will be mixed together for approximately 10 to 20 minutes to assure complete mixing. This process is not intended to generate excess liquid. Should liquid be generated during this initial mixing, it will be collected and discharged naturally into a combined infiltration basin - wetland facility described above as the stormwater retention and infiltration facility. Prior to blending or transport into the compost windrows in Area 2, all materials will be examined to assure proper moisture level (upon firm squeezing, material will release a thin film of water to hand or a few drops of water). If material is too wet, additional bulking material will be added to dry the mixture; if too dry, liquid from the infiltration basin wetland will be added to the mixture to provide moisture. Dry materials will be mixed or blended at the proprietary mix or blend ratios developed at Craven Ag Service for various compost end uses and markets. A portion of finished compost may be recycled with the mix to provide a source for microbes.

Materials will be formed into the windrows using the loader-mixer buckets or by dump truck. Feedstock materials will be transported to the windrows and placed carefully in windrows by lifting and dropping materials to provide final mixing and blending, preliminary aeration, and minimal compaction prior to windrow activities. Typical windrows shall measure no more than 8 feet in height and no more than 32 feet at the base. Material placed in this manner should heat adequately to assure PFRP compliance. Temperatures will be monitored and recorded daily to demonstrate compliance with PFRP and VAR requirements. Windrow areas are designated on the facility permit and all windrows will be marked with date of formation and dates of turning.

The windrow compost process achieves the VAR and PFRP compliance. Demonstrated compliance with VAR requires temperatures exceeding 104 degrees F for 14 days or longer, and averaging 114 degrees F or higher for the 14 day period. Compliance with PFRP requires maintaining temperatures at or above 131 degrees F for 15 days with at least 5 turnings of the windrows. These PFRP temperatures have consistently been exceeded in the VAR area of windrow operations and a PFRP windrow is a "de facto" VAR method. Material will be moved through the active compost production area (area 2) using a front-end-loader bucket or windrow turner (as available) until material has achieved required VAR and PFRP compliance and has been rotated in the windrow for 60 to 120 days. Temperatures will be monitored at specified locations along an active windrow. These are 20%, 40%, 60% and 80% of the windrow length and at depths of 24" and 36" into the windrow at each of these locations. Temperature monitoring will be accomplished Monday through Saturday. Once compliance with all PFRP and VAR requirements has been established through the time/temperature monitoring, the compost shall be moved to area 3 for curing and screening.

The curing/screening area (Area 3) is intended as an area where the compost matures and is prepared for distribution. This process is important in developing stable compost suitable for a wide variety of end-use applications. The stability and maturity of the compost will be assessed through the Solvita test.

Once stable and ready for distribution, the compost will be transported by loader to a screening operation located in Area 3. The screen separates fine material from coarse material. The fines are placed into the final stage of the operation – storage area, area 4 while the coarse materials are recycled back through the compost operation by transport back to Area 1, feedstock storage.

Here these coarse materials are mixed and blended with incoming material and returned to compost windrows as "seed".

A quality assurance/quality control program will be instituted at Craven Ag Service. This process will help to assure:

- A. Compliance with appropriate rules and regulations
- B. Product quality consistent with specified or designated end use
- C. Trained personnel remain available to manufacture quality compost

The QA/QC effort will involve the compliance testing and monitoring including: routine temperature monitoring and recording, nutrient and regulated metals testing, foreign material content and bacteriologic sampling. The compliance testing for regulated metals and bacteria will be conducted by a private certified laboratory. Sampling will be conducted every 20,000 tons of material produced or twice (6 month intervals) per year. Annual calibration will be required on temperature probes. An annual report submitted to DWM is required as a part of the QA/QC program.

In the event that an additional raw material stream becomes available to be added to the composting operation, the material will be submitted for review and approval by the DWM-Solid Waste Section or to this consultant prior to use as a feedstock. The following procedure will be utilized to submit raw materials for approval to the Solid Waste Section:

1. A sample of the raw material will be taken according to the protocol detailed in Section 5.2 of this manual.
2. The sample will be analyzed for the parameters listed in Table 2, Section 5.3 of this manual.
3. A report of the analysis results and a written request for inclusion of the raw material, including proposed handling instructions for the raw material, will be submitted to the Solid Waste Section.
4. Upon notification of approval of the raw material by the Solid Waste Section, the raw material may be incorporated into the process used for compost production.

Incoming or raw material will be inspected visually to assure unwanted trash is not present, that no material received is prohibited by permit, and that the material received is authorized under the permit.

## 1.2 Moisture

Appropriate moisture is necessary to compliment the biological processes of the microorganisms responsible for the degradation of organic matter and stabilization of compost. Composting is a naturally occurring aerobic process. Consequently, the moisture content is influenced by the necessity of supplying oxygen and venting off-gasses. As moisture increases, the particles in the compost become more dense and air spaces shrink, limiting the supply of oxygen and the ability to off-gas. If oxygen supply drops to below 8%, the process becomes anaerobic and slows

dramatically. The results are foul odors, and the need to restore the aerobic conditions, which will delay the processing time and reduce production rates.

Experience has shown that oxygen consumption in compost operations increases at moisture levels above 40% and reaches a maximum at 60%. Based on the proposed ratio of materials, the initial moisture content will be reduced from approximately 70% to the optimum initial moisture level of 60 % by mixing the wetter feedstocks with dry materials such as: recycled, wood-chips, poultry litter, sawdust shavings, gin trash, and/or cotton waste. The initial moisture levels encountered of near 70% will possibly slow the degradation process of the compost materials until moisture reduces to approximately 60%. As a consequence, the wetter feedstocks will be mixed with dry materials on a 50/50 volume ratio to increase solids levels and reduce moisture levels to a more optimum level prior to feeding the materials into the bin. The optimum moisture content for compost materials transported to the windrow is 60% to 65%. This is the target for this operation and it will be met by the 50/50 mix (by volume) using the front-end-loader to mix and blend feedstocks. All mixing and blending of feedstocks will occur on the compacted pad located at the end of the initial receiving bay.

The composting process may also be inhibited when moisture levels fall below 40%. Moisture levels will be maintained such that compost materials are thoroughly wetted without being waterlogged or dripping excess water. As a rule of thumb, the compost materials are too wet if water can be squeezed out of a handful and too dry if the handful does not feel moist to the touch or if firm squeezing does not result in a film of water on the hand or gloved hand. A moisture meter, similar to that described in the Equipment Specifications (Appendix 2), would provide a more accurate determination of the initial moisture content of the compost material, but is not considered necessary for operation of the facility.

If the compost needs additional moisture, treated water contained in the infiltration basin/wetland basin can be used to add moisture during the composting process or if the material is just entering the process; water may be required to proceed through the PFRP process. The addition of moisture from the treatment wetland requires the Process to Further Reduce Pathogens (PFRP) to begin as the liquid is added. The basic compost materials, with the exception of the sawdust, litter, cotton wastes or gin trash, and/or corncobs, are wet and therefore it is unlikely that very much additional moisture will be needed. In all likelihood, the material will normally compost "as-is" or may require moisture removal as achieved through blending with dry feedstock materials.

Given that multiple windrows are presently used, excess moisture can be managed by simply allowing the initial heating cycle to rise, or by turning the windrows frequently to drive water vapor off by venting excess moisture to the atmosphere. The higher the heat generated in the process will also have the additional beneficial effect of killing off potentially pathogenic organisms such as coliform or salmonella, helminthes eggs or cysts, or inactivating viruses and other organisms regulated in waste treatment processes.

Particle size and structure are also important when determining the optimum moisture content. Generally, smaller particles provide more available surface area for microorganism habitat and the greater the microbial activity. This is only the case if sufficient oxygen is available.

Insufficient oxygen presents the same problem described earlier with too much moisture. A combination of excessive moisture and small particles is doubly detrimental. A typical target for particles 15 mm (1/2 inch) in diameter or larger is to keep the compost mixture content at 55-65% moisture. If the particles are 5-15 mm (less than 1/2 inch), a 45-55% moisture content is recommended. If particles are too small and/or wet, bulking materials such as sawdust, ground corn stover, and/or ground wall-board can be added. This is also subject to variation depending on the specific materials available for the compost.

### 1.3 Temperature

Temperature should be monitored closely at 20%, 40%, 60% and 80% of windrow length in all active windrows and recorded daily. Metabolic or biological activity increases with increasing temperature. The optimum temperature range for composting is between 130° F (54.4° C) and 160° F (71.1° C) once the process has begun. As stated in the North Carolina Solid Waste Compost Rules section .1406, the facility shall maintain the compost process at a temperature above 131° F (55° C) for 15 consecutive days or longer, with 5 turnings, and the average temperature during that time shall be higher than 131° F (55° C) to ensure the highest level of pathogen reduction. If pile temperature falls significantly during the composting period, odors may develop. If the pile material does not reach operating temperature, investigate piles for moisture content, porosity, and thoroughness of mixing. Compost managed at the required temperatures will favor destruction of pathogens.

Monitor temperature of the compost windrows **daily – except Sunday**. Appendix 1 provides a Temperature Record form. The system operator should monitor temperatures at specified monitoring locations along the windrow. Temperature monitoring locations are 20%, 40%, 60% and 80% of the total length of the windrow. The temperature monitoring probes consist of 36 inch to 48 inch long dial stem thermometers. Temperature monitoring shall be accomplished at the 24 to 30 inch depth at each monitoring location. At least annually, the temperature probes must be calibrated to assure they are reading temperatures accurately.

### 1.4 Mixing and Process Time

Mixing the compost with the loader bucket turner is necessary to ensure that all particles are exposed to the high temperatures required to inactive potentially pathogenic microorganisms. The mixing redistributes air pockets to insure proper oxygen levels for the composting process. The mixing is accomplished by the rotation of the composting mass. Mixing in the windrow with the turner assures that all particles in the compost mass are exposed to the required temperatures for the required time. Pathogen reduction (PFRP) is achieved in the active compost windrow.

Mixing of raw materials with the loader should be done to evenly distribute additives and bulk materials throughout the composting material. Feedstock mixing and blending shall be done on the concrete pad in the final phase, but on the compacted soil pad initially. Feedstock mixing and blending prior to composting shall be done by mixing approximately 50% active materials such as the dewatered septage and grease trap wastes with approximately 50% wood chip/sawdust, 50% yard and leaf waste, etc. The pre-compost mixing shall be accomplished by

successive scooping, lifting and falling of materials with a 3 cubic yard front-end-loader bucket. At least three scoop/lift/fall cycles will be required to mix materials adequately. Liquids and wet materials will be placed in the mass of material by creating a “V” shaped trough in the dry materials prior to adding the liquid materials.

The PFRP compliance temperature is achieved in Area 2, and a curing stage follows the active compost phase. The curing phase may require as much as 30 days of storage in Area 4. Materials may be bagged or moved to bulk off-site locations following finishing in Area 4. Disposition of compost following compliance depends on market outlets. The finished product is normally dark brown to black in color with a 60%-65% solids composition based on analysis. The odor is slightly earthy or musty and texture is loose. The volume is roughly half of the original volume.

Composting time required is primarily a function of the amount of air supplied. The efficiency can be increased and composting time decreased with added aeration by forced air or increasing turning cycles. This also produces a cooling effect which must be monitored. Once the composting process is complete (as measured by VAR/PFRP Compliance and Solvita test) the compost can be stockpiled without further temperature monitoring until used.

#### 1.5 Carbon : Nitrogen Ratio (C:N)

The carbon to nitrogen ratio is the most important chemical consideration in compost operations. The C:N ratio desired is between 25:1 and 40:1. Other nutrients are generally contained in sufficient ratios for composting in most organic wastes. Carbon and nitrogen are consumed in the decomposition process at a rate which is proportional to one another.

The main goal is to produce a compost which will not deprive soil of its natural nitrogen due to a nitrogen deficiency in the compost. A low carbon to nitrogen ratio during decomposition will result in ammonia volatilization. A high carbon to nitrogen ratio reduces the efficiency of the process, because more microbial activity is required to reduce the C:N ratio. The optimum C:N ratio for finished compost is between 25:1 and 40:1 (carbon to nitrogen).

#### 1.6 Compost Recipes

Ongoing analysis has produced several compost recipes with potential for use at the composting facility. These recipes assume a “Plug Flow” batch of compost. The process time for the compost batch is normally 45 – 60 days in the Windrow and another 90 days in the Curing Pile prior to being screened and ready for market. Once cured, the process can be considered a finish product and is suitable for distribution and beneficial use. The finish product may be moved off site and stocked for ultimate use.

Typical chemical and moisture characteristics of common raw materials used in composting operations are shown in Table 1.

#### **Table 1. Raw Material Characteristics**

Raw Material <sup>1</sup>	% N	C:N Ratio	% Moisture Content
Vegetable Waste	4.2	10:1	82
Dewatered Septage	3	25:1	70
Dewatered FOG	1.5	50-60:1	70
Hardwood Sawdust	0.09	560:1	25
Sawdust Bedding	0.24	442:1	40
Ground Corn Cobs	.6	98:1	15
Ash	<0.5	400:1	5
Gin trash/cotton waste	.5	120:1	10
Tobacco Dust	0.75 to 1.5	40:1	15
Ground Yard Waste	.9	80:1	40
Land Clearing Debris	.09	560:1	--

<sup>1</sup>Nitrogen and Carbon Information based on data from "On-Farm Composting Handbook" or testing on-site materials

## 2.0 Operations

The Craven Ag Service Compost Facility will be operated daily, from 7:00 am until 6:00 pm Monday through Saturday. Additional hours of operation may occur during periods of high demand for the finished compost material; however, no Sunday operations are planned. Operations will proceed according to the requirements and procedures detailed in this operations manual.

### 2.1 Personnel Duties and Requirements

1. Compost Facility Operator - This individual is responsible for overall operation of the Compost facility. He is responsible for loading the proper amount of the selected raw material into the mixer to insure a good quality finished compost. In addition, the facility operator is responsible for maintaining all the temperature monitoring logs and collecting samples of the finished compost for analysis.
2. Assistant Facility Operator(s) - This individual will assist the facility operator, as necessary, and additionally will be responsible for upkeep and clean up around the compost facility. This individual will perform routine preventative maintenance on the composting equipment. This position will be filled as required, and may require more than one person.
3. Maintenance crew - These personnel will be provided from the on-site pre-treatment plant or staff available to Craven Ag Environmental from other operations as

maintenance staff required to perform major maintenance or repairs on the composting equipment.

4. Equipment crew - These personnel will be responsible for screening and custom blending the finished compost material, and for loading trucks for delivery.
5. Transport - These personnel will operate over-the-road transfer trucks. The compost will either be trucked to the final destination by over-the-road trucks, or may be removed by vendor trucks as well, depending on size of the order. It is anticipated that direct sale of bulk material to local contractors would be accommodated by direct loading of the buyer vehicles (private trucks or trailers).

## 2.2 Compost Testing Needs

In addition to the routine testing of the compost material every 20,000 tons or every 6 months for the parameters specified in Section 5 of this manual, and the 6 day/wk monitoring of the composting process for temperature, it may be advantageous to test compost material for carbon, nitrogen, moisture, and pH should compost fail to reach desired temperature or if odor problems develop. The finished compost material will be monitored every 6 months or 20,000 tons of compost processed (the smaller of the two) for nutrients and regulated metals tested by the North Carolina Department of Agriculture. More frequent testing will be accomplished as additional feedstock is added or as process optimization begins, to ensure that the composting process has been successful and that the NC Solid Waste Section annual reporting requirements have been met. Testing may be accomplished on a more frequent basis than required by rule as varying feedstocks are added to the compost and as end users require test product quality information.

## 2.3 Storage

Storage of finished compost should be limited to 4 months after completion of the process. Compost should be utilized within this time period if at all possible. Storage will be provided in either open areas of Area 4, or open exterior storage in the area designated, immediately south of the processing area, on land out of the flood-plain, or at off site locations awaiting disposition and use.

## 2.4 Maintenance Practices and Cleanliness

In order to optimize the composting process, proper maintenance of the facility and equipment is recommended. Listed below are some maintenance practices that can be implemented to ensure the productivity of the facility.

1. Do not allow any equipment that exceeds design load limits on or within twenty feet of the pads.
2. Maintain all electrical and mechanical equipment in good operating condition by following electrical codes and manufacturers' recommendations. Inspect and repair

grounding rods, switches, wiring, and all vehicles and equipment involved in the process.

3. Fences, railing, roofing, and/or warning signs must be maintained to provide warning and prevent unauthorized entry.
4. Repair any vehicular, vandalism or animal damage. Inspect and maintain runoff control structures.
5. Keep the area around the composting facility mowed and free of tall weeds and brush.
6. Clean, shovel, or dry sweep compost production and marketing areas as required to maintain pleasant work environment. Clean and dry any oil spills, wet material spills immediately to sustain reasonably safe work environment.
7. A small liquid collection basin will be used to handle any leachate from the compost mixing area. Contents of the basin will be removed as needed and will normally be incorporated back into compost batch as a liquid and nitrogen source. The addition of leachate to any of the compost requires the Process to Further Reduce Pathogens (PFRP) to start at the time the leachate is added to the compost. In an emergency, the collected leachate (runoff) will be transferred to the City Of Kinston, NC WWTP.

The following is a list of practices that will reduce the potential of odors being emitted from the Compost Site. Where practical, some or all of these practices may be utilized. The odor management practices include:

1. Avoid overly wet feedstocks and compost. The use of relatively coarse co-composting materials that allow oxygen diffusion into the pile can help avoid odor problems.
2. Activities such as mixing and movement of odorous raw materials should be scheduled to minimize the impact of odors. Accomplish these activities only early in the work day to take advantage of rising air currents. Avoid doing these activities on hot, still days or holidays and weekends. Windy conditions or early morning hours are better times to conduct such activities. Monitor the wind direction and postpone activities that may release significant odors when the wind is blowing toward the most sensitive neighbors.
3. Prevent puddles and standing water on the compost pad.
4. Minimize dust, which can transport odor.
5. Ensure that proper aeration, pH, and temperature control is maintained during the composting process.

6. Covering the upper third of the windrow with either 3 to 6 inches of finished compost, 3 to 6 inches of a stable, carbon rich material such as wood chip, or covering the area with a heavy (20 ml) plastic sheet or tarp.

## 2.5 Seasonal and Weather Management

Composting can continue year round, even during cold weather. Seasonal and weather variations may require operational adjustments that compensate for the change in weather conditions. The insulation layer covering the windrows should sufficiently buffer the mass of materials in the windrow against temperature variation, and changes in the operation should not be required.

Cold weather can slow the composting process by increasing the heat transfer rate from the composting operation into the atmosphere, but the insulation layer should mitigate this transfer. The lower air temperatures reduce the microbial activity, especially near the surface. This, in turn, decreases the amount of heat generated.

Warm weather enhances water loss due to evaporation from the windrows. Water or recovered leachate should be added if materials become too dry (moisture content drops below 40%). Again, the loss should not be excessive from the windrow, and controls can be implemented by scheduling turning operations or adding moisture as required.

In event excess liquid accumulates on the site because of wet weather or other adverse condition. That excess liquid will be collected in a tank truck and transported to an approved liquid handling facility such as City of Kinston POTW or CRSWMA.

## 2.6 Contingency Plans

### 1. Equipment Breakdown

In the event of a breakdown of the compost equipment (mixer, loader, screens, etc.), delivery of raw materials from the on-site treatment facilities should be suspended until the equipment is repaired or replaced and material passes all VAR and PFRP requirements.

### 2. Fire

In the case of a fire, immediately notify the local fire department. If employee safety is not compromised, the company pump truck may be utilized to extinguish the fire.

### 3. Freezing Conditions

Operation in freezing conditions requires more frequent inspection of the leachate collection system to insure proper drainage and allow leachate liquid to pool on the pads or windrow areas. Additional caution in operation of the turner and loader is necessary

during conditions where ice may have formed on the site. Frozen raw materials should not be added to the bulk mixer.

#### 4. Windy Conditions

Windy conditions should have little effect on the composting operation since windrows are in open areas. However, during windy conditions, special attention must be given to the temperature of the windrows, and care must be taken during the loading of raw materials (especially light materials such as sawdust) which could tend to “blow off” the composting area. It is anticipated that the local vegetation (tree line) will tend to block a great deal of the wind from the facility. However, if windy conditions are demonstrated to have a detrimental effect on the continued processing of the compost, consideration will be given to planting additional windbreaks.

#### 5. Disposal or Re-Processing of Poor Quality Products

It is anticipated that the compost produced at this facility will easily meet the standards for Class A compost. In the event that a batch of compost does not meet the requirements for Class A compost, several options exist. An initial option would be to re-process the batch in an attempt to meet the Class A compost requirements. This option would be selected if the controlling factor indicating poor quality was pathogen reduction.

Compost materials which do not meet Class A compost requirements but meet the Class B compost may be land applied under specific circumstances in accordance with a separate permit. Specifically, these materials could be applied to agricultural land, provided the land is used for silvicultural or non-food chain related production, or the material could be used for land reclamation projects. Compost which does not meet either Class A or Class B criteria, and is deemed undesirable for any attempt at re-processing, will be disposed of in an appropriate approved, sub-part D landfill site such as CRSWMA.

### **3.0 Equipment Specifications**

The equipment required to operate the Craven Ag Service Composting Site can be characterized as either processing or monitoring equipment.

#### 3.1 Processing Equipment

The primary processing equipment currently utilized at the site for composting is a Loader to serve as a Compost Windrow Turner and a mixer to assure feedstocks are properly mixed prior to placement in the windrow. The windrow turning is achieved by lifting and cascading compost to allow reaeration. Equipment may change with time, but basic functions associated with each will remain as critical to the process. Equipment may be replaced with like equipment and new equipment will be reported to NCDWM as it is obtained.

A rubber tired Cat Loader and a dump truck will be used to transport the raw compost mix to the windrows. Finished compost shall be transported by loader or dump truck to the curing area and ultimately to the finish product storage area (Area 4) and segregated into batches in the storage area.

### 3.2 Monitoring Equipment

A probe-type dial stem thermometer (as manufactured by REOTEMP) with a 36" stainless steel stem will be needed to monitor the temperature of the compost in the finishing piles in Area 2. The thermometer should have a temperature range of 0-200 degrees Fahrenheit.

An additional, optional device that can prove very useful in the production of compost is a moisture meter. This device is more accurate than the "hand squeeze" method of moisture determination. REOTEMP Instrument Corporation has developed a moisture meter which determines moisture levels via a sensor that measures electrical conductivity of the raw materials. The device is available in lengths of 36", 48", and 60".

Equipment specifications for the equipment discussed above can be found in Appendix 2.

### 4.0 Nutrient Management Plan

The majority of the compost produced by the Composting Facility will ideally be sold as a soil amendment. Additional or excess compost will be sold in bulk to local greenhouses and landscape contractors for use as a soil amendment, and/or to the NCDOT for use in highway landscape projects.

In the event of a long term market decline, it may be desirable to land apply some compost off-site. In this case, the material must be a Class A product, or an approval from the NCDWM must be obtained. Land application to agricultural cropland may be used as long as appropriate records are maintained. Compost application rates will vary depending on the agronomic needs of the crop and whether the compost is being used as a primary nutrient source. If the finished compost is used as a primary nutrient source, it should be spread following agronomic practices used for spreading manure. However, compost is generally spread onto land at a thickness of 0.5 to 1 inch. If it is applied at a rate greater than this, it becomes too difficult to incorporate into the soil. Conventional manure spreaders are ideal for handling and spreading compost.

### 5.0 Compost Record Keeping, Analysis and Reporting Requirements

The compost produced at the Craven Ag Service Compost Facility will be routinely analyzed to insure quality control is maintained. Analysis shall be conducted by the North Carolina Department of Agriculture (NCDA), Soil Test Laboratory on Blue Ridge Road in Raleigh, or by a certified analytical laboratory (A and L, Prism Laboratories, Southern Testing, etc.). The compost will be monitored for temperature daily to insure vector and pathogen reduction

compliance (see record keeping forms in Appendix 1). An annual report will be submitted to the NC Solid Waste Section by August 1<sup>st</sup> of each year, in compliance with NCAC 13B Section .1408 (c).

### 5.1 Daily Record Keeping

The compost facility will maintain daily (except Sunday) temperature, compost processing length and daily volume of compost processed records for the composting operation. In addition, the volumes of the various feedstocks will be recorded to ascertain the optimum mix and blend ratios for the continued operation at this facility.

### 5.2 Routine Compost Sampling Procedure

The compost must be sampled once per every 20,000 tons of compost produced or every six (6) months, whichever comes first. The samples will be obtained in a sterile manner according to the following procedure. The sample will be obtained from the finished compost piles, immediately prior to the screening and/or bagging equipment. The sample will consist of a multiple position composite grab sample. A minimum of 5 discrete locations within the finished compost pile in Area 3, immediately prior to the screening /bagging and bulk loading processing of the pile, will be sampled as a composite sample. These sample locations should be taken from within the finished pile, and should represent a "cross section" of the pile, not just the "surface". The sampling will be conducted wearing latex or nitrile gloves, and the composite samples should be well mixed to insure a representative sample is tested. Samples should be immediately refrigerated or placed in sealed containers in a cooler for transport to the laboratory. Collected composite samples should be placed in sterile bags provided by the laboratory if pathogen samples are to be run on the material. Samples should be delivered to the laboratory within 24 hours if pathogen testing is to be performed. It is essential to coordinate with the laboratory ahead of sampling to insure that the proper "hold times" for the various parameters to be tested are not exceeded. It may be desirable to run intermediate nutrient and heavy metal content samples at a more frequent interval than the once every 20,000 tons as specified by regulation.

### 5.3 Routine Compost Analysis

The analysis must include the parameters listed in Table 2 with measurements less than the regulatory limits based on dry weight (mg/kg) or percentage. Testing shall be conducted by private certified laboratories for regulated metals and bacteria. NCDA testing is adequate for nutrients, and foreign matter can be tested by trained personnel.

Foreign matter testing will be determined as follows. The compost material will be dried (EPA Method 160.3), weighed and passed through a one quarter inch (1/4") screen. All materials remaining on the screen will be visually inspected and all foreign material (glass, plastic, metal, etc.) will be removed and weighed. The weight of the removed foreign material, divided by the weight of the total dried sample, multiplied by 100% will be recorded and reported as the percentage foreign material observed in the sample.

**Table 2. Routine Compost Analysis Requirements**

Parameter	Reporting Unit	Test Method
Foreign Matter	%	As described in Subparagraph (2)(5) of 13B Section .1408
Cadmium	mg/kg dry weight basis	EPA Standard Methods 3050/3051
Copper	mg/kg dry weight basis	"
Lead	mg/kg dry weight basis	"
Nickel	mg/kg dry weight basis	"
Zinc	mg/kg dry weight basis	"
Pathogens (Fecal Coliform)	MPN/1000 grams of Sample	Standard Methods for the Examination of Water and Wastewater, Part 9221 E or Part 9222 D
Total Kjeldahl Nitrogen*	%	"
Phosphorus*	%	"
Potassium*	%	"
Salts*		NCDA Standard Analysis

\* Not required by statute, but these analyses provide useful information on product quality

#### 5.4 Annual Report

Craven Ag Service will submit an annual report to the NC Solid Waste Section by August 1<sup>st</sup> of each year, in compliance with NCAC 13B Section .1408 (c). The annual report will contain the facility name, address, permit number, a summary of the total quantities of raw material received at the facility, the total quantity of compost produced by the facility, and the total quantity of compost removed from the facility (marketed or disposed of off-site). The annual report will also include temperature monitoring records and the results of the required analysis for metals, pathogen reduction analysis (fecal coliform), and for the percentage of foreign matter in the finished compost.

#### 6.0 Safety & Health

Proper attention to health and safety at composting facilities can prevent most occupational risks. The safety concerns in composting relate primarily to the use of equipment. If front-end loaders or other standard farm equipment is used, eye and ear protection should be used. Normal safety precautions, such as those provided with the equipment, should be followed. The Farm Safety

Association has developed a fact sheet (No. F-017 - Agricultural Machinery Hazards - See Appendix 3) which should be reviewed by all personnel operating or working near machinery.

Fires are rarely a problem in outdoor composting, as properly moist composting material does not readily burn. However, if material does dry out and if storage piles are too large, spontaneous combustion becomes a possibility. This phenomenon occurs at moisture contents approximately between 25% and 45%. In piles over 12 feet high, it is possible for the internal heat of the compost to initiate chemical reactions, which then lead to spontaneous combustion. Proper attention to moisture, temperature, and pile size is the best protection against this problem. An accessible water supply is a valuable safety precaution.

Human health concerns relating to compost depend both on the individual and on the material being composted. While few pathogenic organisms found in farm animal manures or vegetative wastes affect humans, normal sanitary measures are important (such as washing hands before touching food, eyes, etc.). Some individuals may be hyper-sensitive to some of the organisms in compost. The high population of many of the species of mold and fungi in an active compost process can cause allergic reactions in sensitive individuals. Simple precautions, such as wearing dust masks or even half-mask respirators with disposable cartridges, can help limit human exposure to organisms that may cause allergic reactions. Conditions which may predispose individuals to an infection or allergic response include allergies, asthma, such medication conditions such as antibiotics, punctured eardrum, weakened immune system, adrenal cortical hormones, etc. Workers with any of these conditions should not be assigned to a composting operation. If a worker does develop an allergic reaction to compost, it is important to recognize the problem promptly so that it does not develop into a chronic condition. To prevent health concerns during particularly dry and dusty conditions, a dust mask or half mask respirators should be worn.

Blood borne pathogen testing should be accomplished on employees of the compost operation as a part of the annual physical.

With proper knowledge, equipment, caution, and precautions, these sources of harm can be removed or limited, and injuries, illnesses, and deaths can be prevented.

**Acknowledgement - Reading Operations Guide.**

I acknowledge that I have read and understand the information contained in the following document:

**Craven Ag Service, LLC Compost Facility Operations  
Guide For Large Type III Facility  
Dated: May 31, 2011 (or latest version)**

**Employee:  
Print Name**

**Signature**

**Date**

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**Supervisor:  
Print Name**

**Signature**

**Date**

---

**Acknowledgement - Reading Operations Guide.**

I acknowledge that I have read and understand the information contained in the following document:

**Craven Ag Service, LLC Compost Facility Operations  
Guide For Large Type III Facility  
Dated: May 31, 2011 (or latest version)**

**Employee:  
Print Name**

**Signature**

**Date**

---

**Supervisor:  
Print Name**

**Signature**

**Date**

---

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## **List of Appendices**

Appendix 1. Record Keeping Forms

Appendix 2. Equipment Specifications

Appendix 3. Safety Information

## Appendix 1. Record Keeping Forms

## Appendix 2. Equipment Specifications

### **Appendix 3. Safety Information**









FARM  
**SAFETY**  
ASSOCIATION  
*Growing Safety*

## AGRICULTURAL MACHINERY HAZARDS

FACTSHEET

The very fact that agricultural machinery uses tremendous power to do work makes its operation a potential hazard for both the operator and bystanders. Even though manufacturers try to ensure that their machinery is as safe as possible, the nature of some work creates inherent hazards, which cannot be removed. Most accidents with agricultural machinery can be attributed to human error.

In many cases the operator forgot something, took a shortcut or a risk, ignored a warning, wasn't paying close attention or failed to follow safety rules. Accidents with farm machinery can be crippling or even fatal. It is important to recognize and be alert to possible hazards and to take precautions to avoid injury.

There are many different kinds of agricultural machinery--mowers, tractors, shredders, harvesters, grinders, blowers, augers, balers, etc.--but they all have similar characteristics and similar hazards. You can be cut, crushed, pulled in or struck by an object thrown by these machines.

They can have cutting edges, gears, and chains, revolving shafts, rotating blades, levers and similar hazards. You can also be injured if you fall while working on or near any of these machines.

Some machine parts cannot be completely shielded in order to do their job. For instance, a cutting blade cannot be totally enclosed, or it could not cut. Operators remove guards for maintenance and often they don't get replaced. This creates a potentially dangerous situation.

Most agricultural machines have similar or common components to do their work. A basic understanding of these and the hazards they pose will heighten your safety awareness and prevent injury.

### SHEAR POINTS

Shear points are created when the edges of two objects are moved closely enough together to cut a soft material, as in the case of a pair of shears or an auger.

Cutting points are created when a single object moves forcefully or rapidly enough to cut, as in the case of a sickle blade.

Both shear and cutting points are created on machinery designed to cut, as in harvesters, and on those that are not designed to cut, as in an auger. They are hazards because of their cutting force, and because they often move so rapidly that they may not be visible. It can be easy to forget that they are operating.

Because some cutting and shearing points cannot be guarded, it is important to be aware of the hazard and to be especially alert when they are operating. It is also important to warn others and to look out for their safety, because of the danger of thrown objects while using cutting-type equipment.

## **PINCH POINTS**

Pinch points are formed when two rotating objects move together and at least one of them moves in a circle. For example, the point at which a belt runs onto a pulley is a pinch point.

Belt drives, chain drives and gear drives are other sources of pinch points in power transmission devices. Feed rolls, gathering chains and similar equipment to draw crops into the machine also create pinch points.

Fingers, hands and feet can be caught directly in pinch points, or they may be drawn into the pinch points by loose clothing that becomes entangled. Contact may be made by just brushing against unshielded parts or by falling against them.

You can become entangled in pinch points if you take chances and reach over or work near rotating parts. Machines move too fast to get out of a pinch point once you become caught in it.

To avoid injury from pinch points, be aware of the areas where pinch points occur and avoid them. Wear clothing that fits well and is not loose or floppy. Never reach over or work near rotating parts. Turn off machinery to work on it. Always replace shields if you must remove them for maintenance.

## **WRAP POINTS**

Rotating shafts are the most common source of wrap point accidents, although any exposed machine part that rotates can be a wrap point. A cuff, sleeve, pant leg or just a thread can catch on a rotating part and result in serious injury. Entanglement with a wrap point can pull you into the machine, or clothing may become so tightly wrapped that you are crushed or suffocated. In other cases, you could be thrown off balance and fall into other machine parts.

Even a perfectly round shaft can be a hazard if there is enough pressure to hold clothing against the shaft. Shafts that are not round increase the hazard significantly. Clothing is more likely to catch if there is a little mud or dried manure, or a nick on the shaft. Ends of shafts that protrude beyond bearings are also dangerous. Universal joints, keys and fastening devices can also snag clothing.

Check all equipment for potential wrap points, and shield those that can be shielded. Place warnings on those that cannot be covered, or paint them a bright color, perhaps with wide stripes. Be aware of wrap points and be alert to their danger.

## **CRUSH POINTS**

Crush points are created when two objects move toward each other or one object moves toward a stationary one. For example, hitching tractors to implements may create a potential crush point.

Failure to block up equipment safely can result in a fatal crushing injury. A jack may slip, a hose or overhead support may break, or the equipment may roll. Be sure to take extra precautions when working with machinery that is raised for any reason.

Crushing injuries most commonly occur to fingers that are crushed at the hitching point. Wait until the tractor has stopped before stepping into the hitching position.

If possible arrange the hitch point so that the tractor can be backed into position without anyone between. Always know what the other person is doing.

The head or chest of an operator may be crushed between the equipment and a low beam or other part of a building. Usually, these accidents occur when operating the machine in reverse. Tree limbs are also potential hazards when working with tractors and other machinery.

To prevent being crushed or pinned, first, recognize the potentially dangerous situations, then, avoid them whenever possible.

Block all machinery securely if you must work under it. If an implement can roll freely, block its wheels so it cannot roll.

### **FREE-WHEELING PARTS**

Many machine parts continue to spin after the power is shut off. Examples of this are cutter heads of forage harvesters, hammer mills of feed grinders, rotary mower blades, fans, flywheels, etc.

Never touch these parts until they have stopped moving completely. This may take as long as several minutes.

### **SPRINGS**

Springs are commonly used to help lift equipment such as shock absorbers, and to keep belts tight and may harbour potentially dangerous stored energy. Springs under compression will expand with great force when released, and springs that are stretched will contract rapidly when released.

Know what direction a spring will move and how it might affect other machine parts when released, and stay out of its path.

### **HYDRAULIC SYSTEMS**

Hydraulic systems store considerable energy. They lift implements, such as plows, change the position of implement components, such as a combine header or bulldozer blade, operate hydraulic motors and assist in steering and braking.

Careless servicing, adjustment or replacement of parts can result in serious injury. High-pressure blasts of hydraulic oil can injure eyes or other body parts by burning or penetrating the tissue due to the liquid being hot. Leaks are a serious hazard.

Never inspect hydraulic hoses with your hands because a fine jet of hydraulic fluid can pierce the skin. Jet streams from even pinhole leaks can penetrate flesh. Get medical attention quickly, or you could lose that part of the body that was injected.

Use a piece of cardboard to test the hose for leaks. Before attempting any service on hydraulic systems, shut off the engine, which powers the hydraulic pump.

Lower the implement to the ground and relieve the pressure. Follow the instructions in your operator's manual, because the specific procedures for servicing the systems are very important to your safety.

### **PULL-IN POINTS**

Pull-in points usually occur when someone tries to remove plant material or other obstacles that have become stuck in feed rolls or other machinery parts. Always shut off the power before attempting to clear plugged equipment.

The information and recommendations contained in this publication are believed to be reliable and representative of contemporary expert opinion on the subject material. The Farm Safety Association Inc. does not guarantee absolute accuracy or sufficiency of subject material, nor can it accept responsibility for health and safety recommendations that may have been omitted due to particular and exceptional conditions and circumstances.

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101-75 Farquhar Street, Guelph, Ontario N1H 3N4  
(519) 823-5600

**FINANCIAL RESPONSIBILITY/OWNERSHIP FORM  
SEDIMENTATION POLLUTION CONTROL ACT**

No person may initiate any land-disturbing activity on one or more acres as covered by the Act before this form and an acceptable erosion and sedimentation control plan have been completed and approved by the Land Quality Section, N.C. Department of Environment and Natural Resources. (Please type or print and, if the question is not applicable or the e-mail and/or fax information unavailable, place N/A in the blank.)

**Part A.**

1. Project Name Craven AG Services, LLC Composting Facility
2. Location of land-disturbing activity: County Craven City or Township Vanceboro  
Highway/Street River Road Latitude 35° 15' 07" Longitude 77° 11' 2.08"
3. Approximate date land-disturbing activity will commence: 7/11
4. Purpose of development (residential, commercial, industrial, institutional, etc.): commercial
5. Total acreage disturbed or uncovered (including off-site borrow and waste areas): 4.41
6. Amount of fee enclosed: \$ 325.00. The application fee of \$65.00 per acre (rounded up to the next acre) is assessed without a ceiling amount (Example: a 9-acre application fee is \$585).
7. Has an erosion and sediment control plan been filed? Yes \_\_\_\_\_ No \_\_\_\_\_ Enclosed X
8. Person to contact should erosion and sediment control issues arise during land-disturbing activity:  
Name Gary S. MacConnell, PE E-mail Address gsmmacassoc@bellsouth.net  
Telephone (919) 467-1239 Cell # (919) 523-2248 Fax # (919) 319-6510
9. Landowner(s) of Record (attach accompanied page to list additional owners):  

<u>John W. Dunham</u> Name	<u>(252) 633-5334</u> Telephone	<u>(252) 633-6005</u> Fax Number
<u>2115 W. Highway 55</u> Current Mailing Address	<u>(see mailing address)</u> Current Street Address	
<u>New Bern</u> <u>NC</u> <u>28562</u> City                                      State                                      Zip	<u>(see mailing address)</u> City                                      State                                      Zip	
10. Deed Book No. 2199 Page No. 808 Provide a copy of the most current deed.

**Part B.**

1. Person(s) or firm(s) who are financially responsible for the land-disturbing activity (Provide a comprehensive list of all responsible parties on an attached sheet):  

<u>Craven Ag Services, LLC</u> Name	<u>cas71@suddenlink.net</u> E-mail Address
<u>2115 W. Highway 55</u> Current Mailing Address	<u>(see mailing address)</u> Current Street Address
<u>New Bern</u> <u>NC</u> <u>28562</u> City                                      State                                      Zip	<u>(see mailing address)</u> City                                      State                                      Zip
Telephone <u>(252) 633-5334</u>	Fax Number <u>(252) 633-6005</u>



# **Craven Ag Services, LLC**

## **PROJECT DESCRIPTION**

Craven Ag Services, LLC owns an 89.34 acre tract of land in Craven County, North Carolina that is currently undeveloped. The property is located south west of Vanceboro, North Carolina on River Road. A 4.5 acre portion of this land will be used as the site for the Craven Ag Compost Facility. The purpose of this project is to develop a site plan for the grading of the composting area and to implement the necessary sedimentation and erosion control measures during construction. All excavated soil material will be used on-site as fill dirt for grading and sedimentation and erosion control structures. Approximately 4.5 acres of land will be disturbed over the course of the excavation, and this practice will be managed with the installation of erosion control structures such as diversion berms and straw wattles.

## **SITE DESCRIPTION**

The site is located in the coastal plain region of North Carolina where the topography is generally flat with minimum changes in slope. The elevation at the site ranges between approximately  $\pm$  12 to 16 feet above sea level with average slopes between 0 – 6%. The soil make-up at the site is predominately Tarboro sand and Seabrook loamy sand which are classified as well and moderately drained soils. Approximately 4.5 acres of land will be disturbed during construction.

## **SITE DRAINAGE**

The site is relatively flat and drainage occurs in the form of a sheet flow during heavy rainfall events. This sheet flow runoff will be directed away from the south eastern corner of the site with the use of diversion berms.

## **ADJACENT PROPERTY**

The adjacent property to the site is rural land with low density residential development.

## **SOILS**

The most dominant soil classes at the site are Tarboro sand and Seabrook loamy sand. Tarboro sand is a well drained soil with slopes between 0 to 6 %. Seabrook loamy sand is a moderately well drained soil containing slopes between 0 to 2%. The permeability rate taken from NRCS web soil survey of the most limiting layers of Tarboro sand and Seabrook loamy sand is between 5.95 and 19.98 inches per hour.

## **EROSION CONTROL MEASURES**

Erosion will be controlled through the construction and installation of certain erosion control structures and practices. The use of a temporary construction entrance, diversion berms, and straw wattles will aid in reducing the amount of erosion and sediment loss experienced at the site during rainfall events.

## **Craven Ag Services, LLC**

A temporary construction entrance will be installed at the dirt road entrance to the site off River Road as shown in the plans. Diversion berms will be installed near the edge of the compost pad to divert any sheet flow runoff away from the compost pad. Stormwater outlets for the diversion berms will be spaced at approximately 100 feet along the length of each berm. Straw waddles will be installed at each outlet point along the diversion berms to trap any sediment that is transported by the runoff water.

### **TEMPORARY AND PERMANENT SEEDING**

Permanent seeding is required for all areas disturbed by construction except for any areas covered by structures, pavements, roadways etc. Temporary seeding is required for those areas disturbed by construction and left exposed for 15 days or more before being brought to final grade and permanently seeded.

Temporary and permanent seeding will be accomplished according to the schedule shown on plan sheet D-101. Seeding rates and soil amendments are also described.

### **CONSTRUCTION SEQUENCE**

The contractor must comply with the requirement herein:

- 1) Install erosion control measures as required, such as the construction entrance, diversion berms, and straw waddles.
- 2) Clear and grub any wooded areas to be developed. Stockpile topsoil and suitable fill material in areas designated as stockpiles.
- 3) Begin excavation and grading activities after all required erosion controls measures have been installed and constructed. Salvage any topsoil that may be used after construction.
- 4) Seed temporary areas that have been left dormant for longer than 15 days.
- 5) All erosion and sedimentation control measures shall be inspected weekly and after each heavy runoff producing rainfall. Needed repairs shall be made immediately.
- 6) After construction remove all temporary structures and ensure all seeding is completed for areas disturbed.



And the Grantors covenant with the Grantees, that Grantors are seized of the premises in fee simple, have the right to convey the same in fee simple, that title is marketable and free and clear of all encumbrances, except all encumbrances or restrictions mentioned above, and that Grantors will warrant and defend the title against the lawful claims of all persons whatsoever.

The designation Grantor and Grantee as used herein shall include all parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine or neuter as required by context.

IN WITNESS WHEREOF, the Grantors have hereunto set their hands and adopted as their seals the typewritten word "SEAL" appearing after their signatures hereinbelow this the day and year first above written.

Susan R. King (SEAL)  
SUSAN R. KING

Jamie H. King, Jr. (SEAL)  
JAMIE H. KING, JR.

NORTH CAROLINA  
CRAVEN COUNTY

I, Yvonne E Shockney, a Notary Public of the County and State aforesaid, certify that SUSAN R. KING and husband, JAMIE H. KING, JR., personally appeared before me this day and acknowledged the due execution of the foregoing document.

WITNESS my hand and notarial seal, this the 22<sup>nd</sup> day of July, 2004.



Yvonne E Shockney  
Notary Public

My Commission Expires:  
4-30-2005

Luanne Sandlin (SEAL)  
LUANNE R. SANDLIN

James D. Sandlin, III (SEAL)  
JAMES D. SANDLIN, III

NORTH CAROLINA

JOHNSTON COUNTY

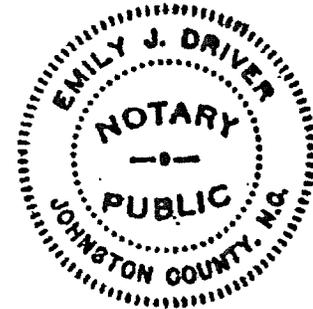
I, EMILY J. DRIVER, a Notary Public of the County and State aforesaid, certify that LUANNE R. SANDLIN and husband, JAMES D. SANDLIN, III, personally appeared before me this day and acknowledged the due execution of the foregoing document.

WITNESS my hand and notarial seal, this the 18 day of June, 2004.

Emily J. Driver  
Notary Public

My Commission Expires:

10-16-2007



*[Signature]*  
Date 6/23/2004 Time 11:36:00 4 of 5 Pgs  
2004-00103235 (SEAL)  
DOUGLAS McRAY ROBINSON 2199 Page 811

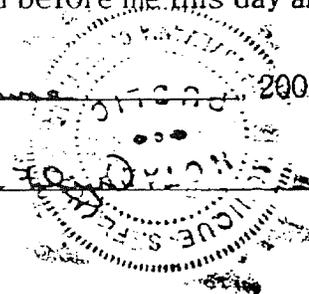
NORTH CAROLINA

Craven COUNTY

I, Monique S. Flynn, a Notary Public of the County and State aforesaid, certify that DOUGLAS McRAY ROBINSON, II (separated), personally appeared before me this day and acknowledged the due execution of the foregoing document.

WITNESS my hand and notarial seal, this the 17<sup>th</sup> day of June, 2004.

Monique S. Flynn  
Notary Public



My Commission Expires:

02/28/09

NORTH CAROLINA

CRAVEN COUNTY

The foregoing certificates of Monique S. Flynn are certified to be correct. This instrument was presented for registration this day and hour, and duly recorded in the Office of the Register of Deeds of Craven County, North Carolina, in Book 2199, at Page 808.

This the 23<sup>rd</sup> day of June, 2004, at 11:36 o'clock A.m.

Becky Thompson  
REGISTER OF DEEDS

By: Anna Strange  
DEPUTY REGISTER OF DEEDS

Date 06/23/2004 Time 11:36:00 5 of 5 Pgs  
No: 2004-00103231

Book 2199 Page 812

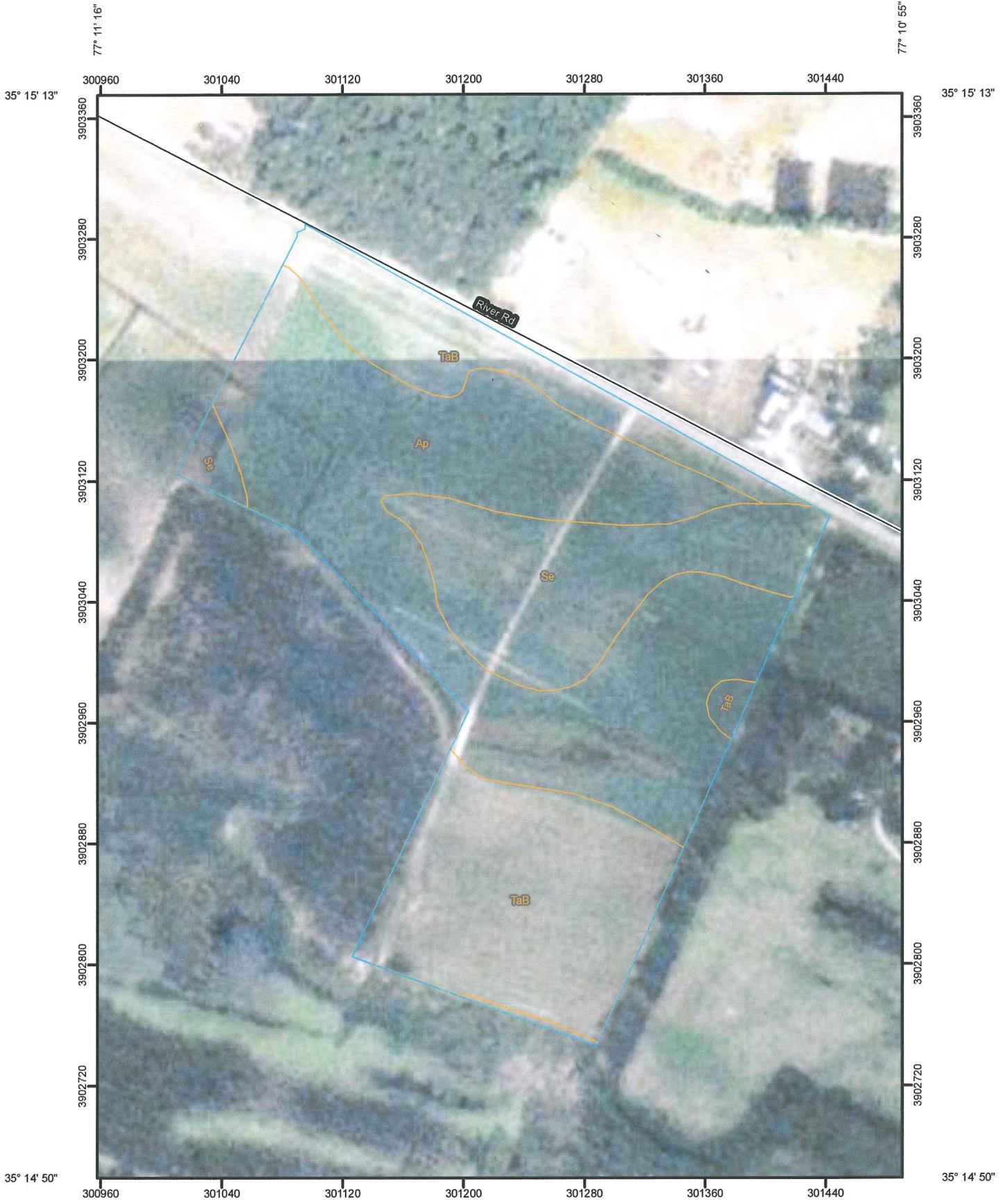
All that certain lot or parcel of land lying and being situate in Number One Township, Craven County, North Carolina, and being more particularly described as follows:

Being all of Tract 1, as the same is shown and delineated on Map entitled "Survey for John W. Dunham and wife, Jene H. Dunham", prepared by H.C. Harris, Jr., Engineering & Surveying, P.A., dated June 14, 2004, and recorded in Plat Cabinet G, Slide 194G, Craven County Registry, reference to said Map being hereby made for a more perfect description of said property.

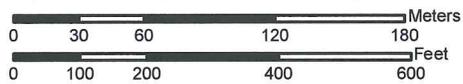
Said property is hereby conveyed subject to the rights of the parties to that certain Timber Deed recorded in Book 2049, Page 1, Craven County Registry.

Said property is conveyed together with all governmental agricultural allotments, quotas, production incentives and buyouts including but not limited to those related to corn, wheat, cotton, tobacco, and soybeans.

Soil Map—Craven County, North Carolina



Map Scale: 1:3,420 if printed on A size (8.5" x 11") sheet.

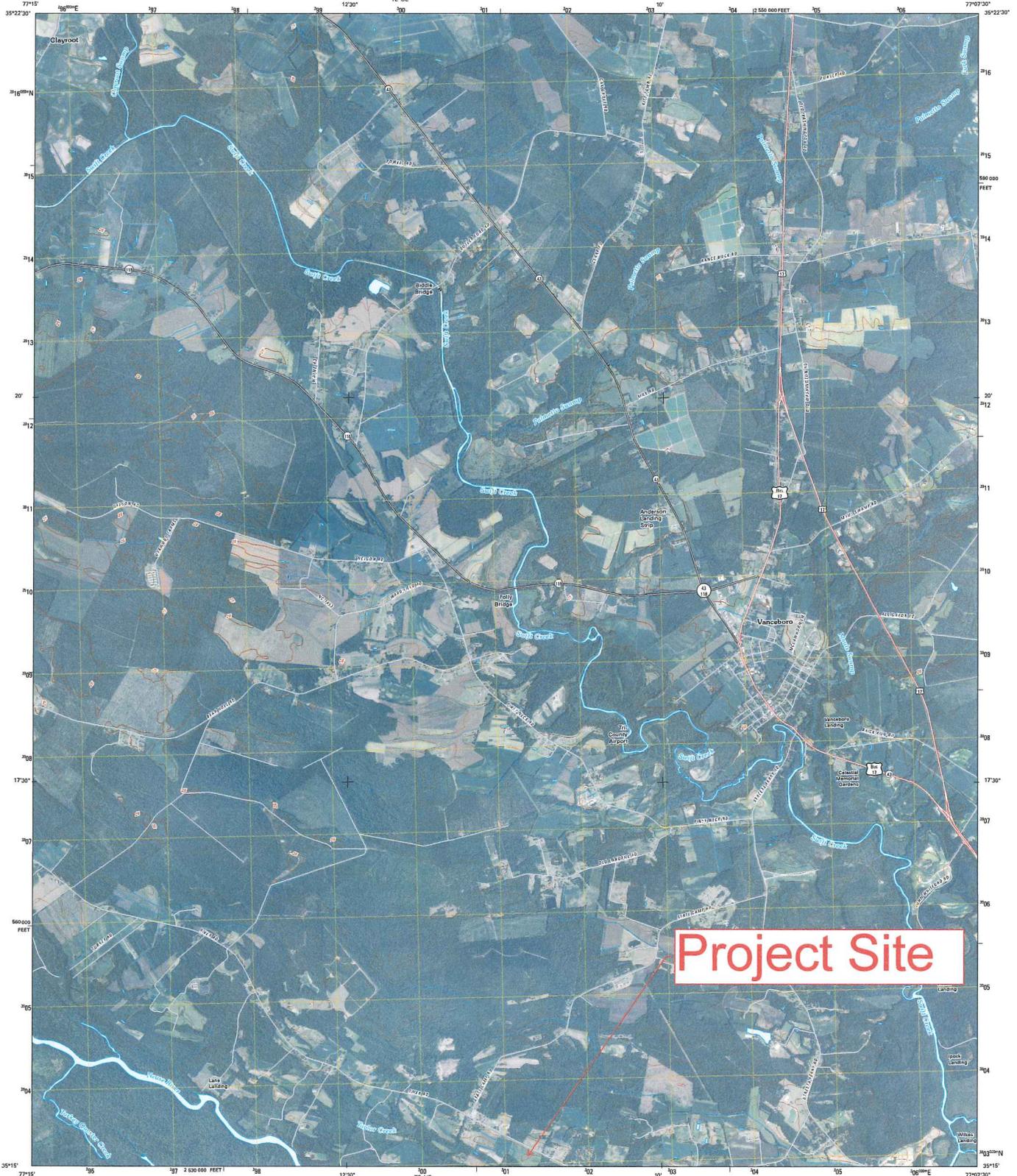




U.S. DEPARTMENT OF THE INTERIOR  
U. S. GEOLOGICAL SURVEY

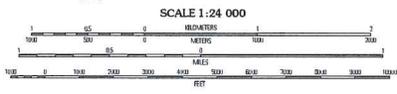
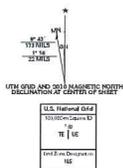


VANCEBORO QUADRANGLE  
NORTH CAROLINA  
7.5-MINUTE SERIES



**Project Site**

Produced by the United States Geological Survey  
North American Datum of 1983 (NAD83)  
World Geodetic System of 1984 (WGS84). Projection and  
1:500-meter grid: Universal Transverse Mercator, Zone 18S  
10 000-foot ticks North Carolina Coordinate System of 1993



QUADRANGLE ALC INDEX

Dalhousie	Wilder	Hickory
Pine Bluffs	Uniontown	Emul
Chocoma	Jasper	Adrian



CONTOUR INTERVAL 5 FEET  
NORTH AMERICAN VERTICAL DATUM OF 1985  
This map was produced to conform with version 0.5.10 of the  
draft USGS Standards for 7.5-Minute Quadrangle Maps.  
A metadata file associated with this product is draft version 0.5.11.

VANCEBORO, NC  
2010

Client: **A.R. Rubin & Associates**  
 Project: **Craven Ag Composting Facility**  
 Project No.: **A45201.00**  
 Subject: **Stormwater - Runoff Calculations**  
 Date: **6/1/2011**

Given: **Calculate runoff**  
**Use Rational Method -  $Q=CiA$**   
**Ref.: NC Erosion and Sediment Control Planning and Design Manual.**

Q = Peak Runoff in CFS  
 C = Runoff Coefficient  
 i = Average Intensity in Inches/Hour  
 Tc = Time of Concentration in Minutes  
 A = Drainage Area in acres

**Given:**

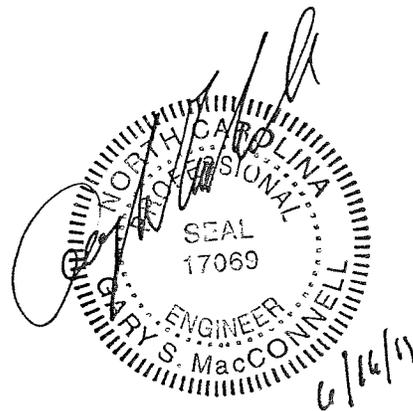
**Runoff Coefficients Used:**

<u>Land Use</u>	<u>C Value</u>	
Graded Area	0.45	Bare Packed Soil (smooth)
Grassed Area	0.15	Pasture (sandy soil)

Tc = 5 Minutes  
 Rainfall Intensity Graph:  
 Storm: 10 Year/24 Hour  
 i = 8.75 Inches/Hour

Total Runoff:

<u>Land Use</u>	<u>Area SF</u>	<u>Area Acres</u>	<u>Runoff CFS</u>
Graded Area:	108,460	2.4899	<b>9.80</b>
Grassed Area:	85,927	1.9726	<b>2.59</b>
<b>Total</b>			<b>12.3931 CFS</b>



## SECTION 02100

### SITE PREPARATION AND EARTHWORK

#### PART 1 - GENERAL

##### 1.01 Description of Work:

A. Work Included: Work under this section consists of the provision of all labor and material to perform all site preparation as indicated herein and/or shown on the Contract Drawings. The work shall include, but is not limited to, the following:

1. Clearing and grubbing.
2. Top soil.
3. Excavation for structures.
4. Dewatering for structures.
5. Use of explosives.
6. Protection of existing utilities.
7. Filling and backfilling.
8. Borrow material.
9. Soil testing.
10. Maintenance and stability.
11. Grading.
12. Disposal of surplus material.
13. Trenching.

B. Site Inspection: The Contractor shall examine the site to determine the extent of removals, grubbing, excavating, rough grading, and related items necessary to complete work shown in the Contract Drawings and/or specified herein. Prior to any

excavation or construction, the Contractor shall locate all existing utilities in the field. All excavation shall be unclassified and the cost shall be included in the bid price.

## **PART 2 - MATERIALS**

This Part is not used.

## **PART 3 - EXECUTION**

### **3.01 Clearing and Grubbing:**

- A. The entire area within the construction limit, unless otherwise noted or where property line permits, shall be cleared and grubbed of all trees, stumps, shrubs, debris, and brush.
- B. Roots, matted roots, stumps, and other vegetable matter shall be removed to 12 inches below existing ground.
- C. In foundation sub-grade areas, the grubbed material shall be removed to 12 inches below the sub-grade.
- D. The cleared and grubbed material shall be removed from the construction site and disposed of by the Contractor at his expense.

### **3.02 Top Soil:**

- A. Materials from excavations and other disturbed areas suitable for top soil shall be removed to an average depth of six (6) inches and deposited in piles separate from other excavated material. Piles of top soil shall be located so that the material can be used readily for the finished surface grading and shall be protected and maintained until needed.
- B. After completion of filling, backfilling, and grading, top soil shall be spread uniformly to a depth of not less than four (4) inches over the entire disturbed area. Top soil shall be compacted lightly in an approved manner. The finished surface shall be in conformity with the lines, grades, and crosssections shown on the Contract Drawings, as well as free from dips, bumps, and irregularities in alignment.
- C. The Contractor shall maintain finished surfaces by preserving, protecting, and replacing top soil as necessary to maintain it in satisfactory condition until work described under "Section 02420 - Fertilizing, Seeding, and Mulching" of the Contract Specifications is begun or the area is otherwise accepted under the Construction Contract.

### 3.03 Excavation for Structures:

- A. The sub-grade at the foundation construction level of the new facilities shall be rolled using a partially-loaded dump truck or similar piece of equipment. Any soft, uncompactible or unacceptable soils encountered in the sub-grade shall be replaced with structural fill placed and compacted to 95 percent of the maximum density, in accordance with American Society for Testing and Materials (ASTM) D 2167.
- B. Excavation carried below the depths indicated, without specific directions, shall be refilled to the proper grade with thoroughly compacted structural fill as described in Paragraph A. An exception is made for footing excavations, where the concrete shall be extended to the bottom of the excavations; however, all additional work of this nature shall be performed at the Contractor's expense.
- C. Excavations for Embankments and Under Pavements, Concrete Footings, and Slabs:  
The entire area of the original ground under embankments, pavements, and concrete footings and slabs shall be excavated to remove all vegetable matter, sod, muck, rubbish, and other unsuitable materials to a minimum depth of 12 inches or to the sub-grade shown on the Contract Drawings.
- D. All excavation shall be made as close to the actual finished lines as possible. Excavation shall be suitably shored, braced, or side-sloped in order to prevent danger to persons or structures, injurious slides or cave-ins, or erosion. Shoring, bracing, and sheeting, except as otherwise noted, shall be removed as the excavations are backfilled in a manner so as to prevent injurious caving.
- E. Excavation shall be kept free of water while construction therein is in progress. The water shall be pumped out of the trench or check dams may be built to keep water out of the ditch in such a manner as not to cause injury to the public health, private property or the work in progress. Erosion control measures shall be taken during this pumping.
- F. Furnish, erect, and maintain the required guards and railing at all exposed boundaries of all excavation.

### 3.04 Dewatering for Structures:

- A. Prior to excavation beneath the ground water table for structures, which have foundations below the water table, a well point system or other means of effective dewatering shall be installed to depress and maintain the water table approximately two (2) feet below the bottom of the lowest excavation level. Dewatering shall be maintained until backfilling above the natural ground water level has proceeded and

until the structural weight of the system is sufficient to prevent "floating out" of the structure.

- B. The Contractor shall have a man experienced in dewatering work on the job during performance of the work, and the dewatering system shall be adequate in every respect. When a well point system is to be used, the system as well as the well point foreman or superintendent shall be approved by the Engineer prior to excavation below the ground water table.
- C. Water from dewatering operations must be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.

### **3.05 Use of Explosives:**

- A. The use of explosives shall not be permitted. In the event that undiggable rock is encountered, the Contractor shall notify the Engineer and submit a proposal to remove the rock. All such work shall be included in the Bid Price.

### **3.06 Protection of Existing Structures:**

- A. The Contractor shall exercise extreme care to avoid damage to existing utilities during the conduct of the new construction. A thorough investigation of the site should be conducted prior to commencing work.
- B. All damage to existing utilities shall be repaired immediately at no additional cost to the Owner.

### **3.07 Filling and Backfilling:**

- A. General: All fill and backfill shall be free from roots, wood scrap material, and other vegetable matter and refuse. Fill and backfill shall be placed in layers not more than eight (8) inches thick, loose except as specified otherwise herein, and each layer shall be compacted thoroughly and evenly.
- B. Structures and Embankments: Backfill shall be placed about structures, as far as practicable, as construction progresses. Compacted backfilling against concrete shall be completed only when directed compaction shall be not less than 95 percent of the maximum density as determined by ASTM D 2167 (Modified Proctor Method).
- C. Concrete Slabs and Pavements: Except where otherwise indicated, fill and/or backfill under pavement and concrete floor slabs shall be compacted to not less than 95 percent of the maximum density at optimum moisture content, as determined by ASTM D 2167 (Modified Proctor Method).

- D. Other Fill: All other fill and backfill, unless otherwise noted, shall be compacted to at least 90 percent of the maximum density at optimum moisture content, as determined by ASTM D 2167 (Modified Proctor Method).
- E. Stone Base: Stone base, or gravel-fill where indicated, shall be crushed granite graded between 1.5-inch to 0.5-inch mesh size. A minimum of three (3) inches of crushed stone shall be provided under all structures. All crushed stone shall be evenly graded to provide a uniform surface.

**3.08 Borrow or Fill Material:**

- A. Borrow or fill shall be used, if needed, at no extra cost to the Owner.

**3.09 Soil Testing:**

- A. Soil shall be tested by a certified testing laboratory, at the direction of the Engineer. Fees for testing shall be paid from the testing allowance. Additional testing required as a result of soil failing to meet the criteria outlined herein shall be paid by the Contractor without compensation from the Owner.

**3.10 Maintenance and Stability:**

- A. The Contractor shall be responsible for the stability and maintenance of all embankments made under the Construction Contract until final acceptance of the entire project. Embankments shall be maintained to the grade and cross-section indicated on the Contract Drawings. Any portions requiring replacement due to displacement and/or damage shall be replaced at the Contractor's expense.

**3.11 Grading:**

- A. The Contractor shall perform all grading in areas so indicated. Fill shall be brought to finished grades indicated on the Contract Drawings and shall be graded so as to drain water away from structures. Areas directly and indirectly affected by the construction work shall be graded to provide proper drainage and surfaces suitable for the use of mowing machines.

**3.12 Disposal of Surplus Material:**

- A. Surplus material not required for completion of the construction work or unsuitable for filling, backfilling, and/or grading shall be disposed of at the Contractor's expense in an approved spoil area and in accordance with local ordinances.

### 3.13 Trenching:

- A. Excavate trenches to true line and grade as shown on the Contract Drawings, except where field adjustments are necessary to avoid other underground utilities. All alignment changes shall be subject to the Engineer's approval.
- B. Accomplish trench excavation by open cut with equipment suitable for this type of service. If backhoes or drag lines are used, the size of bucket must be such that the width of trench excavated is compatible with the diameter of pipe to be installed.
- C. The maximum length of open trench shall be no more than 300 feet and no less than 20 feet without prior approval from the Engineer.
- D. Construct sides of the trench as near to vertical as possible, taking into consideration the type of soil encountered, applicable safety requirements, and the width of area in which the lines are installed. Operations resulting in wide top dimensions sloping directly to the pipe shall not be permitted. Trench width shall be a minimum of six (6) inches plus the outside diameter of pipe and a maximum of two (2) feet plus the outside diameter of pipe. Trench width shall be measured between the faces of the cut at the top elevation of the pipe bell unless special permission of the Engineer is secured.
- E. Trench bottom conformation may be where the trench bottom is excavated slightly above grade and cut down to pipe grade by hand in the fine-grading operation. Where the trench bottom is inadvertently cut below grade, it shall be filled to grade with an approved material and thoroughly tamped. Excavate the bottom of the trench to assure a firm bearing support uniformly throughout the length of the pipe. Excavate a space under and around each bell to relieve it of any load. Blocking under the barrel or bell will not be permitted.
- F. Remove rock or boulders encountered in the bottom of the trench to a depth six (6) inches below the grade of the pipe. Place a suitable tamped foundation of earth material to bring the bottom of the trench to proper sub-grade over rock or boulders.
- G. When unstable conditions are encountered at the invert elevation of the pipe and dewatering or similar measures will not prevent or cure this condition, suitable stabilization material shall be placed in the trench.
- H. When pipe laying is not in progress, plug the open end of the pipe to prevent entry of water, dirt, tools, or other foreign matter into the pipeline. Do not use the pipe as a means of carrying groundwater away from the work area.

**END OF SECTION 02100**

## SECTION 02400

### EROSION CONTROL

#### PART 1 - GENERAL

##### 1.01 Description of Work:

- A. The work shown on the Contract Drawings and specified herein shall constitute the erosion and sedimentation control plan for this project in conformance with the North Carolina Sedimentation Pollution Control Act of 1973. The erosion and sedimentation control plan shown is based on the anticipated construction methods and sequence; however, the Contractor shall act in good faith to comply with the provisions of the North Carolina Sedimentation Pollution Control Act of 1973. The Contractor shall provide, at no additional cost to the Owner, any other measures as may be required to prevent erosion as a result of construction activity at the site.
- B. Temporary erosion control measures shall include, but are not be limited to, sediment traps, check dams, diversion ditches, silt fences, rip rap, grass, mulches, mats, fabric, netting, construction entrances, or any other methods or devices that are necessary to control or restrict erosion. Temporary erosion control measures may include work outside the right-of-way or construction limits, such as borrow pit operations, haul roads, plant sites, equipment storage sites, and disposal of waste or debris. The Contractor shall be liable for all damages to public or private property caused by silting or slides originating in areas used or impacted by the Contractor.
- C. This project disturbs more than one acre, therefore an Erosion and Sedimentation Control Permit is required. However, contractor must comply with all regulations set forth below.

##### 1.02 Contractor's Responsibility:

- A. The Contractor shall be responsible for installing and maintaining erosion control devices as required to function properly.
- B. To insure that the project is in compliance with the regulations, the Contractor shall perform a complete site inspection of the erosion control measures every week and when rainfall occurs on site. Required corrective/maintenance measures shall be noted and implemented within three (3) working days.
- C. Any time delays experienced due to a shutdown by the North Carolina Land Quality Section or due to unanticipated corrective work will not receive any time extensions of the Construction Contract.

### 1.03 Quality Assurance:

#### A. Codes and Standards:

1. All construction activities required by this project shall comply with the North Carolina Sedimentation Pollution Control Act of 1973 and the rules and regulations promulgated pursuant to the provisions of that law.

#### B. The following general specifications also apply to work in this section:

##### 1. North Carolina Department of Transportation (NCDOT):

- a. "Standard Specifications for Roads and Structures." 2006 Edition or latest.

#### C. In the event of conflict between the regulations listed above and the requirements of these Contract Specifications, the more restrictive requirements shall apply.

### 1.04 Submittals:

#### A. Materials and facilities for temporary erosion control measures shall be approved by the Engineer before being used. Any facilities or materials different from those shown on the Contract Drawings or specified herein shall also be submitted to the Engineer for approval.

#### B. Product Data: Submit manufacturer's technical data and material samples for silt fence fabrics, ditch liner, filter cloth, matting for silt fence fabrics, and other manufactured materials as requested.

### 1.05 Construction Schedule:

#### A. Install erosion control measures as required, such as the construction entrance, and check dams or straw wattles.

#### B. Clear and grub the wooded areas to be developed. Stockpile topsoil and suitable fill material in areas designated as stockpiles.

#### C. Begin excavation and grading activities after all required erosion control measures have been installed and constructed. Salvage any topsoil that may be used for construction.

#### D. Seed temporary areas that have been left dormant for longer than 15 days.

#### E. All erosion and sedimentation control measures shall be inspected weekly and after each heavy runoff-producing rainfall. Needed repairs shall be made immediately.

- F. After construction, remove all temporary structures and ensure all seeding is completed for areas disturbed.

## **PART 2 - PRODUCTS**

### **2.01 Permanent Seeding and Mulching:**

- A. Comply with NCDOT Standard Specifications "Section 1660 - Seeding and Mulching."

### **2.02 Temporary Seeding:**

- A. Comply with NCDOT Standard Specifications "Section 1620 - Temporary Seeding."

### **2.03 Matting:**

- A. Comply with NCDOT Standard Specifications "Section 1631 - Ditch Liner and Erosion Control Blankets."

### **2.04 Temporary Mulching:**

- A. Comply with NCDOT Standard Specifications "Section 1615 - Temporary Mulching."

### **2.05 Erosion Control Stone:**

- A. Comply with NCDOT Standard Specifications "Section 1610 - Stone for Erosion Control."

### **2.06 Drainage Stone:**

- A. Drainage stone, washed and uniformly-graded mixture of crushed stone, or crushed or uncrushed gravel conforming to Coarse Aggregate No. 57 or American Society for Testing and Materials (ASTM) C 33 are to be used as specified.

### **2.07 Straw Waddles:**

- A. Waddles shall be 100% curled wood (excelsior) fibers, totally encased in a polyethylene net, and a minimum diameter of 12 inches

## **PART 3 - EXECUTION**

### **3.01 General:**

- A. Construct temporary and permanent erosion control measures as shown on the Contract Drawings or as directed by the Engineer.
- B. Install temporary and permanent erosion control measures in accordance with the Contract Specifications and with the NCDOT "Standard Specifications for Roads and Structures," 2006 Edition or latest.
- C. Permanent or temporary soil stabilization, which includes seeding, mulching, and/or ground cover sufficient to restrain erosion, must be applied to portions of the disturbed area within seven (7) days after final grade is reached anywhere on the site. This includes disturbed areas which are not at final grade, but will remain dormant for longer than 15 days.
- D. Clean any sediment transported onto public roads at the end of each working day.

### **3.02 Temporary Erosion Control Measures:**

- A. Temporary Seeding and Mulching: See "Section 02420 - Fertilizing, Seeding, and Mulching" of these Contract Specifications.

### **3.03 Permanent Erosion Control Measures:**

- A. Grass: See "Section 02420 - Fertilizing, Seeding, and Mulching" of the Contract Specifications.

**END OF SECTION 02400**

## SECTION 02420

### FERTILIZING, SEEDING, & MULCHING

#### PART 1 - GENERAL

##### 1.01 Summary of Work

- A. Permanent Seeding: Permanent seeding is required for all areas disturbed by construction, except for areas covered by structures, pavements, etc.
- B. Temporary Seeding: Temporary seeding is required for those areas disturbed by construction and left exposed for periods of 15 days or more before being brought to final grade and permanently seeded.

##### 1.02 Quality Assurance

- A. The general provisions of the Contract, including the General and Supplementary Conditions (if used) and General Requirements (if any) apply to the work specified in this section.
- B. Codes and Standards: In general, follow procedures and guidelines published by the Soil Conservation Service of the United States Department of Agriculture.
- C. Soil Tests: Secure a minimum of one (1) standard soil sample per acre. Submit samples to the North Carolina Department of Agriculture for analysis and a recommendation for the addition of lime and other amendments. Submit recommendations to Engineer for review.

#### PART 2 - PRODUCTS

##### 2.01 Materials

- A. Fertilizer: Provide 10-10-10 commercial fertilizer conforming to statutory requirements and all rules and regulations adopted by the North Carolina Department of Agriculture.
- B. Limestone: Provide limestone conforming to all statutory requirements and all rules and regulations adopted by the North Carolina Department of Agriculture.

C. Seed: Provide seed conforming to all statutory requirements and all rules and regulations adopted by the North Carolina Department of Agriculture. Provide seed mixtures as tabulated below. Deliver seed to the site in original containers bearing the appropriate guaranteed mixtures. Seed shall show a purity of not less than 90 percent and germination quality of not less than 85 percent.

1. Temporary Mixture:

a. Late Winter and Early Spring: The temporary seed mixture for general areas shall consist of 120 pounds per acre of Rye (grain) and 50 pounds per acre of Annual Lespedeza (Kobe in Piedmont and Coastal Plain, Korean in Mountains).

b. Summer: The temporary seed mixture for general areas shall consist of 40 pounds per acre of German millet. In the Piedmont and Mountains a small-stemmed Sudangrass may be substituted at a rate of 50 pounds per acre.

c. Fall: The temporary seed mixture for general areas shall consist of 120 pounds per acre of Rye (grain).

2. The permanent seed mixture for general areas shall consist of 50 pounds per acre of Pensacola Bahiagrass, 30 pounds per acre of Sericea lespedeza, 10 pounds per acre of Common Bermudagrass, and 10 pounds per acre of German Millet. Bermudagrass may be replaced with 5 pounds per acre of centipedegrass. The best seeding dates for this mixture are April 1<sup>st</sup> through July 15<sup>th</sup>.

3. Other Mixtures: Other mixtures, as approved or recommended by the Soil Conservation Service or the North Carolina Agricultural Extension Office, may be used with Engineer's approval.

D. Mulch: Mulch all seeded areas, except where jute mesh is required. Use undamaged, air-dried, threshed small grain straw free of undesirable weed seed. Anchor straw by tacking with asphalt, netting, or a mulch anchoring tool.

E. Jute Mesh: Use jute mesh on seeded areas where slope is steeper than two (2) horizontal to one (1) vertical (two (2) to one (1) slope). Use woven jute yarn weighing approximately 90 pounds per 100 square yards and having 0.75-inch openings.

## PART 3 - EXECUTION

### 3.01 General

- A. Follow procedures set forth in the publication "Guide for Sediment Control on Construction Sites in North Carolina" by the Soil Conservation Service of the United States Department of Agriculture, and as specified herein.
1. Spread a minimum of four (4) inches of top soil over all disturbed areas to the finished grade as shown on the Contract Drawings.
  2. Remove all grass and weeds and shape the overall area to even out high and low spots.
  3. Scarify soil to a depth of three (3) inches and work into a satisfactory seed bed by discing or through the use of cultipackers, harrows, drags, or other approved means.
  4. The preparation outlined above shall not be done when the soil is frozen, wet, or otherwise in an unfavorable condition.
  5. Begin and complete seeding operations, as outlined below, as soon as possible after final or intermediate grading is completed.
  6. Distribute lime and fertilizer, as required, uniformly over the seed bed. Harrow rake or otherwise work these additions into the seed bed.
  7. Distribute seed uniformly over the established seed bed. Lightly rake the surface of the seed bed in order to cover seed to a maximum depth of 0.25 inch.
  8. Compact the seed bed with an approved roller or drag, after covering the seed.
  9. No lime, fertilizer, or seed shall be applied during a strong wind, when the soil is wet, or when the soil is otherwise unworkable. Should rain follow seeding before rolling is initiated, the seed bed shall not be rolled.
  10. No rip-rap is to be placed along the banks of new fill. Maintain the area and repair any erosion damage until a permanent ground cover is established. Use mulch or mesh as required.

## 3.02 Application

### A. Temporary Seeding:

#### 1. Application of Lime, Fertilizer, Seed, and Mulch:

##### a. For Late Winter and Early Spring:

- i. Apply lime according to the soil tests or at a rate of 2,000 pounds per acre before seeding.
- ii. Apply fertilizer according to the soil tests or at a rate of 750 pounds per acre.
- iii. Seed the seed bed with the specified seed mixture at the specified rate for the recommended planting season.
- iv. Apply grain straw at a rate of 4,000 pounds per acre, or provide equivalent cover of another suitable cover. Mulch shall be suitably anchored. Where jute mesh is required, apply the product according to the manufacturer's recommendations and anchor it with steel hairpin-shaped wire staples.
- v. Refertilize seed bed if growth is not fully adequate, as determined by the Engineer. Re-seed, fertilize, and mulch all damaged, bare, and eroded areas immediately and until a suitable cover is established.

##### b. For Summer:

- i. Apply lime according to the soil tests or at a rate of 2,000 pounds per acre before seeding.
- ii. Apply fertilizer according to the soil tests or at a rate of 750 pounds per acre.
- iii. Seed the seed bed with the specified seed mixture at the specified rate for the recommended planting season.
- iv. Apply grain straw at a rate of 4,000 pounds per acre, or provide equivalent cover of another suitable cover. Mulch shall be suitably anchored. Where jute mesh is required, apply the product according to the manufacturer's recommendations and anchor it with steel hairpin-shaped wire staples.
- v. Refertilize seed bed if growth is not fully adequate, as determined by the Engineer. Re-seed, fertilize, and mulch all damaged, bare, and eroded areas immediately and until a suitable cover is established.

c. For Fall:

- i. Apply lime according to the soil tests or at a rate of 2,000 pounds per acre before seeding.
- ii. Apply fertilizer according to the soil tests or at a rate of 1,000 pounds per acre.
- iii. Seed the seed bed with the specified seed mixture at the specified rate for the recommended planting season.
- iv. Apply grain straw at a rate of 4,000 pounds per acre, or provide equivalent cover of another suitable cover. Mulch shall be suitably anchored. Where jute mesh is required, apply the product according to the manufacturer's recommendations and anchor it with steel hairpin-shaped wire staples.
- v. Refertilize seed bed if growth is not fully adequate, as determined by the Engineer. Re-seed, fertilize, and mulch all damaged, bare, and eroded areas immediately and until a suitable cover is established.

B. Permanent Seeding:

1. Application of Lime, Fertilizer, Seed, and Mulch:

- a. Apply lime according to the soil tests or at a rate of 3,000 pounds per acre before seeding.
- b. Apply fertilizer according to the soil tests or at a rate of 500 pounds per acre.
- c. Seed the seed bed with the specified seed mixture at the specified rate during recommended planting seasons. If grading is completed at times other than the recommended season, provide temporary seeding or other erosion and sedimentation protection approved by the Engineer until the appropriate planting season begins.
- d. Apply grain straw at a rate of 4,000 pounds per acre, or provide equivalent cover of another suitable cover. Mulch shall be suitably anchored. Where jute mesh is required, apply the product according to the manufacturer's recommendations and anchor it with steel hairpin-shaped wire staples.

- e. Refertilize seed bed in the second year, unless growth is fully adequate, as determined by the Engineer. Re-seed, fertilize, and mulch all damaged, bare, and eroded areas immediately and until a suitable permanent cover is established.

**END OF SECTION 02420**