FDEP 2019 NOV 25 PM 2:37

SCOET SOIL & WATER ENGINEERING TECHNOLOGY, INC.

November 6, 2019

Mr. Jeff Martin, P.E.
Industrial Waste Section
Dept. of Environmental Protection, NE District
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7590

RE: Application for a Permit Renewal for Southern Cross Organics and Energy, LLC
Permit # FLA470031

Dear Jeff:

Enclosed are three copies of the permit renewal application packet for Southern Cross Organics and Energy, LLC (SCOE), which includes Forms 1 and 2G and a copy of the revised NMP. This NMP includes a few minor changes at the dairy, such as the dairy adding another quarter section of land and converting their dead animal burial to an approved composting process. As seen in the attached NMP, these changes ensure that a nutrient balance will be maintained for all land application sites.

Please contact me or Dave Temple if you have any questions,

Sincerely,

Del Bottcher, Ph.D., P.E.
FL PE License No. 31056

CC: Dave Temple, Southern Cross Organics and Energy, LLC

Enclosures: Forms 1 and 2G, revised SCOE NMP, and a check for $2500

3448 NW 12th Ave. • Gainesville, FL 32605 • (352) 378-7372 • FAX (352) 378-7472 • www.swet.com

#5204 $2,500.00

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WASTEWATER FACILITY OR ACTIVITY PERMIT
APPLICATION FORM 1
GENERAL INFORMATION

I IDENTIFICATION NUMBER:

Facility ID FLA470031

II CHARACTERISTICS:

INSTRUCTIONS: Complete the questions below to determine whether you need to submit any permit application forms to the Department of Environmental Protection. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the blank in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements. See Section B of the instructions. See also, Section C of the instructions for definitions of the terms used here.

SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED
A. Is this facility a domestic wastewater facility which results in a discharge to surface or ground waters?		X	
B. Does or will this facility (either existing or proposed) include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters?	X		2B
C. Does or will this facility (other than those describe in A. or B.) discharge process wastewater, or non-process wastewater regulated by effluent guidelines or new source performance standards, to surface waters?		X	
D. Does or will this facility (other than those described in A. or B.) discharge process wastewater to ground waters?		X	
E. Does or will this facility discharge non-process wastewater, not regulated by effluent guidelines or new source performance standards, to surface waters?		X	
F. Does or will this facility discharge non-process wastewater to ground waters?		X	
G. Does or will this facility discharge stormwater associated with industrial activity to surface waters?		X	
H. Is this facility a non-discharging/closed loop recycle system?		X	

III NAME OF FACILITY: (40 characters and spaces)

Southern Cross Organics and Energy, LLC

DEP Form 62-620.910(1)
(Effective October 23, 2000)

Facility ID FLA470031

IV FACILITY CONTACT: (A. 30 characters and spaces)

A. Name and Title (Last, first, & title)	B. Phone (area code & no.)
David Temple, Managing Partner	(352) 213-7013

V FACILITY MAILING ADDRESS: (A. 30 characters and spaces; B. 25 characters and spaces)

A. Street or P.O. Box: 20078 137th Road		
B. City or Town: O'Brien	State: FL	Zip Code: 32071

VI FACILITY LOCATION: (A. 30 characters and spaces; B. 24 characters and spaces; C. 3 spaces (if known); D. 25 characters and spaces; E. 2 spaces; F. 9 spaces)

A. Street, Route or Other Specific Identifier: 20078 137th Road		
B. County Name: Suwannee County	C. County Code (if known):	
D. City or Town: O'Brien	E. State: FL	F. Zip Code: 32071

VII SIC CODES: (4-digit, in order of priority)

1. Code #: 211	(Specify) Cattle Feed	2. Code #: 241	(Specify) Dairy
3. Code #:	(Specify)	4. Code #:	(Specify)

VIII OPERATOR INFORMATION: (A. 40 characters and spaces; B. 1 character; C. 1 character (if other, specify); D. 12 characters; E. 3 0 characters and spaces; F. 25 characters and spaces; G. 2 characters; H. 9 characters)

A. Name: Southern Corss Organics and Energy, LLC		B. Is the name in VIII A. the owner? ☒Yes ☐No	
C. Status of Operator: F = Federal; S = State; P = Private; O = Other; M = Public (other than F or S)	(code) P	(specify) LLC	D. Phone No.: (352) 213-7013
E. Street or P. O. Box: 19620 NCR 349			
F. City or Town: O'Brien		G. State: FL	H. Zip Code: 32071

IX INDIAN LAND: Is the facility located on Indian lands? ☐ Yes ☒ No

Facility ID FLA470031

X EXISTING ENVIRONMENTAL PERMITS:

A. NPDES Permit No.	B. UIC Permit No.	C. Other (specify)	D. Other (specify)
FLA470031			

XI MAP: Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. In clude all springs, rivers and other surface water bodies in the map area. S ee instructions for precise requirements. (Attached)

XII NATURE OF BUSINESS (provide a brief description)

A beef cattle and dry dairy cow feeding operation in stacked bed housing barns and a dairy operation with freestall housing barns and a milking center.

XIII CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

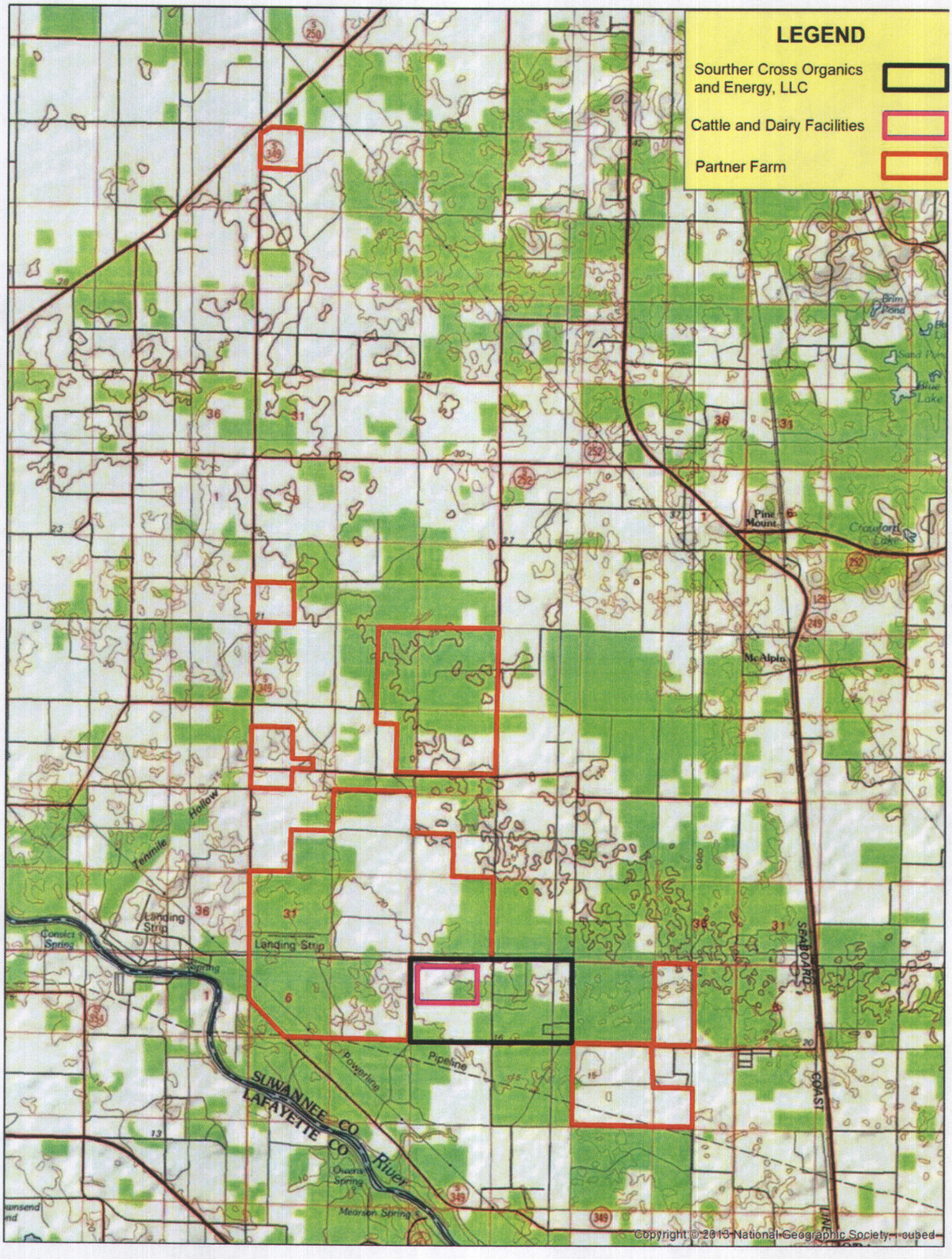
David Temple
A. Name (type or print)

B. Signature

Managing Partner
Official Title (type or print)

11-7-19
C. Date Signed

DEP Form 62-620.910(1)
(Effective October 23, 2000)



MAP XI. Topographical Map of Southern Cross Organics and Energy, LLC and its Partner Farm

FORM 2B

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER
CONCENTRATED ANIMAL FEEDING OPERATIONS AND AQUATIC ANIMAL PRODUCTION FACILITIES

I. GENERAL INFORMATION

Applying for: Individual Permit ☒

A. Type of Business	B. Contact Information	C. Facility Operation Status
☒ 1.Concentrated Animal Feeding Operation (complete items B, C, D, and Section II and IV). ☐ 2.Concentrated Aquatic Animal Production Facility (complete items B, C, and Section III and IV).	Owner/Operator Name: David Temple Telephone: (352) 213-0713 Address: 20078 137th Street Facsimile: City: O'Brien S tate: FL Zip Code: 32071	☒ 1. Existing Facility ☐ 2. Proposed Facility

D. Facility Information

Name: Southern Cross Organics and Energy, LLC Telephone: (352) 213-7013

Address: 20078 137th Street Facsimile:

City: O'Brien State: FL Zip Code: 32071

County: Suwannee Latitude: 30deg 1m 16s Longitude: 83deg 1m 44s

If contract operation: Name of Integrator:

Address of Integrator:

II. CONCENTRATED ANIMAL FEEDING OPERATION CHARACTERISTICS

A. Type and Number of Animals			B. Manure, Litter and/or Wastewater Production and Use.
1. Type	2. Animals		
	No. In Open Confinement	No. Housed Under Roof	
☐ Mature Dairy Cows		2800	a. How much manure, litter and wastewater is generated annually by the facility? 132 million tons/gallons *(circle one)*
☐ Dairy Heifers	1550		b. If land applied how many acres of land under the control of the applicant are available for applying the CAFOs manure, litter, and wastewater? 1800 acres
☐ Veal Calves			
☒ Cattle (not dairy or veal)	700	4521	c. How many tons of manure or litter, or gallons of wastewater produced by the CAFO will be transferred annually to other persons? 12000 tons/gallons *(circle one)*
☐ Swine (55 lbs. or over)			
☐ Swine (under 55 lbs.)			
☐ Horses			

Type	No. In Open Confinement	No. Housed Under Roof
☐ Sheep or Lambs		
☐ Turkeys		
☐ Chickens (Broilers)		
☐ Chickens (Layers)		
☐ Ducks		
☒ Other Specify Calves	825	
3. Total Animals	3050	7321

C. ☒ Topographic Map

D. Type of Containment, Storage, and Capacity

1. Type of Containment	Total Capacity (in gallons)
☒ ~~Lagoon~~ Above Ground Tank	0.47 MGAL
☒ Holding Pond	1.28 MGAL
☐ Evaporation Pond	
☒ Other: Specify Digester	2.5 MGAL

2. Report the total number of acres contributing to drainage: 0.9 acres

3. Type of Storage	Total Number of Days	Total Capacity (tons/gallons)
☐ Anaerobic Lagoon		
☒ Storage ~~Lagoon~~ Holding Pond	4.6	1.28 MGAL
☐ Evaporation Pond		
☒ Aboveground Storage Tanks	2	0.47 MGAL
☐ Below ground Storage Tanks		
☐ Roofed Storage Shed		
☐ Concrete Pad		
☐ Impervious Soil Pad		
☒ Other: Specify Digester	7	2.5 MGAL

E. Nutrient Management Plan

1. Has a nutrient management plan been developed? ☒Yes ☐ No

2. Is a nutrient management plan being implemented for the facility? ☒Yes ☐No

3. If no, when will the nutrient management plan be developed? Date: _____

4. The date of the last review or revision of the nutrient management plan. Date: 11/1/19

5. If not land applying, describe alternative use(s) of manure, litter, and/or wastewater:
Screens solids and composted solids are taken off site for land application by others.

F. Conservation Practices

Please check any of the following conservation practices that are being implemented at the facility to control runoff and protect water quality:

☒Buffers ☐ Setbacks ☐ Conservation tillage ☐ Constructed wetlands ☐ Infiltration field
☐Grass filter ☐ Terrace

III. CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITY CHARACTERISTICS

A. For each outfall, give the maximum daily flow, maximum 30-day flow, and the long-term average flow.

1. Outfall No.	2. Flow *(gallons per day)*		
	a. Maximum Daily	b. Maximum 30 Day	c. Long Term Average

B. Indicate the total number of ponds, raceways, and similar structures in your facility.

1. Ponds:	2. Raceways:	3. Other:

C. Provide the name of the receiving water and the source of water used by your facility.

1. Receiving Water	2. Water Source

D. List the species of fish or aquatic animals held and fed at your facility. For each species, give the total weight produced by your facility per year in pounds of harvestable weight, and also give the maximum weight present at any one time.

1. Cold Water Species			2. Warm Water Species		
a. Species	b. Harvestable Weight		a. Species	b. Harvestable Weight	
	(1) Total Yearly	(2) Maximum		(1) Total Yearly	(2) Maximum

E. Report the total pounds of food during the calendar month of maximum feeding.

1. Month:	2. Pounds of Food:

IV. CERTIFICATION

This is to certify the engineering features of this pollution control project have been designed by me and found to be in conformity with sound engineering principles, applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules of the Department. It is also agreed that the undersigned, if authorized by the owner, will furnish the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signature	Soil and Water Engineering Technology, Inc.
Del Bottcher	Company Name
Name (please type)	Address: 3448 NW 12th Ave
(Affix Seal)	Gainesville, FL 32605
	Florida Registration No.: 31056
	Telephone No: 352-378-7372 Date: 10/1/2019

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

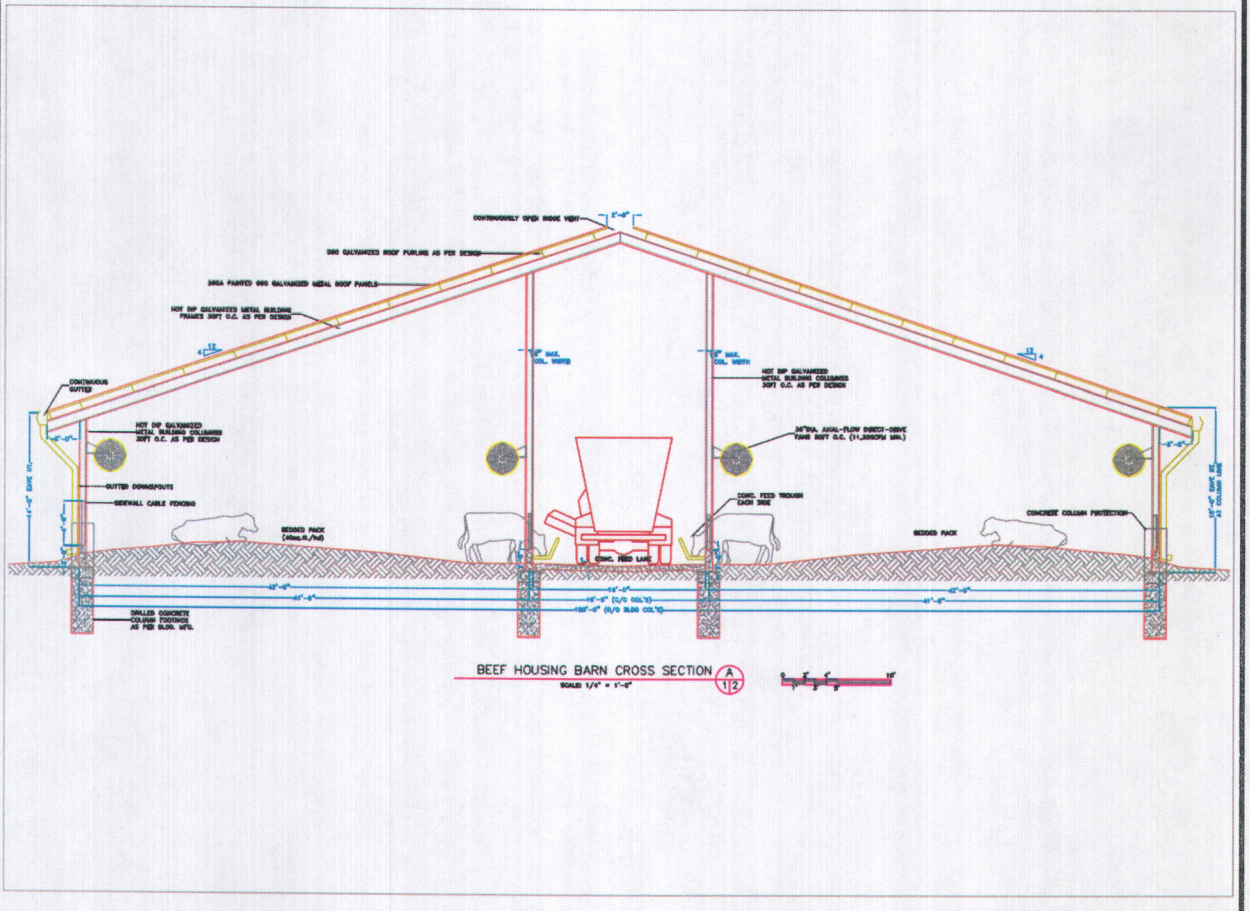
David Temple, Managing Partner	
Name & Officient Title (type or print)	Signature
(352) 213-7013	11-7-19
Telephone No. (area code & No.)	Date Signed:

Comprehensive Nutrient Management Plan

for

Southern Cross Organics & Energy, LLC

20078 137th Road
O'Brien, FL 32071
TELEPHONE NO.: (386) 339-1857



911 Coordinates: 137th RD (Fire Marker 911)
Watershed Code: Lower Suwannee 03110205

(Directions to farm: Started in Live Oak, take SR 51 Southwest 6.2 miles from US 129, turn left on to SR 349, go 11.1 miles, turn left on to 208 St, go 1.4 miles, turn left on to 137th Rd, go north 1.4 and operation is on the right.)

November 1, 2019

Prepared by:

SCWET *Del Bottcher, Ph.D., P.E.*

Soil and Water Engineering Technology, Inc.
3448 NW 12th Avenue
Gainesville, FL
PH: (352) 378-7372

LIST OF TABLES

LIST OF FIGURES

SIGNATURE PAGE

Owner: Southern Cross Organics & Energy, LLC		Telephone #	*(386) 339-1857*
Operator: *David Temple*		Telephone #	*(386) 339-1857*
Owner/Operator Address: *20078 137th Road, O'Brien, Florida 32691*			
Farms(s) # 2959 # 3388	Tract(s) #: *831,1364,1704,3360,3361,4394,4610,4611,4612* *2578,2879*		

Professional Agricultural Engineer Completing the Nutrient Management Plan and Waste Management System Design:

Signature: _____ Date: 11/4/19

Name: *Del Bottcher* Title: *P.E.*

PE License Number: 31056

Owner/Operator

As the owner/operator of this NMP, I certify that I, as the decision-maker, have been involved in the planning process and agree the items/practices listed in each element are needed. I understand that I am responsible for keeping all the necessary records associated with implementation of this NMP. It is my intent to implement/accomplish this NMP in a timely manner as described in this plan.

Signature: _____ Date: _____

Name: *David Temple* Title: *Managing Partner*

EXECUTIVE SUMMARY

The intent of this Nutrient Management Plan (NMP) is to document the actions the management of Southern Cross Organics & Energy, LLC (SCOE) will undertake to reduce the potential for impairment of surface and groundwater resources to ensure compliance with federal and state standards. The management will work with a qualified beef cattle and dairy nutritionist to reduce the nutrients imported onto the farm. Nitrogen and phosphorus levels in the feed will be reduced to the maximum extent possible and practical while maintaining appropriate milk productions and animal growth rates.

SCOE (Figure 1) is expanding its operation to include four additional freebarns (two have been built and two more are proposed), sand separation lane and collection pit for delivering sand free flushwater to the existing methane digester and then through the existing wastewater management system, which includes solids separation before delivery to a large wastewater storage pond before effluent is land applied via seventeen (17) center pivot irrigation systems located on neighboring property. The dairy is designed to handle 2400 lactating cows and 400 dry cows, but until additional freestall barns are built the dairy will be limited to about 1200 lactating cows and 200 dry cows. The existing five stacked-bed animal confinement barns will still house approximately 4,521 beef animals or an equivalent number of dairy dry cows based on manure production. Approximately 700 beef cattle, 1550 heifers, and 825 calves may by grazed on fields owned by the adjacent property owner. No changes are being proposed to the existing five beef stacked-bed confinement barns.

The current cattle feeding operation and new dairy facilities are located in the middle of a large vegetable and forage production farm, which provides the unique opportunity that all manure/bedding materials generated in the barns can be directly used on site as an organic soil amendment/fertilizer. A significant environmental benefit is gained by the fact that a portion of the inorganic fertilizer presently being used on the farmland can be offset by this slow release organic fertilizer material that will be generated by these facilities. The slow release nature of these organic materials has the potential of reducing of net amount of nutrients needed to grow the crops while improving soil tilth. The extent of this benefit is not known, therefore routine tissue testing will be used to assess the crop's nutrient status for fine tuning the amount of supplemental commercial fertilizer needed. Application rates will be below crop uptake levels and will be below levels assumed to impair surface or groundwater resources.

Expanding the animal operations to include dairy cows is being done by the farm for two primary reasons. First, the dairy operation will provide additional income diversity to the farm to stabilize net revenues as volatile commodity markets independently impact their vegetable, cattle, and dairy marketable products. Secondly, the existing methane digester has not performed well using the feedstuff from the cattle barns due to clogging issues and low volatile organic contents. Since, it is known that dairy manure feedstock for digesters performs much better than beef cattle bedding, the conversion of the digester feedstock to dairy manure will maximize its energy production, plus will allow onsite usage of the power that will also increase revenues generated by the digester.

Planning Considerations for NMP

In planning the NMP elements of this conservation plan, consideration was given to each of the potential components that might be included in the NMP. These include:

__X__ Manure and Wastewater Handling and Storage

__X__ Land Treatment

__X__ Nutrient Management

__X__ Record Keeping

This plan includes practices and management for only the NMP elements checked. The farm has adequate acres for the utilization of the manure generated by the dairy cows and beef cattle. The diet of the animals will be balanced by a qualified animal nutritionist and will be adjusted as animal performance, feed ingredients, and economic considerations dictate, while minimizing nitrogen and phosphorus manure nutrient content.

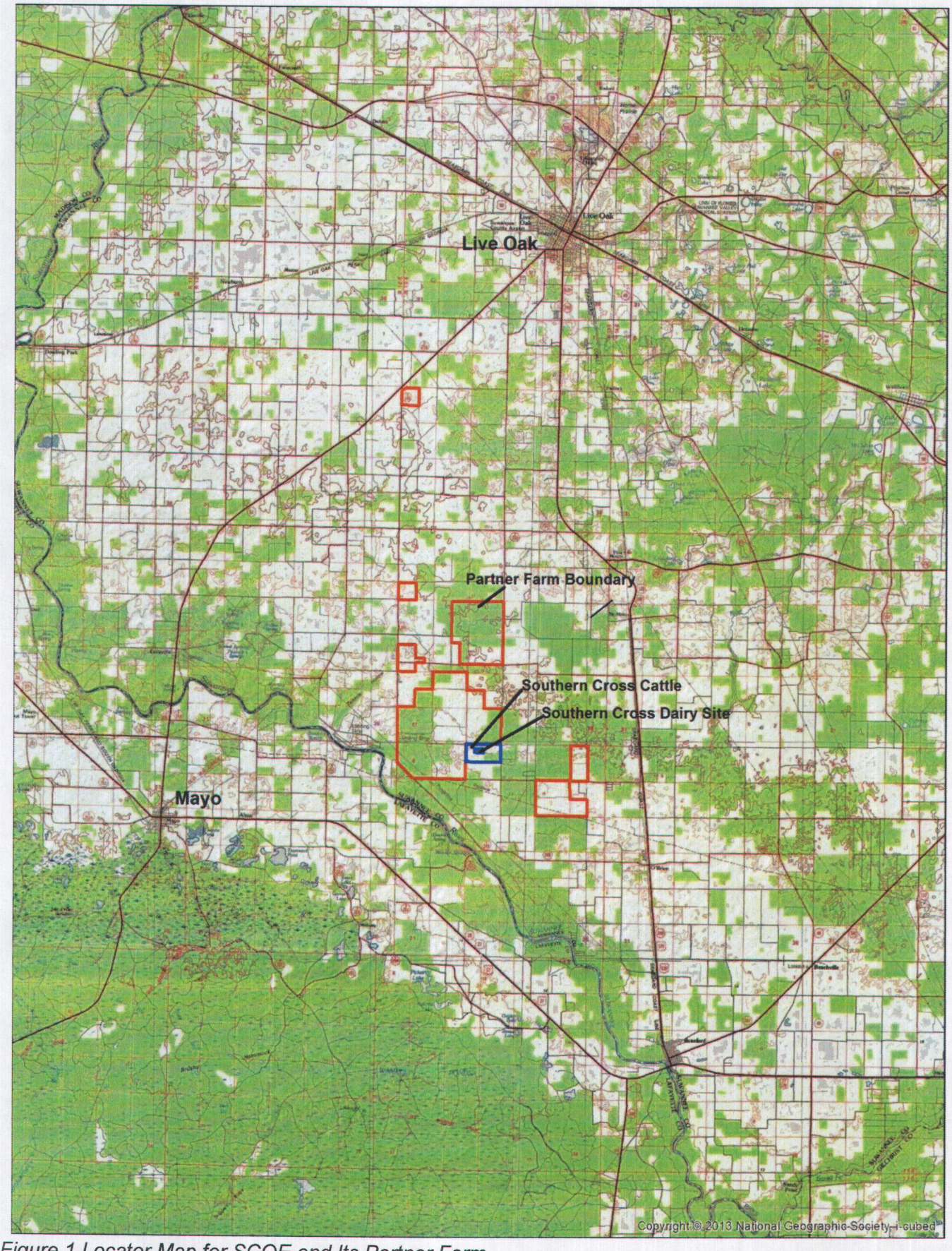


Figure 1 Locator Map for SCOE and Its Partner Farm.

NMP PURPOSE AND CONDITIONS

Purpose of the Nutrient Management Plan (NMP)

Manure and nutrient management consist of controlling the source, rate, form, timing, placement, and utilization of manure, or other organic by-products, bio-solids, and other nutrients in the soil and residues. The goal is to effectively and efficiently use the nutrient resources to adequately condition soils for growing plants that produce food, forage, fiber, and cover while minimizing the transport of nutrients to ground and surface water and environmental degradation. It is used in conjunction with crop rotations, residue management, pest management, conservation buffer practices, and/or other practices needed on a site-specific basis to address natural resource concerns and landowner objectives.

Due to the flat topography, well drained soils, and vegetation, little to no water erosion should occur. With good vegetative cover on the fields and the use of prescribed grazing little to no wind erosion should occur. Duration, intensity, frequency, and season of grazing in or near surface waters will be applied in such a manner as to not cause erosion problems. Therefore, this NMP will focus on addressing water quality concerns.

Nitrogen (N) and phosphorus (P) are the two nutrients most often identified as impairing the quality of ground and surface water. N leaching out of the root zone can be transported to surface water or leach to ground water. N above 10 ppm in drinking water is a health risk. P leachate or runoff entering the surface water contributes to excessive algal growth causing low oxygen levels in surface water that impairs aquatic life and contributes to bad tasting water. This manure and nutrient management plan minimizes the transport of N and P to surface and groundwater.

Conditions

Florida Statute 403 and Title 62 of the Florida Administrative Code and the rules and regulations promulgated thereunder cover the protection of surface and groundwater. This NMP provides the basic information on how animal wastes produced on this operation will be managed and utilized. Following this NMP will keep the operation in compliance with the State of Florida Rules and Regulations.

Note: If the number of livestock changes, fields change, crop rotations changes, the method of storage changes, or if the method of application needs to change, the landowner/operator will need to contact the NRCS or an appropriate certified specialist to revise the NMP.

Utilization of Excess Manure

If wastes will be utilized on lands not controlled by the landowner, an agreement shall be signed by the individual, broker, or group accepting the waste stating:

> *The animal waste will be applied to land to meet the minimum NRCS Field Office Technical Guide conservation practice standards Waste Utilization, Code 633 and Nutrient Management, Code 590; or have a NMP developed on their land by NRCS or certified specialist.*

Quantities of manure transported off-site shall be recorded, including the name of recipient, address, date, nutrient content, and amount transported.

Goals

The landowner's goals for this operation are as follows:

1. Maintain and improve the economic return from the cattle feeding and dairy operations.

2. Maintain good herd health and cattle growth (i.e., avoid lameness, reduce stress and disease).
3. Apply manure to obtain maximum nutrient benefit while minimizing runoff and leaching of the nutrients.
4. Produce 600kw of renewable energy via an existing methane digester.
5. Operate the farm in a socially and environmentally acceptable manner.

SECTION 1: SITE INFORMATION

Description of Cattle and Dairy Facilities

Southern Cross Organics & Energy, LLC (SCOE) includes a confined cattle feeding operation and a dairy operation that has partnered with a neighboring vegetable and field crop farm to make efficient use of the manure solids and effluent and to allow for seasonal beef cattle grazing under the existing irrigation system (various center pivots) during different parts of the year. The facility is owned by SCOE and is managed by Mr. David Temple. Locating these dairy and cattle feeding operations in the middle of a large vegetable and forage production farm provides the unique opportunity that all manure/bedding materials and wastewater generated in the barns can be directly used on site as an organic amendment/fertilizer. A significant environmental benefit is gained by the fact that a portion of the inorganic fertilizer presently being used on the farmland can be offset by these slow release organic fertilizer materials that will be generated by this facility. The slow release nature of these organic materials allows for a net reduction of nutrients needed to grow the crops while improving soil tilth.

Landowner Goals

The landowner has expanded the existing confined animal management system to handle 1200 mature dairy cows in two new freestall barns. SCOE plans to continue to house 4,521 head of beef cattle or the equivalent number of dry cows based on manure production in the existing five stacked-bed confinement barns. Beef cows will have an average weight of 863 lbs and manure nitrogen (N) deposition rate of 94 lbs-N/year while a dry cow will have an average weight of 1250 lbs and manure N deposition rate of 180 lbs-N/year, which means one dry cow will have an equivalent manure production of 1.92 beef cows. Landowner goals include expanding facilities to handle the 2800 mature cows (2400 lactating and 400 dry cows) and maintaining the existing facilities for the beef feeding operation. To expand to 2800 mature cows two additional freestall barns will need to be constructed. The new dairy facilities are in addition to the existing facilities, such as conditioning pastures for new beef cattle stock, beef cattle confinement barns, feed production and processing facilities, methane digester, and effluent irrigation for recycling nutrients back to the crops. To accomplish the landowner goals, two new freestall barns have been constructed and two more are proposed, a new milk center/parlor has been constructed, a new sand lane and collection pit has been constructed, and expanded feed storage facilities for the dairy feed have been constructed.

Southern Cross Organics & Energy, LLC has two center pivots under their control while their partnering neighbor's farm has an addition 50 freshwater center pivot irrigation systems of which 16 are connected to the cattle and dairy waste management system to utilize the nutrients in the manure produces, see Figure 8 below. The wastewater effluent will be pumped to sprayfields where vegetables and forage crops are grown, crops such as peanuts, snap beans, carrots, sweet corn, field corn, potatoes, oats, cotton, sorghum, and bermuda and rye grasses. Conditioning pastures for young beef stock will be rotated through various non-sprayfield pivots. The very limited grazing for conditioning young will be done on bermudagrass, ryegrass, millet, or other residual crops. Solids from the existing stacked-bed confinement barns and any settled and screens solids will be either directly applied at agronomic rates on non-sprayfield pivots or hauled off site or will be composted first onsite before being applied at agronomic rates on non-sprayfield pivots or hauled off site. Composted solids are more desirable to the neighboring vegetable farmer because crops respond better to composted solids than raw solids.

Irrigation and Water Supply System

The irrigation system consists of 52 (Fields 1 through 58, less 44-49) individual center pivots. The size of the center pivot fields varies from 33 acres to 210 acres, see Figure 2. The majority of the center pivots are approximately 135 acres in size. All of the center pivots have their own wells except Fields 41, 42, 29, 30, 31, and 32. There is one well at Field 41 and 42 that runs both center pivots and there is one well at Field 29 that supplies 4 center pivots (Fields 29, 30, 31, and 32). Pivots 1 and 43 are under the control of Southern Cross Dairy while the remaining pivots are under the control of the partnering neighbor. Pivots 1-5, 8, 9, 13-20, and 34-35 are connected to receive wastewater via a 6" diameter PVC pipeline.

Site Layout and Fields Description

Table 1 summaries the use of the fields on the farm, which includes typical crops grown (will vary year to year), animal distribution, acreage, and those receive wastewater effluent. Note that Field IDs shown in Table 1 represents a typical year distribution, so the Field IDs shown for the "Fields with Grazing" and "Crop Land" will vary between these two categories from year to year. Figure 3 shows the conservation plan map with proposed NRCS land uses. Figure 4 shows the proposed facility layout for the dairy operation where changes will occur at SCOE. The remaining portion of SCOE (cattle feeding operation, sprayfields, and natural areas) will be unaltered.

Inventory Resources

The SCOE site encompasses approximately 320 acres. The land is located northeast of Mayo and south of Live Oak in the southern portion of Suwannee County near latitude 30.04 and longitude -82.94 as shown on Figure 1. The SCOE Confined Livestock Area is located in Township, Range, Section: 5S, 13E, 4. The area is extremely rural with very few houses in the vicinity. Figure 2 shows Suwannee Farm with an aerial background.

The natural topography of the site has moderate changes in elevation from 40 to 85 NGVD as shown in a later section. The nearest surface water is the Suwannee River located approximately 2.2 miles to the southwest of cattle and dairy facilities. There are no direct surface water discharge features, such as ditches or streams, located on the SCOE site because of the very well drained soils.

As detailed in a later section, the major soil type on the farm is a Blanton-Alpin-Bonneau fine sand complex. Most of the other soils are very similar in their characteristics to the Blanton-Alpin-Bonneau fine sand complex, which has a hydrologic soil group of "A", i.e. very high infiltration rates with water tables deeper than 15 feet. Surface runoff from these areas is very low.

Utility Inventory

The site does not contain any major utilities that would affect placement of any of the NMP components. Overhead power lines currently enter the farms property from CR349 in multiple places (see Utility Map in Appendix F). These power lines from CR349 serve all fields as needed except Fields 22 through 28. Overhead power lines that serve Fields 22 through 28 enter the Suwannee Farms property from Brannon Road. Underground power lines are also present on the property (see Utility Map in Appendix F). Small utilities such as telephone lines may be rerouted around any NMP components that need to be installed if there is any interference.

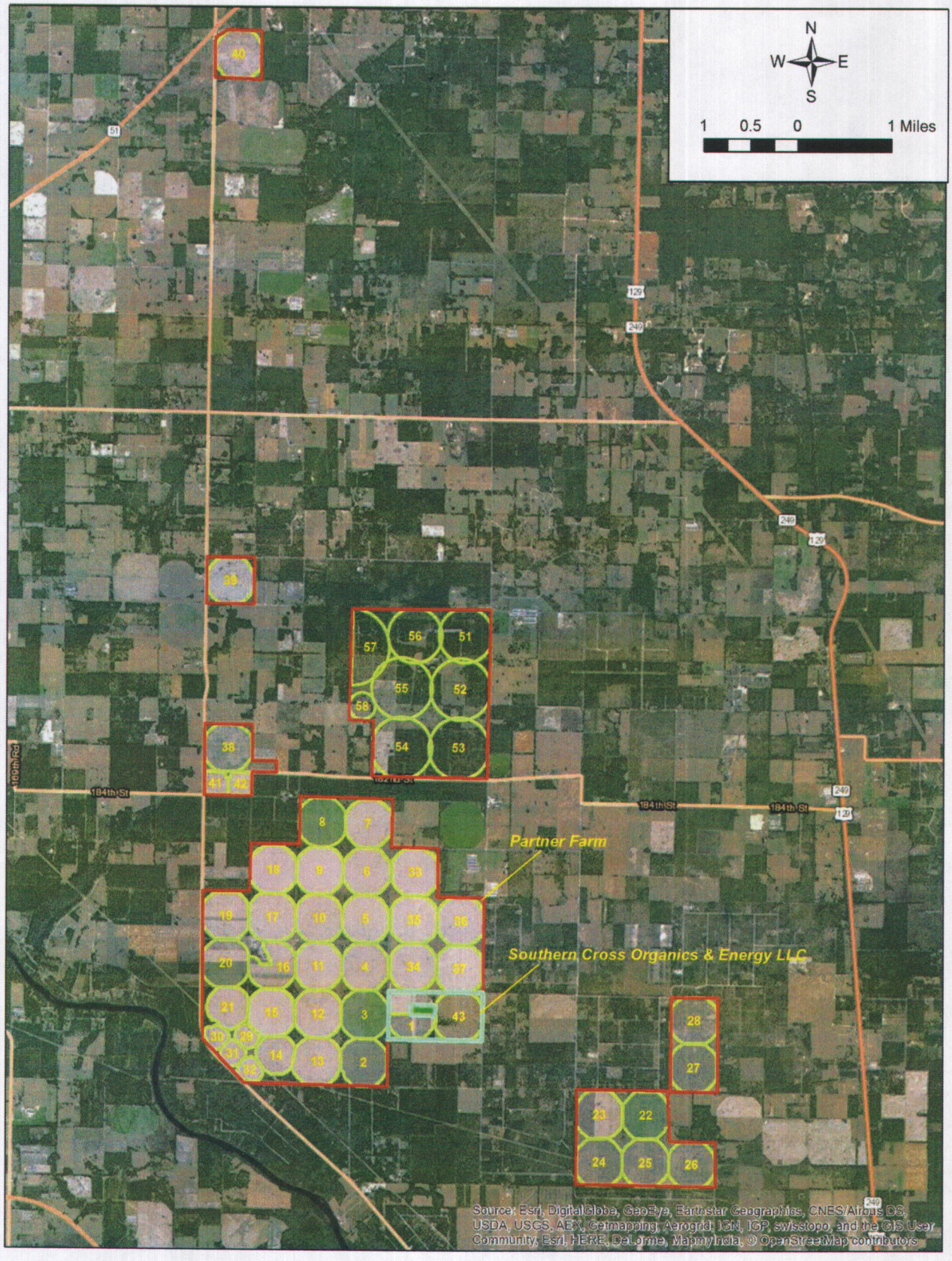


Figure 2. Aerial of SCOE and Its Partner Farm Showing Pivots Layout

TABLE 1. FIELD DESCRIPTIONS AND ANIMAL DISTRIBUTION

Field ID	Primary Land Use	Crop	Feed in Pasture?	Area	Beef Cattle		Dairy Cows			
				(acres)	Per Growout	Annual Average	Lactating	Dry/Springs	Heifers	Calves* (corners)
Areas where Waste is Collected and Treated										
CLA	Confined Beef Cattle (5 Barns)		-	6	5000	4521				
	Confined Dairy Cows (4 barns + parlor)		-	5			2400	400		
Fields with Grazing Animals										
6	Irrigated Cropland	Potatoes,Field corn,	-	134	225	90				25
7	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	-	136	200	70				25
10	Irrigated Cropland	Peanuts,,Oatlage	-	137	225	90				25
22	Irrigated Cropland	Sweet corn,Field corn,Oats-graze	Yes	133					190	25
23	Irrigated Cropland	Peanuts,,Oats-graze	Yes	135					190	25
24	Irrigated Cropland	Snap beans,Field corn,Oats-cut Feb	Yes	134	225	90				25
25	Irrigated Cropland	Snap beans,Field corn,Oats-cut Feb	Yes	135	225	90				25
26	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	Yes	130	225	90				25
31	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	Yes	36	225	90				25
33	Irrigated Cropland	Peanuts,,Oatlage	Yes	136					195	25
36	Irrigated Cropland	Potatoes,Field corn,	Yes	136					195	25
37	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	Yes	138					195	25
38	Irrigated Cropland	Peanuts,,Oats-graze	Yes	136	225	90				25
54	Irrigated Cropland	Vegetables, Forage, Cover	Yes	210					195	25
55	Irrigated Cropland	Vegetables, Forage, Cover	Yes	210					195	25
56	Irrigated Cropland	Vegetables, Forage, Cover	Yes	160					195	25
Cropped Sprayfields (Fields receiving wastewater)										
1	Irrigated Cropland (SCOE owned/controlled)	Field corn,Sorghum,Oats-cut Feb	-	75						25
2	Irrigated Cropland	Peanuts,,Oats-graze	-	135						25
3	Irrigated Cropland	Sweet corn,Field corn,Oats-graze	-	137						25
4	Irrigated Cropland	Peanuts,,Oats-graze	-	134						25
5	Irrigated Cropland	Potatoes,Peanuts,	-	136						25
8	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	-	137						25
9	Irrigated Cropland	Potatoes,Peanuts,	-	137						25
13	Irrigated Cropland	Field corn,Sorghum,Oats-cut Feb	-	137						25
14	Irrigated Cropland	Field corn,Sorghum,Oats-cut Feb	-	88						25
15	Irrigated Cropland	Peanuts,,Oatlage	-	137						25
16	Irrigated Cropland	Peanuts,,Oatlage	-	117						25
17	Irrigated Cropland	Peanuts,,Oatlage	-	141						25
18	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	-	138						25
19	Irrigated Cropland	Peanuts,,Oatlage	-	136						25
20	Irrigated Cropland	Snap beans,Field corn,Oats-cut Feb	-	137						25
34	Irrigated Cropland	Potatoes,Field corn,	-	135						25
35	Irrigated Cropland	Snap beans,Field corn,Oats-cut Feb	-	138						25
Crop Land										
11	Irrigated Cropland	Peanuts,,Oatlage	-	136						
12	Irrigated Cropland	Field corn,Sorghum,Oats-cut Feb	-	138						
21	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	-	103						
27	Irrigated Cropland	Peanuts,,Oatlage	-	137						
28	Irrigated Cropland	Peanuts,,Oatlage	-	136						
29	Irrigated Cropland	Peanuts,,Oatlage	-	33						
30	Irrigated Cropland	Peanuts,,Oatlage	-	33						
32	Irrigated Cropland	Sweet corn,Field corn,Oats-cut Feb	-	35						
39	Irrigated Cropland	Snap beans,Field corn,Oats-cut Feb	-	132						
40	Irrigated Cropland	Peanuts,,Oatlage	-	135						
41	Irrigated Cropland	Field corn,Sorghum,Oats-cut Feb	-	37						
42	Irrigated Cropland	Field corn,Sorghum,Oats-cut Feb	-	37						
43	Irrigated Cropland (SCOE owned/controlled)	Field corn,Sorghum,Oats-cut Feb		138						
51	Irrigated Cropland	Vegetables, Forage, Cover	-	160						
52	Irrigated Cropland	Vegetables, Forage, Cover	-	210						
53	Irrigated Cropland	Vegetables, Forage, Cover	-	210						
57	Irrigated Cropland	Vegetables, Forage, Cover	-	160						
58	Irrigated Cropland	Vegetables, Forage, Cover	-	40						
Headquarters										
HQ1	Headquarters (Office - Packaging)	-	-	20						
HQ2	Headquarters (Commodities)		-	20						
HQ3	Headquarters (Access Roads)		-	8						
HQ4	Headquarters (Retention Ponds)		-	7						
HQ5	Headquarters (Future Compost/Bioenergy)		-	5						
Other Areas on Farm			-							
Unused areas	Woods and pivot corners	Pine/Brush	-	989						
Totals				7500	6775	5221	2400	400	1550	825

* Fresh calves and fed young heifers < 6 months old

Cattle and Dry Cow Housing and Feeding Operation

The five existing cattle confinement barns will continue to be used for raising beef cattle but will also be used periodically for dry cows from the dairy operation. When dry cows are present, the allowable number of beef cattle will be reduced accordingly. The cattle feeding operation includes 1.5 to 2 annual average 167 to 200 day grow-out periods where young stock are brought to the facility at about 500 lbs and will leave at about 1200 lbs. Note, the growout periods for the individual herds will overlap and therefore there will be a fairly continuous number of animals on the farm throughout the year. Approximately half of the new stock can be placed directly into the barns while the remaining animals will need to be grazed on irrigated conditioning pastures for about 30-60 days. The average time for the animals on the conditioning pastures will be relative short. Once in the barns, the animals will be housed fulltime except for very brief periods where they will be moved to holding pens next to each barn (Figure 4) for barn maintenance purposes, such as bedding removal. These holding pens are covered and have 50ft x 100ft concrete floors with 1ft side walls to ensure no seepage can leave the building and to assist clean-out operations. Additional information on these barns and the bedding storage barn discussed below is provided in Appendix I.

The beef confinement barns have a center feed lane and open stacked bedding areas on the sides as shown in Figures 5 and 6. There are fans in all barns to cool the animals. The barns have concrete floors. Bedding materials for the cattle barns, such as peanuts hulls, old hay, sawdust, cropped sorghum, or old horse bedding, will be spread in the barns every day or as needed to ensure adequate moisture adsorption of manure products and a comfortable lounging environment for the animals. As shown in the barn drawings, the water troughs are located on the outside of the barns so that if overflow occurs the water will not enter the bedding material. No other fresh water use will be used for the cattle confinement barns. The water supply line will be on the outside of the building so any leakage will not come into contact with the bedding material. Between moisture evaporation and bedding material adsorption, no runoff will occur from the concrete pad. The manure/bedding materials will accumulate in the barns (under roof) until removed for delivery to the plug-flow methane digester or land applied.

A 60ft x 120ft bedding storage building was built to house the bedding materials being brought to the facility and for temporary storage of excess bedding solids from the feed barns and separated solids from the screw pressed discussed below. The covered storage building is needed to keep these materials dry prior to being spread into the feed barn to maximize moisture absorption. The placement of this building (Figure 4) near the methane power plant (generators) allows the future use of the waste heat from the biogas fueled diesel engines to be used to further dry the bedding and solids materials within these barns.

Dairy Facilities (Proposed)

There will be a new milk parlor and five freestall confinement barns built to house the 2800 mature cows (see Figure 4). The barns will be bedded with either sand or organic mulch from recycled solids. The dairy freestall barns will be flushed with recycled water from the collection pit at the end of the sand lane. The milk parlor will be flushed with fresh water. The dairy barns flush water will flow to the center travel lane and then to the north where it enters a 500' sand separation lane where sand will be removed and recycled for bedding if used. The sand lane drains into the collection pit where the effluent is either recycled back to the barns as flushwater or the excess effluent is pumped directly into the methane digester.

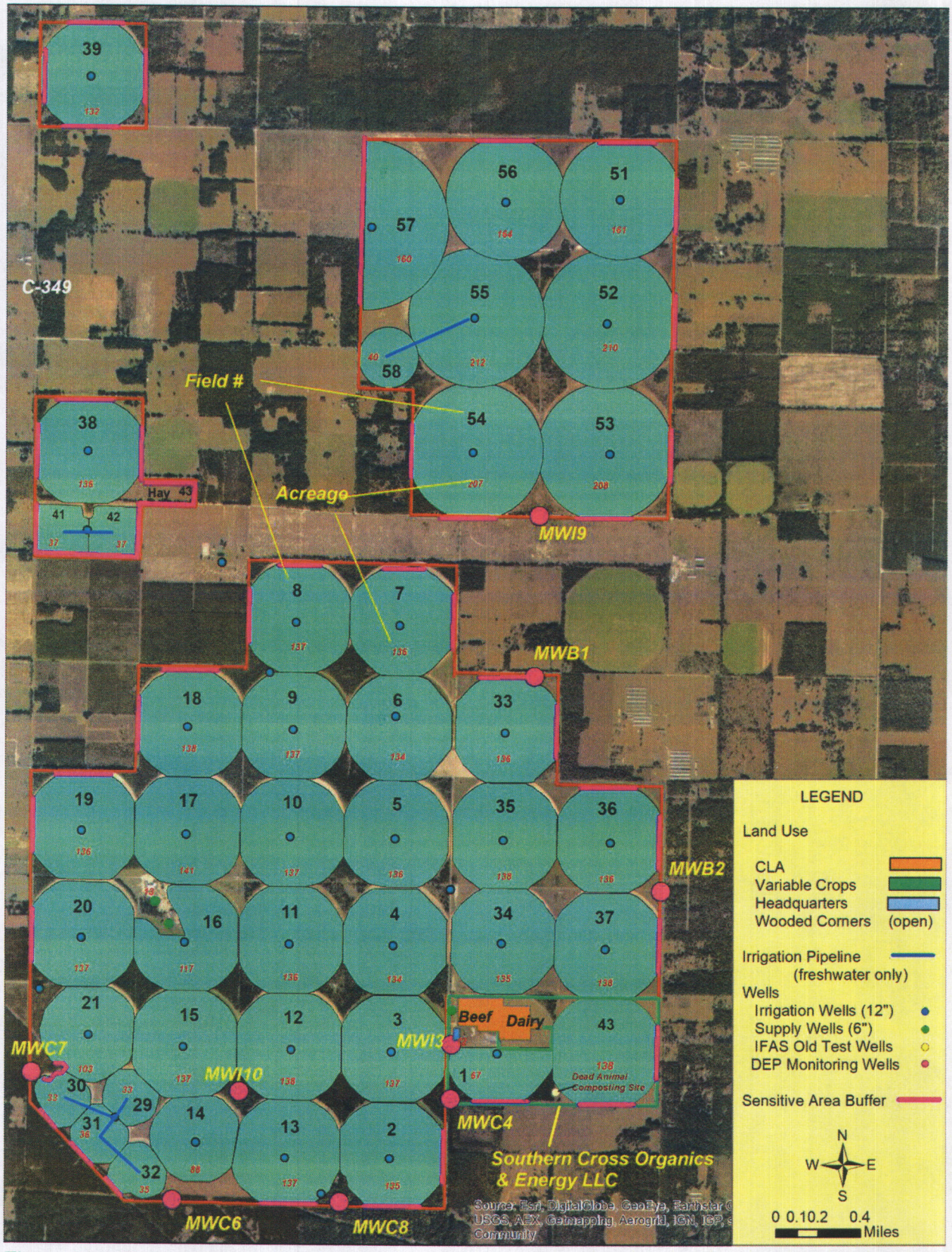
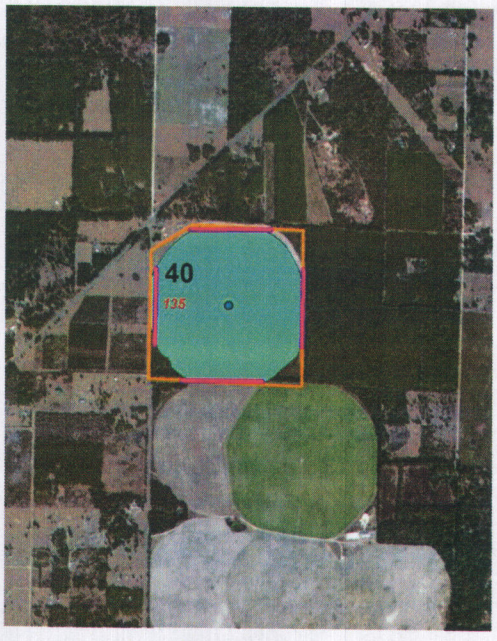


Figure 3.a. Field Crops and Conservation Plan Map



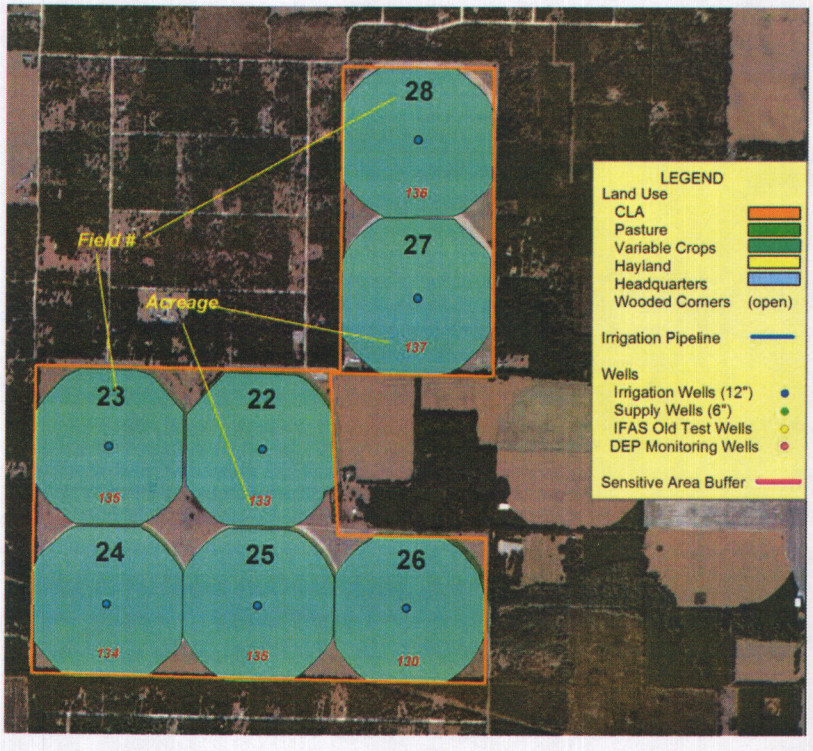


Figure 3.b. Field Crops and Conservation Plan Map

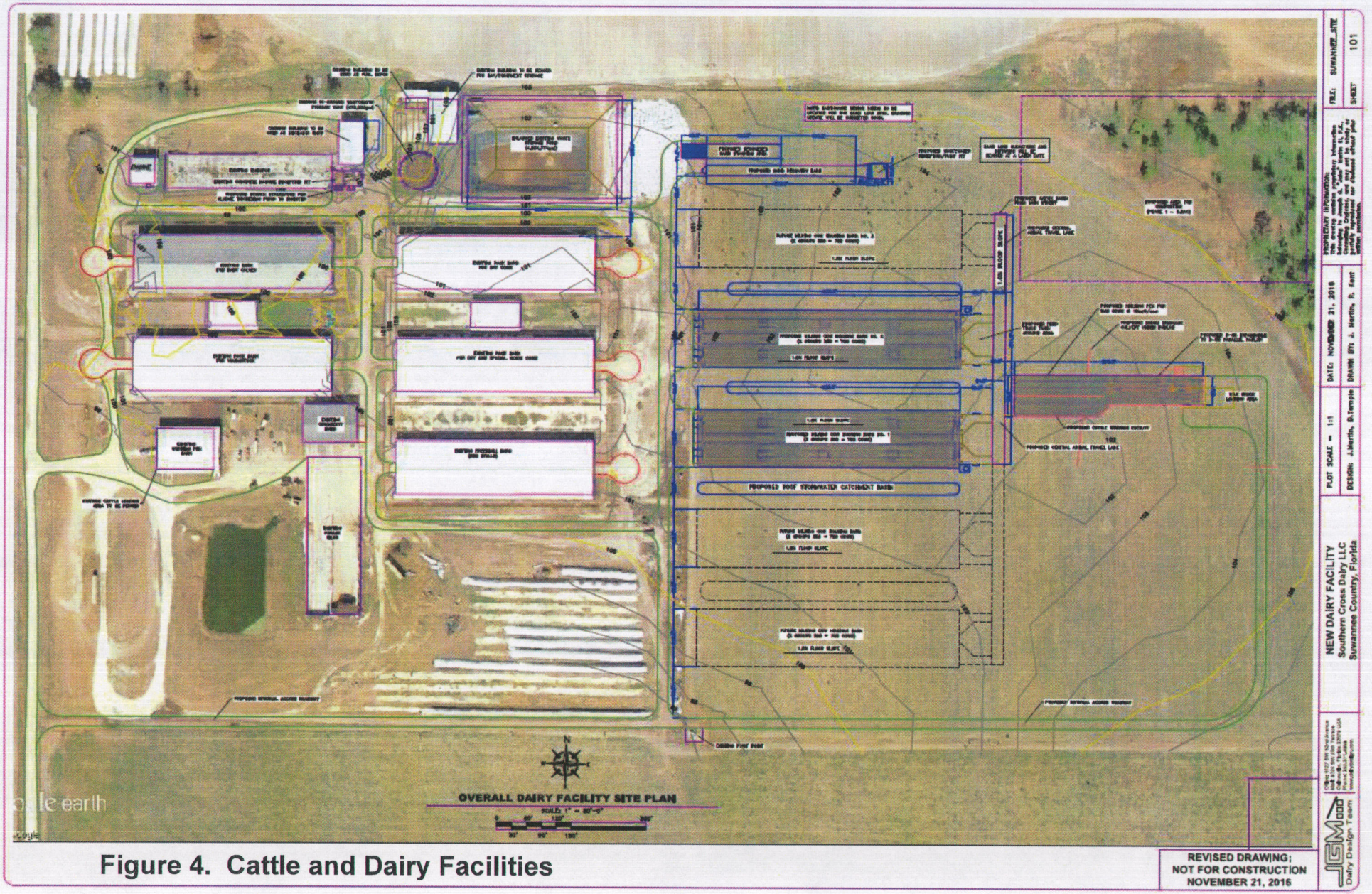


Figure 4. Cattle and Dairy Facilities

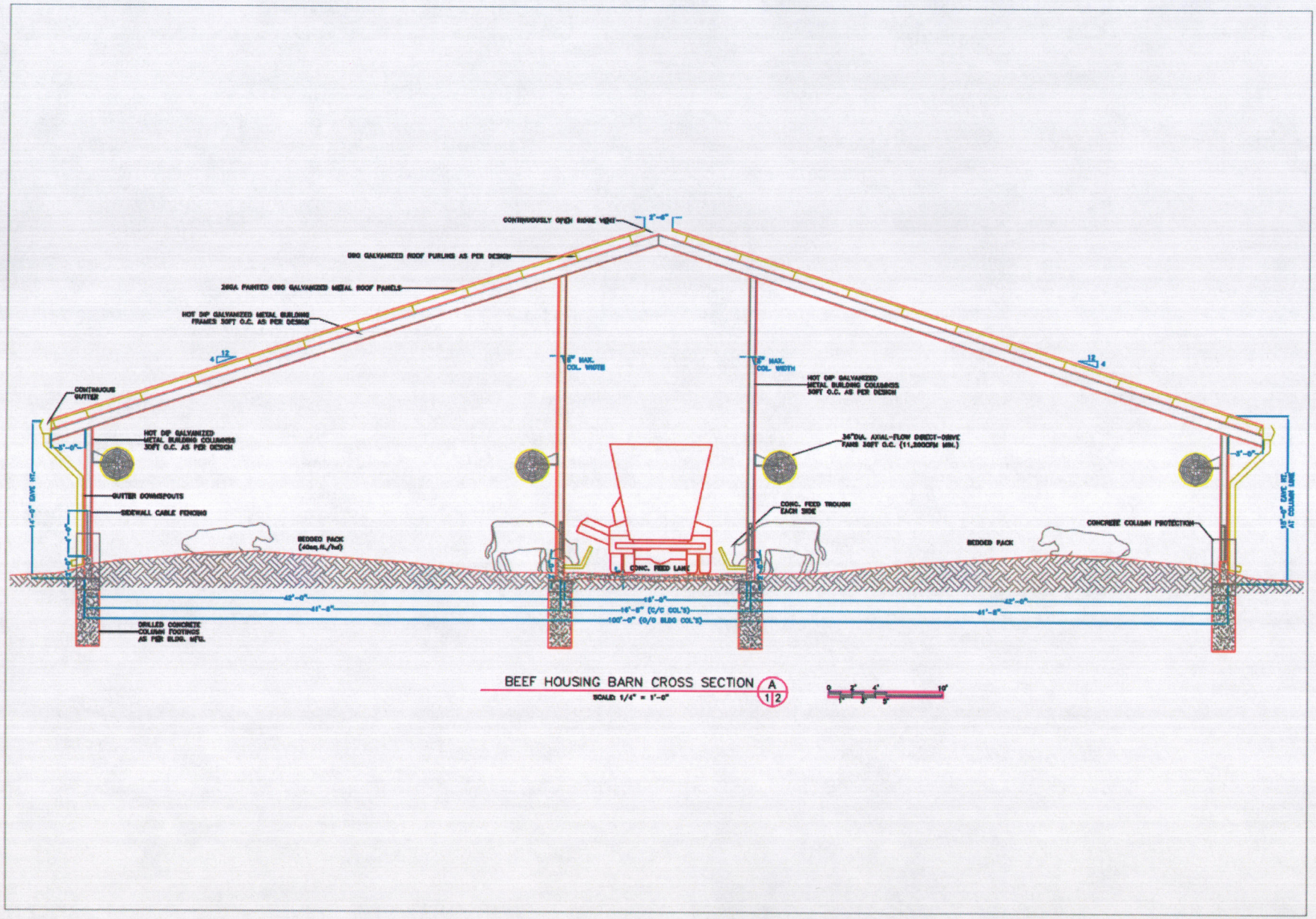


Figure 5. Stacked Bed Cattle Confinement Barn (Profile View)

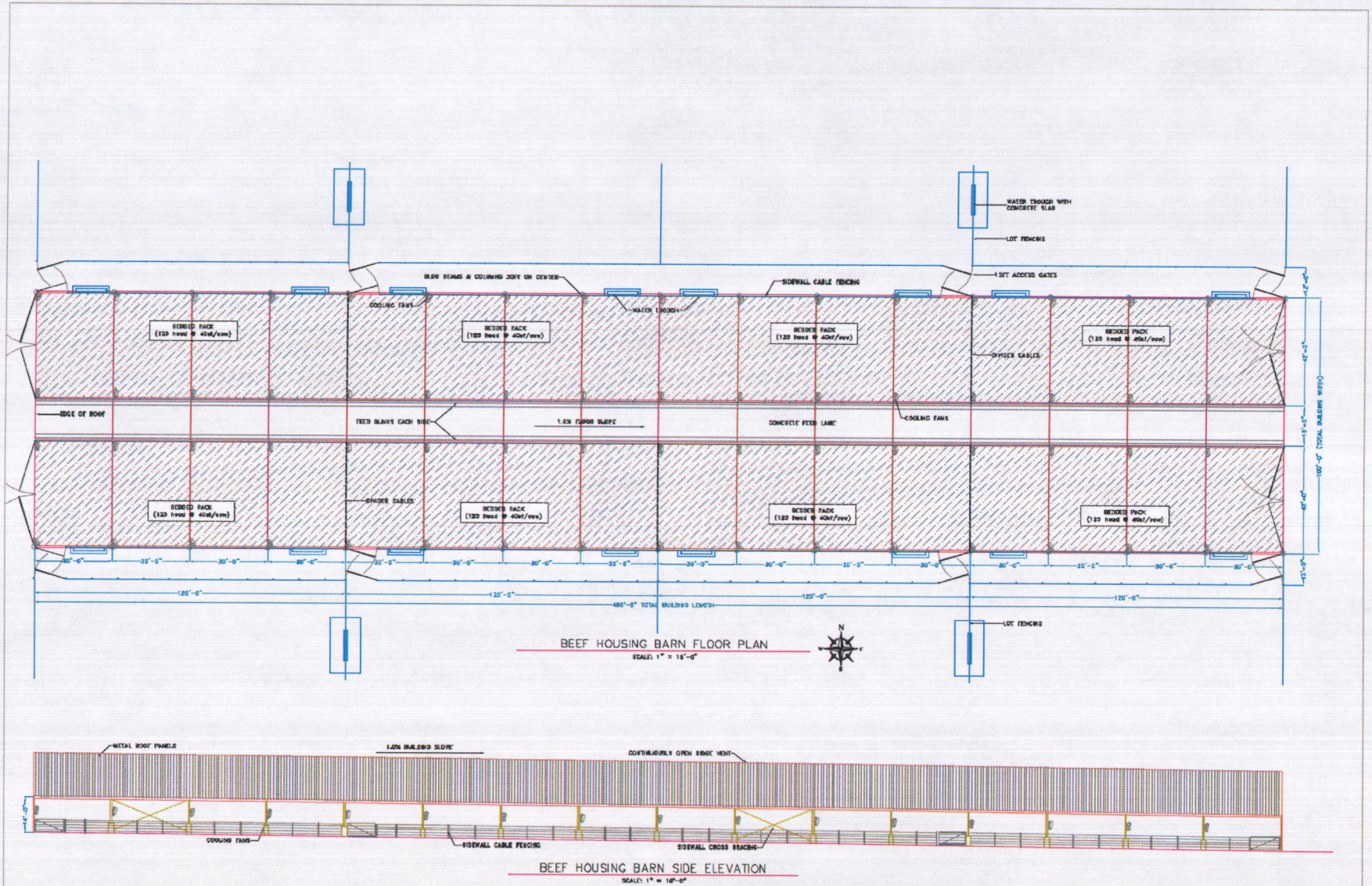


Figure 6. Stacked Bed Cattle Confinement Barn (Side Profile/Plan View)

Waste Management System and Digester

A plug-flow digester and its associated 600KW electrical power generation system was built to use the waste from the cattle feeding operation. However, the cattle waste has not performed well in the digester, and therefore one of the primary goals of the new dairy is to generate a proven high quality feed stock for the digester. The dairy waste may still be augmented with cattle waste if needed, but the dairy waste water will be the primary manure supply to the digester. The layout of the bio-energy system at the cattle and dairy operation is shown in Figure 4 while a more detailed flow diagram of the bio-energy system is provided in Figure 7. The bio-energy system will handle daily inputs of the manure from the dairy. Any supplemental manure/bedding materials will be mixed in the receiving pit and brought to an appropriate moisture content (~10-12% solids) before being pumped into a 2.7 million gallon, spirally-mixed, plug-flow, and temperature-controlled methane digester. The digester is mostly underground so will not affect air through the barns and to be visually non-intrusive. The biogas generated in the digester will either be piped to two reciprocating engines connected to two 300 kw three phase electric generators or cleaned and delivered to a nearby natural gas pipeline. Waste energy from the engines or a boiler will be used to heat the digester to a constant 101 deg F for optimal gas production. The effluent from the digester will be pumped over two sloping screen separators to remove the larger solids. The effluent from the screen separators flows into a concrete solids settling tank (0.47 million gallons, 73'dia x 16'deep) to remove additional solids before overflowing into the existing plastic lined storage pond (1.7 million gallons, 120' x 230' x 18' with 3:1 side slopes, see Figure 4. Effluent from the irrigation storage pond will be pumped to center pivot irrigation systems on site or on the neighbor's farm that has partnered with Southern Cross Organics & Energy LLC for delivery to crops. The solids from the solids separators will be either directly applied at agronomic rates on non-sprayfield pivots or hauled off site or will be composted first onsite before being applied at agronomic rates on non-sprayfield pivots or hauled off site. The sludge solids from the settling pond will be spread on fields at agronomic rates. Approximately 40% of the phosphorus is removed in each of the solids separation steps. Less nitrogen (~20%) will be removed with the solids, so the majority will still be available for crop use through the effluent irrigation system.

The effluent irrigation will be delivered to the 17 pivots (~2195 acres) for use by the crops via a 6" diameter pipelines as shown in Figure 8. The 6" pipe size is sufficient to handle the 250 gpm produced by the floating effluent irrigation pump. Since this flow rate is insufficient to operate the center pivots, the effluent will only be delivered to a pivot that is being operated from a freshwater well. This means that the 250 gpm effluent will need to be delivered at a slightly higher pressure into the freshwater supply pipeline going to the pivot. The additional 250 gpm flow to the pivots means the capacity of the existing freshwater pumps have been reduced or the effluent be delivered to two or three operating pivots at the same time to prevent excessive pressures at the pivots. The floating pump has a pressure relief blowback to the pond to prevent excessive pressures. The mixing of the effluent and freshwater virtually eliminates any odors and provide optimal application uniformity.

In summary, the dairy flush water, cattle barn cleanout, and the land application process will be as follows: The excess dairy flush water will be pumped into the methane digester. If needed, some manure/bedding material from the cattle barns will be delivered to the reception pit at the east end of the manure digester where it will have water added before it is pumped into the methane digester. The effluent from the digester will be pumped over sloping screen solids separators before flowing into a large tank where additional solids will settle. Effluent from the settling tank will flow to a large irrigation storage pond from which the water will be pumped to

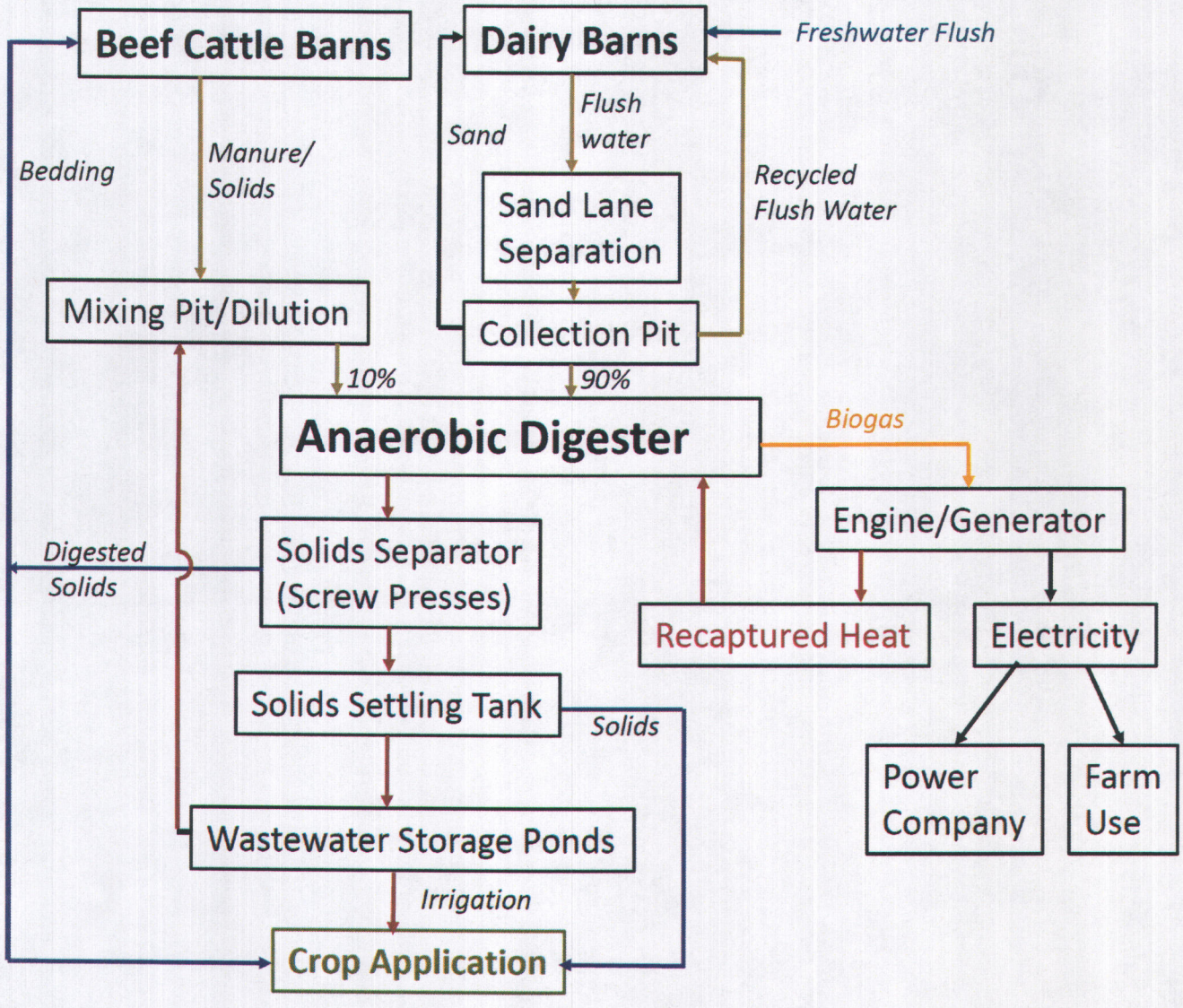


Figure 7. Flow Diagram of Waste Management and Bio Energy System

Figure 8. Sprayfields and Wastewater Effluent Pipeline.

17 center pivot systems. The collected solids will be used as bedding after composting, land applied, or taken off the farm while the settled solids will be spread on crops on the farm that are not reachable by the effluent irrigation system. The spreaders will apply the materials uniformly across the receiving field in accordance with the nutrient management plan provided. The farm will have adequate equipment and protected storage areas to ensure that no raw manure/bedding materials will be stored in uncovered staging areas. Composted bedding materials may be stored in uncovered areas. The farm will purchase a slurry spreader to transport and apply the solids accumulated in the solids settling tank.

The fresh bedding materials will be stored in a new storage barn near the power generation building. The cattle barns bedding will be spread by a spreader or blower wagon/truck. It is anticipated that the initial layer of bedding material will be spread just after cleanout and before the animals are brought back into the barn. Additional bedding will likely be blown in from the outside edge of the barn, but could also be spread from the feed lane on an as needed basis. Periodical grading of the stacked bed with a power rake may be needed to level the bed. The dairy barn bedding will be either sand or composted/dried solids from the screw presses.

Most of the animal feed will be grown on the farm in the form of forage crops, such as corn, sorghum, and ryegrass. These forages will be processed and stored in a large bunker silo or silage bags located near the barns (Figure 4), before being fed to the animals. Other feed products, such as grain mixes, will be purchased and stored in a covered commodity barn also located near the confinement barns (Figure 4).

Stormwater

The roof runoff from the cattle feed barns is directed to a large retention basins located on the south of the barns while the dairy freestall barns have retention ponds along the side of them as shown in Figure 4. All of the barns have been guttered with down spouts every thirty feet. For the five stacked-bed confinement barns the down spouts are connected to an 8" PVC pipe, which are connected to progressively larger corrugated stormwater pipes that ultimately enters the large original existing retention basin via a 30" pipe. All surface water drainage from the feed commodity facilities including the bunker silo is also directed to a large retention pond located south and west of the commodity barns. The system is designed so that no offsite discharge will occur from the commodity storage facilities for storms up to and including the 25-year, 24-hour storm event. This pond also handles excess road runoff and runoff from the bio-energy facility. Details of the cattle feeding facilities stormwater system are provided in the "*Stormwater Management Plan for Cattle Feeding Operation Facilities at Suwannee Farms*" dated June 10, 2008, which is on file with FDEP as part of the ERP permit requirements and in good standing.

The roof runoff from the dairy barns will be handled in retention ponds located along the sides of the barns as shown in Figure 4, thus not requiring any guttering on the barns. The ponds are sized based on retaining the 100-year storm event on site. The "*Stormwater Management Plan for Dairy Facilities at Suwannee Farms*" dated May 27, 2014. According to this plan the retention ponds will be constructed to meet the following minimum design requirement. The ponds shall be constructed to a depth of 2 feet with 3:1 side slopes for easy maintenance with a total surface area calculated as:

Pond Area (acres) = contributing roof area (acres) x .95 + access road area (acres) x 0.7

SECTION 2: MANURE AND WASTE WATER HANDLING AND STORAGE

This section addresses the components and activities associated with the production facility, HUAs, manure and wastewater storage and treatment structures and areas, and any areas used to facilitate transfer of manure and wastewater. Components and activities covered in this section are: types of animals, number of animals, average weight of animals, confinement time, total estimated manure and wastewater volumes produced at the facility, manure storage type, volume and length of storage, existing and planned manure transfer equipment, nutrient content of the manure materials, nutrient losses in the waste management system, emergency action plan, and mortality disposal plan.

NOTE: Design and associated calculations in this section assumes the dairy and cattle operation are at full capacity of 2800 mature cows and 5000 beef cattle. Noted above, the dairy portion will not be able to expand beyond 1400 mature cows until two additional freestall barns are constructed.

General

Conservation practices planned for the waste storage, collection, and transfer facilities are presented in this section separately for the cattle feeding operation and the new dairy facilities.

If in the future the landowner decides to adjust the nutrient content of the feed, he will work with a certified feed specialist and will minimize manure nutrient content. The nutrient content of waste was taken from Table FL 4-5 of the NRCS AWMFH based on a medium to high feed ration and the current feed content and are presented in the later Nutrient Management section.

Cattle Feeding Operation

All 5,000 beef cows (average weight 863 lbs) will be totally confined with collected solids being mostly land applied typically after being composted, however some solids may be delivered to the plug-flow methane digester if the dairy manure levels are not sufficient to optimize gas production. Note that dry cows may be housed in the stacked-bed confinement barns periodically where the number of beef cows will be reduced by 1.92 per dry cow.

As indicated above, the nutrient management plan for the cattle feeding operation is based on nutrient recycling where the animal manure is collected, passed through a methane digester, applied to forage and other crops as organic fertilizer, and finally a portion of these nutrients return to the animals as feed. The following discussion presents the nutrient balances through each component of the waste management and feed production systems

Cattle Confinement Barns and Manure/Bedding Handling: The primary sizing criteria for the barns is allowing for 41 ft^2/animal of stacked bedded area for animals that come into the barns at a weight of 525 lbs and leave at a weight of 1,200 lbs. The cattle will be housed in the confinement barns approximately 91% of the time that the animals are on the farm. The only time the animals are not in the barns is during a brief conditioning periods when they first come onto the farm and during clean-out operations or other barn maintenance activities where they will be held in covered, concrete floored holding pens next to the barns. All of the manure deposited in the barns will be totally contained within the barns until clean-out activities. Routinely, the manure/bedding materials will be representatively sampled and tested for nitrogen and phosphorus content as it is being added to the digester. The manure/bedding materials will be cleaned out of the barns by front-end loaders and placed directly into transfer dump truck or wagon, which will be used to transport the solids to the reception pit of the methane digester where it will be mixed with water and chopped to form ~12% solids slurry

before being pumped into the methane digester or will be placed in spreaders for land application at agronomic rates in accordance with the NMP.

Dairy Facilities

A milk parlor and two freestall confinement barns have been built to house the 1400 mature cows (see Figure 4). Once two more freestall barns are built, the dairy mature cow herd size will increase to 2800. The barns will be bedded with either sand or organic mulch from recycled solids. The dairy freestall barns will be flushed with recycled water from the collection pit at the end of the sand lane. The milk parlor will be flushed with fresh water. The dairy barns flush water will flow to the center travel lane and then to the north where it enters a 500' sand separation lane where sand will be removed and recycled for bedding if sand is being used. The sand lane and a secondary sand drop in the collection pit at the end of the sand lane will minimize the amount of sand getting into the methane digester. Two 1000 gpm pumps on float controls will deliver the effluent from the collection pit to the methane digester. The two pumps are needed for redundancy in case of a pump failure. Figure 9 provides the wastewater flow layout for the dairy and cattle operations waste management system.

Wastewater Volumes and Storage

The volume of water generated that must be handled by the waste management system is calculated in Table 2. The wastewater volume includes the freshwater flush water from the milk parlor, cooling sprinklers in the dairy barns, and manure and bedding volumes. Though it is unlikely that any of the cattle litter will be put through the digester after the dairy comes on line, to be conservative it was estimated that as much as 20% of the cattle litter could be used to augment feed stock for the methane digester, so this volume is included in the analysis. As shown in the Nutrient Management section, the volume of wastewater generated will only amount to about 2.9 inches over the 2195 acres of pivots receiving the wastewater. As seen in Table 2 the existing wastewater storage pond is significant to handle the additional wastewater from the dairy because only three days of retention time is required due to the large number of very well-drained sprayfields that are available to the facility. The 24-hour 25-year storm event storage is available in the pond as long as the water level is kept 2 feet below the top of berm. A marker shall be placed in the pond to clearly indicated this depth.

Methane Digester

As indicated the dairy will be the primary source of manure going to the digester because of its better biogas production properties than the cattle manure. The effluent from the 2.7 million gallon, spirally-mixed, plug-flow, and temperature-controlled methane digester will be pumped through three screw presses to remove the larger solids for offsite delivery. The effluent from the screw presses will then go into a concrete solids settling tank (0.47 million gallons, 73'dia x 16'deep) to remove additional solids before overflowing into the existing plastic lined storage pond (1.7 million gallons, 120' x 230' x 18' with 3:1 side slopes. The storage pond has approximately 3 days of storage and is designed to contain the 25-year 24-hour design storm as shown in Table 2. The stormwater inputs are from rainfall falling on the concrete travel lanes between the dairy barns, the sand lane and collection pit, the open top settling tank (4,200ft^2), and the irrigation pond itself (38,000ft^2), which translates to less than 1.0 foot depth in the irrigation pond. Control elevations for the pond are provided in the O&M Section. Effluent from the irrigation storage pond will be pumped to center pivot irrigation systems on the farm for delivery to crops. The solids from the screen separators will be composted or directly applied to field crops at agronomic rates. The sludge solids from the settling tank will be spread on

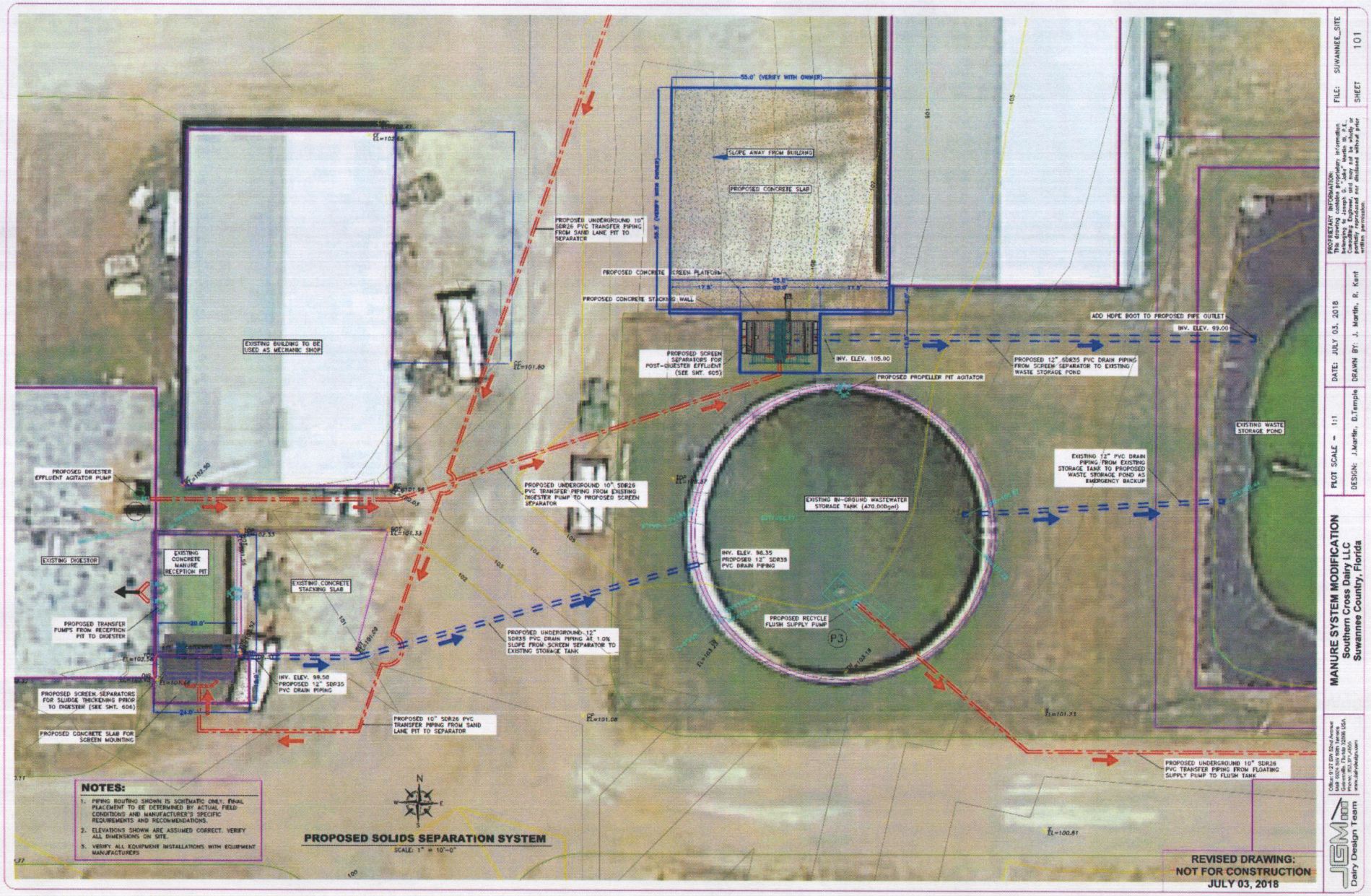


Figure 9. Waste Management System Layout for Cattle and Dairy Facilities

TABLE 2. WATER BUDGET CALCULATIONS FOR WASTE MANAGEMENT SYSTEM

Water Use

Animal Type	gal/day/cow	gal/day	
Lactating	110	264000	
Dry/Springers	70	28000	
Beef Cattle	0	14918	mix water
Total		**306918**	

Manure Production

Animal Type	gal/day/cow	gal/day	
Lactating	14	33540	
Dry/Springers	14	5590	
Beef Cattle	8	7459	20% to WSP
Total		**46589**	

Stormwater to WSP Pond

Source Area	Area (ac)	Avg DailyRain* gal/day	24h-25y Storm** gal/day	ft3/day
Travel Lane	0.032	255	7472	998.976
Sand Lane and Pit	0.022	175	5137	686.796
Solids Separator Tank	0.09	717	21016	2809.62
Waste Storage Pond	0.7	5737	168128	22477
Total	**0.9**	**6885**	**201753**	**26972**

* Annual Wet Season Rain July to September (92days) = 27 inches

** 24-hour 25-year storm event = 8.6 inches

Volume for 3-Day Storage Requirement =	1,081,175 gallons
24-hour 25-year Storm Event Storage Requirement =	201,753 gallons
Total WSP Storage Requirement =	1,282,928 gallons
Available WSP Storage =	1,650,000 gallons

fields at agronomic rates. Approximately 40% of the phosphorus is removed in each of the solids separation steps. Less nitrogen (~20%) will be removed with the solids, so the majority will still be available for crop use through the effluent irrigation system.

The application rate in the sprayfields (in lbs/acre) will be determined based on the nutrient content analysis of the manure/bedding materials, estimated losses through the waste management system, the receiving field's limiting nutrient, and the nutrient uptake of the crop rotation in the field as outlined below. Records will be maintained on the amount of manure/bedding materials removed, nutrient contents, and application rates by field.

The estimated manure and bedding production rates per animal used in this assessment were taken from the NRCS Animal Waste Management Field Handbook and are provided in the Nutrient Management Section of this NMP. For the cattle barns there will be a significant amount of moisture loss (60%), solids shrinkage (20%), and nitrogen volatilization (10%) losses occurring in the barns prior to clean-out, which will be approximately once a week. About 50% of the P and 10% of the nitrogen is removed with the solids prior to entering the irrigation pond. The solids and their nutrients will be taken spread onsite at agronomic rates on the non-sprayfield pivots (before or after composting) or taken off site as marketable solids. The ultimate amount of nutrients available for crop uptake after delivery losses is also provided in Nutrient Management Section below.

Geologic investigations (Appendix D) revealed that the in-situ soils are adequate to allow the construction of the proposed new facilities. All earth and concrete work has been and will be done in accordance with NRCS specifications. Figure 4 shows the general layout of the new facilities.

Crop fields

The crop fields (Field 1- Field 58) will continue to be irrigated with fresh water as needed. An irrigation water management plan is provided in Appendix G. A well located at each pivot point provides water to each center pivot. Effluent will be also be applied to Fields 2-21 and 27-37, while settled solids will be land applied at agronomic rates to Fields 38-42 and Hay Field 43.

Crop rotations for individual pivots will vary from year to year, but in general the following crops will be grown peanuts, snap beans, carrots, sweet corn, field corn, potatoes, oat, cotton, and sorghum.

Composting of Collected Bedding Materials

SCOE composts manure and bedding materials collected from the stacked-bed confinement barns on the farm. The bedding materials, such as sawdust, woodchips, and other dried plant materials, are added to the barns daily to adsorb the liquid fraction of the manure to maintain animal comfort. After a few weeks of accumulation these manure laden bedding materials are removed from the barns and placed into windrows (long continuous piles) in the composting area shown in Figure 10. The windrows are turned periodically to ensure that uniform composting takes place. The compost will reach temperatures of 160°F resulting in rapid moisture loss. This means the windrows have a high capacity to hold large amounts of rainfall before any leaching will occurs out the bottom of the compost. In addition to the limited amount of leaching, the hyper-active aerobic bacteria quickly take up the soluble nutrients in the compost, which results in low nutrient concentrations in the water that does leach. Therefore, windrow composting is considered an environmentally friendly process. As shown in Figure 10, the composting area is also graded to ensure that any runoff that might occur will remain onsite. The amount of runoff between the windrows is also anticipated to be small because the soils at the site are very well-drained sands.

Once a windrow has finished the composting process, which typically takes two to four weeks, the composted materials are taken offsite for use as an organic soil amendment by others.

Mortality Disposal

Dead animals will be disposed of according to Florida Statutes 823.041 and local laws in a manner that does not adversely affect ground or surface water or create public health concerns. Composting will be the primary means of mortality disposal and will be done in accordance with UF-IFAS recommendations. However, burial will remain as a backup option. The farmer anticipates about 10 beef cattle and 20 dairy cows will parish per year. The dead animal composting site is located in the SW corner of pivot 43 (Figure 3). The University of Florida procedure for dead animal composting as presented by Dr. Shearer (http://dairy.ifas.ufl.edu/drs/2006/Shearer.pdf, UF College of Veterinary Medicine) is:

> *"The Procedure for Composting is described as a 2-stage process. In the first stage, carcasses are placed into a compost area with carbon bulking agents (wood chips, straw, sawdust, dead leaves and/or other bedding material). When composting smaller animals such as calves one may use a bin or area with alternating layers of the carbon bulking material. Always begin with a base layer of dry material approximately one foot deep under the animal to act as a sponge for fluids that seep from the carcass. The bigger the animal the deeper the base layer that is required. The base layer should extend at least two feet beyond all sides of the animal. The animal should be covered with compost ingredient material to form a peaked pile such that a minimum of one foot of cover exists all around the animal. Frequently, it is convenient to compost large animals such as cattle or horses in individual piles or windrows.*

Water may be added to the mixture and it is left alone for a minimum of 6 months. During stage 1 soft tissue will break down completely and bones will have softened and undergone partial decomposition. After 6 months it is time to begin Stage 2 by mixing and aerating the contents of the compost pile. When mixing is complete re-cover the pile and leave it undisturbed for another 6 months. After this time the compost is ready for field application. Alternatively, some prefer to leave the pile alone for the entire 12 month period after which time they will remove the compost and spread it directly on crops. Regardless, one of the keys to successful composting is that the compost pile remain undisturbed during the 1st and 2nd stages of the degradation process. This assures a more complete breakdown of the soft tissues and bones. Experience has also shown that carcasses will compost more quickly if the carcass is quartered and the thorax, abdomen and rumen are opened prior to composting. It generally requires a minimum of 9-10 months to compost an intact cow carcass. Bones from immature animals will usually degrade rather quickly in the compost, whereas bones from more mature animals may take several seasons to totally breakdown. However, bones that do not breakdown may be used as base material for the next compost pile. Bones may be buried or placed in "bone pile" where they may serve as a calcium source for wild animals. As bacteria compost the carcass heat reaching temperatures as high as 140o F are produced. This is sufficient to kill most pathogenic bacteria (with the exception of spores) and viruses."

If the burial option becomes necessary, it will be done in the same area as the composting option described above. Burial of dead animals must meet the following requirements:

- provide a minimum of 30-inches of suitable soil cover over the carcass,
- bottom of burial is two-feet above highest groundwater elevation,

For burial and composting:

- it is greater than 100 feet away from private well,
- it is greater than 200 feet away from public well,
- it is greater than 50 feet from an adjacent property line,
- it is greater than 500 feet from a residence, and
- it is greater than 100 feet from a stream, lake, pond, wetland, or 100 year floodplain.

Emergency Response Plan

The following emergencies have been identified for this operation. This plan address the emergency response required for the identified emergencies. A copy of the Emergency Action Plan shall be placed in a prominent location at the farm.

In Case of a Storage Facility Spill, Leak, or Failure Emergency, implement the following: Stop all other activities to address the emergency.

b. Stop all flow into from the barn or feed storage facility.
c. Assess the extent of the emergency and determine how much help is needed.
d. Call for help & contractor if needed.
e. Use a skid loader or tractor with blade to contain or divert spill or leak, if possible.
f. If containment material is needed, excavate soil from the area located east of the confinement barns.
g. If possible, begin pumping manure and spreading in the neighboring fields at the prescribed application rates.
h. Complete the clean-up and repair the necessary components.
i. Initiate additional containment measures, corrective measures, or property restoration measures as directed by emergency agency officials.

In Case of a Land Application Manure/Waste Discharge Emergency, implement the following :

a. Stop all other activities to deal with the emergency.
b. Assess the extent of the emergency and determine how much help is needed.
c. Call for help if needed.
d. If spilled on the road, call the sheriff's office for traffic control and clean the spill immediately from the road and roadside if needed.
e. Contain the spill or runoff from entering the stream or waterway using straw bales, saw dust, or soil material.
f. Prevent further runoff by incorporating the waste.
g. Initiate additional containment measures, corrective measures, or property restoration measures as directed by emergency agency officials.

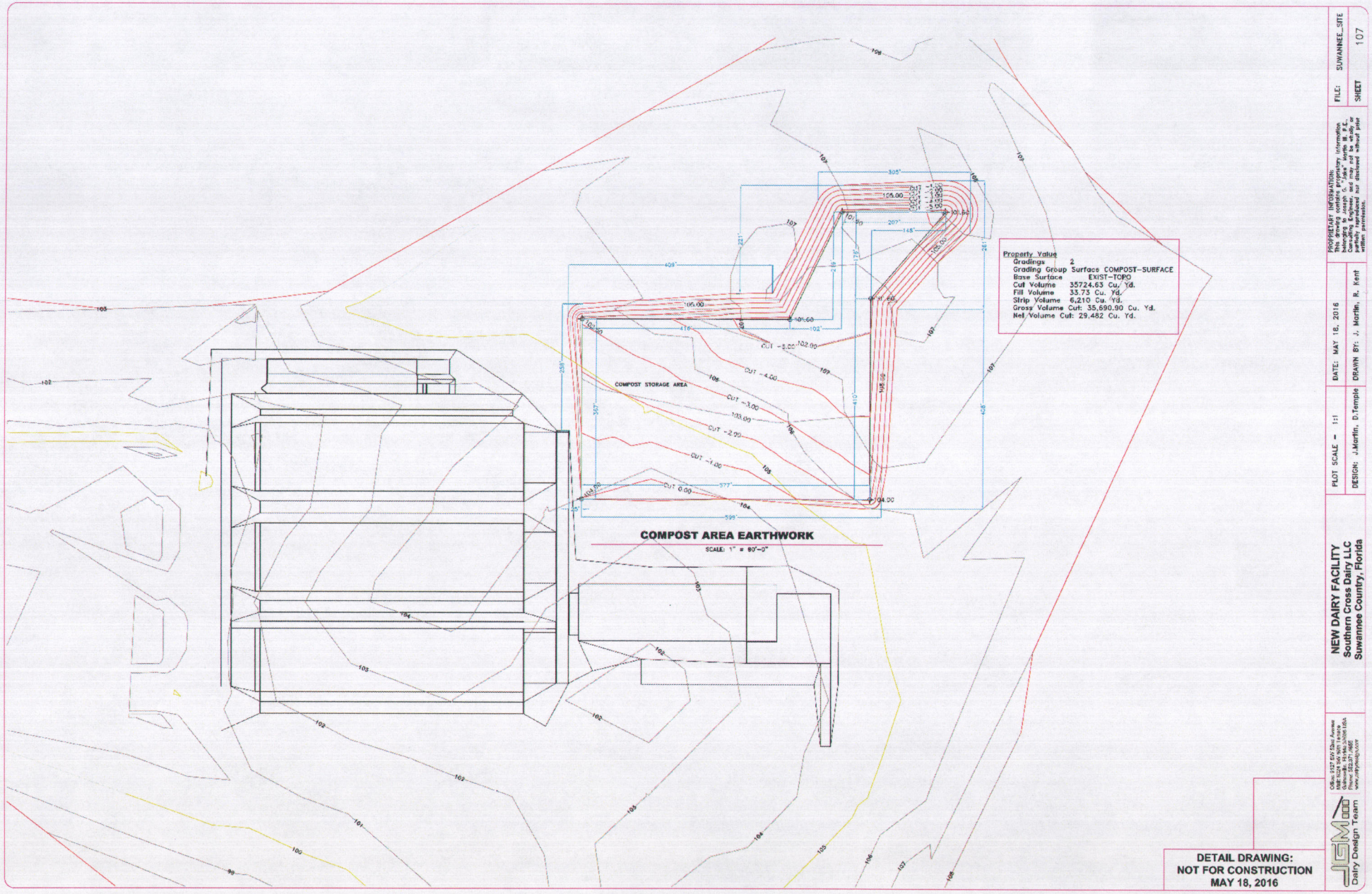


Figure 10. Composting Area

In Case of a personal injury, implement the following:

a. Stop all other activities to deal with the emergency.
b. Call for help (See Table 3).

In Case of a fire, implement the following:

a. Stop all other activities to deal with the emergency.
b. Try to extinguish the fire with the appropriate rated fire extinguishers.
c. If fire can not be contained, call for help (See Table 3.)

Provide the following information when reporting an emergency.

a. Your name and phone number.
b. Directions to the farm.
c. Description of emergency.
d. Estimate of the amounts, area covered, and distance traveled.
e. Has manure reached surface waters or major field drains?
f. Is there any obvious damage: employee injury, fish kill, or property damage?
g. What is currently in progress to contain situation?

Documentation

The following items shall be documented in writing and filed with the Emergency Action Plan for future reference and emergency response training.

a. Date and time, location of spill, affected landowners.
b. Affect of manure spill on any surface water body or potable water well.
c. Approximately how much manure was released and for what duration.
d. Amount of manure, if any, that left the farm property.
e. Any damage, such as personal injury, fish kill, property damage.
f. Cause of the spill.
g. Procedure to handle the emergency.
h. Clean up efforts.
i. List of authorities called, those that responded, and the time it took for them to respond.

TABLE 3. FARM INFORMATION AND IMPORTANT PHONE NUMBERS FOR EMERGENCY RESPONSE

Farm Name	Southern Cross Organics & Energy, LLC				
Address	20078 137th Road, O'Brien, FL 32071				
Farm Phone	**(352) 213-7013**				
Permit #	Facility ID # FLA470031				
Directions to Farm	STARTING IN LIVE OAK, TAKE SR 51 SOUTHWEST 6.2 MILES FROM US 129, TURN LEFT ON TO SR 349, GO 10 MILES, TURN LEFT INTO FARM				
		Type of Emergency			
Emergency Phone Numbers		**Facility Spill, Leak or Failure**	**Land Application Manure Waste Discharge**	**Personal Injury**	**Fire**
Farm Owner	David Temple 386-213-7013	X	X	X	X
Farm Manager	David Temple 386-213-7013	X	X	X	X
Fire or Ambulance	911			X	X
Equipment: Trackhoe Dozer	David Temple 386-213-7013	X	X		
Contacts To Be Made Within 24 Hours					
Florida Fish and Wildlife	1-800-342-8105	X	X		
Florida Department of Environmental Protection	904-807-3300	X	X		
Local Fire Department	386-364-2943				X
NRCS	352-486-2672	X	X		
Local Sheriff's Office	386-362-2222		X		
Florida Department of Transportation	386-362-4010		X		
County Health Department	386-362-2708	X	X		

SECTION 3: LAND TREATMENT PRACTICES

This section addresses evaluation and implementation of appropriate conservation practices on sites proposed for land application of manure and organic by-products from the cattle feeding operation. .

General

All manure management structures shall have an environmental risk assessment completed. Appendix F contains FL-CPA-30 and NRCS-CPA-52. This evaluation of waste management system found a few potential adverse effects, but none exceed the beneficial effects and no special environmental concerns were found. Therefore, no Quality Assurance Plan is required.

Fields where nutrients are applied will be managed to soil loss tolerance. The settled solids from the settling pond will be land applied to Fields 38-42 and the Hayfield Field 43 (See Figure 3, showing effluent and solids application areas and any sensitive areas.) As shown by the buffer on Figure 3, no manure products will be placed within 50' of any property boundary or sinkholes. Fertilizer, pesticide, and herbicide will be applied via a mechanical spreader in those areas. When the center pivot system is used for fertigation, individual sprinklers will be shut off in those areas. Pasture1 is a pasture for the young animals for conditioning prior to them being moved to the confinement barns (Figure 5).

The topological features of the farm are shown in Figure 10 while Figure 11 provides a soils map for the farm. There are several soils on the farm, but they are dominated by the Alpin Fine Sand and related deep sand complexes (see Figure 11 and also See Non-Technical Descriptions of the soils in Appendix E). Soil borings and site specific soil investigation in the construction site area verified the soil descriptions are accurate.

Planned land treatment practices for the NMP for the farm are presented in Appendix C.

P Index

The Florida Phosphorus (P) Index is an assessment tool used to evaluate the potential for P transport from the land application area. One of the factors used in the P Index is the current soil test. The current soils test report (Appendix E) recommends no application of P_2O_5 to the crops. Also, a soil study (Appendix E) was conducted by Ron Kuehl to verify the soil classifications and the presence of any clay layers and coated sands. Based on the soil survey as verified by Mr. Kuehl, recent soil test for P levels, and proposed application rates, the P Indices were computed for all fields (See Phosphorus Index Worksheet in Appendix E and Table 4 for results of the P assessment) to determine the potential for P transport.

The field locations and ID numbers are shown in Figure 3. The phosphorus index is based the soil's erosion, runoff, and leaching potential, sensitivity of nearby waterbodies, soil phosphorus test results, and phosphorus fertility rates and application methods. Figure 11 shows the soils map for the farm that was used for the assessment. Table 4 shows the assessment parameters and the resulting phosphorus indices for each field. An index category of "low" or "medium" means the field can be nutrient balanced based on nitrogen, while indices of "high" or higher require nutrient balancing based on phosphorus. As seen in Table 4, all fields can receive manure/bedding materials based on nitrogen loading rates.

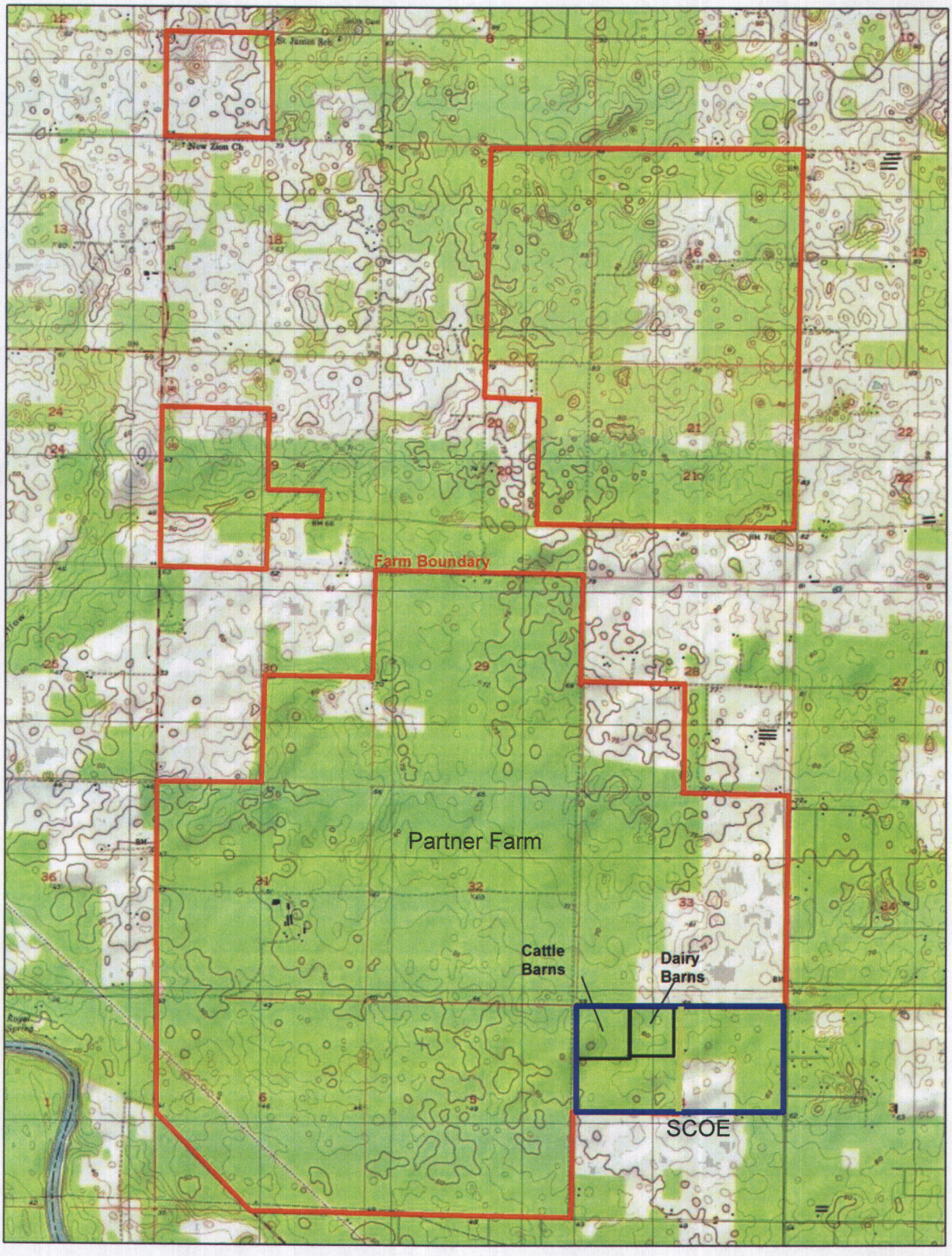
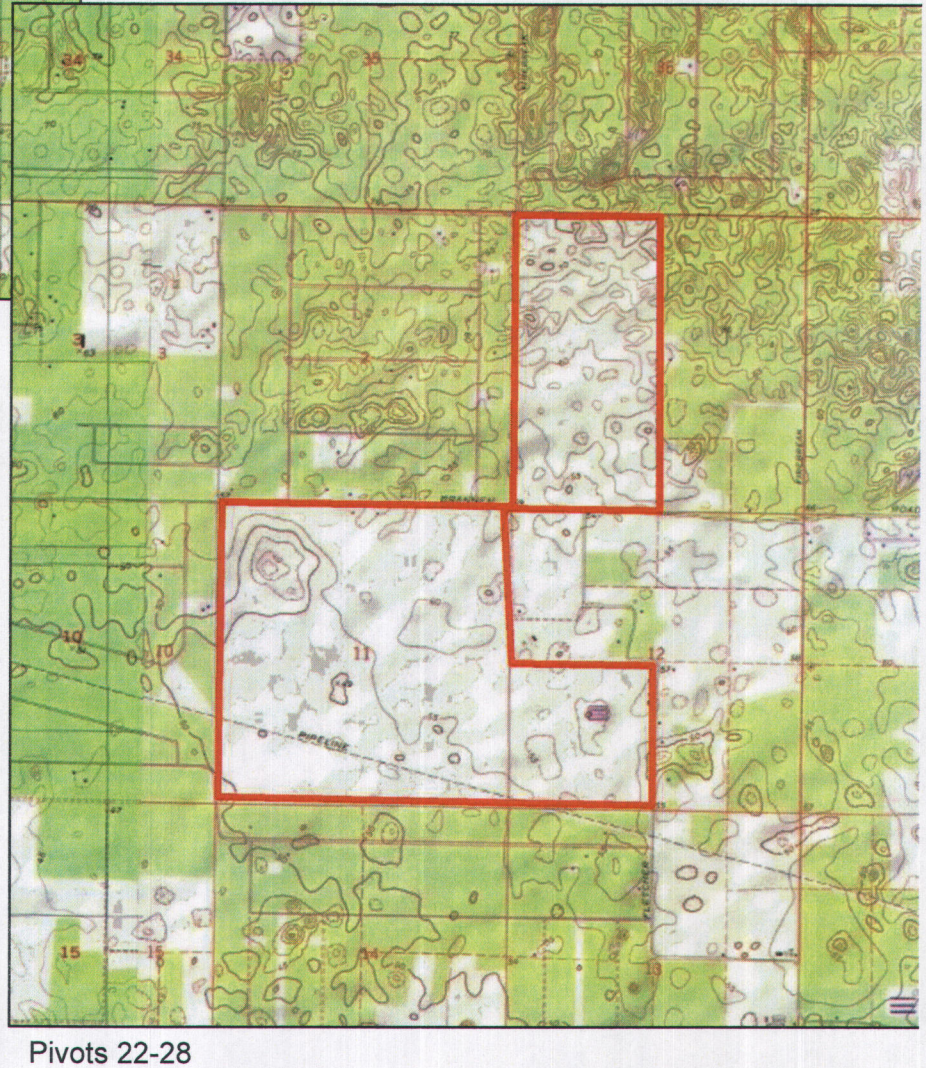


Figure 11.a Topographical Map of Pivots 1-43 and 51-58

Pivot 40



Pivots 22-28

Figure 11.b. Topographical Map of Pivots 22-28 and Pivot 40 to the Far North.

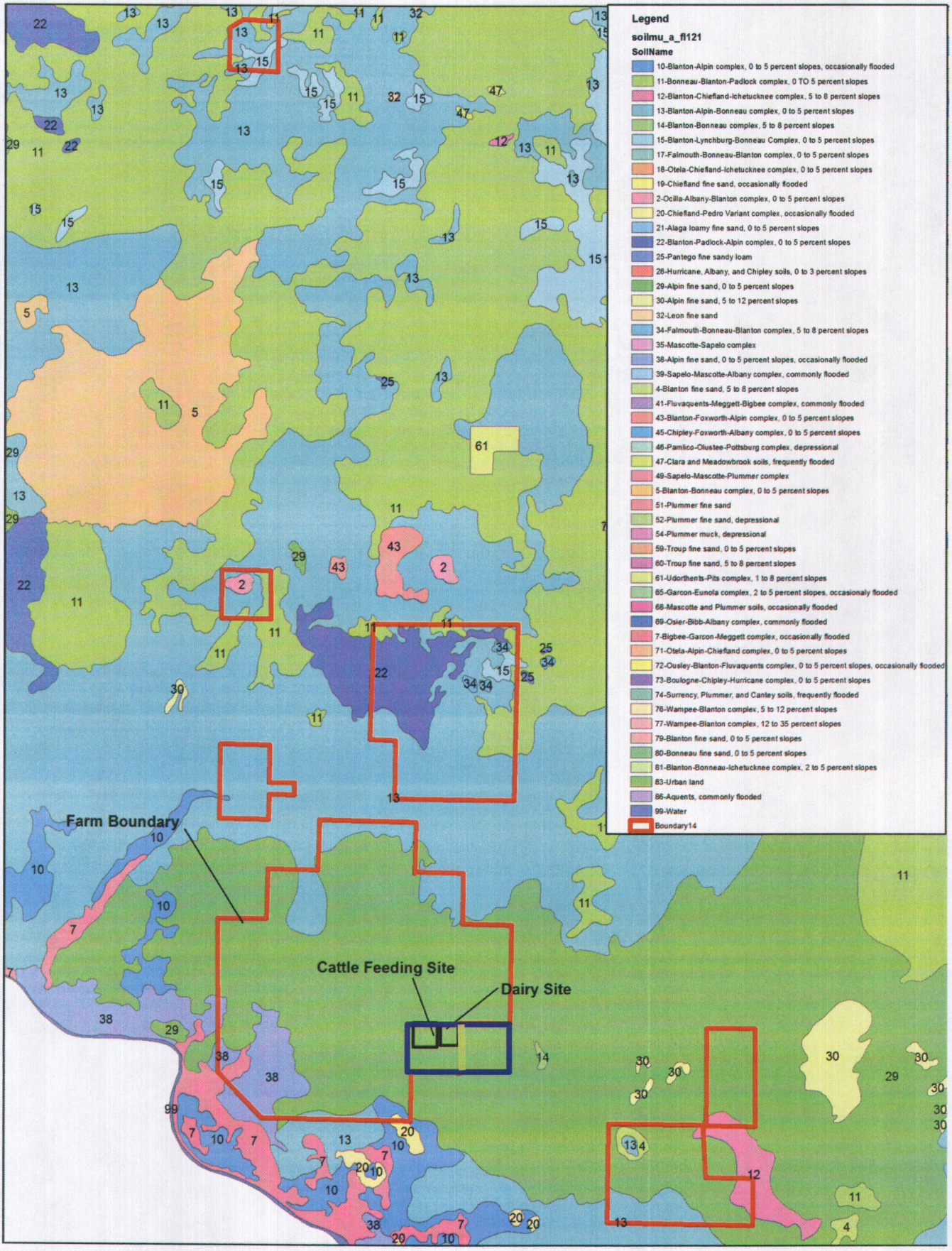


Figure 12. Soils Map

TABLE 4. PHOSPHORUS INDICES ANALYSIS FOR FIELDS

Field ID	Soil Type		Site Index Values					Mangement Index Values						Index	Rating
	Code	% of Field	Erosion*	Runoff**	Leaching***	Waterbody	Sum	Soil Test	Fertility Index	P APP 1	P APP 2	WW Vol	Sum		
1	29	100	0	1	4	0	5	65	1.6	1.9	3.4	0	7	35	Low
2	29	70	0	1	4	0	5	74	1.9	5.9	0.0	0.02	10	49	Low
3	13	25	0	1	4	0	5	74	1.9	5.9	0.0	0.02	10	49	Low
4	10	5	0	1	1	0	2	74	1.9	5.9	0.0	0.02	10	20	Low
5	20	5	0	8	1	0	9	74	1.9	5.9	0.0	0.02	10	88	Medium
6	29	100	0	1	4	0	5	93	2.3	5.9	0.0	0.02	10	51	Low
7	29	100	0	1	4	0	5	83	2.1	5.9	0.0	0.02	10	50	Low
8	29	100	0	1	4	0	5	102	2.6	5.9	3.0	0.02	14	68	Low
9	29	100	0	1	4	0	5	69	1.7	5.9	0.0	0.02	10	48	Low
10	29	70	0	1	4	0	5	67	1.7	5.9	0.0	0.02	10	48	Low
11	13	30	0	1	4	0	5	67	1.7	5.9	0.0	0.02	10	48	Low
12	29	60	0	1	4	0	5	72	1.8	5.9	0.0	0.02	10	49	Low
13	13	40	0	1	4	0	5	72	1.8	5.9	0.0	0.02	10	49	Low
14	29	85	0	1	4	0	5	75	1.9	5.9	3.7	0.02	14	68	Low
15	13	15	0	1	4	0	5	75	1.9	5.9	3.7	0.02	14	68	Low
16	29	95	0	1	4	0	5	99	2.5	5.9	0.0	0.02	10	52	Low
17	29	100	0	1	4	0	5	90	2.2	5.9	0.6	0.02	11	54	Low
18	29	100	0	1	4	0	5	105	2.6	5.9	2.0	0.02	13	63	Low
19	29	90	0	1	4	0	5	73	1.8	5.9	2.0	0.02	12	59	Low
20	13	10	0	1	4	0	5	73	1.8	5.9	2.0	0.02	12	59	Low
21	29	30	0	1	4	0	5	65	1.6	5.9	2.0	0.02	12	58	Low
22	38	70	0	1	4	0	5	65	1.6	5.9	2.0	0.02	12	58	Low
23	29	50	0	1	4	0	5	85	2.1	5.9	2.0	0.02	12	60	Low
24	38	50	0	1	4	0	5	85	2.1	5.9	2.0	0.02	12	60	Low
25	29	100	0	1	4	0	5	96	2.4	5.9	0.0	0.02	10	52	Low
26	29	85	0	1	4	0	5	80	2.0	5.9	0.0	0.02	10	50	Low
27	29	55	0	1	4	0	5	101	2.5	5.9	3.2	0.02	14	68	Low
28	13	45	0	1	4	0	5	101	2.5	5.9	0.0	0.02	10	52	Low
29	29	100	0	1	4	0	5	92	2.3	5.9	0.0	0.02	10	51	Low
30	29	85	0	1	4	0	5	70	1.7	5.9	0.0	0.02	10	48	Low
31	38	15	0	1	4	0	5	70	1.7	5.9	0.0	0.02	10	48	Low
32	29	50	0	1	4	0	5	63	1.6	5.9	0.0	0.02	10	48	Low
33	38	40	0	1	4	0	5	63	1.6	5.9	0.0	0.02	10	48	Low
34	7	10	0	4	1	0	5	63	1.6	5.9	0.0	0.02	10	48	Low
35	29	95	0	1	4	0	5	94	2.3	1.9	3.4	0	8	38	Low
36	12	5	0	1	1	0	2	94	2.3	1.9	3.4	0	8	15	Low
37	29	55	0	1	4	0	5	89	2.2	1.9	3.4	0	8	38	Low
38	13	20	0	1	4	0	5	89	2.2	1.9	3.4	0	8	38	Low
39	4	25	0	1	1	0	2	89	2.2	1.9	3.4	0	8	15	Low
40	29	35	0	1	4	0	5	65	1.6	1.9	2.9	0	6	32	Low
41	13	65	0	1	4	0	5	65	1.6	1.9	2.9	0	6	32	Low
42	29	40	0	1	4	0	5	58	1.5	1.9	2.9	0	6	31	Low
43	13	60	0	1	4	0	5	58	1.5	1.9	2.9	0	6	31	Low
44	29	70	0	1	4	0	5	112	2.8	1.9	4.6	0	9	46	Low
45	12	30	0	8	0	0	8	112	2.8	1.9	4.6	0	9	74	Low
46	29	80	0	1	4	0	5	73	1.8	5.9	2.0	0.02	12	59	Low
47	12	20	0	1	1	0	2	73	1.8	5.9	2.0	0.02	12	23	Low
48	29	100	0	1	4	0	5	70	1.8	5.9	2.0	0.02	12	58	Low
49	38	100	0	1	4	0	5	60	1.5	5.9	2.0	0.02	11	57	Low
50	7	70	0	1	8	0	9	55	1.4	5.9	0.0	0.02	9	84	Medium
51	38	30	0	1	4	0	5	55	1.4	5.9	0.0	0.02	9	47	Low
52	38	100	0	1	4	0	5	54	1.3	5.9	2.0	0.02	11	56	Low
53	29	20	0	1	4	0	5	42	1.0	5.9	3.6	0.02	13	63	Low
54	38	80	0	1	4	0	5	42	1.0	5.9	3.6	0.02	13	63	Low
55	29	40	0	1	4	0	5	92	2.3	5.9	3.8	0.02	14	70	Low
56	13	60	0	1	4	0	5	92	2.3	5.9	3.8	0.02	14	70	Low
57	29	100	0	1	4	0	5	70	1.7	5.9	4.9	0.02	15	73	Low
58	29	100	0	1	4	0	5	78	1.9	5.9	5.4	0.02	15	77	Medium
59	29	100	0	1	4	0	5	96	2.4	5.9	4.9	0.02	15	76	Medium
60	29	100	0	1	4	0	5	60	1.5	5.9	5.4	0.02	15	74	Low
61	13	100	0	1	4	0	5	86	2.1	22.2	0.0	0	24	122	Medium
62	13	50	0	1	4	0	5	65	1.6	22.2	0.0	0	24	119	Medium
63	2	25	0	4	1	0	5	65	1.6	22.2	0.0	0	24	119	Medium
64	13	45	0	1	1	0	2	52	1.3	22.2	0.0	0	24	47	Low
65	11	20	0	1	1	0	2	52	1.3	22.2	0.0	0	24	47	Low
66	15	35	0	1	1	0	2	52	1.3	22.2	0.0	0	24	47	Low
67	13	90	0	1	4	0	5	65	1.6	22.2	0.0	0	24	119	Medium
68	10	10	0	1	1	0	2	65	1.6	22.2	0.0	0	24	48	Low
69	13	100	0	1	4	0	5	66	1.7	22.2	0.0	0	24	119	Medium
70	13	100	0	1	4	0	5	50	1.3	22.2	0.0	0	23	117	Medium

* On fields with 100% grass cover and zero runoff potential, the RUSLE erosion calculation would yield no erosion potential. Cropped fields were < 5 T/A or 1 index, however, "0" was set for fields with no surface outlet, i.e. drains to internal depressions, "1" set for surface outlet (sinkholes and offsite), see Appendix H

** Most of the soil types within the fields have an "A" hydrologic group code, plus these fields no surface outlets, therefore zero runoff potential, so set at 0 to reflect soil condition except if sensitive area present, i.e. sinkhole.

*** IFAS Circular 1279 with Nov.2005 using draft Table 14 used.

SECTION 4: NUTRIENT MANAGEMENT

This section addresses the requirements for land application of all nutrients and organic by-products (e.g., animal manure, wastewater, commercial fertilizers, crop residues, legume credits, irrigation water, etc.). Consideration for manure odor management is included. Land application of manure and organic by-products is the most common method of manure utilization due to the nutrients and organic matter content of the material. Land application procedures is planned and implemented in a way that minimizes potential adverse impacts to the environment and public health.

General

Conservation practices planned for each field and the operation are listed in the Plan and Implementation Schedule (Appendix C). Specifics of the nutrient management plan are listed below.

Manure and associated byproducts applied on this farm will be land applied based on the applicable regulations, crop, yield of the crop to be grown, and analysis of the wastewater and manure collected as solids.

The P-Index assessment indicated a predominantly low potential for P to be transported from the field. Therefore, the application rate will be based on N for all areas (see Section 3).

Nutrient Management Plan

There are three types of land application of manure products on the farm. First, will be the application of the wastewater effluent from the methane digester via irrigation, second will be the application of separated, settled, and composted solids via spreaders, and third will be the direct manure deposition by the grazing animals in cattle conditioning pastures and heifer pastures. The estimated manure production rates per animal are provided in Tables 5 and 6 and are based on the NRCS Agricultural Waste Management Field Handbook.

The nitrogen and phosphorus application rates for the various crops grown on Partner Farm were taken from the NRCS Animal Waste Management Field Handbook and are provided in Table 7. Table 8 provides an example of variable crop rotation grown on the farm and their estimated nitrogen uptakes. However, because of the annual variability of the crop rotations under the pivots, the net nutrient balance for the cropped field are provide as annual average balances of the typical distribution of crops for the three field categories of sprayfields (receive wastewater effluent), seasonally grazed fields, and cropped fields only receiving periodic solids applications. Table 9 provides the amount of nutrients being deposited in the confinement barns and how these nutrients move through the waste management system to ultimately provide the amount of nutrient that will be land applied via the irrigation effluent from the digester or as solids that are removed before the wastewater enters the irrigation wastewater storage pond. This table also takes into accounts atmospheric losses of nitrogen due to volatilization. Table 10 provides nutrient uptakes estimated based on NRCS handbook values for hay, crops, grazing, and forage production, the manure application rate, and the required supplemental fertilizer quantity, if any. As seen in Table 8, for most fields, the nutrient loads from the manure products are well below even the phosphorus limits for allowable nutrient applications although the design was based on N.

TABLE 5. BEEF CATTLE WASTE AND BEDDING NUTRIENT CHARACTERISTICS

Animal Type	Average Weight (lbs)	Nitrogen* Excreted (lbs-N/yr/animal)	Phosphorus* Excreted (lbs-P/yr/animal)	Potassium* Excreted (lbs-K/yr/animal)
Beef Manure	863	94	30	66
Bedding Material	-	9	10	9
Total	863	103	40	76

* Nutrient excretion rates estimated from NRCS Agricultural Waste Management Field Handbook and Van Horn, et al. (1990) where a medium to high. feed ration was assumed.

TABLE 6. DAIRY ANIMAL WASTE NUTRIENT CHARACTERISTICS

Animal Type	Average Weight (lbs)	Nitrogen* Excreted (lbs-N/yr/animal)	Phosphorus* Excreted (lbs-P/yr/animal)	Potassium* Excreted (lbs-K/yr/animal)
Lactating Cows	1300	250	53	145
Dry Cows	1250	180	41	108
Springers	1100	0	0	0
Heifers	800	91	11.7	70
Bulls	1200	150	41	90
Calves	100	15	2.5	8

* Nutrient excretion rates estimated from NRCS Agricultural Waste Management Field Handbook and Van Horn, et al. (1990) where a medium to high. feed ration was assumed.

TABLE 7. NUTRIENT UPTAKE BY PARTNER FARM CROPS

Crop	Yield	Units	N%	P%	K%	N(lbs/acre)	P(lbs/acre)	K(lbs/acre)
Peanuts	2,800	lbs/acre	3.60%	0.17%	0.50%	101	5	14
Snap Beans	6,000	lbs/acre	0.88%	0.26%	0.96%	53	16	58
Carrots	26,000	lbs/acre	0.19%	0.04%	0.25%	49	10	65
Sweet Corn	11,000	lbs/acre	0.89%	0.24%	0.58%	98	26	64
Field Corn Silage	14,000	lbs/acre	1.10%	0.20%	1.34%	154	28	188
Potatoes	29,000	lbs/acre	0.33%	0.06%	0.52%	96	17	151
Oat haylage	8,000	lbs/acre	1.60%	0.28%	0.94%	128	22	75
Cotton	1,600	lbs/acre	2.67%	0.58%	0.83%	43	9	13
Sorghum	9,000	lbs/acre	1.67%	0.36%	0.42%	150	32	38
Hay (bermuda/rye)	13,000	lbs/acre	2.96%	0.34%	1.40%	385	44	182
Haylage (bermuda)	8,000	lbs/acre	1.88%	0.19%	1.40%	150	15	112
Grazing (dry)	7,000	lbs/acre	3.79%	0.44%	1.40%	265	31	98
Grazing (irrigated)	10,000	lbs/acre	3.95%	0.47%	1.41%	395	47	141

TABLE 8. NITROGEN UPTAKE BY TYPICAL CROP ROTATIONS AT PARTNER FARM

Field #	Acres	1st crop	N req.	2nd crop	N req.	3rd crop	N req.	Total N/ac/yr
1	66	Sweet corn	98	Field corn	131	Oats-graze	92	321.1
2	135	Peanuts	142			Oats-graze	92	234.6
3	137	Sweet corn	98	Field corn	131	Oats-graze	92	321.1
4	134	Peanuts	142			Oats-graze	92	234.6
5	136	Potatoes	89	Peanuts	142			231.5
6	134	Potatoes	89	Field corn	131			220.2
7	136	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
8	137	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
9	137	Potatoes	89	Peanuts	142			231.5
10	137	Peanuts	142			Oatlage	91	233.6
11	136	Peanuts	142			Oatlage	91	233.6
12	138	Field corn	229	Sorghum	115	Oats-cut Feb	86	430.5
13	137	Field corn	229	Sorghum	115	Oats-cut Feb	86	430.5
14	88	Field corn	229	Sorghum	115	Oats-cut Feb	86	430.5
15	137	Peanuts	142			Oatlage	91	233.6
16	117	Peanuts	142			Oatlage	91	233.6
17	141	Peanuts	142			Oatlage	91	233.6
18	138	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
19	136	Peanuts	142			Oatlage	91	233.6
20	137	Snap beans	88	Field corn	131	Oats-cut Feb	86	305.5
21	103	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
22	133	Sweet corn	98	Field corn	131	Oats-graze	92	321.1
23	135	Peanuts	142			Oats-graze	92	234.6
24	134	Snap beans	88	Field corn	131	Oats-cut Feb	86	305.5
25	135	Snap beans	88	Field corn	131	Oats-cut Feb	86	305.5
26	130	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
27	137	Peanuts	142			Oatlage	91	233.6
28	136	Peanuts	142			Oatlage	91	233.6
29	33	Peanuts	142			Oatlage	91	233.6
30	33	Peanuts	142			Oatlage	91	233.6
31	36	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
32	35	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
33	136	Peanuts	142			Oatlage	91	233.6
34	135	Potatoes	89	Field corn	131			220.2
35	138	Snap beans	88	Field corn	131	Oats-cut Feb	86	305.5
36	136	Potatoes	89	Field corn	131			220.2
37	138	Sweet corn	98	Field corn	131	Oats-cut Feb	86	315.4
38	136	Peanuts	142			Oats-graze	92	234.6
39	132	Snap beans	88	Field corn	131	Oats-cut Feb	86	305.5
40	135	Peanuts	142			Oatlage	91	233.6
41	37	Field corn	229	Sorghum	115	Oats-cut Feb	86	430.5
42	37	Field corn	229	Sorghum	115	Oats-cut Feb	86	430.5
51-58	Are being developed so no cropping data available yet							

TABLE 9. NUTRIENT BALANCE FOR AREAS WHERE MANURE IS DEPOSITED AND COLLECTED FOR LAND APPLICATION

Design Parameters:	**4521**	**beef cattle**
(Annual Average Values)	**2400**	**lactating cows**
	400	**dry cows/springers**

Location	Percent Time Dairy Herd Spends in Given Area	N Deposited	Collection Method	N Removal Rate as solids	N Removal Rate* in the Waste Management System 30%	N to Sprayfield	Removal before Sprayfield excl. past.
Suwannee Farms		(lbs-N/yr)		(lbs-N/yr)	(lbs-N/yr)	(lbs-N/yr)	(%)
Beef Cattle in Stacked Bed	100%	751485	Scraped	601188**	45089	105208	86%
Lactating in Parlor	15%	90000	Flush	0	27000	63000	30%
Lactating in Freestalls	85%	510000	Flush	0	153000	357000	30%
Dry/Springers in Freestalls	100%	72000	Flush	0	21600	50400	30%
Total		**1423485**		**601188**	**246689**	**575608**	**60%**

* N removal due to volatilization and solids removal

** 80% of solids and associated N from cattle barns is assumed to be directly land applied

N Based

Designed N Application/Acre	291	lbs-N/ac/yr	Comments:
Area of Sprayfield Needed:	1385	acres	Assumes 30% additional volatilization loss after application to field
Sprayfield Available:	2195	acres	

Solids

Area needed for Separated Solids	1457	acres	Assumes 50% additional volatilization loss after application to field
Available	1872	acres	

TABLE 10. NUTRIENT UPTAKES FOR CROPS AND ESTIMATED MANURE PRODUCT LOADS TO FIELDS

Field ID	Acreage (Active) (acres)	Crop***	Animal Type & Irrigation	Dry Matter Yield (tons/ac)	Nutrient Needed			Nutrients Provided by Manure Products****			Nutrients Provided by Commercial Fertilizer**			Waste Water Application (in/y)
					N (lbs/ac/y)	P2O5 (lbs/ac/y)	K20 (lbs/ac/y)	N* (lbs/ac/y)	P2O5 (lbs/ac/y)	K20 (lbs/ac/y)	N (lbs/ac/y)	P2O5 (lbs/ac/y)	K20 (lbs/ac/y)	
Areas where Waste is Collected and Treated														
CLA	10.5	-	Confined Cows/Cattle	-	-	-	-	-	-	-	-	-	-	-
Fields with Grazing Animals														
6,7,10,22-26,31, 33,36-37,38,54-56	2235	Vegetable / Forage	Cattle/Heifers / Yes	10	284	75	151	37	28	62	247	48	89	-
Cropped Sprayfields (Fields receiving wastewater)														
1-5,8,9,13-20,34-35	2195	Vegetable / Forage	No animals / Yes	12	291	77	154	184	142	239	107	-65	-85	2.33
Crop Land														
11,12,21,27-30,32, 39-42,51-53,57-58	1872	Vegetable / Forage	No animals / Yes	10	284	75	151	226	37	106	58	38	45	-
43-Hay Fielc	17	Bermudagrass/Rye-G	No animals / Nc	5	385	101	171	226	37	106	159	63	66	-

* Nitrogen losses after deposit of grazing animal manures is assumed to be 50%, note there are no P or K losses assumed.

** Fertilizer rate to be based on soil tests

*** Crops can include field and sweet corn, potatoes, peanuts, snap beans, oats, ryegrass, carrots, and sorghum

**** The source of the Manure Products for the three field categories are:

Fields with Grazing Animals direct deposition by animal manure and perhaps very limited amounts of solids from cattle barns and separated solids

Cropped Sprayfields: wastewater only from storage ponds

Crop Land: solids from cattle barns and separated solids

Please note that over time fields may be rotated between the **Crop Land** and **Fields with Grazing Animal**s categories.

Nutrient uptake for sprayfields (cropland) under irrigation with no grazing (Fields 1-5, 8, 9, 13-20, 34, 35) is based on combination crops of peanuts, snap beans, carrots, sweet corn, field corn, potatoes, oat, cotton, sorghum. Nutrient uptake for the crop varies between 98 and 402 lbs N/acre/yr depending on the crop combination.

Nutrient uptake for hayland not under irrigation (Field 43) is based on a bermudagrass and ryegrass combination. A conservative N requirement that can be safely applied from year to year by grazing animals is about 385 lbs.N/acre/yr. Application of N via solids application is projected to average 93 lbs. N/acre/yr. 292 N/acre/yr will have to be added (see Table 9).

Soil amendments shall be applied to adjust pH to the specific crop range for optimum utilization of nutrients as per soil test recommendations. Documentation of nutrients applied (including amounts, dates, form, source by field is necessary to evaluate the NMP. Section 5 provides record keeping requirements and forms for use in recording needed data.

Feed Production System

One of the greatest advantages of having the cattle feeding operation associated with Partner Farm is their ability to grow onsite most of the feed that the animals will need. As described in the previous section, the nutrients from the cattle feeding operation will be used to partially meet the nutrient requirements of the all crops on the farm including the forage crops for animal feed. The most likely forage crop rotation to be grown will be a corn/sorghum/ryegrass that will be harvested and placed directly into a bunker silo or silage bags. These crops will be ensiled in the bunker to produce a high quality moisture fodder for the animals. Other crop materials from the vegetable crops and packing operations may also be used as feed stuff for the animals. Additional grain mixes and nutrient feed supplements will also be purchased and stored in the roofed onsite commodity barns.

The cattle will be fed at least twice daily using feed stuff from the bunker silo and commodity barns. The feed will be presented to the animal along a feed-face on each side of the center drive lane. Any waste feed will either be used for supplement bedding in the barns or spread on surrounding fields at agronomic rates.

The roof runoff from the feed barns will be collected in gutters and piped to the large retention pond south of the confinement barns. All surface water drainage from these feed commodity facilities including the bunker silo will also be directed to a retention pond located south and west of the commodity barns, Figure 4. The system is designed so that no offsite discharge will occur from the commodity storage facilities for storms up to and including the 25-year, 24-hour storm event. The retention pond will also handle access road runoff and runoff from the bio-energy facility. An ERP stormwater permit will be modified and submitted to FDEP as part of the NPDES permit process.

Irrigation Water Management

Irrigation is a vital component to the successful implementation of this NMP and needed to ensure the planned crop production. See Appendix G for fresh water irrigation water management (IWM) plan. Note that since the wastewater is used as an alternative source of irrigation water, the net consumptive use of water on the farm is essentially unchanged with the addition of the cattle and dairy operations.

Manure Odor Management

The manure products in the cattle barns are routinely mixed with dry bedding materials to maintain an aerobic condition within the bedding/manure materials to minimize odor. The barns are also cleaned on a routine basis with solids being land applied or delivered on-site to the receiving pit of the methane digester. The dairy barns are flushed several times days. These practices and the physical location of the animal housing facilities within the farm property ensures minimize odors, particularly at farm boundaries. The solids and liquid effluent coming out of the methane digester will be virtually odor free because the odorous organics in the manure will be fully broken down during digestion process. In additional to the fact that the effluent has little, if any odor, the effluent will be diluted by a factor of 4:1 with freshwater at the pivots before land application, thus ensuring no detectable odors during land application.

SECTION 5: RECORD KEEPING

This section addresses records and documentation required for the NMP. Documentation of management and implementation activities associated with the NMP provides valuable benchmark information that can be used to adjust the NMP to better meet production objectives. Record keeping (manure analysis and feed analysis) have been recorded for the cattle feeding operation, but no onsite data are available yet for the dairy operation and therefore literature values were used for the development of the nutrient balance. Crop and waste production records were used to verify the NMP nutrient balance and help create future cropping sequence as shown in Table 9.

General

Field-by-field records are to be kept by the producer for a minimum of 5 years or the length of the cropping rotation, whichever is longer, for fields where the producer has control to apply waste. A record of nutrient application shall be maintained at the farm for the life of the system. Record keeping is to assist in maximizing the utilization of the land available and in the operation and maintenance of the waste management system. Plant tissue samples should be analyzed for N and P_2O_5 at each harvest with the results recorded on the ledger. See Table 10 for testing schedules.

Records will include the following:

1. Soil test results – Soil tests should be taken and sent to IFAS soil testing lab or other approved lab as recommended to monitor the soil nutrient levels and determine appropriate application rates.
2. Dates, quantities and sources of all nutrients applied and/or sold; and heavy metals applied if applicable; nutrient content of waste.
3. Dates, acres, and methods of nutrient application (e.g. broadcast, incorporated, injected, or fertigation).
4. Crops planted and dates planted, weather conditions, and soil moisture condition at time of application.
5. Harvest dates and yield.
6. Results of laboratory test (e.g. manure analysis, plant tissue, and other organic by-product test).
7. Adjustments to the nutrient management plan based on records and changes in farming operations as appropriate.
8. Record of internal inspections for manure system components.
9. Record of any spill events.
10. Number of cows on a monthly basis.
11. Number of cows and hours per day in pasture. Hours needed only if animals are being moved from pasture to barns on a daily basis.
12. Inspections made by third party.
13. Changes to NMP.

TABLE 10 TESTING SCHEDULE

Items to be Tested	Test	Testing Frequency
Solids from Confinement Barn	N, P2O5, K20	Quarterly
Crops in waste distribution fields	N, P2O5, K2O in plant tissue samples	Each harvest
Pastures	N, P2O5, K2O in plant tissue samples	Once every 6 months
Soil test	P2O5, K2O	Annual

Sample record keeping forms are attached:

ɘnter Pivot

______________ LANDOWNER:________________________________

TION		CENTER PIVOT OPERATION DATA			****LAB ANALYSIS OF WASTE WATER						CROP DATA				
ᑭ	ACRES				NUTRIENT CONTENT (LBS/AC IN)			*NUTRIENT APPLIED (LBS/AC)			YIELD	CROP ANALYSIS (LBS/TON)			**NUTRIE
		TIMER SET (%)	RUN TIME (HRS)	GROSS DEPTH (IN)	N	P_2O_5	K_2O	N	P_2O_5	K_2O	(TONS/AC)	N	P_2O_5	K_2O	N

'IELD (TONS/AC) * CROP ANALYSIS(LBS. OF NUTRIENT/TON)
ɿUTRIENT CONTENT(LBS OF NUTRIENT/AC-IN) * GROSS DEPTH APPLICATION VOLUME (IN)
ⱯGE
/ASTE STORAGE FACILITY WHEN PUMPED OUT

lger

______________ Landowner: ______________________________

ɟetation		Tons of Solids Applied (ton/ac)	Lab Analysis of Solids/Sludge 1/						Crop Data						
			Nutrient Content (lbs/ac in)			Nutrient Applied (lbs/ac) 2/			Yield (ton/ac)	Crop Analysis (lbs/ton)			Nutrient Removal (lbs/a		
Crop	Acres		N	P_2O_5	K_2O	N	P_2O_5	K_2O		N	P_2O_5	K_2O	N	P_2O_5	K_2

te storage pond when pumped out or in solids separator

Yield (tons/ac) x Crop Analysis (lbs of nutrient/ton)

ıutrient Content (lbs of nutrient/ton) x Tons of Solids Applied

Crop Planting Harvesting Ledger

Farm Name: _____ Landowner: _____

Date	Planting/ Harvesting	Vegetation			Crop Data						
					Yield (ton/ac)	Crop Analysis (lbs/ton)			Nutrient Removal (lbs/ac) 1/		
		Field #	Crop	Acres		N	P2O5	K2O	N	P2O5	K2O

1/ Nutrient Removal (lbs/ac) = Yield (tons/ac) x Crop Analysis (lbs of nutrient/ton)

Pasture Use Ledger

Farm Name: _____ Landowner: _____ Herd No: _____

Date	Herd Lot No.	Crop	Acres	# of Cows	Avg. Weight of Cows (lbs)	Time in Herd Lots (hours)

Record of Federal Restricted Use Pesticide Application for Crop Year _____

(Certified Private Applicator-Name) _____ (Certification No. If Available) _____

Date Mo/Day/Yr	Location or Tract/Field	Brand Name Or Product Name And Registration No.	Total Amount Applied	Size Of Area Treated	Crop, Commodity, Stored Product Or Site	Check This Block If Spot Treat.

SECTION 6: OPERATION AND MAINTENANCE

This section addresses the operation and maintenance of the waste management system, conservation practices, soil testing, manure testing, and equipment calibration.

General

Operation and maintenance of structural, non-structural, and land treatment measures requires effort and expenditures throughout the life of the practice to maintain safe conditions and assure proper functioning. Operation includes the administration, management, and performance of non-maintenance actions needed to keep a completed practice safe and functioning as planned. Maintenance includes work to prevent deterioration of practices, repairing damage, or replacement of the practice if one or more components fail. Listed below is the operation and maintenance for the structural, non-structural, and land treatment measures for this cattle feeding and dairy operation.

Manure and Wastewater Management in Confinement Barns and Methane Digester

The most critical management activity for the cattle feeding operation is the proper management of the stacked bedding packs in the barns so that no runoff will occur from them. The confinement barns have concrete floors. Bedding materials, such as peanuts hulls, old hay, sawdust, or old horse bedding, must be spread in the barns every few days to ensure adequate moisture adsorption of manure products and to provide a comfortable lounging environment for the animals. Between moisture evaporation and bedding material adsorption, no runoff of manure products should occur off the concrete pad. It is anticipated that the initial layer of bedding material will be spread just after cleanout and before the animals are brought back into the barn. Additional bedding will likely be blown in from the outer edges of the barn or from the feed lane on an as needed basis. Periodical grading of the stacked bed with a power rake may be needed to level the bed.

The manure/bedding materials will accumulate in the barns (under roof) until removed and land applied or possibly periodically delivered to the methane digester. All of the wastewater from the dairy confinement barns will be delivered to the methane digester. The effluent from the irrigation pond that receives the effluent from the digester will be sprayed on about 2195 acres of surrounding farmland while the screened and settled solids will be spread on about 1889 acres of surrounding farmland. There is adequate storage in the barns to handle the accumulated manure/bedding materials for an entire grow-out period if needed, but cleanouts will be done about weekly to improve the performance of the methane digester. The manure/bedding materials will be cleaned out of the barns by front-end loaders and placed directly into spreader for land application or may periodically be delivered, via truck or wagon, to the reception pit of the methane digester where it is mixed with water and chopped to form ~12% solids slurry before being pumped into a 2.7 million gallon, spirally-mixed, plug-flow, and temperature-controlled methane digester. The manure/bedding materials will be representatively sampled and tested for nitrogen and phosphorus content as it is being added to the digester's reception pit. The effluent from the dairy barns will also be periodically tested for nutrients and solids content. The operation and maintenance of the methane digester and its associated electricity generation facility has been provided to the farmer as a independent document by the DVO, Inc. the constructor that built the bio-energy facility. The operation of the digester will not influence the waste handling procedures described in the plan and therefore are not included.

Digester Effluent Solids Separation and Handling

All of the dairy wastewater will be delivered directly to the methane digester and periodically some of the cattle manure/bedding may also be delivered to the digester, but typically will be land applied. The digester will breakdown about 50% of the solids through its anaerobic processes. The effluent from the digester will be pumped through three screw presses to remove the larger solids. The solids from the screen separators will accumulate on a concrete pad that has a roof over it before being moved to outside composting piles or land applied directly or for delivery off-farm. The effluent from the solids separators will gravity drain into a solids settling tank to remove additional solids before going to the irrigation storage pond. Solids in the settling tank will be transferred to a slurry tanker via a pipe collected to the bottom of the tank. There will be sufficient head pressure within the tank to force the solids into the slurry tanker. The slurry tanker will be used to spread these solids on the appropriate fields. The overflow from the settling tank flows via gravity to the plastic lined irrigation holding pond.

Irrigation Pond Management

The irrigation / waste storage ponds have a storage capacity of approximately 1.7 million gallons, which translates into a holding time of approximates 3 days. However, to ensure adequate storage within the pond for the 25-year 24-hour design storm event, the water depth in the pond shall not exceed 16.0 feet (2 feet below top of dike) during normal operations, which includes 11.8 inches for the 25-year 24-hour design storm and 1.0 foot of freeboard. A visible marker shall be placed at a location that can be observed daily to ensure the pond does not exceed this depth. Water in the pond will be pumped to the sprayfields via 6" PVC pipelines using a 250 GPM irrigation pump station that will have a screened floating inlet.

Waste water Land Application

Effluent from the irrigation storage pond will be pumped to center pivot irrigation systems on the farm for delivery to crops in accordance with the nutrient management plan. The sludge solids from the settling pond will be spread on fields outside of the effluent sprayfields at agronomic rates. In according with USDA recommendations no wastewater effluent or sludge solids shall be applied to any editable crops within 120 days of harvest. Composted solids may be applied within 30 days of harvest. The Partner Farm has agreed to follow these recommendations even though they are only recommendations, i.e. not mandated.

Nutrient Management

The effluent from the irrigation pond will be sprayed on about 2195 acres of surrounding farmland while the settled solids will be spread on about 1889 acres of surrounding farmland in accordance with the application rates should in Table 9. To ensure the appropriate application rates occur, the effluent and solids must be sampled representatively every two weeks and composited and preserved over no more than one quarter before being tested for total nitrogen and total phosphorus concentrations. The nutrient content and applications can then be used to calculate the nutrient loads being applied to the land. Records of the amount, nutrient content, and application field number must be kept.

When applying commercial fertilizer, calibrate application equipment every day to ensure that applied rates are within +/- 10% of recommended rates. It is important to avoid unnecessary exposure to chemical fertilizers and organic wastes. Protective clothing, respirator, gloves and footwear shall be worn when appropriate. When cleaning equipment after nutrient application, residual fertilizers shall be removed and saved in an appropriate manner. If the system is to be flushed, waste water shall be kept away from high runoff areas, ponds, lakes, streams, wells, and other water sources. Fertilizer containers shall be disposed in an approved manner, according to local or state regulation. Commercial fertilizer application will be based on the nutrient rates shown in
Table 9.

Do not spread manure products or fertilize within 50' of the property line or in the 50' buffer zone around the sinkholes shown in Fields 23, 26, and 39.

Irrigation Management

The total annual quantity of fresh water and effluent irrigation is to be applied uniformly over the irrigated area in accordance with the IWM plan as provided in Appendix G. Any changes in the cropping system will need to be analyzed to determine the effects that may occur on nutrient uptake and water use in the irrigated area.

Check the sprinkler nozzles frequently for any blockage. Periodically check and repair if needed the air release valve, pressure gage, check valve and pressure release valve at the pump discharge and the components at the irrigation well.

Pest Management

See Appendix H.

Equipment Calibration

Commercial Fertilizer Application Equipment Calibration

The nitrogen applicator, the commercial broadcast spreaders, and corn planter will be set per the manufacturers recommendations then filled with a known amount and checked over known acreage. Adjustments will be made to achieve the planned rates.

Watering Facility

As shown in the barn drawings the water troughs are located on the outside of the barns so that if overflow occurs the water will not enter the bedding material. The water supply line will also be on the outside of the building so any leakage will not come into contact with the bedding material. The water troughs in the holding pens and CLA must be checked often for leaks and the proper functioning of automatic water level control devices. Replace or repair defective automatic water level controls immediately. Water troughs not in use should be drained to prevent the formation of algae. The area around the water troughs will need to be shaped and filled to prevent rutting, ponding, organic build-up, and erosion around the concrete.

Pasture Management

Grazed fields shall be managed for the optimal growth of bermudagrass and ryegrass as appropriate. The time that animals are in the condition pastures should average less than 45 days per growout period. The grasses shall be mowed and reseeded as needed to maintain a continuous cover. It is anticipated that hay will be cut from all pastures at least once a year. Grazing of pastures should commence and cease based on the bermudagrass or ryegrass height. Grazing of pastures should commence when the bermudagrass or rye has reached a height of 6 inches. Grazing should be stopped when the bermudagrass has been reduced to a

height of 4 inches and the rye at the height of 3 inches. Herds should be rotated through their assigned pastures so as to allow each pasture some consecutive days rest.

Fields with grazing beef cattle will be managed for temporary grazing between August and April where sorghum will be used as forage crop during the summer and early fall and ryegrass may be used during the late fall and winter.

Time on pastures shall be such that the cattle/acre/yr is uniform. The actual time that cattle are on pastures shall be adjusted based on production of forage and amount of nutrients applied. It is required that a ledger be kept to record the number of cows and time kept on individual pasture area. A sample ledger is attached. The farm must be managed to prevent HIA's from developing. This will be accomplished using gates and fencing to confine cows to specific areas. The cows should be moved non-stop between the barn and pastures - ***do not*** allow the cows to pause between destinations. Gates and fences will be used to keep the cows either on pasture or on concrete to avoid creation of a HIA. Portable feeders, portable shades, electric fence and portable water troughs are ways to help distribute the cows, and ultimately evenly spread the nutrients over the pastures. Electric twine can be used to subdivide the pastures and restrict grazing to the desired areas. This will help prevent the formation of HIA's. A daily use record, such as the attached ledger, should be used in order to insure uniform distribution of the nutrients. If an HIA starts to develop, corrective measures must be taken. Corrective actions may include, but are not limited to, temporarily fencing off the area, reseeding the area, and relocating the cause of the HIA. Supplemental fertilizer may be needed to maintain vegetation in the pastures in good condition. A soil test will determine which nutrients are lacking and the amount to apply. Only apply the amount of nutrients recommended by the soil test and in accordance with the nutrient management plan.

Animal Trails and Walkways

The walkways should be cleaned frequently to prevent a buildup of manure and reshaped as necessary to facilitate the removal of surface runoff. Fences and gates shall be used to control the access and movement of cattle using the animal trails and walkways and to prevent the creation of ruts in the trails and walkways.

Fencing

Fences and gates will be inspected often and repaired promptly. Electric twine can be used if it becomes necessary to subdivide the herd lots and to prevent the development of HIA's.

Record Keeping

See Section 5 of this document.

Manure/Bedding and Wastewater Testing

Sampling Frequency

The bedding material in the confinements should be sampled just prior to each barn cleanout. However, management of the waste can be improved if a sample is taken both during field application and about two weeks prior to field application to allow time for a testing lab to analyze the manure and provide results of the analysis. A history of analysis can further provide guidance on how often samples should be collected as long as consistent management of the operation is maintained.

The actual amount of nutrients applied can be calculated if sampling the nutrient content of the manure products occurred when they are field applied provided that the application equipment

has been recently calibrated. The disadvantage of sampling the nutrient content of the manure products is that a targeted nutrient application rate cannot be achieved without knowing the nutrient value and adjusting the application rate accordingly.

To apply the manure products at an estimated targeted nutrient application rate, historical analysis or documented data shall be used. Once the actual analysis of the manure products is received from the testing lab, the historical analysis and/or documented data can be compared with the actual analysis. This will allow the operator to apply a specific amount of nutrient to a given field.

The effluent/wastewater being pumped from the irrigation pond to the sprayfields also needs to be sampled and tested quarterly along with records of the flow meter readings monthly.

Collecting a Solid Sample

Manure products from the stacked beds generally have a moisture content of approximately 80%. Following are guidelines for collecting solid manure samples:

Representative sample is required. If using a narrow bladed shovel, dig down into the pile at various depths, but withdrawing the sample from at least 18-inches below the surface crust. It is also possible to use a metal pipe that has a 3-inch diameter, is 4 to 5 ft long, and sharpened on the bottom end. This pipe can be pressed or driven into the pile, using wooden dowel or broom handle to dislodge the sample from the pipe after it has been withdrawn.

- Brush away exterior crust.
- Collect 10 to 12 sub-samples from all over stack, extending as deeply as possible.
- Avoid bedding materials when collecting, if possible.
- Pour each sub-sample into a clean plastic bucket, mix well, and place about a quart into a "ziploc"-type plastic bag.
- Label bag (date, time, location) and deliver to testing lab.

The liquid wastewater samples should be collected via a spigot on the discharge pipe from the irrigation pump. The sample shall be collected after the irrigation system has been operating for a minimum of one hour. Multiple composited samples over the course of the irrigation cycle would be better, but not required.

Preparing the Sample for Delivery to a Testing Lab

It is important to take special care of the sample once collected. All samples, whether solid or liquid should be delivered as soon as possible after collection. Please follow the laboratory's requirements for collection, storage, and preservation protocols. If immediate delivery is not possible, refrigerate solid samples and freeze liquid samples until delivery. Samples to be stored more than 14 days before delivering to the lab typically should be frozen.

- Deliver or mail samples to the lab as soon as possible.
- DO NOT USE GLASS OR METAL CONTAINERS to collect or ship the sample. Glass can break if miss-handled and metal can contaminate samples. Use only clean plastic bottles, buckets, and bags.
- Double bag all solid samples in a "ziploc"-type plastic bag.
- Liquid samples should be placed in a clean plastic bottle, allowing a one-inch air space at the top. Many labs can provide 250-ml bottles to use for liquid samples. Make sure bottle caps are tightened sufficiently to prevent leakage.
- Attach a completed sample submission form to the samples, making sure that labels on the samples match what is on the form. It is helpful to enclose sample submission forms (and payment, if applicable) in a separate "ziploc"-type plastic bag to protect it in case of condensation, etc.

Consider the postal schedule before collecting a sample. Samples collected and mailed early in the week will stand less chance of sitting idle in the postal system over a weekend.

Soil Tests

Soil tests are required to ensure nutrients are being applied at appropriate agronomic rates, Soil testing should occur as recommended in Table 11. Soil nutrient levels should be monitored by soil testing to determine the requirement or buildup of phosphorus and potassium in the soil. As a minimum, a soil test analysis must include pH, phosphorus, and potassium.

Soil samples are to be collected in accordance with the University of Florida Institute of Food and Agricultural Sciences (IFAS) extension service guidance or standard industry practice if accepted by IFAS.

Soil testing is to be performed by laboratories that are accepted in one or more of the following programs:

- State Certified Programs
- The North American Proficiency Testing Program (Soil Science Society of America)
- Other laboratories whose test results and interpretations of such test are within the currently accepted guidelines of IFAS.

Groundwater Monitoring

The existing nine monitoring wells (MWB-1, MWB-2, MWI-3, MWC-4, MWI-5, MWC-6, and MWC-7, MWC-8, and an observation well MWI9) are shown on Figure 3 shall monitored routinely. Groundwater samples should be taken from the monitoring wells on a quarterly basis and analyzed by a laboratory approved by the Florida Department of Health and Rehabilitation Services. Follow proper procedures while sampling, preserving, and transporting these samples. As a minimum, the **quarterly** water samples should be analyzed for the following parameters:

In situ parameters:

pH

Water depth (feet)

Laboratory analyses:

Nitrate+Nitrite Nitrogen (as N)
Ortho Phosphorus (as P)
Fecal Coloform

The above sampling results shall will be maintained at the farm and provided to FDEP per permit requirements. Annually, a trend analysis of the groundwater nitrate+nitrite data shall be completed to identify possible changes that could indicate the need for corrective actions.

Safety

Due to the possible entrance to the facility by the public, placing warning signs around hazardous areas as a precautionary measure is strongly recommended. NRCS personnel will provide assistance in sign wording and location upon request.

Acceptance of O&M Plan

The undersigned has read and agrees with all the terms and conditions of this Operation and Maintenance Plan.

_____ (Owner)

_____ (Date)

APPENDIX A - NMP CHECKLIST

This appendix contains the checkslist that was used to complete the NMP. The checkslist contains all the topics and items that shall be covered in the NMP. The checklist should be used whenever the NMP is updated or revised.

NMP Checklist

1. Site information

- ✓ Names, phone numbers, and addresses of the AFO owner(s) and manager(s).
- ✓ Location of production site: legal description, driving instructions from nearest post office, and the emergency 911 coordinates.
- ✓ Farmstead sketch.
- ✓ Plat map or local proximity map (Optional).
- ✓ Emergency action plan covering: fire, personal injury, manure storage and handling, and land application operations.
- ✓ Operation procedures specific to the production site and practices.
- ✓ Existing documentation of present facility components that would aid in evaluating existing conditions, capacities, etc. (i.e., as-built plans, year installed, number of animals a component was originally designed for, etc.)

2. Production information

- ✓ Animal types, phases of production, and length of confinement for each type at this site.
- ✓ Animal count and average weight for each phase of production on this site.
- ✓ Calculated manure and wastewater volumes for this site.
- ✓ Manure storage type, volume, and approximate length of storage.

3. Applicable permits or certifications

- ✓ Federal, Tribal, State or local permits and/or ordinances.
- ✓ Operator or manager certifications.
- ✓ Manure applicator certifications.
- ✓ Record of inspections or site assessments.
- ✓ Changes made to NMP.

4. Land application site information

- ✓ Date plan prepared.
- ✓ Written manure application agreements (when applicable).
- ✓ Aerial maps of land application area.
- ✓ Individual field maps with marked setbacks, buffers, and waterways, and environmentally sensitive areas, such as sinkholes, wells, gullies, tile inlets, etc.
- ✓ Landowner names, addresses, and phone numbers.
- ✓ Legal description of land sites, including watershed codes.
- ✓ Specific and unique field identification codes.
- ✓ Land use designation.
- ✓ Soil map, with appropriate interpretations
- ✓ Risk assessments for potential nitrogen or phosphorus transport from fields. (See NRCS GM –190, Part 402, "Nutrient Management", Section 402.07)
- ✓ Land treatment practices planned and applied, and level of treatment they provide.

5. Manure application plans

- ✓ Crop types, realistic yield targets, and expected nutrient uptake amounts.
- ✓ Application equipment descriptions and methods of application.
- ✓ Expected application seasons and estimated days of application per season.
- ✓ Estimated application amounts per acre (volume in gallons or tons per acre, and pounds of plant available nitrogen, phosphorous as P_2O_5, and potassium as K_2O per acre)
- ✓ Estimate of acres needed to apply manure generated on this site respecting any guidelines published for nitrogen or phosphorous soil loading limits.

6. Actual activity records

- ✓ Soil tests -- not more than 5 years old.
- ✓ Manure test annually for each individual manure storage containment.
- ✓ Planned and applied rates, methods of application, and timing (month and year) of nutrients applied. (Include all sources of nutrients – manure, commercial fertilizers, etc.)
- ✓ Current and/or planned crop rotation.
- ✓ Weather conditions during nutrient application (Optional)
- ✓ General soil moisture condition at time of application (i.e., saturated, wet, moist, dry) (Optional)
- ✓ Actual crop and yield harvest from manure application sites.
- ✓ Record of internal inspections for manure system components.
- ✓ Record of any spill events.

7. Mortality disposal

- ✓ Plan for mortality disposal.
- ✓ Methods and equipment used to implement the disposal plan.

8. Operation and Maintenance

- ✓ Detailed operation and maintenance procedures for the conservation system, holding facility, etc., contained in the NMP. This would include procedures such as calibration of land application equipment, storage facility emptying schedule, soil and manure sampling techniques, etc.

APPENDIX B - LANDOWNER'S RESPONSIBILITIES

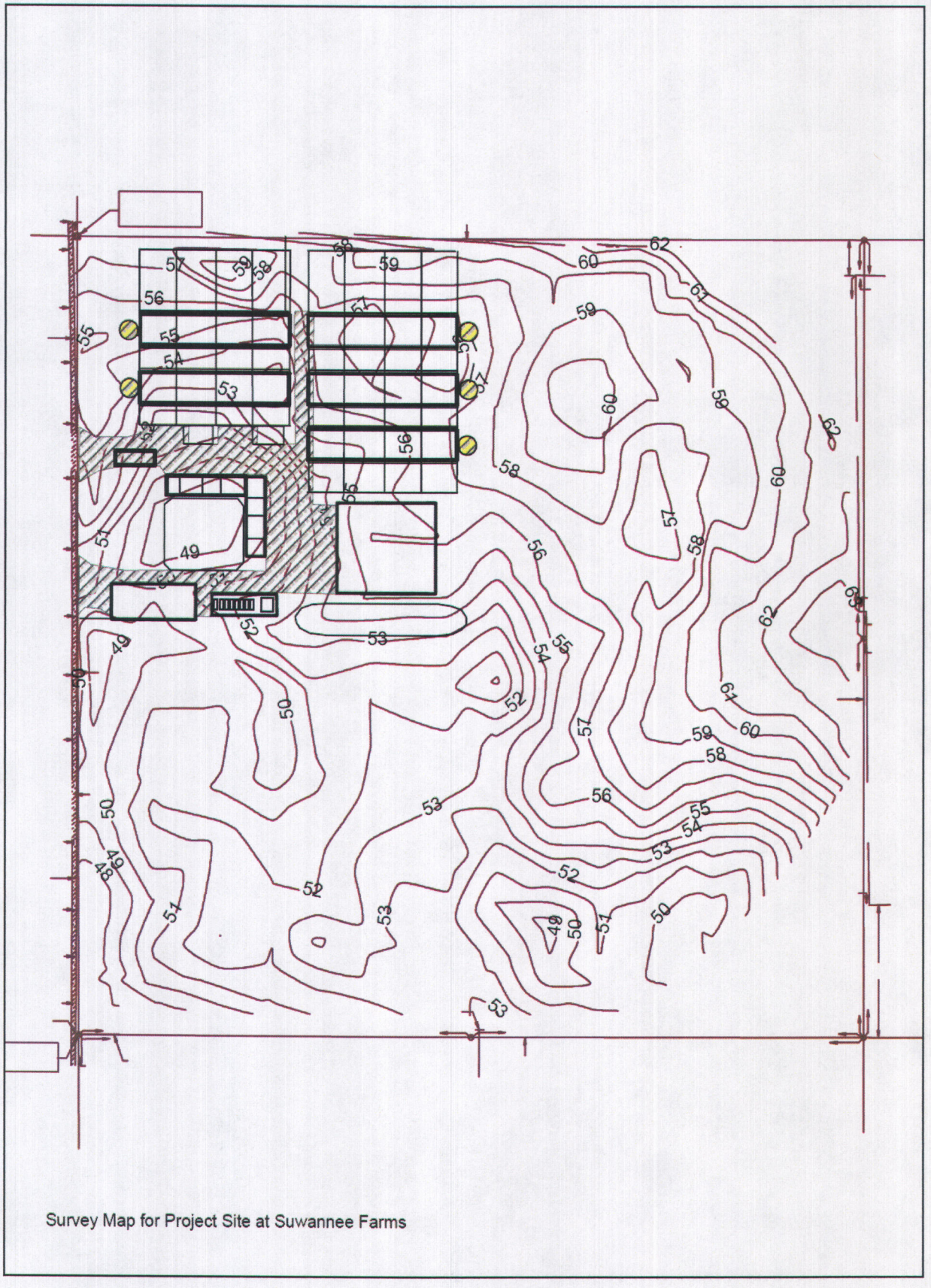
This appendix covers the landowner's responsibility for constructed conservation system with USDA assistance. The landowner is responsible for ensuring proper installation of all components of the NMP.

Landowner's Responsibility for Constructed Conservation Systems with USDA Assistance

	Landowner	Contractor	Technical Agency or TSP
During Planning	▪ Identifies problems and management objectives. ▪ Checks utility locations. ▪ Assists with survey and site investigation as needed. ▪ Identifies needed permits. ▪ Selects from conservation practice alternatives. ▪ Applies for cost-share, if desired. ▪ Obtains needed permits. ▪ Consults with regulatory agencies as needed.		• Inventory resources and identify resource problems. • Analyzes resource data. • Alerts landowner to apparent wetlands, threatened and endangered species, archeological sites, and utilities. • Formulates conservation practice alternatives to protect resources and meet objectives of landowner. • Evaluates alternatives. • Develops plan for landowner's selected alternative. • Conducts site investigations. • Informs landowner of operation and maintenance responsibilities. • Identifies needed permits.
During Design	▪ Is available for consultation. ▪ Follows up with historical society, if required. ▪ Obtains needed permits and easements. ▪ Identifies utilities and contacts utility company to locate buried utilities. ▪ Reviews design for agreement. ▪ Concurs in Operation, Maintenance, and Replacement Plan.	• May provide assistance for survey and site investigation.	• Surveys site, if needed. • Designs system based on plan. • Reviews design and specifications with landowner. • Prepares cost estimates for construction. • Develops operation and maintenance plan. • Develops Construction Quality Assurance Plan including staking, inspection, documentation, and certification. • Approves Design. • Informs landowner of safety responsibilities.

	Landowner	Contractor	Technical Agency or TSP
During Construction	▪ Is available for consultation and decisions. ▪ Follows all Federal/state/local laws, rules, and regulations. ▪ Hires contractors. ▪ Hosts pre-construction conference. ▪ Notifies utilities prior to construction activities. ▪ Notifies contractor of utility location. ▪ Notifies agency before starting construction. ▪ Authorizes contractor to begin work. ▪ Avoids impact to cultural and historical resources, protected species, and wetlands. ▪ Implements landowner part of Construction Quality Assurance Plan (QAP). ▪ Assures compliance with design.	▪ Participates in pre-construction conference. ▪ Observes and verifies located utilities. ▪ Adheres to all pertinent laws, licensing requirements, etc., related to work performed for the landowner. ▪ Works safely in accordance with OSHA requirements. ▪ Informs landowner of planned construction schedule. ▪ Obtains materials, equipment, and appropriately skilled people onsite as scheduled. ▪ Implements contractor part of Construction QAP. ▪ May provide layout and construction check surveys. ▪ Uses materials specified in construction plan. ▪ Builds to specific dimensions, elevations, and workmanship. ▪ Documents construction materials used. ▪ Furnishes measurements and other needed information for certification of completion.	▪ Assists landowner with pre-construction conference. ▪ Implements agency part of Construction QAP. ▪ Informs landowner and contractor of results of inspections. ▪ Informs landowner of presence of unexpected conditions or unexpected cultural and historical resources. ▪ Assesses need for design changes and provides alternatives as appropriate. ▪ Certifies proper completion of conservation practices.
Maintenance	▪ Follows Operation, Maintenance, and Replacement Plan and updates it as needed. ▪ Contacts agency/TSP for additional assistance, if needed.	▪ Provides warranties to landowner as agreed.	▪ As requested, follows up with operation and maintenance plan and periodically assists landowner to update plan.
	The landowner is ultimately responsible for the proper construction and maintenance of a conservation system.	The contractor is responsible for constructing the system according to design and specifications, for quality control and safety.	The technical agency is responsible for inspecting and certifying that project plans and specifications are met. Agency staff cannot train or serve as foreman for contractors.

APPENDIX C – SITE SURVEY



Survey Map for Project Site at Suwannee Farms

APPENDIX D – FLORIDA PHOSPHOROUS INDEX AND SOIL TEST RESULTS

The Florida P Index and soils tests are used to evaluate the potential for P transport from the land application area. Soil tests will be completed once a year for each of the field where waste will be applied. Also a study was also done by a soil scientist and is included in this appendix to verify the soils classifications and to identify other critical soil characteristics for the P-Index assessment. This appendix also contains an example Phosphorous Index Worksheet, most recent soil tests, and non-technical soils descriptions. Also, includes the soil borings tests report.

APPENDIX E - IRRIGATION MANAGEMENT PLAN

Controlling the volume, frequency, and application rate of irrigation water is important in managing soil moisture to promote desired crop response and decrease non-point source pollution of surface and groundwater resources. This appendix contains the irrigation water management plan for the solids application fields and pasture for the farm.

Irrigation Water Management Plan Field 1-12, 16-23, 26-28, 34-37

Date:	September 9, 2009
Cooperator:	SCOE and Partner Farms, Suwannee County, FL
Location:	T 5S S 4 R 13E
Field Numbers:	1-12, 16-23, 26-28, 34-37
Crop:	Combinations of peanuts, snap beans, carrots, sweet corn, field corn, potatoes, oat, cotton, sorghum, bermuda grass and ryegrass. See Table 9 for breakdown by field
Rooting Depth:	Varies by crop from a minimum of 18" to a maximum of 36" (dry season effective rooting depth with no restrictive layer or HWT)
Estimated Yields:	Varies by crop combination, see Table 8 for yield per acre by crop
Irrigation System:	Center Pivots (existing)
Water Supply:	Fresh water only for Fields 1, 22, 23, 26; Other fields also receive effluent
Predominate Soil Series:	Alpin fine sand (29)

Table 1: Field 1-12, 16-23, 26-28, 34-37

Crop	Rooting Depth (inches)	[1]/AWC (inches)	[2]/MAD (in)	[3]/Gross application per irrigation (inches)	Critical Irrigation Period	Operating Time – (hours/day)
Varies, see Table 9	0" - 12"	0.84	0.42	0.49	Varies by crop; See Irrigation Guide, FL Supplement	TBD
	12"-18"	0.84	0.42	0.49		TBD
	18"-24"	0.36	0.18	0.21		TBD
	24" - 36"	0.72	0.36	0.42		TBD

[1]/ - Available Water Capacity within the 12" root zone (AWC) = 0.07 in/in. Available Water Capacity within the 18" root zone (AWC) = 0.07 in/in. Available Water Capacity within the 24" root zone (AWC) = 0.06 in/in, and Available Water Capacity within the 36" root zone (AWC) = 0.06 in/in.

[2]/ - Management Allowed Depletion (MAD) of 50%.

[3]/ - Application depth necessary to replace water used by crop assuming an application efficiency of 85%.

PROPOSED MANAGEMENT PRACTICE: Center Pivots (existing)

RECOMMENDATIONS:

The most important aspect of irrigation water management is properly evaluating and monitoring the available soil moisture for the particular crop. The feel and appearance method will be used for determining soil moisture and when irrigation is needed. See attached feel and appearance worksheets.

The system is designed to provide irrigation water for the crops in fields 1-12, 16-23, 26-28, 34-37. The irrigation pump will provide the rate of water needed to irrigate for consumptive use. The 250 gpm effluent pump will be used in tandem with each freshwater well pump for those fields receiving a combination of freshwater and effluent.

Planned crop yields can be obtained with minimal quantities of irrigation water. Irrigation should, as a minimum, be applied at the critical periods for the planned crops which vary by crop. See the Irrigation Guide Florida Supplement provided in this Appendix. Overall, prior to planting crops, or soon thereafter, the 12 inch root zone should be brought up to field capacity. If operated properly, supplemental irrigation can result in moderate crop production. The system should be managed as much as possible to maintain a high moisture level in the root zone. This will ensure that moisture is available if a drought begins.

For planned crop yield, during the critical irrigation period, irrigation should commence when the available soil moisture drops below the MAD and should continue until the soil reaches field capacity. Refer to the Operation and Maintenance Plan for the sprayfield system for additional information and guidance.

The irrigation system should be checked periodically to ensure proper operation of the pump, pipeline, and sprinklers. Some puddling may occur during system operation. If significant puddling or runoff occurs, the system should be operated at the fastest speed available and the frequency of irrigation increased.

Check the condition of the crop to ensure that growth is occurring and that the crop looks consistent in color and height to determine adequacy and uniformity of irrigation. If application is not uniform, a system evaluation should be performed.

If there is change in the soil moisture monitoring method or irrigation method, the NRCS office in Wauchula, Florida, should be contacted.

Irrigation Water Management Plan Field 14-15, 29, 31-32

Date:	September 9, 2009
Cooperator:	SCOE and Partner Farms, Suwannee County, FL
Location:	T 5S S 4 R 13E
Field Numbers:	14-15, 29, 31-32
Crop:	Combinations of peanuts, snap beans, carrots, sweet corn, field corn, potatoes, oat, cotton, and sorghum.See Table 9 for breakdown by field
Rooting Depth:	Varies by crop from a minimum of 18" to a maximum of 36" (dry season effective rooting depth with no restrictive layer or HWT)
Estimated Yields:	Varies by crop combination, see Table 8 for yield per acre by crop
Irrigation System:	Center Pivots (existing)
Water Supply:	Fresh water and effluent
Predominate Soil Series:	Alpin fine sand, depressional (38)

Table 1: Field 14-15, 29, 31-32

Crop	Rooting Depth (inches)	[1]/AWC (inches)	[2]/MAD (in)	[3]/Gross application per irrigation (inches)	Critical Irrigation Period	Operating Time – (hours/day)
Varies, see Table 9	0" - 12"	0.84	0.42	0.49	Varies by crop; See Irrigation Guide, FL Supplement	TBD
	12"-18"	0.84	0.42	0.49		TBD
	18"-24"	0.36	0.18	0.21		TBD
	24" - 36"	1.08	0.54	0.63		TBD

[1]/ - Available Water Capacity within the 12" root zone (AWC) = 0.07 in/in. Available Water Capacity within the 18" root zone (AWC) = 0.07 in/in. Available Water Capacity within the 24" root zone (AWC) = 0.06 in/in, and Available Water Capacity within the 36" root zone (AWC) = 0.09 in/in.

[2]/ - Management Allowed Depletion (MAD) of 50%.

[3]/ - Application depth necessary to replace water used by crop assuming an application efficiency of 85%.

PROPOSED MANAGEMENT PRACTICE: Center Pivots (existing)

RECOMMENDATIONS:

The most important aspect of irrigation water management is properly evaluating and monitoring the available soil moisture for the particular crop. The feel and appearance method will be used for determining soil moisture and when irrigation is needed. See attached feel and appearance worksheets.

The system is designed to provide irrigation water for the crops in fields 14-15, 29, 31-32. The irrigation pump will provide the rate of water needed to irrigate for consumptive use. The 250 gpm effluent pump will be used in tandem with each freshwater well pump.

Planned crop yields can be obtained with minimal quantities of irrigation water. Irrigation should, as a minimum, be applied at the critical periods for the planned crops which vary by crop. See the Irrigation Guide Florida Supplement provided in this Appendix. Overall, prior to planting crops, or soon thereafter, the 12 inch root zone should be brought up to field capacity. If operated properly, supplemental irrigation can result in moderate crop production. The system should be managed as much as possible to maintain a high moisture level in the root zone. This will ensure that moisture is available if a drought begins.

For planned crop yield, during the critical irrigation period, irrigation should commence when the available soil moisture drops below the MAD and should continue until the soil reaches field capacity. Refer to the Operation and Maintenance Plan for the sprayfield system for additional information and guidance.

The irrigation system should be checked periodically to ensure proper operation of the pump, pipeline, and sprinklers. Some puddling may occur during system operation. If significant puddling or runoff occurs, the system should be operated at the fastest speed available and the frequency of irrigation increased.

Check the condition of the crop to ensure that growth is occurring and that the crop looks consistent in color and height to determine adequacy and uniformity of irrigation. If application is not uniform, a system evaluation should be performed.

If there is change in the soil moisture monitoring method or irrigation method, the NRCS office in Wauchula, Florida, should be contacted.

Irrigation Water Management Plan Field 30

Date:	September 9. 2009
Cooperator:	SCOE and Partner Farms, Suwannee County, FL
Location:	T 5S S 4 R 13E
Field Numbers:	30
Crop:	Sweet Corn.See Table 9 for breakdown by field
Rooting Depth:	30" (dry season effective rooting depth with no restrictive layer or HWT)
Estimated Yields:	11,000 lbs/acre
Irrigation System:	Center Pivot (existing)
Water Supply:	Fresh water and effluent
Predominate Soil Series:	Bigbee Complex (7)

Table 1: Field 30

Crop	Rooting Depth (inches)	[1/]AWC (inches)	[2/]MAD (in)	[3/]Gross application per irrigation (inches)	Critical Irrigation Period	Operating Time – (hours/day)
Sweet Corn	0" - 12"	0.84	0.42	0.49	Pre-planting and Tassle to Grain	TBD
	12"-30"	1.26	0.63	0.74		TBD

[1/] - Available Water Capacity within the 12" root zone (AWC) = 0.07 in/in. Available Water Capacity within the 30" root zone (AWC) = 0.07 in/in.
[2/] - Management Allowed Depletion (MAD) of 50%.
[3/] - Application depth necessary to replace water used by crop assuming an application efficiency of 85%.

PROPOSED MANAGEMENT PRACTICE: Center Pivot (existing)

RECOMMENDATIONS:

The most important aspect of irrigation water management is properly evaluating and monitoring the available soil moisture for the particular crop. The feel and appearance method will be used for determining soil moisture and when irrigation is needed. See attached feel and appearance worksheets.

The system is designed to provide irrigation water for the crops in Field 30. The irrigation pump will provide the rate of water needed to irrigate for consumptive use. The 250 gpm effluent pump will be used in tandem with the freshwater well pump.

Planned crop yields can be obtained with minimal quantities of irrigation water. Irrigation should, as a minimum, be applied at the critical periods for the planned crops which for sweet corn is pre-planting and tassle to grain. See the Irrigation Guide Florida Supplement provided in this Appendix. Overall, prior to planting crops, or soon thereafter, the 12 inch root zone should be brought up to field capacity. If operated properly, supplemental irrigation can result in moderate crop production. The system should be managed as much as possible to maintain a high moisture level in the root zone. This will ensure that moisture is available if a drought begins.

For planned crop yield, during the critical irrigation period, irrigation should commence when the available soil moisture drops below the MAD and should continue until the soil reaches field capacity. Refer to the Operation and Maintenance Plan for the sprayfield system for additional information and guidance.

The irrigation system should be checked periodically to ensure proper operation of the pump, pipeline, and sprinklers. Some puddling may occur during system operation. If significant puddling or runoff occurs, the system should be operated at the fastest speed available and the frequency of irrigation increased.

Check the condition of the crop to ensure that growth is occurring and that the crop looks consistent in color and height to determine adequacy and uniformity of irrigation. If application is not uniform, a system evaluation should be performed.

If there is change in the soil moisture monitoring method or irrigation method, the NRCS office in Wauchula, Florida, should be contacted.

Irrigation Water Management Plan Field 13, 24-25, 33, 38-42

Date:	September 9, 2009
Cooperator:	SCOE and Partner Farms, Suwannee County, FL
Location:	T 5S S 4 R 13E
Field Numbers:	13, 24-25, 33, 38-42
Crop:	Combinations of peanuts, snap beans, carrots, sweet corn, field corn, potatoes, oat, cotton, and sorghum. See Table 9 for breakdown by field
Rooting Depth:	Varies by crop from a minimum of 18" to a maximum of 36" (dry season effective rooting depth with no restrictive layer or HWT)
Estimated Yields:	Varies by crop combination, see Table 8 for yield per acre by crop
Irrigation System:	Center Pivots (existing)
Water Supply:	Fresh water only for Fields 24, 25, and 38-42; Other fields also receive effluent
Predominate Soil Series:	Banton-Alpin Complex (13)

Table 1: Field 13, 24-25, 33, 38-42

Crop	Rooting Depth (inches)	[1]/AWC (inches)	[2]/MAD (in)	[3]/Gross application per irrigation (inches)	Critical Irrigation Period	Operating Time – (hours/day)
Varies, see Table 9	0" - 12"	0.60	0..30	0.35	Varies by crop; See Irrigation Guide, FL Supplement	TBD
	12"-18"	0.30	0.15	0.18		TBD
	18"-24"	0.30	0.15	0.18		TBD
	24" - 36"	0.60	0..30	0.35		TBD

[1]/ - Available Water Capacity within the 12" root zone (AWC) = 0.05 in/in. Available Water Capacity within the 18" root zone (AWC) = 0.05 in/in. Available Water Capacity within the 24" root zone (AWC) = 0.05 in/in, and Available Water Capacity within the 36" root zone (AWC) = 0.05 in/in.

[2]/ - Management Allowed Depletion (MAD) of 50%.

[3]/ - Application depth necessary to replace water used by crop assuming an application efficiency of 85%.

PROPOSED MANAGEMENT PRACTICE: Center Pivots (existing)

RECOMMENDATIONS:

The most important aspect of irrigation water management is properly evaluating and monitoring the available soil moisture for the particular crop. The feel and appearance method will be used for determining soil moisture and when irrigation is needed. See attached feel and appearance worksheets.

The system is designed to provide irrigation water for the crops in fields 13, 24-25, 33, 38-42. The irrigation pump will provide the rate of water needed to irrigate for consumptive use. The 250 gpm effluent pump will be used in tandem with each freshwater well pump for those fields receiving a combination of freshwater and effluent.

Planned crop yields can be obtained with minimal quantities of irrigation water. Irrigation should, as a minimum, be applied at the critical periods for the planned crops which vary by crop. See the Irrigation Guide Florida Supplement provided in this Appendix. Overall, prior to planting crops, or soon thereafter, the 12 inch root zone should be brought up to field capacity. If operated properly, supplemental irrigation can result in moderate crop production. The system should be managed as much as possible to maintain a high moisture level in the root zone. This will ensure that moisture is available if a drought begins.

For planned crop yield, during the critical irrigation period, irrigation should commence when the available soil moisture drops below the MAD and should continue until the soil reaches field capacity. Refer to the Operation and Maintenance Plan for the sprayfield system for additional information and guidance.

The irrigation system should be checked periodically to ensure proper operation of the pump, pipeline, and sprinklers. Some puddling may occur during system operation. If significant puddling or runoff occurs, the system should be operated at the fastest speed available and the frequency of irrigation increased.

Check the condition of the crop to ensure that growth is occurring and that the crop looks consistent in color and height to determine adequacy and uniformity of irrigation. If application is not uniform, a system evaluation should be performed.

If there is change in the soil moisture monitoring method or irrigation method, the NRCS office in Wauchula, Florida, should be contacted.

Fine sand and loamy fine sand soils

Percent available: Currently available soil moisture as a percent of available water capacity.

Available Soil Moisture Remaining	Appearance of soil
0-25 percent available	Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure.
25-50 percent available	 Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remains on fingers.
50-75 percent available	 Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon.

75-100 percent available	 Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon.
100 percent available	Wet, forms a weak ball, moderate to heavy soil/water coating on fingers, wet outline of soft ball remains on hand

Courtesy of the United States Department of Agriculture, Natural Resource Conservation Service, *Estimating Soil Moisture by Feel and Appearance* (Program Aid 1619)

APPENDIX F – PEST MANAGEMENT

This appendix contains pest management plan which is required to control pests for the crop to achieve the planned yield to utilize the nutrient produced at the farm.

DOCUMENTATION FOR DETERMINING SOILLEACH AND SOILRUN FOR PESTICIDE AND NUTRIENT MANAGEMENT

Cooperator Name: *SCOE and Partner Farms* *County*: Suwannee
Tract Nos: 831,1364,1704,3360,3361,4394,4610,4611,4612,2578,2879 Sheet 1 of 1

Field No.(s)	Predominant Soil Type	Soil Leach Rating	Soil Runoff Rating	Job Sheet Number Selected	Comments
1-43	*Aplin Fine Sand, Alpin Fine Sand, Depressional, Banton-Alpin Complex, Bigbee Complex*	*High*	*Low*	*2*	*No surface water close*

For all soils, Hydrologic Group is A. Soil leach rating and soil runoff rating were determined from WIN-PST.

Prepared by: *Mandy Parks* Date Prepared: 11/01/*06*.

U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

FL-CPA-15
(09/02)

PESTICIDE AND NUTRIENT MANAGEMENT JOB SHEET NUMBER 2

(Soileach = med. or high; Soilrun = low;
Leaching Index = med. or high)

Tract Number(s): 831,1364,1704,3360,3361,4394,4610,4611,4612,2578, 2879

Field Number(s): 1-43

PESTICIDE MANAGEMENT

Soils in these field(s) have a medium or high potential for pesticide leaching to the groundwater and a low potential for pesticide runoff from the field(s) to surface water.

The Florida Pest Control Guide contains a listing of pesticides suitable for each type of pest and is available from the Cooperative Extension Service (CES). This list also contains Relative Leaching Potential Index (RLPI) values. While any approved pesticide listed in the guide can be used, the applicator should consider for use pesticides with a larger RLPI value and larger Health Advisory Level (HAL or HALEQ) value.

Special emphasis should be placed on the above criteria where the field is in close proximity to sinkholes or karst formations.

The local CES office can assist you with proper pesticide selection using the above and other pest control criteria.

Read and follow pesticide labels, it is the law.

NUTRIENT MANAGEMENT

Soils in these field(s) have a medium or high potential for nitrogen leaching to the groundwater and a low potential for phosphorous runoff from the field(s) to surface water.

A soil test will be used as a guide to determine plant nutrient needs. In addition, a listing of nitrogen and phosphorous requirements by crop type is available from the Cooperative Extension Service. Nutrients shall be added at the rate needed by the crop grown, or according to the producers' goals, whichever is lower.

PEST MANAGEMENT SECTION

Prepared for: SCOE and Partner *Farms* Prepared by: *Mandy Parks* Date: *11/06*

The goal of pest management is to reduce populations of target organisms to acceptable levels while minimizing contamination of soil, water, air and the effects on non-target organisms, through safe and economic use of pesticides.

Integrated Pest Management (IPM) will be used whenever possible utilizing the most appropriate means of pest control including cultural, mechanical, biological, and chemical methods. Crop rotation and varietal resistance is considered a part of IPM systems, which will help reduce the pesticide availability as a potential pollutant. *Scouting is an integrated part of proper pest management.*

An example of Integrated Pest Management is the current recommendation to control Tropical Soda Apple. The recommendation incorporates prevention, mowing and herbicides in a manner that provides the most cost effective treatment alternative.

Label directions and Material Safety Data Sheets (MSDS) will be followed.

The producer will ensure that all environmental laws are adhered to as they pertain to pesticide application and container disposal.

The producer will ensure that all persons in or near pesticides or application sites are aware of and are taking proper safety and environmental precautions.

Records of all pest management activities should be maintained to provide evidence that the activities complied with local, state, and Federal laws, rules and regulations. Records are required whenever restricted use pesticides are applied. Use the form "Record of Federal Restricted Use Pesticide Application" to document the application of restricted use pesticides. Refer to the document Pesticide Record Keeping for additional information.

The following information is needed to have the most accurate information in selecting and applying pest control measures:

A. Pesticide and Nutrient Management Job Sheets (forms FL-CPA-14-17) and,
B. Soil Leach and Soil Runoff Documentation Form (form FL-CPA-13) and,
C. Record of Federal Restricted Use Pesticide Application Form (form FL-CPA-32) and,
D. Pesticide Record Keeping, PI-20, and,
E. IFAS Pesticide Selection Guides
   - Pasture: Managing Pesticides for Crop Production and Water Quality Protection, Circular 992,
   - Soil Ratings for Selecting Pesticides for Water Quality Goals, Circular 959,

   Gilchrist County Soil Ratings, Fact Sheet SL-121
   - Weed Management in Pastures and Rangeland - 2001, SS-AGR-08,
   - WEEDS IN THE SUNSHINE: Tropical Soda Apple (Solanum viarum Dunal) in Florida - 1999 SS-AGR-50,
   - WEEDS IN THE SUNSHINE: Cogongrass (Imperata cylindrica (L.) Beauv.) Biology, Ecology and Control in Florida - 1999, SS-AGR-52,
   - Smutgrass Control in Perennial Pastures, Feb. 2000, SS-AGR-18,
F. Biological Control of Pasture Mole Crickets with Nematodes, Feb., 2001.
G. Insect Management in Pasture, ENY402, Jan 2001.

OBJECTIVE

The objective of Pest Management is to reduce populations of target organisms to acceptable levels while minimizing contamination of soil, water and air, and the effects on non-target organisms, through safe and economic use of pesticides or other measures. Pest Management should be applied on all lands and water where a reduction in pest populations is needed to achieve the producers' goals.
Pest plants known to occur on in the planning area or in the surrounding area include the following;

Tropical soda apple (*Solanum viarum* Dunal); **Cogongrass** (*Imperata cylindrica* (L.) Beauv.); **Dogfennel** (*Eupatorium capillifoium* (Lam.) Small); **Smutgrass** (*Sporobolus indicus* (L.) R. Br.)

IMPORTANT INFORMATION

The producer is responsible for ensuring that all label instructions are followed, that proper safety precautions are taken, and that the pesticide is applied as directed.

The producer is responsible for ensuring that pesticides are used in a safe and responsible manner. This includes ensuring that field re-entry and other human safety precautions are followed.

Adhere to all withdrawal periods between herbicide application and grazing, haying, or slaughter shown on the product label or UF/IFAS publications.

The producer is responsible for seeking and using the most current information available from the local extension agent.

The use of brand names in this document does not constitute an endorsement of the product.

Do not use 2,4-D herbicide as Limpograss (Hermarthria Altissima) varieties are injured by this herbicide.

Because pesticide labels and Florida extension service recommendations change frequently, all control recommendations included in this plan should be confirmed with the local extension agent prior to pesticide application.

SPECIFIC RECOMMENDATIONS

Tropical soda apple

This pest plant will be controlled according to the recommendations included in UF publication SS-AGR-50, WEEDS IN THE SUNSHINE: Tropical Soda Apple (*Solanum viarum* Dunal) in Florida – 1999.

Spot treatment with an approved chemical is the recommended method to control this weed, due to the scattered nature of the infestation. However, if dense stands are found the recommended treatment is to mow to a 3 inch stubble height when the plant reaches the flowering stage through April. This will prevent the plant from producing fruit.

Care must be taken to thoroughly investigate hammocks and other areas where birds roost or where other wildlife spends a significant amount of time. This will prevent plants from being left untreated. Make certain that the entire plant is covered to ensure herbicide uptake and maximum control. Allow herbicides to dry on plants 3-4 hours before rainfall. Use a color marker to ensure that all plants are treated.

Cogongrass

This weed was not found in the resource inventory. It is included because it is known to occur in Florida and the effect it has on the natural plant communities it infests.

All treatments will be conducted according to the recommendations included in UF publication SS-AGR-52, WEEDS IN THE SUNSHINE: Cogongrass (*Imperata cylindrica* (L.) Beauv.) Biology, Ecology and Control in Florida – 1999.

Spot treatment with an approved chemical is the recommended method to control this weed, due to the scattered nature of the infestation. However, if dense stands are found the infestation may be treated with a broadcast applicator.

Smutgrass

All treatments will be conducted according to the recommendations included in the UF publication SS-AGR-18, Smutgrass Control in Perennial Grass Pastures, or other applicable guidance.

When Velpar is used to control smutgrass, a 60-day cattle withdrawal period is required by the label instructions. Mowing after seed head development is an ineffective control of this weedy grass, as it tends to spread the seed over a larger area.

Dogfennel

All treatments to control dogfennel will be conducted according to the recommendations provided in the UF publication WEEDS IN THE SUNSHINE: Weed Management In Pastures and Rangeland – 2001 or other guidance material.

Other Pest Plants

All fields will be inspected regularly to locate invasive and undesirable plants. When plants are located they will be managed using approved methods of control. Selection of control methods will be based on environmental and economic considerations. The UF publication WEEDS IN THE SUNSHINE: Weed Management in Pastures and Rangeland – 2000 will be used as guide to current control recommendations.

PLANNING CONSIDERATIONS

The following guidelines will be followed when selecting methods of pest management.

1. Pest Management will be done within current environmental regulations.
2. Pesticide recommendations can change frequently.
   - Registrations may be canceled or added at any time. Recommended rates or products that were valid at the start of the growing season may change. Therefore, it is the producers' responsibility to check with the county extension agent for the most recent recommendations.
   - Select the proper pesticide based on the target species, effects to non-target species, and the soil leaching and runoff characteristics. Soil leach and runoff characteristics are found on the attached form FL-CPA-15. Use the following UF/IFAS circulars and Fact sheets when selecting and using pesticides;

     Circular 992 - "Pasture: Managing Pesticides for Crop Production and Water Quality Protection" revised Jan., 1998.

     SS-AGR-100 - "Principles of Weed Management" revised January 2000.

     SS-AGR-16 – "WEEDS IN THE SUNSHINE: Approximate Herbicide Pricing – 2000.

SS-AGR-67 – "Floralta Limpograss (Hermathria Altissima)": – UF-IFAS revised February 2006.

3. Avoid applications of chemicals prior to periods of anticipated heavy or sustained rainfall to minimize the potential contamination of surface water, groundwater, and ineffective control of target organisms.
4. Use integrated pest management (IPM) systems whenever possible, utilizing the most appropriate means of pest control including cultural, mechanical, biological, and chemical methods. Crop rotation and varietal resistance should be considered as a part of an integrated pest management system.
5. Use field scouting to determine when treatment threshold has been reached. Treatment thresholds for specific pests and crops are often available from local Florida Cooperative Extension Service offices.
6. Alternate pesticides of dissimilar mode of action or chemistry to reduce-target species resistance.
7. Select methods of application that will result in the least potential for runoff and leaching.

OPERATION, SAFETY, AND MAINTENANCE

The following items will be considered or followed (as appropriate):

1. All pesticide applicators will be fully trained and licensed to apply restricted use pesticides in accordance with Federal and state laws. Training is available through the Florida Cooperative Extension Service and IFAS.
2. Before application of any herbicide, read the product label and follow all directions and precautions. Follow all directions and precautions listed on the Material Safety Data Sheets (MSDS). The use of pesticides in a manner inconsistent with the label is illegal.
3. Use formulations that meet or exceed the soil leaching or runoff potential when leaching or runoff is potentially a problem. Refer to forms FL-CPA-13 through 17 for soil leaching and runoff characteristics.
4. Information on pesticide solubility, toxicity, degradation rates and adsorption rates, and site characteristics such as geology, soils, depth to water table, proximity to surface water, topography, and climate should be in the possession of the applicator before pesticides are applied.
5. Calibrate all application equipment at the beginning of the season and as needed throughout the application season.
6. Pesticides should not be applied prior to forecasted rainfall events or during windy conditions when wind drift is a concern.
7. Application equipment should be shut off when crossing turn rows adjacent to fields to avoid contamination of surface water bodies including field ditches, and to conserve chemical use.
8. Maintain application equipment in good working order to prevent accidental spills.
9. Base pesticide applications on the presence of a pest, not on an annual application schedule. If a pest is an endemic problem, pesticides may be applied as recommended by IFAS. Regularly conduct field scouting to determine when treatment thresholds have been reached.

10. Reduce the amount of rinsate as much as possible. Rinsing the sprayer is necessary only when;
    - changing from a herbicide to another pesticide in order to avoid crop injury,
    - when moving to a new application site and the pesticide last used in the sprayer is not registered for the new site, or
    - when cleaning the sprayer for storage.

    Do not dump rinsate on the ground or dispose of to surface waters or septic systems! If possible, the rinsate should be sprayed in the field where the pesticide was originally applied, as long as it does not exceed the maximum application rate for that pesticide on the site. Another option is to store the rinsate and use it to dilute the same pesticide for the next application. Dilute pesticide solutions can be treated to breakdown their active ingredients. Information on pesticide degradation tanks is available from at the local Florida Extension Office or from the Florida Department of Environmental Regulation.
11. Avoid mixing pesticides and loading and rinsing sprayers immediately adjacent to wells, sinkholes, or surface water. Use backflow devices to prevent contamination of water source.
12. Always store pesticides in their original labeled containers, preferably in a locked building with appropriate warning signs. Locate building so accidental spills create minimal environmental problems.
13. Dispose of leftover material and containers according to the label requirements. Before disposal, pesticide containers should be triple rinsed to remove as much material as possible, and punctured to make sure they are not used elsewhere. **Never** re-use pesticide containers for any purpose other than to return to the manufacturer. Whenever possible or feasible, use pesticides in mini-bulk or some other kind of returnable container to minimize container disposal.
14. Avoid exposure to pesticides. Wear protective clothing, including respirator, gloves, and footwear as specified on the label. Bathe or wash affected area as soon as possible after possible dermal (skin) exposure and prior to dining and smoking. Oral ingestion or inhalation of pesticides requires immediate first-aid measures or the assistance of a poison-control center or doctor.
15. Check product label and adhere to field reentry time.
16. Be absolutely sure, if pesticides are applied by a custom applicator or a farm employee who is not the actual decision-maker, that they are aware of the area to be treated and of any label restrictions for the pesticide they are applying.
17. Provide areas for emergency washing for those who might accidentally come into contact with chemicals, and develop a safety plan for personnel exposed and accidental spills.
18. Field records should be kept for two (2) years.

SCOE - Appendix F

PESTICIDE SELECTION WORKSHEET

Landowner/Operator Name: *SCOE & Partner Farm*

Crop: *Forage and vegetables* **Tract** *All* **Field ID:** *All* **Sheet** *1 of 1*

Target Pest	IFAS Recommended Pesticides	K_{oc} Value	Relative Losses		Toxicity		Soil Type	Soil Leaching Rating	Soil Runoff Rating	Selected Pesticide	Comments
			Leaching RLPI	Runoff RRPI	MCL/IIAL HALEQ	Aquatic Toxicity					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Aphids											
(apply according to directions in UF Circular ENY 402)	***Methyl Parathion*** *Declare 4E*	*5100E*	*>2000*	*39*	*2*	*3.7*	*Aplin Fine Sand, Alpin Fine Sand, Depressional, Banton-Alpin Complex, Bigbee Complex*	*High*	*Low*		*No surface water near.*
	Malathion *Malathion 57EC*	*1800*	*>2000*	*555*	*200*	*0.2*					
Army Worms, Grasshoppers, and other Caterpillars	***Bt (Bacillus thuringiensis)***	*Nd*	*Nd*	*Nd*	*Nd*	*Nd*					
	Methyl Parathion *Declare 4E*	*5100E*	*>2000*	*39*	*2*	*3.7*	*Aplin Fine Sand, Alpin Fine Sand, Depressional, Banton-Alpin Complex, Bigbee Complex*	*High*	*Low*		*No surface water near.*
	Malathion *Malathion 57EC*	*1800*	*>2000*	*555*	*200*	*0.2*					
	Methomyl *Lannate 2.4LV*	*72*	*24*	*24*	*200*	*3.4*					
(apply according to directions in UF Circular ENY 402)	***Carbaryl*** *Sevin 80 WSP Sevin XLR or 4F*	*300*	*300*	*300*	*700*	*114*					
Chinch Bugs	***Methyl Parathion*** *Declare 4E*	*5100E*	*>2000*	*39*	*2*	*3.7*	*Aplin Fine Sand, Alpin Fine Sand, Depressional, Banton-Alpin Complex, Bigbee Complex*	*High*	*Low*		*No surface water near.*
(apply according to directions in UF Circular ENY 402)	***Carbaryl*** *Sevin 80 WSP Sevin XLR or 4F*	*300*	*300*	*300*	*700*	*114*					

SCOE and Partner Farm

Fire Ants *(apply according to directions in UF Circular ENY 402)*	***Hydromethylnon*** *Andro granules*	*730000*	*>2000*	*1*	*2*	*0.16*	*Aplin Fine Sand, Alpin Fine Sand, Depressional, Banton-Alpin Complex, Bigbee Complex*	*High*	*Low*		*No surface water near.*
Grasshoppers	***Methyl Parathion*** *Declare 4E*	*5100E*	*>2000*	*39*	*2*	*3.7*	*Aplin Fine Sand, Alpin Fine Sand, Depressional, Banton-Alpin Complex, Bigbee Complex*	*High*	*Low*		*No surface water near.*
(apply according to directions in UF Cicular ENY 402)	***Malathion*** *Malathion 57EC*	*1800*	*>2000*	*555*	*200*	*0.2*					
	Azinphos methyl *Sniper 2E*	*1000*	*nd*	*nd*	*nd*	*nd*					

Comments: Apply pesticides with caution and according to label instructions. The higher the rating number the safer the product is for the environment. This list should be updated periodically due to the constant changes that occur in industry product labeling. Consult with your local Cooperative Extension service for additional information.
If the K_{oc} value is 100 or less or if the RLPI value is 10 or less and the soil leach rating is high, then the pesticide has a high potential for leaching and should be used with extreme caution. Alternative pesticides and reduced rates should be considered if possible. Apply pesticide during periods with low potential for rainfall if possible.

Control Recommendations for Pasture Insect Pests
(excerpt from IFAS ENY402 Insect Management in Pasture)

Insect infestations in pastures usually start in small isolated areas. Make frequent inspections and spot treat before infestations become widespread. This practice not only saves insecticide, but also prevents extensive injury to the grass and reduces the residue problem.

Recommended materials are listed in Table A. The use of trade names is solely for purpose of providing specific information. It is not a guarantee or warranty of the products named and does not signify that they are approved to the exclusion of others of suitable composition. Dilute WP and EC formulations in enough water for sufficient coverage (usually 3 gallons by air and 10 gallons by ground).

Apply low rates of materials to light infestations, light forage cover, and smaller stages of pests. Apply higher rates to heavy infestations, dense forage cover, and mature stages of pests.

Restrictions
Lannate LV: Do not make more than four applications per crop. Do not apply more than 0.9 lb Ai/acre/crop. For bermudagrass only.

Sevin 80 WSP: Up to 2 applications may be made but not more often than once every 14 days. Do not exceed 3 ¾ lb/acre/year (3 qt of Sevin XLR or 4F).

Table A: - Recommended Pest Management Materials

Trade Name (Common Name)	lb AI/A	Formulation/ A	Acres/gal or lb	Min Days to Harvest and Restrictions
APHIDS				
Declare 4E (methyl parathion)	0.125	½ pt	16	15
Malathion 57 EC (malathion)	0.94 – 1.25	1.5 – 2 pt	5.3 – 4	0
ARMYWORMS, GRASS LOOPERS AND OTHER CATERPILLARS				
Declare 4E (methyl parathion)	0.75	**1.5 PT**	5.3	15
Lannate 2.4 LV (methomyl)	0.23 – 0.9	¾ - 3 pt	10.7 – 2.7	7-grazing; 3-hay; For bermudagrass pasture application only. Remove livestock prior to application
Malathion 57 EC (malathion)	1.25	2 pt	4	0
Several Brands (Bacillus thuringiensis)	See individual brand labels			
Sevin 80 WSP (carbaryl)	1 – 1.5	1 1/4 - 1 7/8 lb	0.8 – 0.53	14
Sevin XLR or 4F (carbaryl)	1 – 1.5	1 – 1.5 qt	4 – 2.7	
CHINCH BUGS				
Declare 4E (methyl parathion)	0.75	1.5 qt	5.3	15 (false chinch bugs)
Sevin 80 WSP (carbaryl)	1 – 1.5	1 1/4 - 1 7/8 lb	0.8 – 0.53	14
Sevin XLR or 4F (carbaryl)	1 – 1.5	1 – 1.5 qt	4 – 2.7	
FIRE ANTS				
Amdro granules (0.73% hydramethylnon)	0.75	1 – 1.5 lb	1 – 0.7	Broadcast evenly
	Up to 1.5	5 TBSP/mound	Up to 0.01	Mound treatment. Do not apply more than 1 ½ lbs bait per acre.
GRASSHOPPERS				
Declare 4E (methyl parathion)	0.75	1.5 pt	5.3	15
Sniper 2E (azinphos methyl)	0.5 – 0.75	2 – 3 pt	4 – 2.7	16
Malathion 57 EC (malathion)	0.94 – 1.25	1.5 - 2	5.3 - 4	0