COMPREHENSIVE NUTRIENT MANAGEMENT PLAN

for

SOUTHWEST REGIONAL DAIRY CENTER

TARLETON STATE UNIVERSITY

U.S. Highway 281
Stephenville, Texas 76402

Erath County, Texas

Completed by: Leigh Cranmer and Monty Dollar

Form CNMP 002 (May 19, 2005)

CNMP No. 5561040-4 13

COMPREHENSIVE NUTRIENT MANAGEMENT PLAN
CERTIFICATION

Applicant (Producer)

I (We) concur in the conservation practices and implementation schedules indicated in this comprehensive nutrient management plan (CNMP). I (We) understand that when these planned Conservation Practices are applied and maintained, the Resource Management System will meet the State's requirements for water quality. I (We) agree to notify the local SWCD in the event of deviation from the implementation schedule and that any substitution or changes to the conservation practices or schedules must be in accordance with the Natural Resources Conservation Service – Field Office Technical Guide (NRCS-FOTG), the State Board's Technical Criteria and Programmatic Guidance for Comprehensive Nutrient Management Planning, and the rules and regulations of the State. Failure to comply with this plan and implementation schedule will result in the loss of certification.

Applicant (Producer) — Date: 28-JUL-2010

Manure and Wastewater Handling/Storage

I certify through field verification that the capacity of each retention control structure equals or exceeds, or will equal or exceed after some corrective action, the capacity required by any waste authorizations (permit or registration) applicable to the operation. Any exceptions will be noted in the CNMP along with the volume, amount of sludge and the extent of encroachment of the sludge into the required capacity.

Licensed Professional Engineer — Date: 28 July 10

SEAL

STATE OF TEXAS
TED A. GRIBBLE
89609
LICENSED
PROFESSIONAL ENGINEER

Land Treatment

All land treatment practices contained within the CNMP are planned in accordance with the NRCS – FOTG.

Conservation Planner — Cert. No. — — Date: 27 July 2010

Nutrient Management

All nutrient management activities contained within the CNMP are planned in accordance with NRCS Conservation Practice Standard 590 (Nutrient Management).

Texas Certified Nutrient Management Specialist — Cert. No. TX 20156 — Date: 27 July 2010

Natural Resources Conservation Service

The CNMP meets the requirements of the NRCS - FOTG for a Resource Management System.

NRCS District Conservationist — Date: 8-2-10

Soil and Water Conservation District

The CNMP includes the entire conservation management unit and meets the Soil and Water Conservation Districts program, plan, and it's priorities.

Approved by: Soil and Water Conservation District — Date: 8-2-10

Texas State Soil and Water Conservation Board

The CNMP satisfies the Technical Criteria and Programmatic Guidance for Comprehensive Nutrient Management Planning adopted by the State Board and contains an implementation schedule compliant with Title 30, Section 523.8(j) of the Texas Administrative Code.

CERTIFIED by: Texas State Soil & Water Conservation Board — Date: 8/4/10

1.2. Operation Information and Location

Southwest Regional Dairy Center, Tarleton State University
TSU, College of Agriculture and Human Sciences
Box T-0180
Stephenville, Texas 76402

Contact: Dr. Barry Lambert
Office Phone: (254) 968-9222
Email Address: **blambert@tarleton.edu**

Physical Location:

The facility is a planned dairy research and teaching facility to be located on the southwest corner of the intersection of U.S. Highway 281 and College Farm Road approximately 1.7 miles north of Stephenville, Texas in Erath County, Texas.

Latitude: 32º15'20.13" N
Longitude: 98º11'48.61" W

1.3. Executive Summary

The Southwest Regional Dairy Center will be operated by Tarleton State University staff and employees. The primary contact for this dairy is Dr. Barry Lambert. The facility will consist of classrooms, laboratories, a milking parlor, three barns, feed storage areas, and retention control structures including a lagoon and manure digester which will be located on approximately 90 acres. There is also one 10.1 acre field available for waste application onsite, Field 3A.

The CNMP is designed to address, at a minimum, the soil erosion and water quality concerns on this operation. There are several potential soil and water quality concerns that have been identified on this operation, including Sheet and Rill Erosion, Pollutants (nutrients and/or pesticides) in Groundwater, and Pollutants in Surface Water. More specifically, a waste management system is needed to transfer effluent to fields for application. A Nutrient Management Plan is necessary to prescribe the rate and timing of both solid and liquid waste application. Conservation buffers and application setbacks will be utilized to protect ground and surface water quality. These have been or will be addressed, as described in the Conservation Plan of Operations located in Section 2 of this CNMP.

The Southwest Regional Dairy Center has entered into an agreement with Texas AgriLife Research in which Texas AgriLife Research will accept effluent and manure from the dairy. This agreement can be found in Section 7.1. All waste will be applied according to the Nutrient Management Plan included in the CNMP. Fields covered by this application agreement are: LMUs 1A - C; 2A – K; and 3B. The information regarding

crop rotations and yields, grazing, and other operational information was obtained from Texas AgriLife Research personnel. However, other than the application rate of manure and/or effluent, Southwest Regional Dairy has no operational control over these fields.

CNMP 001 (11/19/02)

Request No. CNMP - ☐☐☐

Priority: _____

DECLARATION OF INTENT TO REQUEST CERTIFICATION OF A COMPREHENSIVE NUTRIENT MANAGEMENT PLAN

CROSS TIMBERS SOIL AND WATER CONSERVATION DISTRICT # 556

County ERATH, Texas HUA No. ☐☐☐☐☐☐☐☐-☐☐☐

Name: SOUTHWEST REGIONAL DAIRY CENTER, TARLETON STATE UNIV.

Address: TSU, COLLEGE OF AG. & HUMAN SCIENCES, BOX T-0180

City/State: STEPHENVILLE, TX Zip Code: 76402 Phone #: 968-9222

I hereby declare my intent to request certification of a Comprehensive Nutrient Management Plan, as provided by Title 31, §523.8 of the Texas Administrative Code. It is my intention to implement and maintain this CNMP in order to ensure my animal feeding operation is consistent with state water quality standards, state water quality laws regarding animal feeding operations, and the state agricultural and silvicultural nonpoint source management program.

(1) General description and location of all property within this conservation management unit.
DAIRY AT SOUTHWEST CORNER OF US. HWY 281 & COLLEGE FARM ROAD. LMU 1A-E EAST OF DAIRY. LMUs 2A-K 0.6 MILES SOUTH OF DAIRY ON EAST SIDE OF US. HWY 281. LMUs 3A-B AT DAIRY SITE.
Total Acres: 196.83 ac.

(2) The land is controlled and operated by the applicant(s). ( ) Yes (X) No If no, explain.
SOME LAND IS CONTROLLED & OPERATED BY TEXAS AGRILIFE RESEARCH (LMUs 1, 2, & 3B), AND IS COVERED UNDER APPLICATION AGREEMENT. *

(3) Is a permit, registration, or other written authorization to operate required (X) Yes ( ) No

(4) I intend to request cost-share (from the TSSWCB), if available, for the implementation of soil and water conservation practices associated with my CNMP ( ) Yes (X) No

(5) I understand that my CNMP may be selected for an annual status review by personnel of the State Soil and Water Conservation Board.

DHC

Applicant's Signature

12.15.09
Date

****

District Director

Date

NOTE: If you are not a cooperator with the Soil and Water Conservation District, a District Cooperative Agreement must be completed and attached to this application.

February 1, 2003

* DAIRY SITE AND LMU 3A IS CONTROLLED & OPERATED BY TSU. APPLICATION AGREEMENT WILL BE INCLUDED IN CNMP.

2.1. Vicinity Map and Conservation Plan Maps

Figure 2.1a is the Vicinity Map, a general overview of the dairy site and all LMUs. The following maps show each LMU independently. Conservation Plan Maps for the dairy and its Land Management Units (LMUs) reflect the LMU numbers, acreage, and land use for each LMU. These maps are labeled as Figures 2.1a through 2.1d.

2.2. Topographic Maps

Topographic Maps for the dairy and its LMUs are labeled 2.2a through 2.2c. These maps are intended to show the topography of the dairy production area and the LMUs, along with pipelines, pivots and other engineering information.

2.3. Waste Application Maps

Waste Application Maps are labeled 2.3a through 2.3c. The Waste Application Maps show the portion of each LMU which is available for manure and wastewater application according to the NMP.

2.4. Soils Maps

Soils Maps for the dairy and its LMUs are labeled 2.4a through 2.4c.

2.5. General Soils Descriptions

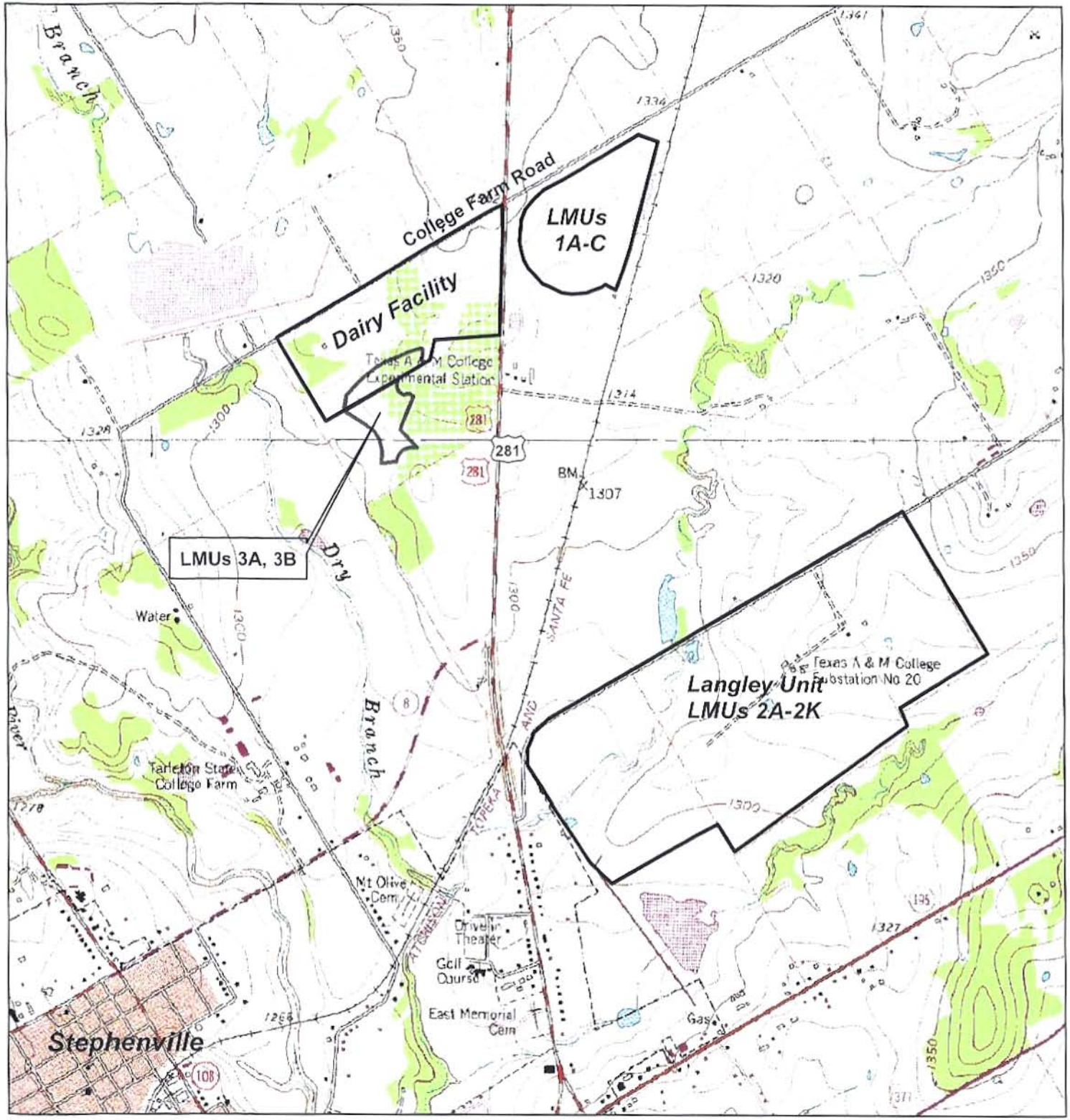
The report "Brief Map Unit Descriptions" from Soil Data Mart is provided for all soil map units located in the diary production area and/or the LMUs.

2.6. Conservation Plan of Operations

The Conservation Plan of Operations (CPO) reflects conservation and land treatment practices that have been or will be implemented on the dairy and the LMUs.

2.7 RUSLE2

Reports from RUSLE2 estimating sheet and rill erosion on all LMUs have been included.



USGS 7.5' Quadrangles
Knob Hill and Stepheville, Texas
Contour Interval = 10 ft.

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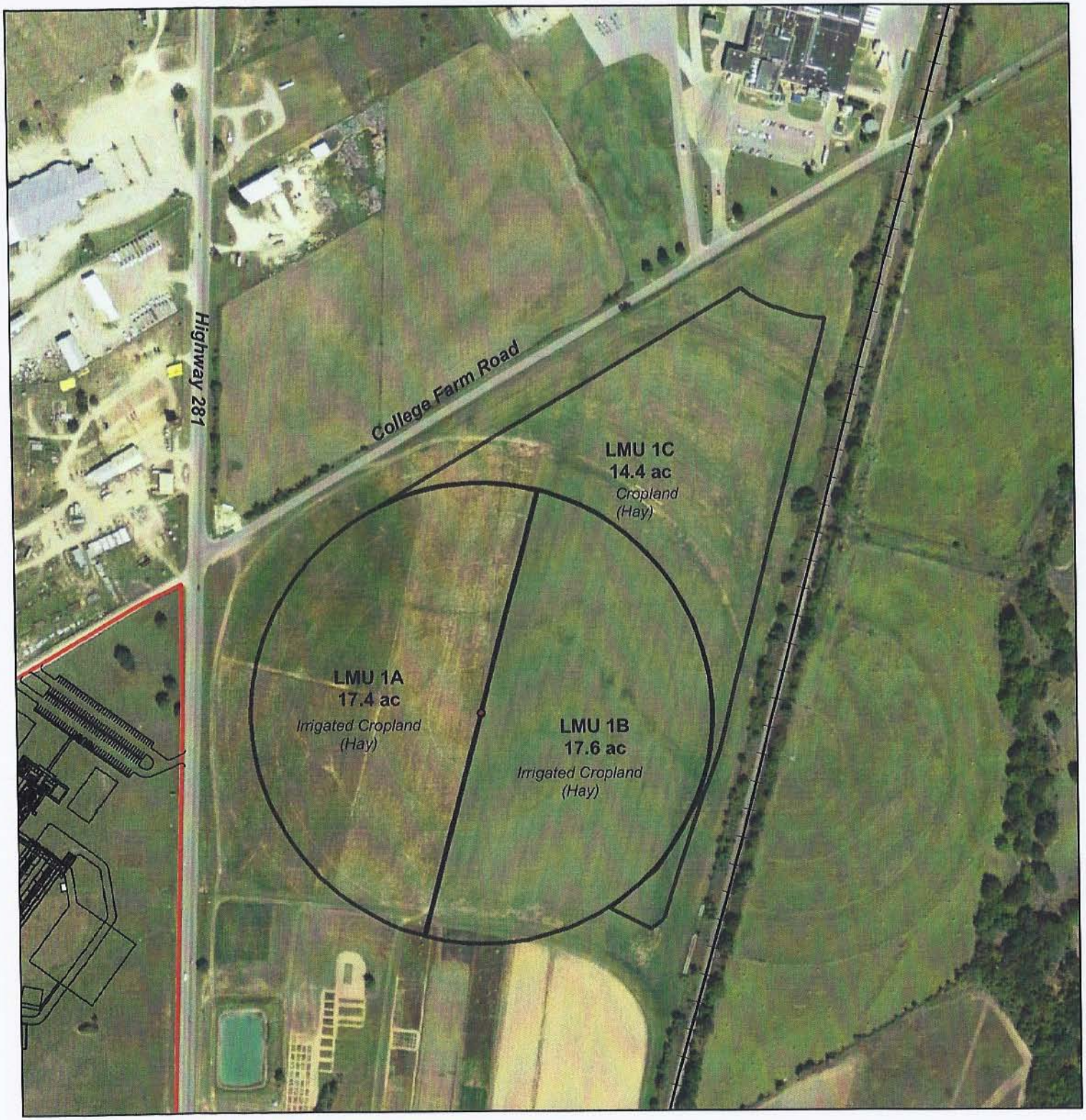
Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	April 2010

Figure 2.1a
Vicinity Map

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Dairy Facility
- Land Management Unit
- Railroad

Digital Orthopholo Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

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Tarleton State University

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Figure 2.1b
Conservation Plan Map
Land Management Units 1A, 1B, 1C

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081

Legend

Land Management Unit

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

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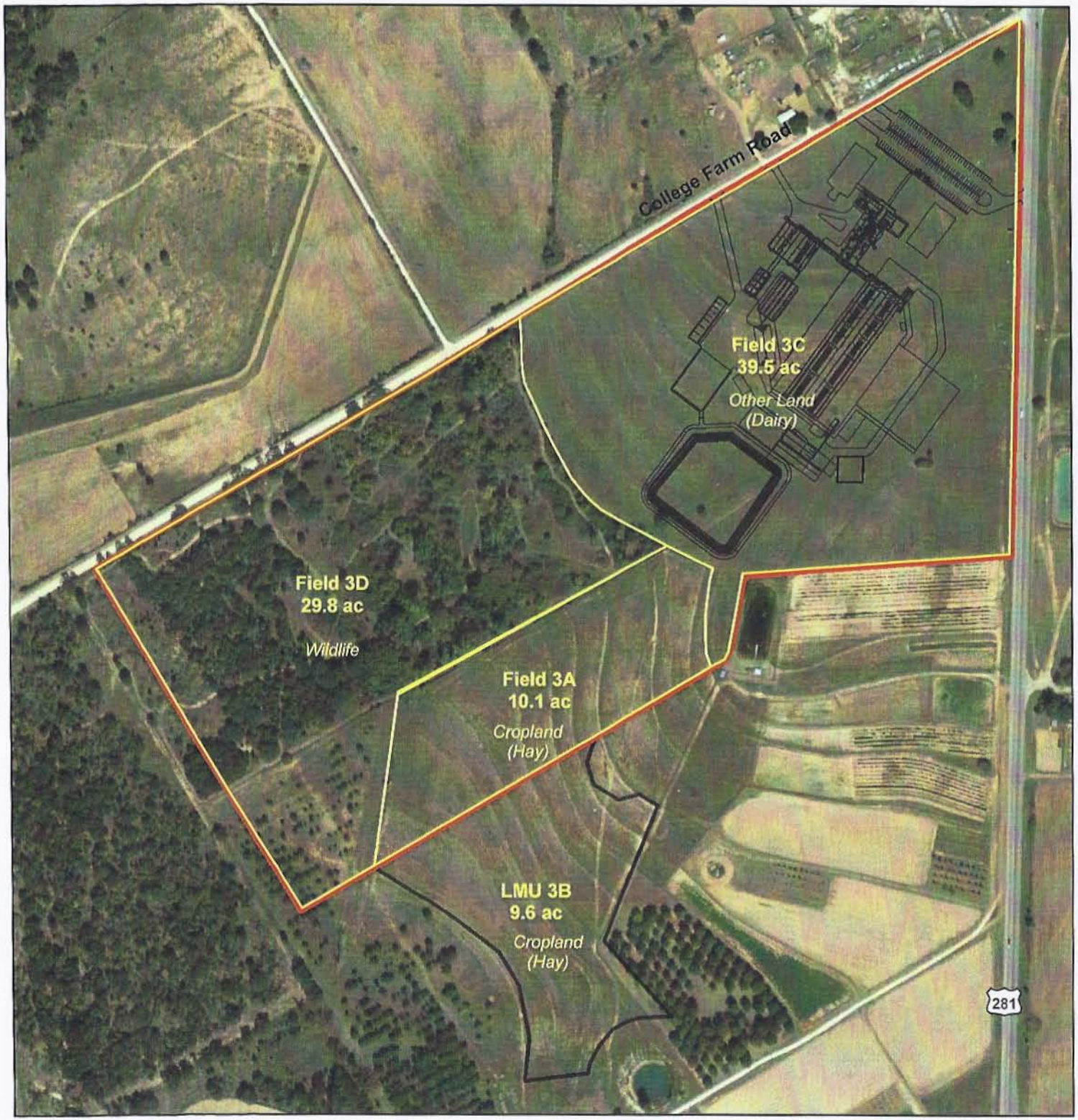
Tarleton State University

Project No. 02-014300.07 | April 2010

Figure 2.1c
Conservation Plan Map
Land Management Units 2A thru 2K

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- TSU Dairy Facility
- Field
- Land Management Unit

Digital Orthophoto Quadrangle:
2008 USDA-FSA Naitonal Agricultural Imagery Program
(from TNRIS)

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Southwest Regional Dairy Center
Tarleton State University

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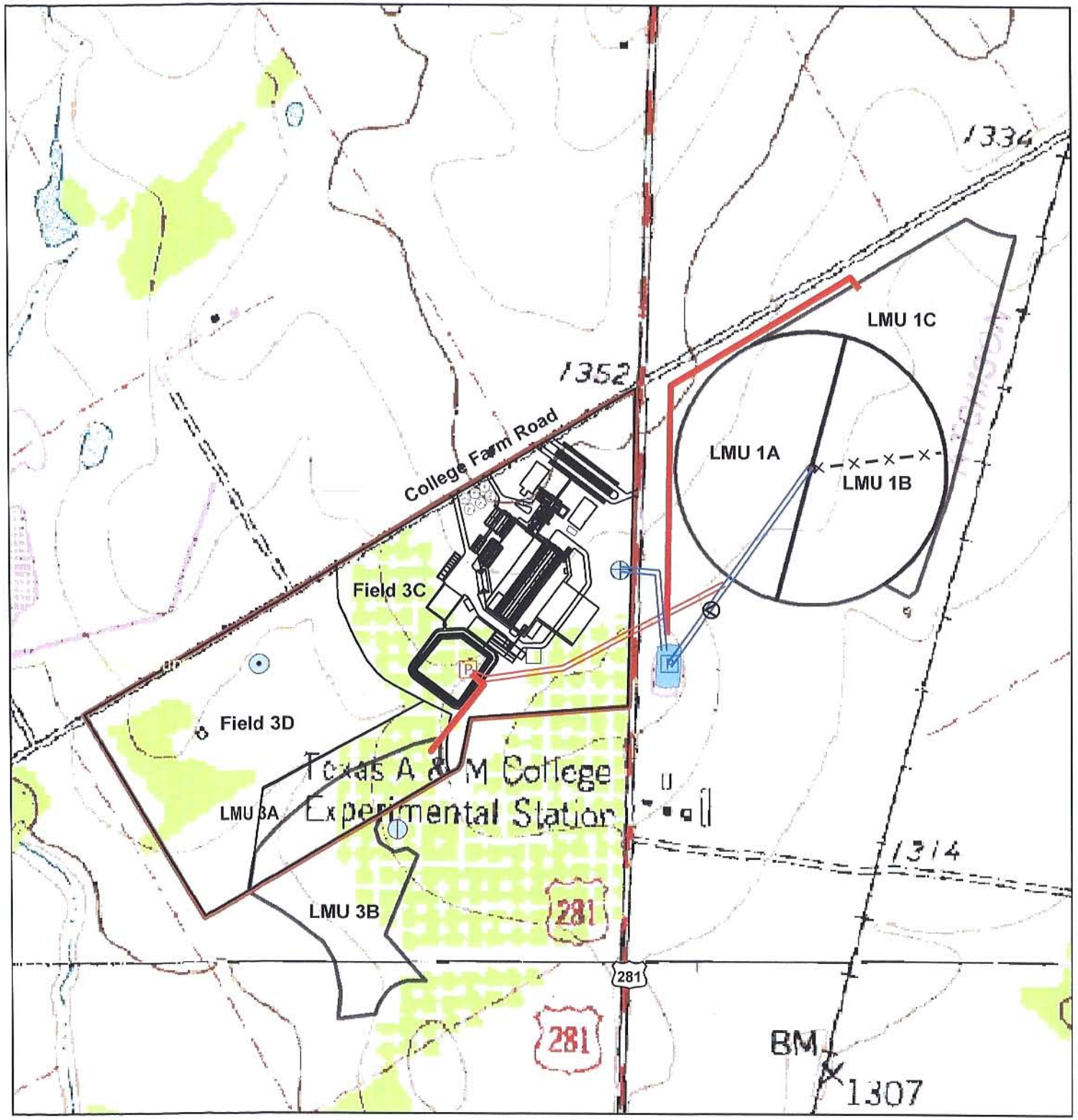
Figure 2.1d
Conservation Plan Map
Land Management Units 3A & 3B

Cirrus
Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Dairy Facility
- Existing irrigation pipeline
- Planned underground effluent pipeline
- Planned aboveground effluent pipeline
- Existing irrigation sprinkler
- Irrigation reservoir
- Existing irrigation well (agriculture/animal use)
- Existing irrigation well (agriculture only)
- Planned public water supply well
- Existing pumping plant
- Planned pumping plants
- Check valve

USGS 7.5' Topographic Maps
Stephenville and Knob Hill, Texas

Contour Interval = 10 ft.

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Southwest Regional Dairy Center
Tarleton State University

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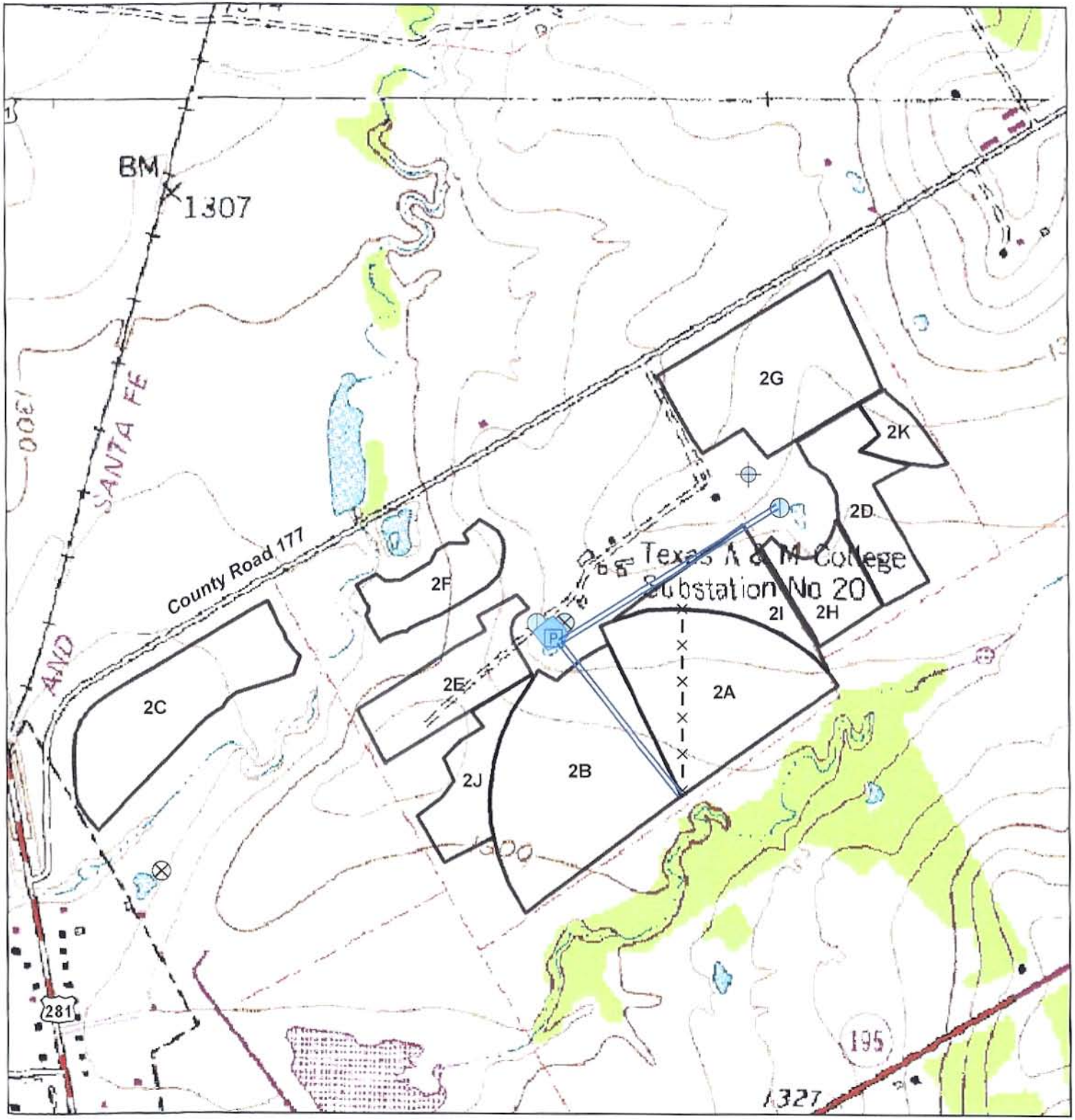
Figure 2.2a
Topographic Map
Dairy Facility, LMUs 1A-1C and 3A-3B

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Existing irrigation pipeline
- Existing irrigation sprinkler
- Irrigation reservoir
- Existing pumping plant
- Existing domestic well
- Existing irrigation well
- Unused irrigation well (Steel plate over wellhead)
- Windmill (Plugged and abandoned)

USGS 7.5' Topographic Maps
Knob Hill and Stephenville, Texas

Contour Interval = 10 ft.

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Figure 2.2b
Topographic Map
Land Management Units 2A thru 2K

Cirrus Associates, LLC
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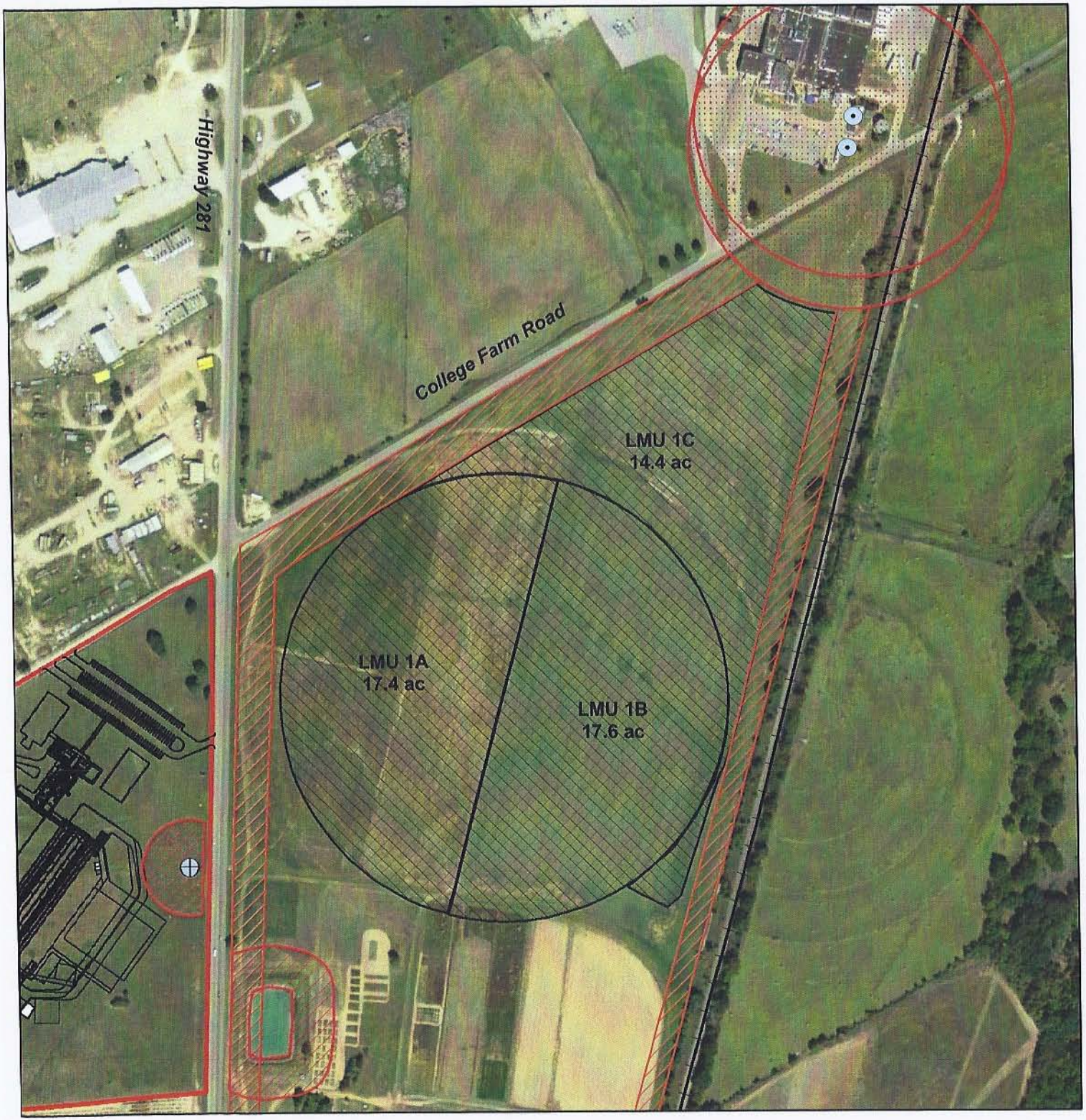
Richardson, Texas 75081



Legend

- TSU Dairy Facility
- Waste Application Area
- Planned or existing public water supply well
- Existing irrigation well
- Railroad

Buffer Distances

- 130 ft.
- 150 ft.
- 500 ft.

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

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Southwest Regional Dairy Center
Tarleton State University

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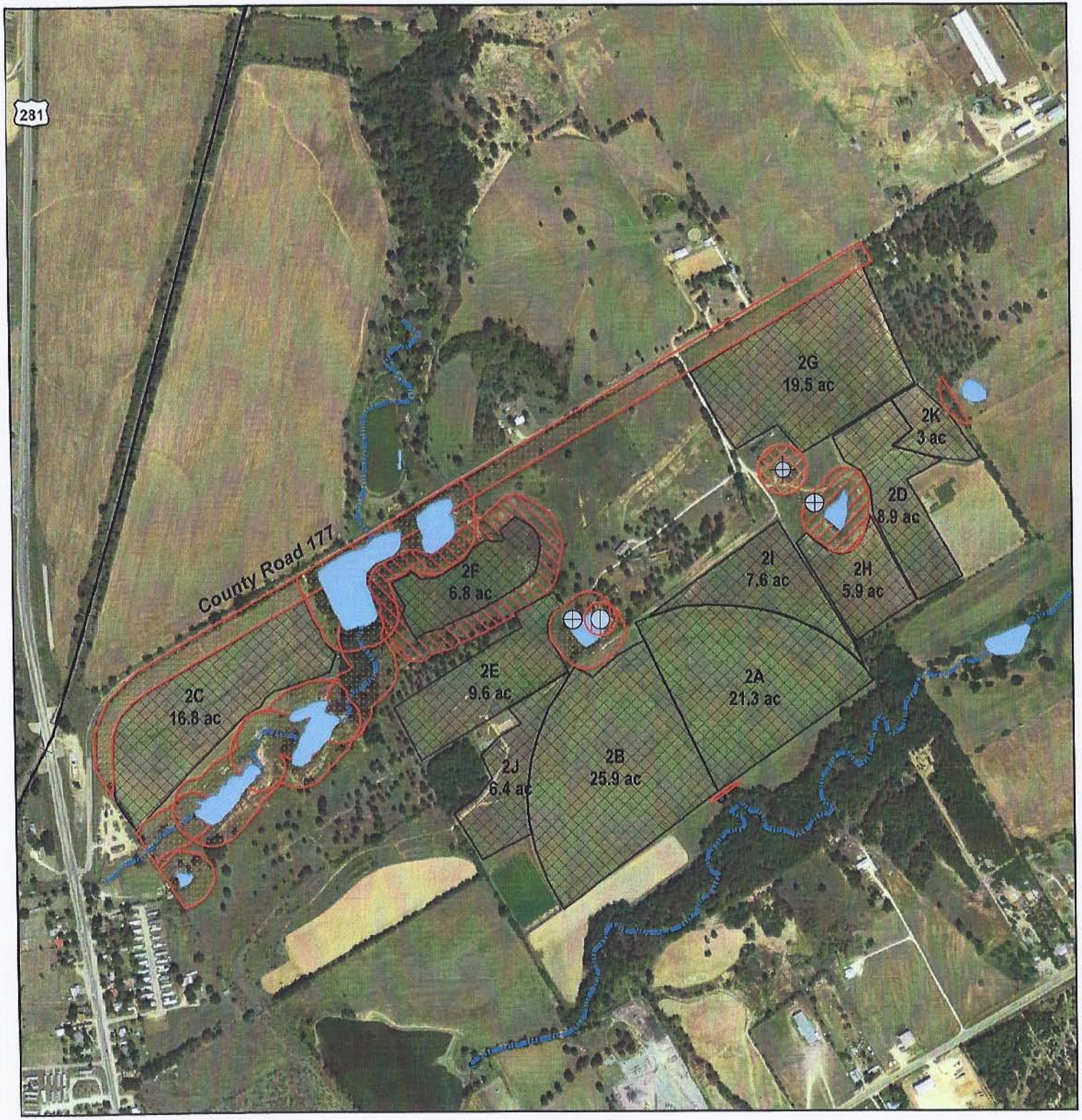
Figure 2.3a
Waste Application Map
Land Management Units 1A, 1B, 1C

Cirrus
Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Waste Application Area
- Existing domestic well
- Existing irrigation well
- Unused irrigation well (Steel plate over wellhead)
- Railroad
- Pond
- Intermittent stream

Buffer Distances

- 100 ft.
- 128 ft.
- 130 ft.
- 133 ft.
- 150 ft.

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

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Southwest Regional Dairy Center
Tarleton State University

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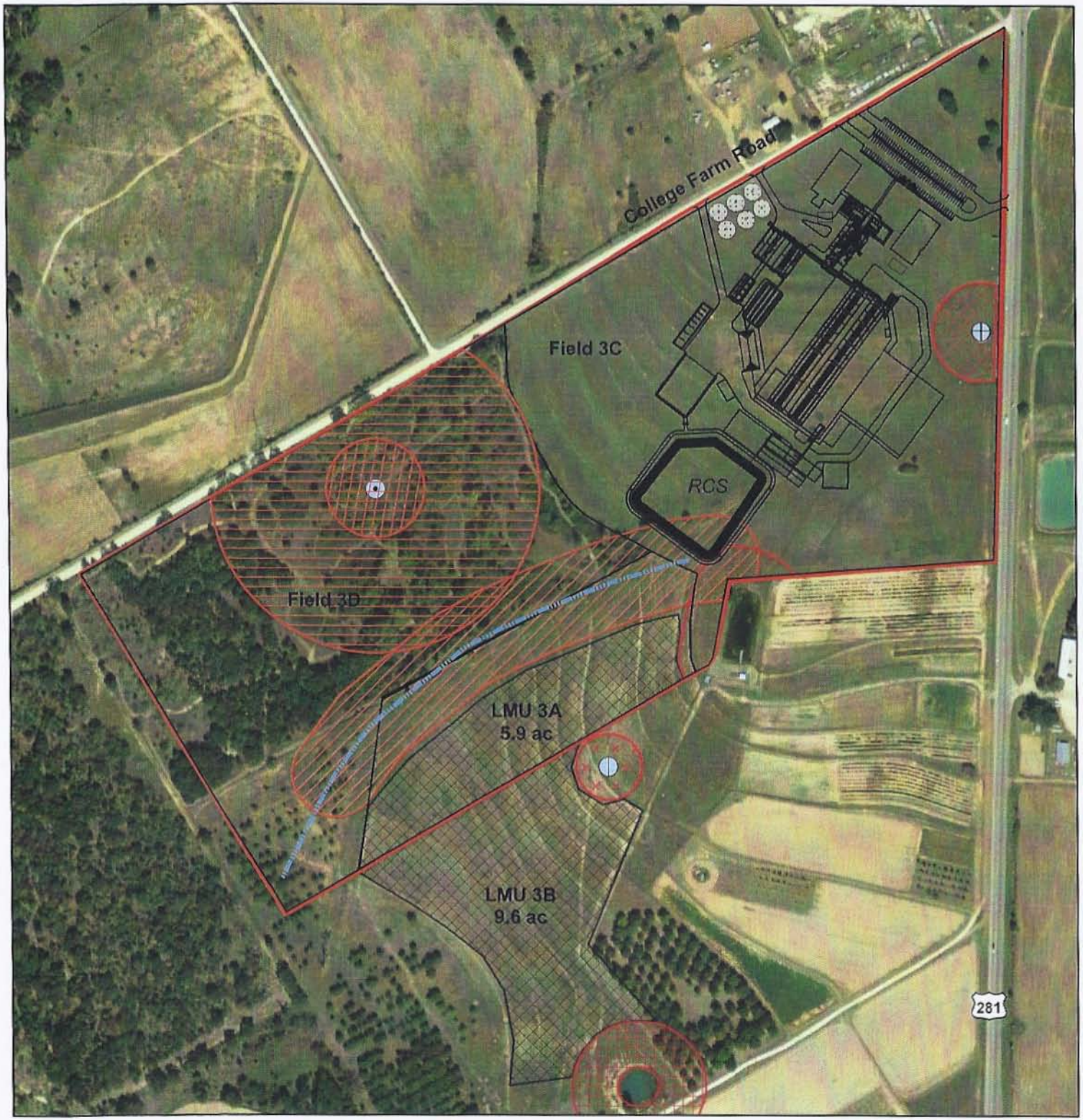
Figure 2.3b
Waste Application Map
Land Management Units 2A thru 2K

Cirrus
Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Dairy Facility
- Waste Application Area
- Planned public water supply well
- Existing irrigation well (agriculture and animal use)
- Existing irrigation well (agriculture only)
- Drainage

Buffer Distances

- 100 ft.
- 128 ft.
- 130 ft.
- 140 ft.
- 150 ft.
- 500 ft.

Digital Orthophoto Quadrangles:
2008 USDA-FSA National AgriculturalImagery Program
(from TNRIS)

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Southwest Regional Dairy Center
Tarleton State University

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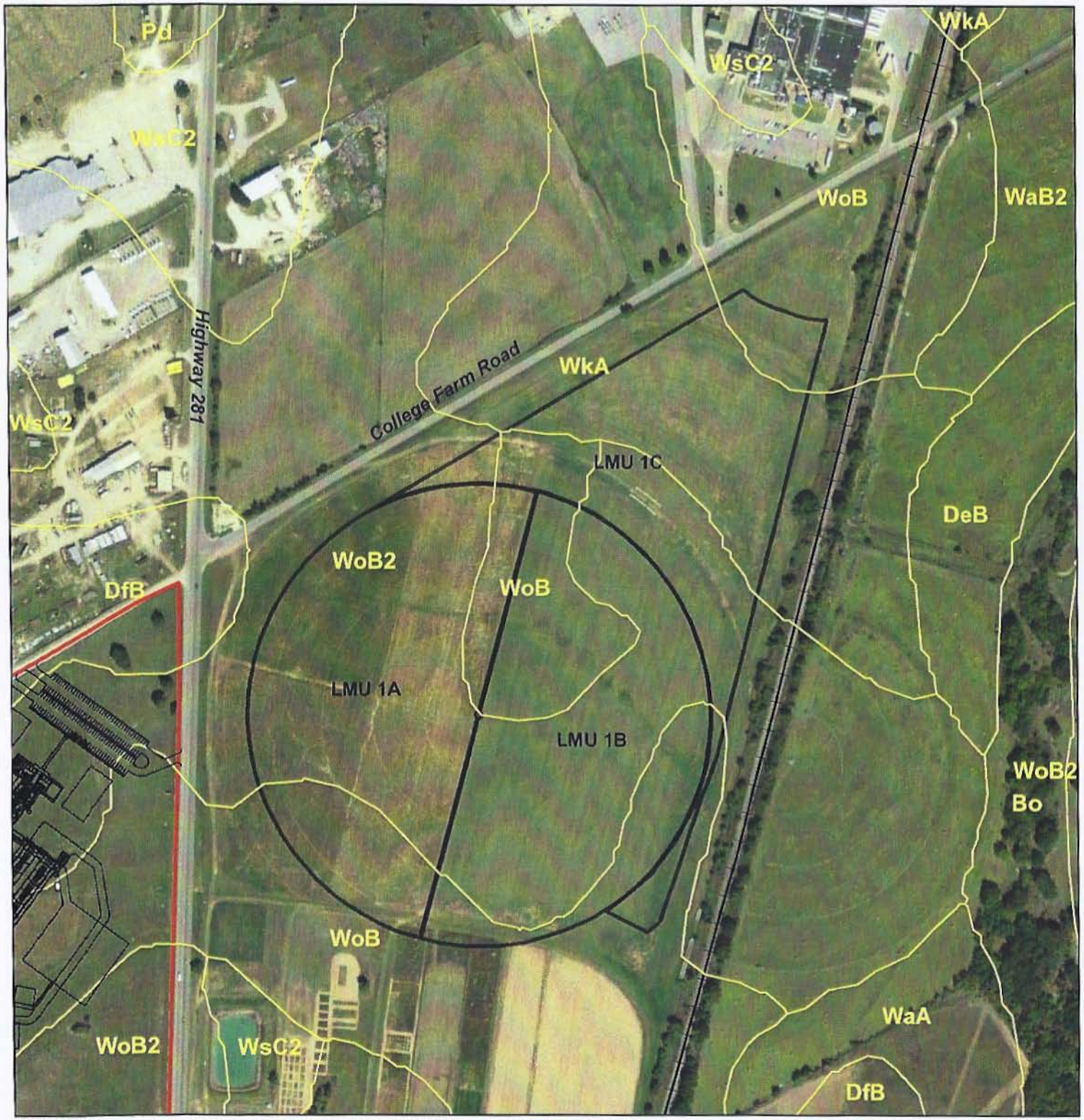
Figure 2.3c
Waste Application Map
Land Management Units 3A & 3B

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Dairy Facility
- Land Management Unit
- Railroad

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

NRCS Soils from SSURGO

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Southwest Regional Dairy Center
Tarleton State University

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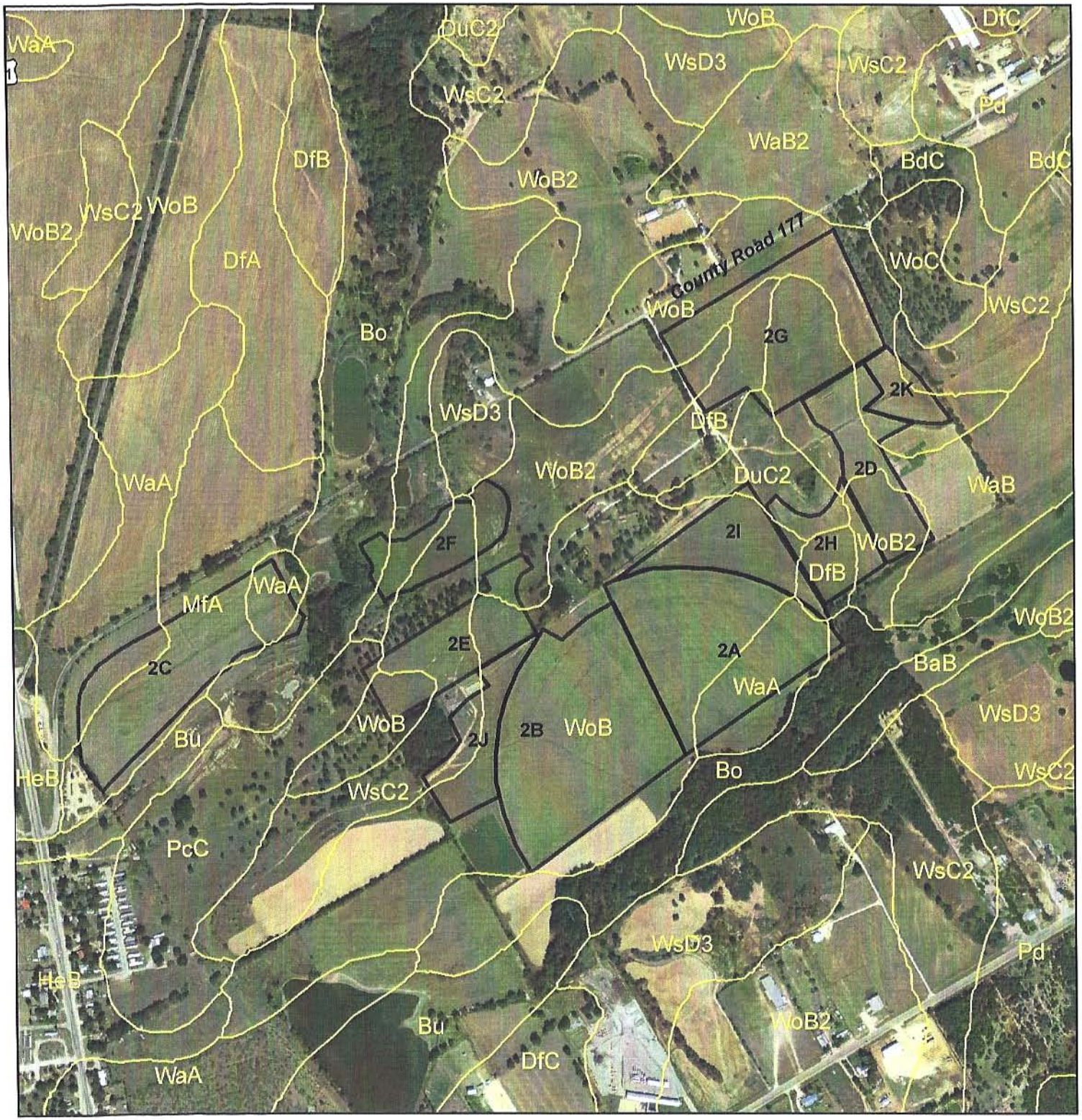
Figure 2.4a
Soils Map
Land Management Units 1A, 1B, 1C

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

Land Management Unit

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

NRCS Soils (from SSURGO)

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Southwest Regional Dairy Center
Tarleton State University

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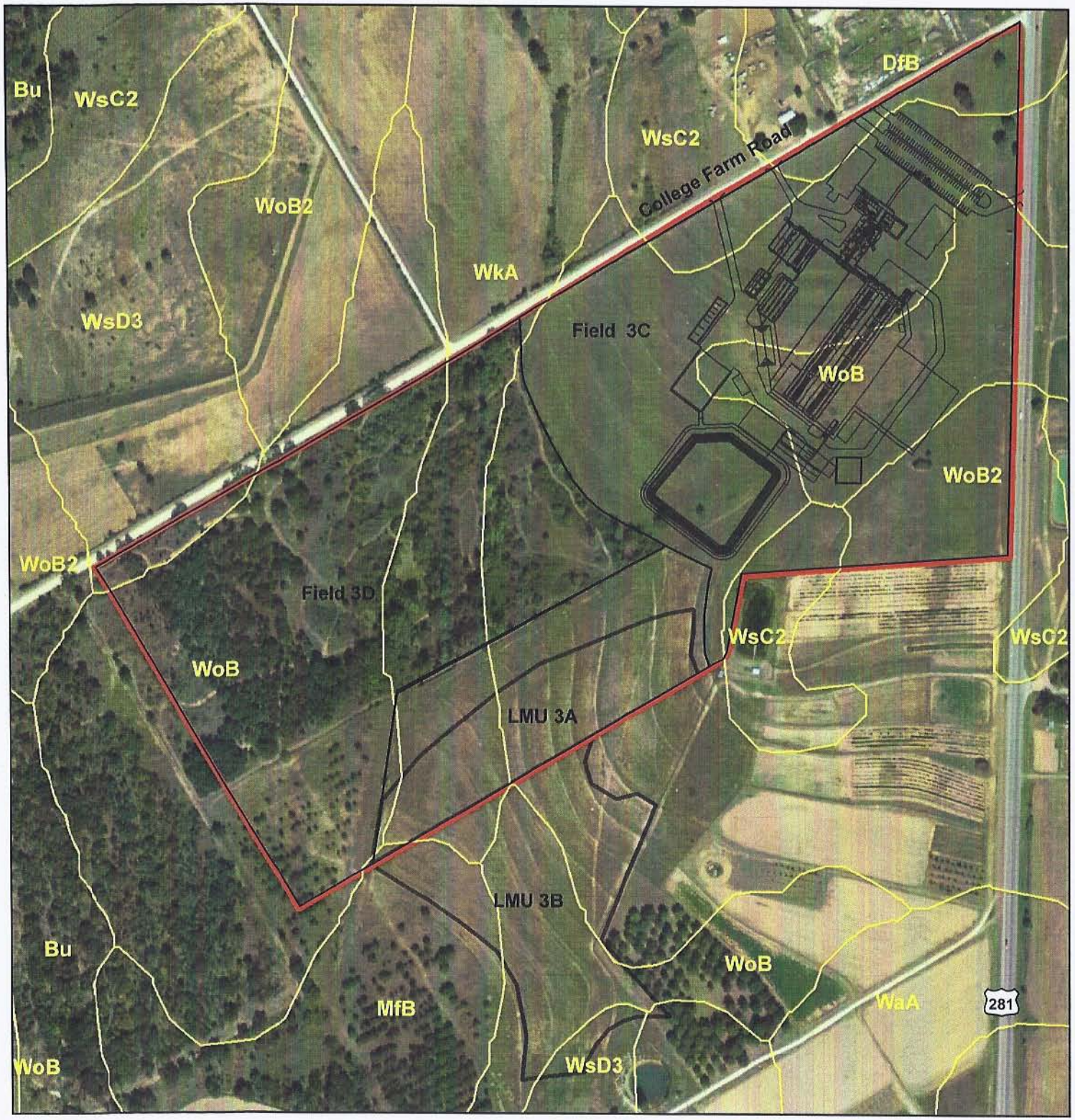
Figure 2.4b
Soils Map
Land Management Units 2A thru 2K

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- TSU Dairy Facility
- Field

Digital Orthophoto Quadrangle:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

NRCS Soils from SSURGO

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Feet
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Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	April, 2010

Figure 2.4c
Soils Map
Fields 3A through 3D

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081

Map Unit Description (Brief)

Erath County, Texas

[Only those map units that have entries for the selected non-technical description categories are included in this report]

Map Unit: Bo - Bosque loam, occasionally flooded

Description Category: PHG

2A - LOAMY BOTTOMLAND - Deep and very deep, loamy bottomlands with friable loamy subsoils; may overflow; medium natural fertility; medium to high water holding capacity with good plant- soil-moisture relationship; high production potential.

Map Unit: DfB - Duffau fine sandy loam, 1 to 3 percent slopes

Description Category: PHG

8C - LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and friable loamy subsoils; slopes 0 to 8 percent; medium natural fertility; medium to high water holding capacity with good plant-soil-moisture relationship; medium to high production potential.

Map Unit: DuC2 - Duffau soils, 2 to 5 percent slopes, eroded

Description Category: PHG

8C - LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and friable loamy subsoils; slopes 0 to 8 percent; medium natural fertility; medium to high water holding capacity with good plant-soil-moisture relationship; medium to high production potential.

Map Unit: MfA - May fine sandy loam, 0 to 1 percent slopes

Description Category: PHG

8C - LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and friable loamy subsoils; slopes 0 to 8 percent; medium natural fertility; medium to high water holding capacity with good plant-soil-moisture relationship; medium to high production potential.

Map Unit: MfB - May fine sandy loam, 1 to 3 percent slopes

Description Category: PHG

8C - LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and friable loamy subsoils; slopes 0 to 8 percent; medium natural fertility; medium to high water holding capacity with good plant-soil-moisture relationship; medium to high production potential.

Map Unit: PcC - Purves clay, 3 to 5 percent slopes

Description Category: PHG

13A - SHALLOW CLAYEY - Very shallow and shallow clayey uplands less than 20 inches thick; medium natural fertility; droughty very low to low water holding capacity with poor plant-soil-moisture relationship; low production potential.

Map Unit: WaA - Hassee fine sandy loam, 0 to 1 percent slopes

Description Category: PHG

8A - TIGHT LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and dense subsoils; slopes 0 to 5 percent; low natural fertility; seasonally wet or droughty; medium water holding capacity but poor to fair plant-soil-moisture relationship; medium to high production potential.

Map Unit Description (Brief)

Erath County, Texas

Map Unit: WaB - Hassee fine sandy loam, 1 to 3 percent slopes

Description Category: PHG

8A - TIGHT LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and dense subsoils; slopes 0 to 5 percent; low natural fertility; seasonally wet or droughty; medium water holding capacity but poor to fair plant-soil-moisture relationship; medium to high production potential.

Map Unit: WkA - Hassee fine sandy loam, thick surface, 0 to 2 percent slopes

Description Category: PHG

8A - TIGHT LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and dense subsoils; slopes 0 to 5 percent; low natural fertility; seasonally wet or droughty; medium water holding capacity but poor to fair plant-soil-moisture relationship; medium to high production potential.

Map Unit: WoB - Windthorst fine sandy loam, 1 to 3 percent slopes

Description Category: PHG

8A - TIGHT LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and dense subsoils; slopes 0 to 5 percent; low natural fertility; seasonally wet or droughty; medium water holding capacity but poor to fair plant-soil-moisture relationship; medium to high production potential.

Map Unit: WoB2 - Windthorst fine sandy loam, 1 to 3 percent slopes, eroded

Description Category: PHG

8A - TIGHT LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and dense subsoils; slopes 0 to 5 percent; low natural fertility; seasonally wet or droughty; medium water holding capacity but poor to fair plant-soil-moisture relationship; medium to high production potential.

Map Unit: WsC2 - Windthorst soils, 3 to 5 percent slopes, eroded

Description Category: PHG

8A - TIGHT LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and dense subsoils; slopes 0 to 5 percent; low natural fertility; seasonally wet or droughty; medium water holding capacity but poor to fair plant-soil-moisture relationship; medium to high production potential.

Map Unit: WsD3 - Windthorst soils, 1 to 8 percent slopes, severely eroded

Description Category: PHG

8B - SLOPING TIGHT LOAMY UPLAND - Moderately deep to very deep uplands with loamy surfaces and dense subsoils; slopes greater than 5 percent; low natural fertility, seasonally wet or droughty; medium water holding capacity but poor to fair plant-soil-moisture relationship; medium production potential.

Conservation Plan

SOUTHWEST REGIONAL DAIRY CENTER,
TARLETON STATE UNIVERSITY
COLLEGE OF AGRI. AND HUMAN SCIENCES
BOX T-0180
STEPHENVILLE, TX 76402

Irrigated Cropland - Hay

CONSERVATION CROP ROTATION (328)

Hybrid bermudagrass will be interseeded annually with a small grain to assist with the uptake of nutrients from animal waste and to provide quality feed for dairy cattle. For more specific information on cropping practices, see RUSLE2 and Nutrient Management Plan. **This field is not controlled by Southwest Regional Dairy Center (SRDC). For more information, please see the application agreement located in Section 7 of the CNMP.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1B	17.6 ac	4	2011		
Total:	17.6 ac				

FORAGE HARVEST MANAGEMENT (511)

The cutting and removal of forages from the field will be managed to ensure that the best combination of quantity and quality is achieved, as well as to promote vigorous regrowth and to maintain stand life. Maintain a stubble height of 3 to 8 inches for coastal and other hybrid bermudagrass cultivars (Fields 1B, 2A and 2B), and of 4 to 6 inches for perennial peanuts (Field 1A). **These fields are not controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A	17.4 ac	9	2010		
1B	17.6 ac	9	2010		
2A	21.3 ac	9	2010		
2B	25.9 ac	9	2010		
Total:	82.2 ac				

NUTRIENT MANAGEMENT (590)

Manage the amount, form, placement and timing of inorganic and organic nutrient application according to annual soils tests (0-2", 2-6", 6-24") and a detailed, site-specific Nutrient Management Plan (NMP). The NMP will be updated at least annually in accordance with NRCS standards and specifications and federal, state and local rules and regulations, and more frequently if necessary due to cropping, yield, or other changes. Sensitive areas will be protected through the use of conservation practices like conservation buffers and application setbacks. For more specific information, see the attached NMP. **These fields are covered by an application agreement between SRDC and Texas AgriLife Research. Waste application will be according to the NMP, but cropping decisions will be made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A	17.4 ac	11	2010		
1B	17.6 ac	11	2010		
2A	21.3 ac	11	2010		
2B	25.9 ac	11	2010		
Total:	82.2 ac				

PEST MANAGEMENT (595)

Manage weeds, insects and disease to prevent an economic impact on crop production and overall plant health. Follow all pesticide label requirements and federal, state, and local laws regarding pesticide use. Pay special attention to label requirements on buffers, application setbacks, and other practices necessary to protect sensitive areas. Dispose of empty containers as directed. For information on specific pests and crops, refer to information from Texas AgriLife Extension and Texas AgriLife Research publications and information. **These fields are not controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A	17.4 ac	9	2010		
1B	17.6 ac	9	2010		
2A	21.3 ac	9	2010		
2B	25.9 ac	9	2010		
Total:	82.2 ac				

IRRIGATION SYSTEM, SPRINKLER (442)

Maintain existing irrigation sprinkler for a minimum of 10 years according to existing irrigation system design. Irrigation sprinkler is used for the uniform distribution of both irrigation water and effluent without causing excessive erosion, water loss or negatively impacting water quality. Observe sprinkler system closely when applying effluent and repair leaks quickly to avoid unintentional discharge of animal waste to waters of the state. Flush sprinkler system after effluent application to protect from damage. **This irrigation sprinkler is not controlled by SRDC. It is used to apply effluent according to the attached NMP. Fresh water irrigation decisions are made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A	17.4 ac	9	2010		
1B	17.6 ac	9	2010		
Total:	35 ac				

IRRIGATION REGULATING RESERVOIR (552)

Maintain existing irrigation regulating reservoir to temporarily store irrigation water for application to irrigated fields. **These reservoirs are not controlled by SRDC. All irrigation decisions are made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A, B	1 no	9	2010		
2A, B	1 no	9	2010		
Total:	2 no				

PUMPING PLANT (533)

Maintain pumping facility according to manufacturer's specifications in order to transfer irrigation water from the irrigation regulating reservoir to the application field. **These pumps are not controlled by SRDC. All irrigation decisions are made by Texas AgriLife Research.**

	Planned Amount	Month	Year	Applied Amount	Date
1A, B	1 no	9	2010		
2A, B	1 no	9	2010		
Total:	2 no				

IRRIGATION SYSTEM, SPRINKLER (442)

Maintain existing irrigation sprinkler for a minimum of 10 years according to existing irrigation system design. Irrigation sprinkler is used for the uniform distribution of irrigation water without causing excessive erosion, water loss or negatively impacting water quality. **This irrigation sprinkler is not controlled by SRDC. All irrigation decisions are made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
2A	21.3 ac	9	2010		
2B	25.9 ac	9	2010		
Total:	47.2 ac				

IRRIGATION WATER MANAGEMENT (449)

Irrigation applications will be scheduled to ensure that the timing and amount of irrigation events are optimal to meet plant demand without causing erosion, water loss, leaching of nutrients, or other undesireable effects. In order to protect groundwater resources, anti-backflow chemigation valves will be installed and maintained. **These fields are not controlled by SRDC. All irrigation decisions are made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A	17.4 ac	9	2010		
1B	17.6 ac	9	2010		
2A	21.3 ac	9	2010		
2B	25.9 ac	9	2010		
Total:	82.2 ac				

IRRIGATION WATER CONVEYANCE, PIPELINE, HIGH PRESSURE, UNDERGROUND, PLASTIC (430DD)

Maintain existing underground irrigation pipelines as required by manufacturer. Repair any leaks promptly. A check valve will be installed in the existing irrigation pipeline in LMU 1 at the location on the Topographic Map, Figure 2.2a in this CNMP, in order to protect water quality. **These pipelines are not controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A,B	1800 ft	9	2010		
2A,B	1700 ft	9	2010		
Total:	3500 ft				

WASTE UTILIZATION (633)

Animal wastes (manure and effluent) will be land applied for beneficial use. Effluent will be applied primarily to fields 1A and 1B through a center pivot sprinkler. Manure may be applied to other irrigated fields as necessary and planned in the NMP. The enclosed NMP will detail the proper and planned manure and effluent application rates, timing, and methods of application to provide needed crop nutrients and to minimize the transport of nutrients into ground and surface water. Manure and effluent will be tested annually in order to develop the annual NMP. Records of all waste applications will be kept for a minimum of 5 years onsite. Records will be kept for any animal waste that is transferred offsite, including the amount and chemical analysis of the waste and the name of the person accepting the waste. During manure and effluent application, all application setbacks and buffers must be observed. For more specific details, see the Waste Application map and NMP. **These fields are covered by an application agreement between SRDC and Texas AgriLife Research. Waste application will be according to the NMP, but cropping decisions will be made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1A	17.4 ac	11	2010		
1B	17.6 ac	11	2010		
2A	21.3 ac	11	2010		
2B	25.9 ac	11	2010		
Total:	82.2 ac				

MANURE TRANSFER (634)

Install and maintain according to NRCS standards and specifications 6" 100 psi manure transfer pipeline for the transport of effluent from the waste treatment lagoon to the land application area. Pipeline will be buried at least 4' below ground surface.

Field	Planned Amount	Month	Year	Applied Amount	Date
1A,B	1145 ft	6	2010		
Total:	1145 ft				

Cropland - Hay

PASTURE AND HAY PLANTING (512)

Sprig fields 3A and 3B with hybrid bermudagrass to provide acceptable ground cover, erosion control, cattle feed, and assist with utilization of animal wastes onsite. Use high quality, regionally adapted sprigs at a rate of at least 12 bushels per acre. Fertilize for establishment, if necessary, according to NMP. Control weeds during establishment by shredding or the use of herbicides. **Only Field 3A is controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
3A	10.1 ac	5	2010		
3B	9.6 ac	5	2010		
Total:	19.7 ac				

FORAGE HARVEST MANAGEMENT (511)

The cutting and removal of forages from the field will be managed to ensure that the best combination of quantity and quality is achieved, as well as to promote vigorous regrowth and to maintain stand life. Maintain a stubble height of 3 to 8 inches for coastal and other hybrid bermudagrass cultivars. **Only Field 3A is controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1C	14.4 ac	9	2010		
2C	16.8 ac	9	2010		
3A	10.1 ac	9	2010		
3B	9.6 ac	9	2010		
Total:	50.9 ac				

NUTRIENT MANAGEMENT (590)

Manage the amount, form, placement and timing of inorganic and organic nutrient application according to annual soils tests (0-2", 2-6", 6-24") and a detailed, site-specific Nutrient Management Plan (NMP). The NMP will be updated at least annually in accordance with NRCS standards and specifications and federal, state and local rules and regulations, and more frequently if necessary due to cropping, yield, or other changes. Sensitive areas will be protected through the use of conservation practices like conservation buffers and application setbacks. For more specific information, see the attached NMP. **Fields 1C, 2C and 3B are covered by an application agreement between SRDC and Texas AgriLife Research. Waste application will be according to the NMP, but cropping decisions will be made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1C	14.4 ac	11	2010		
2C	16.8 ac	11	2010		
3A	10.1 ac	11	2010		
3B	9.6 ac	11	2010		
Total:	50.9 ac				

WASTE UTILIZATION (633)

Animal wastes (manure and effluent) will be land applied for beneficial use. Effluent may be applied to fields 1C, 3A and 3B through a hose and reel sprinkler system, though these are not the primary effluent application fields. Manure may be applied to field 2C as necessary and planned in the NMP. The enclosed NMP will detail the proper and planned manure and effluent application rates, timing, and methods of application to provide needed crop nutrients and to minimize the transport of nutrients into ground and surface water. Manure and effluent will be tested annually in order to develop the annual NMP. Records of all waste applications will be kept for a minimum of 5 years onsite. Records will be kept for any animal waste that is transferred offsite, including the amount and chemical analysis of the waste and the name of the person accepting the waste. During manure and effluent application, all application setbacks and buffers must be observed. For more specific details, see the Waste Application map and NMP. **Fields 1C, 2C and 3B are covered by an application agreement between SRDC and Texas AgriLife Research. Waste application will be according to the NMP, but cropping decisions will be made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1C	14.4 ac	11	2010		
2C	16.8 ac	11	2010		
3A	10.1 ac	11	2010		
3B	9.6 ac	11	2010		
Total:	50.9 ac				

MANURE TRANSFER (634)

Install and maintain 4" 160 psi PVC above-ground manure transfer pipe for the transport of effluent from the waste treatment lagoon to the land application area for the application of wastewater to dryland hay land. During daily operations, care will be taken to ensure that pipeline is not damaged. Daily inspections of line are required.

Field	Planned Amount	Month	Year	Applied Amount	Date
1C	2175 ft	6	2010		
3A, B	525 ft	6	2010		
Total:	2700 ft				

PEST MANAGEMENT (595)

Manage weeds, insects and disease to prevent an economic impact on crop production and overall plant health. Follow all pesticide label requirements and federal, state, and local laws regarding pesticide use. Pay special attention to label requirements on buffers, application setbacks, and other practices necessary to protect sensitive areas. Dispose of empty containers as directed. For information on specific pests and crops, refer to information from Texas AgriLife Extension and Texas AgriLife Research publications and information. **Only Field 3A is controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
1C	14.4 ac	9	2010		
2C	16.8 ac	9	2010		
3A	10.1 ac	9	2010		
3B	9.6 ac	9	2010		
Total:	50.9 ac				

FILTER STRIP (393)

Sprig hybrid bermudagrass in order to protect water quality. The filter strip may be hayed and/or grazed as long as its ability to function as intended is not compromised. Use high quality, regionally adapted sprigs at a rate of at least 12 bushels per acre. Fertilize for establishment, if necessary, according to NMP. Control weeds during establishment by shredding or the use of herbicides. Refer to the Waste Application Map (Figure 2.3c) for more information. **Animal wastes (e.g. manure and/or effluent) shall not be applied to the filter strip area.**

Field	Planned Amount	Month	Year	Applied Amount	Date
3A	4.2 ac	5	2010		
Total:	4.2 ac				

Wildlife

UPLAND WILDLIFE HABITAT MANAGEMENT (645)

Existing cover will be maintained in order to prevent soil erosion and to provide cover, food and shelter for wildlife species present on property. Although grazing of this field is not its primary use, limited grazing may occur as long as cover remains adequate after grazing.

Field	Planned Amount	Month	Year	Applied Amount	Date
3D	29.8 ac	9	2010		
Total:	29.8 ac				

WATER WELL (642)

Install water well to provide water for the dairy facility and livestock according to state and local rules and regulations.

Field	Planned Amount	Month	Year	Applied Amount	Date
3D	1 no	9	2010		
Total:	1 no	9	2010		

Pasture

NUTRIENT MANAGEMENT (590)

Manage the amount, form, placement and timing of inorganic and organic nutrient application according to annual soils tests (0-2", 2-6", 6-24") and a detailed, site-specific Nutrient Management Plan (NMP). The NMP will be updated at least annually in accordance with NRCS standards and specifications and federal, state and local rules and regulations, and more frequently if necessary due to cropping, yield, or other changes. Sensitive areas will be protected through the use of conservation practices like conservation buffers and application setbacks. For more specific information, see the attached NMP. **These fields are covered by an application agreement between SRDC and Texas AgriLife Research. Waste application will be according to the NMP, but cropping decisions will be made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
2D	8.9 ac	11	2010		
2E	9.6 ac	11	2010		
2F	6.8 ac	11	2010		
2G	19.5 ac	11	2010		
2H	5.9 ac	11	2010		
2I	7.6 ac	11	2010		
2J	6.4 ac	11	2010		
2K	3 ac	11	2010		
Total:	67.7 ac				

WASTE UTILIZATION (633)

Manure will be land applied for beneficial use as necessary and planned in the NMP. The enclosed NMP will detail the proper and planned manure application rates, timing, and methods of application to provide needed crop nutrients and to minimize the transport of nutrients into ground and surface water. Manure will be tested annually in order to develop the annual NMP. Records of all waste applications will be kept for a minimum of 5 years onsite. Records will be kept for any animal waste that is transferred offsite, including the amount and chemical analysis of the waste and the name of the person accepting the waste. During manure application, all application setbacks and buffers must be observed. For more specific details, see the Waste Application map and NMP. **These fields are covered by an application agreement between SRDC and Texas AgriLife Research. Waste application will be according to the NMP, but cropping decisions will be made by Texas AgriLife Research.**

Field	Planned Amount	Month	Year	Applied Amount	Date
2D	8.9 ac	11	2010		
2E	9.6 ac	11	2010		
2F	6.8 ac	11	2010		
2G	19.5 ac	11	2010		
2H	5.9 ac	11	2010		
2I	7.6 ac	11	2010		
2J	6.4 ac	11	2010		
2K	3 ac	11	2010		
Total:	67.7 ac				

PEST MANAGEMENT (595)

Manage weeds, insects and disease to prevent an economic impact on crop production and overall plant health. Follow all pesticide label requirements and federal, state, and local laws regarding pesticide use. Pay special attention to label requirements on buffers, application setbacks, and other practices necessary to protect sensitive areas. Dispose of empty containers as directed. For information on specific pests and crops, refer to information from Texas AgriLife Extension and Texas AgriLife Research publications and information. **These fields are not controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
2D	8.9 ac	9	2010		
2E	9.6 ac	9	2010		
2F	6.8 ac	9	2010		
2G	19.5 ac	9	2010		
2H	5.9 ac	9	2010		
2I	7.6 ac	9	2010		
2J	6.4 ac	9	2010		
2K	3 ac	9	2010		
Total:	67.7 ac				

PRESCRIBED GRAZING (528)

Grazing will be managed according to a prescribed grazing schedule that meets the needs of the soil, water, air, plant and animal resources and the objectives of the resource manager. The prescribed grazing schedule will improve plant health and vigor. The degree and frequency of use of the forage shall be established for each grazing season. Consider the grazing season to start in April and end the following April of each year. The manager will apply this practice on a continuing basis, making adjustments as needed in emergency periods to ensure that the concept and objectives of applications are met. A contingency plan for drought will be developed. These pastures are not intensively grazed, but utilized when needed for research projects or another use. **These fields are not controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
2D	8.9 ac	4	2011		
2E	9.6 ac	4	2011		
2F	6.8 ac	4	2011		
2G	19.5 ac	4	2011		
2H	5.9 ac	4	2011		
2I	7.6 ac	4	2011		
2J	6.4 ac	4	2011		
2K	3 ac	4	2011		
Total:	67.7 ac				

FENCE (382)

Install temporary electric fencing as needed to facilitate grazing of LMUs. **These fields are not controlled by SRDC.**

Field	Planned Amount	Month	Year	Applied Amount	Date
2D	8.9 ac	9	2010		
2E	9.6 ac	9	2010		
2F	6.8 ac	9	2010		
2G	19.5 ac	9	2010		
2H	5.9 ac	9	2010		
2I	7.6 ac	9	2010		
2J	6.4 ac	9	2010		
2K	3 ac	9	2010		
Total:	67.7 ac				

WATERING FACILITY (614)

Provide temporary watering facilities as needed to supply livestock water and to facilitate grazing of LMUs.
These fields are not controlled by SRDC.

Field	Planned Amount	Month	Year	Applied Amount	Date
2D	1 no	9	2010		
2E	1 no	9	2010		
2F	1 no	9	2010		
2G	1 no	9	2010		
2H	1 no	9	2010		
2I	1 no	9	2010		
2J	1 no	9	2010		
2K	1 no	9	2010		
Total:	8 no				

Dairy Production Area

HEAVY USE AREA PROTECTION (561)

Protect soil in heavily used areas in dairy production site through the use of vegetation, surfacing material or mechanical structures.

Field	Planned Amount	Month	Year	Applied Amount	Date
3C	39.5 ac	9	2010		
Total:	39.5 ac	9	2010		

WASTE TREATMENT LAGOON (359)

Construct and maintain a waste treatment lagoon designed to treat organic waste biologically in accordance with NRCS Standards and Specifications and state regulations. This installation is planned as part of an overall waste management plan. Included in the construction of the waste treatment lagoon will be compacted clay liner and concrete chute(s). For more specific information, see design, construction, and certification information in the Pollution Prevention Plan.

Field	Planned Amount	Month	Year	Applied Amount	Date
3C	1 no	6	2010		
Total:	1 no	6	2010		

POND SEALING OR LINING, COMPACTED CLAY TREATMENT (521D)

Install 36" of compacted clay liner in the Waste Treatment Lagoon in accordance with NRCS Standards and Specifications and state regulations. Follow lagoon and liner maintenance requirements located in the Pollution Prevention Plan. This installation is planned as part of an overall waste management plan. For more specific information, see design, construction, and certification information in the Pollution Prevention Plan.

Field	Planned Amount	Month	Year	Applied Amount	Date
3C	1 no	6	2010		
Total:	1 no	6	2010		

SEDIMENT BASIN (350)

Construct sediment basin(s) to collect animal waste in order to preserve the capacity and function of the waste treatment lagoon. Manure levels should be maintained at a level below the outlet to the waste treatment lagoon. Maintenance and clean out timing should follow design guidelines and TCEQ regulations. Designed to be cleaned out four times annually. For more specific information, see design, construction, and certification information in the Pollution Prevention Plan.

Field	Planned Amount	Month	Year	Applied Amount	Date
3C	2 no	6	2010		
Total:	2 no	6	2010		

PUMPING PLANT (533)

Install 20 hp pumping facility according to manufacturer's specifications in order to transfer effluent from the waste treatment lagoon to the center pivot application fields, LMUs 1A and 1B. A 15 hp pumping facility will also be installed according to manufacturer's specifications in order to transfer effluent from the waste treament lagoon to the dryland application fields, LMUs 1C, 3A and 3B. All necessary safety features such as safety shut-off connections will be installed.

Field	Planned Amount	Month	Year	Applied Amount	Date
3C	2 no	6	2010		
Total:	2 no	6	2010		

ACCESS CONTROL (472)

Fence waste treatment lagoon and sediment basins to exclude livestock, wildlife and unauthorized personnel, as a safety measure and to prevent damage to clay liner.

Field	Planned Amount	Month	Year	Applied Amount	Date
3C	3 ac	9	2010		
Total:	3 ac	9	2010		

ANIMAL MORTALITY FACILITY (316)

All mortality will be hauled off-site for disposal within 72 hours by a commercial rendering company. Commercial rendering is also the planned disposal method for a catastrophic mortality. Follow all NRCS Standards and Specifications and local, state and federal laws regarding mortality disposal. For more detailed information, please see Section 8 of the CNMP and the PPP.

Field	Planned Amount	Month	Year	Applied Amount	Date
3C	1 no	9	2010		
Total:	1 no	9	2010		

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 1A

File: profiles\Erath_SWRDC_1A

Inputs:
Location: Texas\Erath County
Soil: WoB2 WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES, ERODED\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Forage Peanut, Hayed 4 cut	Alfalfa, yr2 regrowth after cutting	tons	1.5000
CMZ 48\c.Other Local Mgt Records\Forage Peanut, Hayed 4 cut	Alfalfa, yr2 regrowth after cutting	tons	1.5000
CMZ 48\c.Other Local Mgt Records\Forage Peanut, Hayed 4 cut	Alfalfa, yr2 regrowth after cutting	tons	1.5000
CMZ 48\c.Other Local Mgt Records\Forage Peanut, Hayed 4 cut	Alfalfa, yr2 regrowth after cutting	tons	1.5000

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.62 t/ac/yr
Detachment on slope: 0.62 t/ac/yr
Soil loss for cons. plan: 0.62 t/ac/yr
Sediment delivery: 0.62 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/1/0	Harvest, hay, legume	Alfalfa, yr2 regrowth after cutting	23
7/1/0	Harvest, hay, legume	Alfalfa, yr2 regrowth after cutting	30
8/1/0	Harvest, hay, legume	Alfalfa, yr2 regrowth after cutting	36
9/1/0	Harvest, hay, legume	Alfalfa, yr2 regrowth after cutting	40

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 1B

File: profiles\Erath_SWRDC_1B

Inputs:
Location: Texas\Erath County
Soil: WoB2 WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES, ERODED\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Wheat, winter, grain S.E.	Bushels	40.000
CMZ 48\c.Other Local Mgt Records\Bermuda, GC, 6 cuts; small gr, interseeded, GC; CMZ 48	Wheat, winter silage	tons	11.000

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.29 t/ac/yr
Detachment on slope: 0.29 t/ac/yr
Soil loss for cons. plan: 0.29 t/ac/yr
Sediment delivery: 0.29 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
5/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	45
6/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	43
7/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	43
8/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	46
9/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	46
10/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	45
11/1/0	Drill or airseeder, dble disk opnr w/ fluted coult 5x10 paired row	Wheat, winter, grain S.E.	56
4/1/1	Harvest, small grain silage with cover crop	Wheat, winter silage	49

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 1C

File: profiles\Erath_SWRDC_1C

Inputs:
Location: Texas\Erath County
Soil: WkA WAURIKA FINE SANDY LOAM, THICK SURFACE, 0 TO 2 PERCENT SLOPES (HASSEE)\WAURIKA (HASSEE) fine sandy loam 80%
Slope length (horiz): 200 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 3 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 3 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 3 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 3 cuts; CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.037 t/ac/yr
Detachment on slope: 0.037 t/ac/yr
Soil loss for cons. plan: 0.037 t/ac/yr
Sediment delivery: 0.037 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	30
8/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	30
10/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	29
10/15/0	Harvest, hay, grass	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	32

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2A

File: profiles\Erath_SWRDC_2A

Inputs:
Location: Texas\Erath County
Soil: WoB WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.079 t/ac/yr
Detachment on slope: 0.079 t/ac/yr
Soil loss for cons. plan: 0.079 t/ac/yr
Sediment delivery: 0.079 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
5/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	34
6/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	34
7/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	36
8/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	39
9/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	41
10/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	41
10/15/0	Harvest, hay, grass	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	42

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2B

File: profiles\Erath_SWRDC_2B

Inputs:
Location: Texas\Erath County
Soil: WoB WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, hay; 5 cuts; CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.079 t/ac/yr
Detachment on slope: 0.079 t/ac/yr
Soil loss for cons. plan: 0.079 t/ac/yr
Sediment delivery: 0.079 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
5/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	34
6/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	34
7/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	36
8/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	39
9/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	41
10/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	41
10/15/0	Harvest, hay, grass	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	42

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2C

File: profiles\Erath_SWRDC_2C

Inputs:
Location: Texas\Erath County
Soil: MfA MAY FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES\MAY fine sandy loam 100%
Slope length (horiz): 200 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.030 t/ac/yr
Detachment on slope: 0.030 t/ac/yr
Soil loss for cons. plan: 0.030 t/ac/yr
Sediment delivery: 0.030 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	14
8/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	13
10/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	12
10/15/0	Graze, rotational	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	13

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2D

File: profiles\Erath_SWRDC_2D

Inputs:
Location: Texas\Erath County
Soil: WaB WAURIKA FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES (HASSEE)\WAURIKA (HASSEE) fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.066 t/ac/yr
Detachment on slope: 0.066 t/ac/yr
Soil loss for cons. plan: 0.066 t/ac/yr
Sediment delivery: 0.066 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	14
8/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	13
10/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	12
10/15/0	Graze, rotational	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	13

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2E

File: profiles\Erath_SWRDC_2E

Inputs:
Location: Texas\Erath County
Soil: WsC2 WINDTHORST SOILS, 3 TO 5 PERCENT SLOPES, ERODED\WINDTHORST fine sandy loam 100%
Slope length (horiz): 180 ft
Avg. slope steepness: 4.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.14 t/ac/yr
Detachment on slope: 0.14 t/ac/yr
Soil loss for cons. plan: 0.14 t/ac/yr
Sediment delivery: 0.14 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	14
8/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	13
10/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	12
10/15/0	Graze, rotational	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	13

RUSLE2 Profile Erosion Calculation Record

Info: LMU 3 2F

File: profiles\Erath_SWRDC_2F

Inputs:
Location: Texas\Erath County
Soil: WsC2 WINDTHORST SOILS, 3 TO 5 PERCENT SLOPES, ERODED\WINDTHORST fine sandy loam 100%
Slope length (horiz): 180 ft
Avg. slope steepness: 4.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.14 t/ac/yr
Detachment on slope: 0.14 t/ac/yr
Soil loss for cons. plan: 0.14 t/ac/yr
Sediment delivery: 0.14 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	14
8/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	13
10/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	12
10/15/0	Graze, rotational	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	13

RUSLE2 Profile Erosion Calculation Record

Info: LMU #2G

File: profiles\Erath_SWRDC_2G

Inputs:
Location: Texas\Erath County
Soil: WaB WAURIKA FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES (HASSEE)\WAURIKA (HASSEE) fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Warm Season Grass, Grazed	Grass, warm season pasture yr2, regrowth after grazing	pounds	1500.0
CMZ 48\c.Other Local Mgt Records\Warm Season Grass, Grazed	Grass, warm season pasture, y2 senesc to yr3 regrowth	pounds	2000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.74 t/ac/yr
Detachment on slope: 0.74 t/ac/yr
Soil loss for cons. plan: 0.74 t/ac/yr
Sediment delivery: 0.74 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
7/1/0	Graze, rotational	Grass, warm season pasture yr2, regrowth after grazing	12
10/15/0	Graze, rotational	Grass, warm season pasture, y2 senesc to yr3 regrowth	8.7

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2H

File: profiles\Erath_SWRDC_2H

Inputs:
Location: Texas\Erath County
Soil: DfB DUFFAU FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES\DUFFAU fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Bermuda, Grazed, CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.058 t/ac/yr
Detachment on slope: 0.058 t/ac/yr
Soil loss for cons. plan: 0.058 t/ac/yr
Sediment delivery: 0.058 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	14
8/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	13
10/1/0	Graze, rotational	Bermudagrass, coastal regrowth yr2+	12
10/15/0	Graze, rotational	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	13

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2I

File: profiles\Erath_SWRDC_2I

Inputs:
Location: Texas\Erath County
Soil: WoB WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\OW Bluestem, Grazed, CMZ 48	Bluestem, old world, established, regrowth after grazing or hay	tons	3.0000
CMZ 48\c.Other Local Mgt Records\OW Bluestem, Grazed, CMZ 48	Bluestem, old world, established, senesc thru spring regrowth	tons	4.0000

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.017 t/ac/yr
Detachment on slope: 0.017 t/ac/yr
Soil loss for cons. plan: 0.017 t/ac/yr
Sediment delivery: 0.017 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
8/1/0	Graze, rotational	Bluestem, old world, established, regrowth after grazing or hay	47
11/1/1	Graze, rotational	Bluestem, old world, established, senesc thru spring regrowth	19

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2J

File: profiles\Erath_SWRDC_2J

Inputs:
Location: Texas\Erath County
Soil: WoB WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\OW Bluestem, Grazed, CMZ 48	Bluestem, old world, established, regrowth after grazing or hay	tons	3.0000
CMZ 48\c.Other Local Mgt Records\OW Bluestem, Grazed, CMZ 48	Bluestem, old world, established, senesc thru spring regrowth	tons	4.0000

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.017 t/ac/yr
Detachment on slope: 0.017 t/ac/yr
Soil loss for cons. plan: 0.017 t/ac/yr
Sediment delivery: 0.017 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
8/1/0	Graze, rotational	Bluestem, old world, established, regrowth after grazing or hay	47
11/1/1	Graze, rotational	Bluestem, old world, established, senesc thru spring regrowth	19

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 2K

File: profiles\Erath_SWRDC_2K

Inputs:
Location: Texas\Erath County
Soil: WoB WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\c.Other Local Mgt Records\Warm Season Grass, Grazed	Grass, warm season pasture yr2, regrowth after grazing	pounds	2000.0
CMZ 48\c.Other Local Mgt Records\Warm Season Grass, Grazed	Grass, warm season pasture, y2 senesc to yr3 regrowth	pounds	1500.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.97 t/ac/yr
Detachment on slope: 0.97 t/ac/yr
Soil loss for cons. plan: 0.97 t/ac/yr
Sediment delivery: 0.97 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
7/1/0	Graze, rotational	Grass, warm season pasture yr2, regrowth after grazing	9.8
10/15/0	Graze, rotational	Grass, warm season pasture, y2 senesc to yr3 regrowth	9.5

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 3A

File: profiles\Erath_SWRDC_3A

Inputs:
Location: Texas\Erath County
Soil: WoB2 WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES, ERODED\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	4000.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.083 t/ac/yr
Detachment on slope: 0.083 t/ac/yr
Soil loss for cons. plan: 0.083 t/ac/yr
Sediment delivery: 0.083 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/15/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	30
8/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	32
10/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	30
11/1/0	Harvest, hay, grass	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	33

RUSLE2 Profile Erosion Calculation Record

Info: LMU # 3B

File: profiles\Erath_SWRDC_3B

Inputs:
Location: Texas\Erath County
Soil: WoB WINDTHORST FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES\WINDTHORST fine sandy loam 100%
Slope length (horiz): 300 ft
Avg. slope steepness: 2.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2500.0
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	2000.0
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal regrowth yr2+	pounds	1500.0
CMZ 48\a.Single Year/Single Crop Templates\Improved Grass\Bermuda, hay; CMZ 48	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	pounds	1500.0

Contouring: a. rows up-and-down hill
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
T value: 5.0 t/ac/yr
Soil loss erod. portion: 0.35 t/ac/yr
Detachment on slope: 0.35 t/ac/yr
Soil loss for cons. plan: 0.35 t/ac/yr
Sediment delivery: 0.35 t/ac/yr

Crit. slope length: -- ft
Surf. cover after planting: -- %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
6/15/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	15
8/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	25
10/1/0	Harvest, hay, grass	Bermudagrass, coastal regrowth yr2+	26
11/1/0	Harvest, hay, grass	Bermudagrass, coastal, y2+ senesc thru yr3 + greenup	28

USDA NRCS

Natural Resources Conservation Service

Conservation Across America

Pasture & Hayland Planting

Job Sheet – 512

Texas A&M Grass Images, Bioinformatics Working Group; Photo from Forages 5th Ed. CD Companion

HYBRID BERMUDAGRASS

DESCRIPTION - The leaves, stems, and rhizomes are larger diameter and longer than common bermudagrass. Seed heads rarely produce viable seed. They are more drought tolerant and more productive than common bermudagrass. Soils, management, and forage use are important in selecting variety.

CULTIVARS - See table on back of this sheet for a comparison of bermudagrass hybrids.

ADAPTATION - Best adapted to well and moderately well drained soils.

PLANTING DATES – Planted by sprigs 1/15-6/1 or planted by tops 5/30-6/15.

PLANTING RATE - If planted with a sprigging machine the planting rate is 12 Bu. sprigs per acre, if planted by broadcasting 24 Bu. sprigs per acre is the rate. Five to seven square bales of fresh tops are needed per acre to establish by planting tops.

PLANTING DEPTH - 1 to 3 inches deep.

SEEDBED PREPARATION - Disk 6 - 8 inches deep, well in advance of planting, and allow to firm from rainfall or by rolling.

LIME AND FERTILIZER - Bermudagrass pH range is 5.5 - 8.0. Fertilizer rate will be determined by current soil test. Nitrogen (N) application will vary depending upon site conditions and intensity of management. For pasture, a moderate to high level of production can be attained with 60 Lb/Ac N application in the spring and 60 Lb/Ac N application after each grazing cycle, for hay 100 Lb/Ac in the spring and 100 Lb/Ac after each cutting. Other nutrients should be added, as needed, according to a current soil test. If, lime phosphorus, potassium, or other nutrients are needed before planting, incorporate them during seedbed preparation.

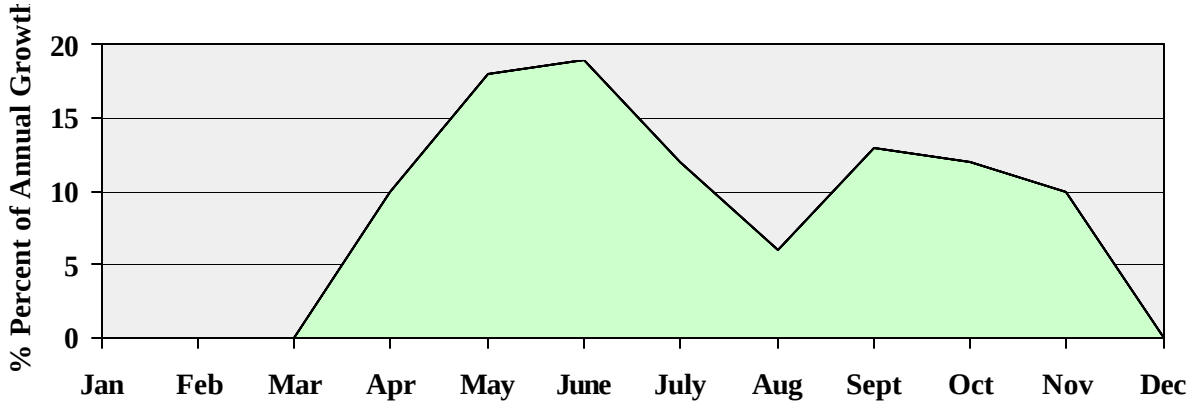
PLANTING METHODS - Hybrid bermudagrass sprigs and tops can be planted with a sprigging machine or they can be broadcast using a manure spreader and then disking to cover. For more information on planting tops see NRCS Job Sheet entitled, Planting Bermudagrass Hybrids Using Tops. The soil should be firmed with a cultipacker, or roller during or immediately after planting. If sprigging, soil should be rolled before planting to firm seedbed.

MANAGEMENT - Protect from grazing until plants are well rooted, and not easily pulled up by livestock. Control weeds to reduce competition. Follow all label directions when using herbicides. When grazing to control weeds, stock the area heavily for short periods; do not graze shorter than 6 inches during the establishment year. After establishment, hybrid bermudagrass should not be grazed until it is at least 6 inches tall, and it can be grazed to 3.0 inches in a rotational system. Hay may be cut to a 3-inch height. Grazing should be on approximately an 18 - 28 day schedule. Best quality hay can be cut at about 4-week intervals.

Comparison of Released Bermudagrass Hybrids

Alicia*	Adaptation similar to coastal, but less winter hardy and recovers slower than coastal after severe winter. Yield is usually less than coastal. Good for erosion control, provides quicker cover than coastal, but forage is usually lower in quality than coastal. Somewhat susceptible to rust.
Brazos	Production is similar or higher than coastal on adapted soils. Cold tolerance similar to coastal. Usually higher digestibility than coastal.
Coastal	Best adapted to moderately to well drained sandy to loamy soils, but will persist on clayey soils. Moderate cold tolerance.
Coastcross -1 and Tifton 68	Soil adaptation same as coastal, but both lack cold tolerance, which limits their use to coastal areas of Texas. Both have good disease resistance and produce higher quality forage than coastal. Coastcross primarily spreads by above ground stolons, only occasionally produces rhizomes. Tifton 68 only produces stolons.
Grazer	Adaptation similar to coastal, but less winter hardy. Short growth habit results in lower total production than coastal, but quality is better than coastal. Best used as pasture not hay.
Jiggs*	Adapted to a wide range of soils, faster establishment and higher production potential than coastal on most soils, especially clayey soils. Forage quality similar to coastal. Cold tolerance may be less than coastal. Jiggs is susceptible to rust.
Tifton 44	Soil adaptation and total production similar to coastal, better cold tolerance, earlier spring and later fall growth than coastal.
Tifton 78	Soil adaptation similar to coastal, much less cold tolerant than coastal. It establishes and spreads faster than coastal. Spring growth starts earlier than coastal. Immune to rust.
Tifton 85*	Soil adaptation similar to coastal, but less cold tolerant. Higher production potential, and better forage quality than coastal. Performs better than coastal on sandy soils. Earlier spring growth and later fall growth than coastal
*Often planted by tops	Mature tops are not usually available until the end of May. They must be planted into moist soils and packed immediately after planting.

Growth Curve For Hybrid Bermudagrass



Actual growth is dependent upon local climate and seasonal variations in temperature and rainfall. Growth curve assumes adequate fertility based on soil test recommendation.

USDA NRCS
Natural Resources Conservation Service

Determining Effluent Application Rates – Waste Utilization 633

Rev. 4/06

Total Annual Application – Should not exceed the maximum annual or biennial rates per field as stated in Appendix 2 of the Texas Nutrient Management Standard (590) or Table 2 or 2a of the 590-633 spreadsheet.

Maximum Hourly Application Rate - The maximum hourly application rate is determined by the texture of the soil layer with the lowest permeability within the upper 24 inches of the predominant soil in each field. ***The hourly application rate must be low enough to avoid runoff and/or ponding***. For effluent with 0.5% solids or less do not exceed the rates shown in **Table 1**. If the effluent contains more than 0.5% solids the Table 1 values must be reduced by the appropriate amount shown in **Table 2**.

Table 1 – Maximum Application Rate (in/hr)

Soil Texture	Application amount in inches						
	0.25	0.50	0.75	1.00	1.25	1.50	2.00
Sand	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Loamy sand	6.00	6.00	4.83	4.22	3.86	3.62	3.32
Sandy loam	4.91	2.97	2.32	1.99	1.80	1.67	1.51
Loam	3.11	1.69	1.21	0.98	0.84	0.74	0.62
Silt loam	2.70	1.45	1.03	0.82	0.70	0.61	0.51
Sandy clay loam	1.74	0.96	0.69	0.56	0.48	0.43	0.37
Clay loam	1.27	0.68	0.48	0.39	0.33	0.29	0.24
Silty clay loam	1.09	0.57	0.40	0.32	0.26	0.23	0.19
Sandy clay	0.61	0.33	0.23	0.19	0.16	0.14	0.12
Silty clay	0.84	0.44	0.30	0.24	0.20	0.17	0.14
Clay	0.39	0.21	0.14	0.11	0.09	0.08	0.07

NOTE: This table is for infiltration for full cover conditions and initial moisture content at 50 percent of available water capacity. Field capacity of sand through sandy loam is assume to be 1/10 bar.

Table 2 – Reduction Coefficients by Percent Solids

Soil Texture	Percent Solids (by wt)						
	0.50	1.0	2.0	3.0	5.0	7.0	10.0
Sand	0.88	0.55	0.31	0.22	0.13	0.10	0.07
Loamy sand	0.70	0.54	0.37	0.28	0.19	0.14	0.10
Sandy loam	0.87	0.77	0.63	0.53	0.40	0.32	0.25
Loam	0.97	0.93	0.88	0.83	0.74	0.67	0.59
Silt loam	0.98	0.95	0.91	0.87	0.81	0.75	0.68
Sandy clay loam	0.99	0.97	0.95	0.92	0.87	0.83	0.78
Clay loam	0.99	0.99	0.98	0.97	0.94	0.92	0.89
Silty clay loam	1.00	1.00	0.99	0.99	0.98	0.97	0.96
Sandy clay	1.00	1.00	1.00	1.00	0.99	0.99	0.99
Silty clay	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Clay	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Maximum One-time Application Rate - The maximum amount of effluent that can be applied to a field at anyone time is the amount that will bring the top 24 inches of the soil to its available water holding capacity which is the maximum amount of plant available water that can be held by the soil against the forces of gravity. The available water capacity (AWC) of upper 24 inches of the predominant soil in each field should be used. The AWC of the upper 24 inches of the profile may be calculated from AWC data in Section II of the NRCS Field Office Technical Guide, or Soil Survey.

To determine any one-time application amount the current soil moisture level of the upper 24 inches of the predominant soil in the field should be estimated using the guidance in **Table 3**. Several random samples of the upper 24" should be pulled and evaluated to determine average conditions. Additional information on estimating soil moisture can be found in the NRCS Program Aid 1619, Estimating Soil Moisture by Feel and Appearance, or from the University of Nebraska Extension publication, No. G84-690-A, by the same name. Both of these publications have pictures of various soils at different AWC to be used as a guide to estimating soil moisture.

Once the current moisture of the upper 24 inches is estimated it is subtracted from the AWC of the upper 24 inches and the difference is the maximum application for those soil conditions on that day. Remember, the maximum hourly application and the maximum one time application rates are only estimates to be used as a guide. The gallon figures in Table 3 are estimates of the amount of effluent that can be applied to bring the soil to full AWC without runoff, ponding or excessive leaching. No runoff or ponding should occur during application, so frequent observations should be made during each application to ensure that these conditions are met.

Table 3 - Maximum one time Application Rates Based on AWC

Available Moisture in the Soil	Sands and Loamy Sands 1/, 3/	Sandy Loam and Fine Sandy Loam 1/,2/,3/	Very Fine Sandy Loam, Loam, Silt Loam, Silty Clay Loam 2/,3/	Sandy Clay, Silty Clay, Clay, Fine and Very Fine Textured Soils 2/,3/
<25 % Soil Moisture	Dry, loose and single-grained; flows through fingers.	Dry and loose; flows through fingers.	Powdery dry; in some places slightly crusted but breaks down easily into powder.	Hard, baked and cracked; has loose crumbs on surface in some places.
Amount to Reach AWC	20,000 gallons per acre	20,000 gallons per acre	40,000 gallons per acre	27,000 gallons per acre
25-50% Soil Moisture	Appears to be dry; does not form a ball under pressure.	Appears to be dry; does not form a ball under pressure.	Somewhat crumbly but holds together under pressure.	Somewhat pliable; balls under pressure.
Amount to Reach AWC	15,000 gallons per acre	20,000 gallons per acre	30,000 gallons per acre	20,000 gallons per acre
50 to 75% Soil Moisture	Appears to be dry; does not form a ball under pressure.	Balls under pressure but seldom holds together.	Forms a ball under pressure; somewhat plastic; sticks slightly under pressure.	Forms a ball; ribbons out between thumb and forefinger.
Amount to Reach AWC	10,000 gallons per acre	13,000 gallons per acre	20,000 gallons per acre	13,000 gallons per acre
75% to Field Capacity	Sticks together slightly; may form a weak ball under pressure.	Forms a weak ball that breaks easily, does not stick.	Forms ball; very pliable; sticks readily if relatively high in clay.	A ribbon out between fingers easily; has a slick feeling.
Amount to Reach AWC	5,000 gallons per acre	7,000 gallons per acre	11,000 gallons per acre	7,000 gallons per acre
100% Field Capacity	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.
Above Field Capacity	Free water appears when soil is bounced in hand.	Free water is released with kneading.	Free water can be squeezed out.	Puddles: free water forms on surface.

Source: USDA-Natural Resources Conservation Service (NRCS), *Ohio Field Office Technical Guide.*

1/ Rate will be one half the maximum if, the field and crop has a high leaching potential and shallow groundwater (<100 ft.) is present.

2/ Rate will be one half maximum if, the predominant field slope is 5 to 8 percent.

3/ Remember these are just estimated maximum application rates and that any one time application must cease if ponding and/or runoff occur.

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Texas Agricultural Extension Service
The Texas A&M University System

Managing Crop Nutrients Through Soil, Manure and Effluent Testing

Mark L. McFarland, Tony L. Provin, and Sam E. Feagley*

Benefits of Manure and Effluent

Livestock manures are often rich in plant nutrients. Studies have shown that up to 75 percent of the nitrogen (N), 60 percent of the phosphorus (P_2O_5) and 80 percent of the potassium (K_20) fed to dairy cattle are excreted in manure. Poultry litters and swine manures may have even higher values for phosphorus and potassium. These elements are essential plant nutrients required by all plants for normal growth and production. In addition, litter and manures contain smaller amounts of other plant nutrients including calcium, magnesium, sulfur, manganese, copper, iron, zinc, boron, molybdenum, and chloride.

Along with these nutrients, manures and litters supply valuable organic matter to help improve soil structure, soil tilth and workability, and water and nutrient holding capacities. In addition, manures and litters increase the activity of beneficial soil microbes. However, nutrient concentrations in manure can be highly variable, depending on feeding rations and methods of collection, storage and handling. Table 1 shows the average and range in concentrations of nutrients in various types of livestock manure.

*Assistant Professor and Extension Soil Fertility Specialist, Assistant Professor and Extension Soil Chemist, and Professor and State Environmental Soils Specialist, respectively, The Texas A&M University System.

For operations using runoff and effluent containment systems, the benefits of supplemental irrigation water during periods of low rainfall are obvious. In addition, these waters will contain significant quantities of plant nutrients. However, depending on rainfall runoff amounts, effluent production and seasonal evaporational losses, nutrient concentrations vary significantly. Table 2 shows the average and range of nutrient concentrations in effluents at various stages of collection and management.

Soil Testing

Soil testing is the foundation of a sound fertility management program. A soil test is a series of chemical analyses on soil which estimates whether levels of essential plant nutrients are sufficient to produce a desired crop and yield. When not taken up by a crop, some nutrients, particularly nitrogen, can be lost from the soil by leaching or volatilization. Others, like phosphorus, react with soil minerals over time to form compounds which are not available for uptake by plants. Soil testing can be used to estimate how much loss has occurred and predict which nutrient(s) and how much of that nutrient(s) should be added to produce a particular crop and yield.

Collecting a good soil sample is the most critical step in soil testing. It is generally recommended that one "composite" soil sample be collected from each uniform area (field or part of a field) of 10 to 40 acres. Care should be taken to prevent sampling across areas with historically different land uses, soil types, fertilization practices, or crop yields. For fields used for routine land application of manure and wastewater, one sample per field is commonly submitted. A composite sample is obtained by combining 10 to 15 individual soil cores taken randomly across each field. The 10 cores are placed in a clean plastic bucket, thoroughly

Table 1. Average and Range ( ) in Nutrient Value for Manure at the Time of Land Application.[1]

Source	Dry Matter	Nitrogen (N)	Phosphorus (P_2O_5)	Potassium (K_2O)
	%	(lbs/ton)		
Cow (fresh)	25	15	8	10
Beef (feedlot)	65 (45-79)	27(23-39)	24 (15-39)	36 (18-56)
Dairy (corrals)	65 (2-80)	28 (4-44)	11 (1-78)	26 (1-48)
Dairy (stockpile)	80	28	12	23
Broiler (litter)	65 (25-85)	58 (34-89)	51 (32-67)	40 (16-48)
Layer	35 (4-78)	30 (13-70)	40 (2-85)	20 (8-52)
Swine	18 (15-20)	10 (9-11)	9 (7-13)	7 (6-9)

[1]Adapted from Mathers, et al., 1973, Harty et al., 1992, and Bandel, 1990.

Table 2. Average and Range ( ) in Nutrient Value of Effluents at the Time of Land Application.[1]

Source	Dry Matter	Nitrogen (N)	Phosphorus (P_2O_5)	Potassium (K_2O)
Dairy	%	(lbs/acre-inch)		
Primary Lagoon	<1.0	49 (39-64)	11 (8-13)	62 (48-150)
Second Stage Lagoon	<1.0	21 (16-27)	5 (1-9)	55 (46-66)
Beef	<1.0	38	25	32
Swine	<1.0	113	34	79
Poultry	<1.0	271	90	497
Dairy		(lbs/1000 gallons)		
Primary Lagoon	<1.0	1.8 (1.4 - 2.4)	0.4 (0.3 - 0.5)	2.6 (1.8 - 5.5)
Second Stage Lagoon	<1.0	0.8 (0.6 - 1.0)	0.2 (0.04 - 0.3)	2.0 (1.7 - 2.4)
Beef	<1.0	1.4	0.9	1.2
Swine	<1.0	4.1	1.2	2.9
Poultry	<1.0	9.9	3.3	18.3

[1] Adapted from Sweeten and Wolfe, 1993.

mixed and then about 1 pint is sent to the laboratory for testing.

Individual soil cores can be taken using a regular spade, soil auger or soil sampling tube (Figure 1). First, scrape any plant residue from the surface and then make the core or boring 6 inches deep. Be careful not to remove dark colored, partially decomposed organic matter when removing plant residue. When using a spade, dig a 6-inch deep, 45 degree V-shaped hole and take a 1-inch slice from the smooth side of the hole. Then remove a 1 by 1-inch core from the center of the shovel slice. By collecting 10 to 15 individual cores across the area, one can better ensure that the soil test results will be representative of the site and fertilizer recommendations will be appropriate. Complete sampling instructions and sample bags can be obtained from your local county Extension office.

Soil samples taken for the purpose of regulatory reporting may require more than one soil depth. For example, current regulations for most concentrated animal feed operations require composite samples from each land application field for two depths: 0 to 6 and 6 to 24 inches. Both depths should be collected at each of the 10 to 15 coring sites in a field, placed into separate buckets and submitted as separate samples to the laboratory. Care should be taken during sampling not to mix soil from the two sampling depths, to avoid obtaining incorrect results. In addition, both the sample bags and soil test information sheets should be clearly marked to distinguish between different samples and among different fields. Facilities subject to state regulations should review their permits to determine which samples and tests may be required.

To ensure good samples, a producer also should follow these recommendations:

1. Never use heat to dry a sample. You can air dry the sample by laying it on clean paper (do not use newsprint of any kind).
2. Keep accurate records of the area represented by each sample.
3. Avoid sampling areas such as small gullies and other eroded areas, depressions, terraced waterways and unusual spots.
4. When sampling fertilized fields, do not sample in the fertilized band.
5. Do not use metal buckets or containers with any residue in them since it might affect test results.
6. To avoid contamination, be sure to clean your sampling tool and bucket(s) before sampling the next field.

Soil tests can be obtained from the Texas Agricultural Extension Service Soil, Water and Forage Testing Laboratory in College Station, Texas, or from various private laboratories across the state. Costs range from about $10 and up, depending on the laboratory and type of tests requested. Contact your local county Extension agent for more information.

Table 3 illustrates the results from a typical soil test analysis. The numerical values are given in parts per million (ppm), which can be multiplied by 2 to obtain estimated pounds of nutrient per acre. Depending on the crop and yield goal (as requested on the soil test information sheet), a fertilizer recommendation for all major and most minor crops in Texas will be provided by the Texas Agricultural Extension Service Soil, Water and Forage Testing Laboratory. You may need to request recommendations from many commercial laboratories. The fertilizer recommendation can be used to determine commercial fertilizer needs, or used in conjunction with manure/wastewater analyses to determine proper land application rates.

Figure 1. Soil sampling is the most important step in soil testing. Above is an example of a 1 x 1 x 6-inch core taken with a spade.

Table 3. Example of a Soil Test Report.

SOIL TEST REPORT

TEXAS AGRICULTURAL EXTENSION SERVICE–THE TEXAS A&M UNIVERSITY SYSTEM

SOIL TESTING LABORATORY, COLLEGE STATION TX 77843

LAB DIRECTOR (409)845-4816

DATE RECEIVED: _____

DATE PROCESSED: _____

COUNTY: _____

LAB#: _____

SOIL ANALYSIS

|SOIL TEST RATINGS - PPM ELEMENT (AVAILABLE FORM)|

PH ACIDITY	NITROGEN	PHOSPHORUS	POTASSIUM	CALCIUM	MAGNESIUM	SALINITY	ZINC	IRON	MANGANESE	COPPER	SODIUM	SULPHUR
6.6 MILDLY ACIDIC	3. VERY LOW	3. VERY LOW	40. VERY LOW	820 HIGH	41. LOW	260. NONE	.22 MOD	5.2 MOD	1.2 MOD	.12 MOD	16. VERY LOW	3 LOW

(PPM X 2 = LBS/ACRE 6 INCHES DEEP)

CROP AND YIELD RANGE: Improved and Hybrid Bermuda Grass (1 Hay Cutting Plus Grazing)

Suggested Fertilizer Rate LBS/A: $\frac{95 - 50 - 110}{N \quad P_2O_5 \quad K_20}$

Broadcast at spring growth.

Topdress with additional 60 lbs/a of nitrogen after each 4 to 6 week graze down.

Magnesium levels are becoming low. Consider using 150 lbs/a of potassium magnesium sulfate annually.

Broadcast 15 lbs of sulphur per acre. In some cases, deep rooted perennial crops may not respond to sulphur applications due to its presence in the deeper profile.

Further information and assistance can be obtained from your county Extension agent:

Agent name: Address:

Manure and Effluent Testing

Nutrient concentrations in manures and effluents can vary substantially due to differences in feeding rations and methods of collection, handling, storage and moisture content. This will affect the fertilizer value of the material and determine proper land application rates. As a result, regular laboratory analyses of manures and effluents are strongly recommended. In addition, annual soil testing is recommended to evaluate soil nutrient levels and adjust loading rates.

To obtain samples for manure analysis, take 5 to 7 random core samples from various locations in the manure stockpile using a spade or shovel. Be certain to dig into the stockpile to collect the samples since weathering of the outside layer can change nutrient levels. Mix the core samples in a clean plastic bucket or paper bag. Place about 1 pint of the mixed sample into a sampling bag or a sealable plastic storage bag to submit for testing. Samples should be submitted as soon as possible after collection since chemical changes in the nutrients within the bag can occur during storage.

Effluent samples can be obtained by collecting 5 to 10 samples from various locations around the lagoon. These samples can be taken using a plastic bottle attached to a long pole (Figure 2). Mix the samples in a clean container and submit a minimum of eight ounces of the mixture in a tightly sealed plastic bottle (new plastic baby bottles work well). Fill the container to within one to two inches of the top to allow for expansion. Do not use glass containers, as they may explode due to pressure buildup or break during shipment.

Figure 2. Lagoon effluent samples being collected with a bottle attached to a pole extension.

Clearly label each sample with an identification number. This number should correspond to the one listed on the sample identification sheet submitted with the sample to the laboratory. Place all samples, information sheets and payment into a sturdy paper box for shipment to the laboratory. Keep a record of the dates and locations from which the samples were collected. Submit all samples as soon as possible after collection.

Table 4 presents results from a typical laboratory analysis of manure for three samples from different sources. Values for nitrogen, phosphorus, potassium, calcium and magnesium are given in percent (%). Multiplying these numbers by 20 will give the total pounds of nutrient per ton. For example, 1.09% nitrogen would be equivalent to 21.8 lbs N/ton.

Phosphorus (P) values should then be multiplied by 2.29 to give pounds of P_2O_5/ton. Potassium (K) values should be multiplied by 1.2 to give pounds of K_2O/ton. Other nutrients expressed in parts per million (ppm) can be multiplied by 0.002 to obtain pounds per ton.

Table 5 presents the results from a typical laboratory analysis of effluent for two samples from different sources. Values for nitrogen, phosphorus and potassium are given in percent (%). Multiply these percentages by 2264 to obtain the total pounds of nutrient per acre-inch. Here again, phosphorus and potassium must then be multiplied by 2.29 or 1.2, respectively, to give pounds of P_2O_5 or K_2O per acre-inch. For nutrients expressed in ppm, multiply values by 0.2264 to determine pounds per acre-inch.

Manure and effluent tests can be obtained from the Texas Agricultural Extension Service Soil, Water and Forage Testing Laboratory in College Station, Texas, or from various private laboratories across the state. Costs range from about $20 and up, depending on the laboratory and type of tests requested. Contact your local county Extension agent for more information.

Determining Land Application Rates

Land application rates should be beneficial to crops while protecting the environment. However, nutrient ratios ($N:P_2O_5:K_2O$) in manures usually do not match the nutrient requirements of crops. As a result, the most efficient and economical fertilizer management strategy gener-

Table 4. Typical Laboratory Analysis Report for Solid Dairy Manure Obtained from Three Sources.

PLANT ANALYSIS REPORT
TEXAS AGRICULTURAL EXTENSION SERVICE THE TEXAS A&M UNIVERSITY SYSTEM
SOIL, WATER AND FORAGE TESTING LABORATORY
COLLEGE STATION, TX 77843-2474
Lab Coordinator (409) 845-4816

Date Received: _____
Date Reported: _____
County: _____

Plant Analysis*
Plant Analysis Ratings

Lab Number	Sample ID Sample Type	Nitrogen %	Phosphorus %	Potassium %	Calcium %	Magnesium %	Sodium PPM	Zinc PPM	Iron PPM	Copper PPM	Manganese PPM	Sulfur PPM	Boron PPM
xxx	MAN	1.09	.58	2.25	1.40	.82	2,000	130	6,116	36	202	3,956	42
xxx	MAN	2.00	1.03	1.93	4.73	1.81	5,751	263	9,611	88	427	6,390	56
xxx	MAN	1.24	.77	1.20	4.15	.81	2,456	164	12,392	65	291	3,911	37

*Results Reported on 100% Dry Matter Basis

Table 5. Typical Laboratory Analysis Report for Dairy Lagoon Effluent Obtained from Two Sources.

Extension Soil, Water and Forage Testing Laboratory
Effluent/Liquid Manure Analysis Report

Lab#	Sample ID	N	P	K	Ca	Mg	Na	Zn	Fe	Cu	Mn	NO_3	pH	Conductivity
		<----------	%	---------->			<----------	PPM	---------->			%		µmhos/cm
xxx	Lagoon 1	.027	.005	.065	.015	.009	145	0	3	0	0	< 1	7.3	5,170
xxx	Lagoon 2	.014	.004	.056	.010	.006	114	0	3	0	0	< 1	7.3	3,440

ally involves using a combination of manure and/or effluent, and commercial fertilizer to meet crop nutrient needs. In this way, the proper balance of nutrients for optimum crop production can be provided.

Phosphorus-based application rates can help prevent the buildup of phosphorus in soils. Excessive levels of phosphorus in soils can lead to nutrient imbalances which reduce crop yields, and can potentially contribute to water pollution. Once the proper application rate is determined based on soil and manure/effluent testing, supplemental commercial fertilizer can be used to supply the balance of crop needs for other essential nutrients (particularly nitrogen).

Management Considerations

Using manures and wastewaters effectively can greatly reduce crop fertilizer needs, and thus improve the economics of production. At the same time, application of too much manure, wastewater or commercial fertilizer, or a combination of these materials, can reduce crop yields, hurt animal performance and limit profits. When nutrients are applied at excessive rates and are not balanced with crop requirements, plant nutrient deficiencies or toxicities can occur. For example, excessive phosphorus levels in soil can cause a zinc and/or iron deficiency in crops. In addition, over application and/or improper spreading of manure and effluent can pollute surface and ground water with nitrates, phosphates and/or fecal bacteria. This accidental contamination of the ground and surface water can pose a health risk to you, your family and livestock, and may require years to correct.

Other best management practices (BMPs), which should be followed when using any fertilizer material, include:

1. Time applications of manures and fertilizers as close as possible to periods of crop nutrient need.
2. Avoid applications when the ground is frozen, saturated, or when the potential for heavy rainfall is great.
3. Inject or incorporate wastes into the soil if possible to conserve nutrients.
4. Avoid surface applications on steep (>8%) slopes.
5. Use management practices to control sediment losses.
6. Provide a filter or buffer strip (25 to 100 feet) between the application area and any nearby water resources including wells, ponds, streams, etc. (increase strip width in areas prone to erosion, slow infiltration, or limited plant growth).

Calibrating Solid Manure Spreaders

No fertilizer material can be properly applied if the rate of application is not known. A properly calibrated manure spreader will help ensure the correct amount of manure is applied. The following procedure can be used to calibrate typical solid manure spreaders.

Materials needed:

- Bucket
- Plastic sheet, tarp or old bed sheet. Even sizes, such as 8 feet x 8 feet, 10 feet x 10 feet or 10 feet x 12 feet will make the calculation easier.
- Scales (accurate to $^1/_2$ pound).

Table 6. Calibration of Solid Manure Spreaders.

Pounds of Manure Applied to Sheet	Tons of Manure Applied/Acre		
	Size of Sheet (feet)		
	8'x8'	10'x10'	10'x12'
1	0.34	0.22	0.18
2	0.68	0.44	0.36
3	1.02	0.65	0.54
4	1.36	0.87	0.73
5	1.70	1.09	0.91
6	2.04	1.31	1.09
7	2.38	1.52	1.27
8	2.72	1.74	1.45
9	3.06	1.96	1.63
10	3.40	2.18	1.82
11	3.74	2.40	2.00
12	4.08	2.61	2.18
13	4.42	2.83	2.36
14	4.76	3.05	2.54
15	5.10	3.27	2.72
16	5.45	3.48	2.90
17	5.79	3.70	3.09
18	6.13	3.92	3.27
19	6.47	4.14	3.45
20	6.81	4.36	3.63
21	7.15	4.57	3.81
22	7.49	4.79	3.99

If the size of the sheet being used is not listed, the following equation may be used to determine litter application per acre. Remember to account for the moisture content of the material if application rates are to be made on a dry weight basis. This can be done by dividing tons/acre (wet weight basis) by the percent moisture content (decimal fraction).

$$\frac{\text{Pounds of manure collected over sheet} \times 21.78}{\text{Area of sheet, ft.}^2} = \text{tons/acre (wet weight basis)}$$

To calibrate:

1. Locate a large and reasonably smooth, flat area where manure can be applied.
2. Spread the plastic sheet, tarp or bed sheet evenly on the surface of the test field.
3. Start driving the spreader at the normal application speed toward the sheet, and begin spreading at an even rate.
4. Drive over the sheet at the normal application speed while continuing to apply manure.
5. Collect all manure spread on the sheet and pour it into the bucket.
6. Weigh the bucket with manure, then subtract the weight of the empty bucket to determine pounds of manure applied to the sheet.
7. Repeat the procedure at least three times to get a reliable average.
8. Determine the average weight of the manure applications.
9. Refer to the chart in Table 6 under the appropriate sheet size to read Tons of Manure Applied Per Acre.
10. Remember to account for moisture content when determining actual land application rates on a dry weight basis.

Optional Method for Easy Calculations

1. Use a square sheet measuring 4 feet 8 inches on all sides, which is equal to 1/2000th of an acre.
2. Follow steps 1 through 8 above.
3. Pounds of manure collected on this size of sheet is equal to the Tons of Manure Applied Per Acre.

Literature Cited

Bandel, V.A. 1990. Using manure to cut fertilizer costs. University of Maryland Cooperative Extension Service. Fact Sheet 512.

Harty, S. M., G. C. Clary, P. Hargis and S. Reeves. 1992. Poultry litter utilization - Production alternatives for plant and animal agriculture. Misc. pub. Texas Agricultural Extension Service, College Station, TX.

Mathers, A. C., B. A. Stewart, J. D. Thomas and B. J. Blair. 1973. Effects of cattle feedlot manure on crop yields and soil conditions. Tech. Rep. No. 11. USDA Southwest. Great Plains Research Center, Bushland, Texas.

Sweeten, J. M. and M. L. Wolfe. 1993. Manure and wastewater management systems for open lot dairy operations in Texas. District 6 Dairy Conference, May 20.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Chester P. Fehlis, Deputy Director, Texas Agricultural Extension Service, The Texas A&M University System.

2.5M, Reprint

3.1. Manure Storage and Sizing

TCEQ TPDES Permit Number:	WQ004920000
Type of Authorization:	Individual Permit
Authorized Headcount:	600 head
Average Weight:	1400 lbs

This is a dairy operation planned to operate with 600 head dairy cows that are kept in total confinement. The average liveweight per head is approximately 1400 pounds. The manure production is based on book values and does not account for specific feed management practices. Prior to any planned expansion, the engineering design will need to be reevaluated for the proposed increases in number of animals and any associated operational changes. Any operational changes that effect the design assumptions should be reviewed with an engineer to determine if structural changes are necessary. Additionally, TCEQ should be informed before any expansion of the operation.

Runoff from the dairy production area is directed into RCS #1, which is designed to contain runoff from a 25-year, 10-day rainfall on the containment area, 45 days of process generated wastewater, minimum treatment volume and 1 year of sludge accumulation. Effluent from RCS #1 is allowed to evaporate, or applied at agronomic rates primarily to LMUs 1A and 1B, with the option to apply to LMU 1C, 3A and/or 3B as necessary. Manure is temporarily stockpiled within the drainage area of the RCS until applied on-site or hauled off-site.

For more specific information on Manure and Wastewater Handling and Storage, see the NMP, Sections 9.3 and 9.4 of this CNMP, and/or PPP.

The Nutrient Management Plan (NMP) is designed to utilize animal wastes (manure and wastewater) produced at the dairy in an environmentally responsible manner. The executive summary of the NMP explains in detail the planned manure and wastewater application rates and timing for the following crop year based on the crops grown along with the results of annual soils tests and manure and wastewater analyses. Whenever possible, the planned application rates are based upon phosphorus removal by the crop to prevent phosphorus buildup in the soil.

Executive Summary

Nutrient Summary of planned Manure Applications in 2010
(taken from Tables section of NMP)

				NITROGEN Rates			P2O5 Rates		
LMU #	**acres**	**Manure Type**	**Max. Appl. per LMU per acre**	Max allowed (lb/ac)	**Planned** appl. (lb/ac)	Suppl needed (lb/ac)	Max allowed (lb/ac)	**Planned** appl. (lb/ac)	Suppl needed (lb/ac)
1A	17.4	**EFF**	**5.3 ac in**	150	**5**	5	43	**1**	70
1B	17.6	**EFF**	**21.2 ac in**	600	**600**	0	173	**173**	70
1C	14.4	**EFF**	**10.6 ac in**	300	**0**	290	87	**0**	105
2A	21.3	SOL	**22.3 tons**	500	**500**	0	246	**246**	0
2B	25.9	SOL	**22.3 tons**	500	**500**	0	246	**246**	0
2C	16.8	SOL	**13.4 tons**	300	**300**	0	147	**147**	0
2D	8.9	SOL	**10.7 tons**	240	**240**	0	118	**118**	0
2E	9.6	SOL	**10.7 tons**	240	**240**	0	118	**118**	0
2F	6.9	SOL	**10.7 tons**	240	**240**	0	118	**118**	0
2G	19.5	SOL	**1.8 tons**	40	**40**	0	20	**20**	20
2H	5.9	SOL	**10.7 tons**	240	**240**	0	118	**118**	0
2I	7.6	SOL	**3.6 tons**	80	**80**	0	39	**39**	10
2J	6.4	SOL	**3.6 tons**	80	**80**	0	39	**39**	5
2K	3	SOL	**1.8 tons**	40	**40**	0	20	**20**	30
3A	5.9	**EFF**	**10.6 ac in**	300	**0**	295	87	**0**	115
3B	9.6	**EFF**	**10.6 ac in**	300	**0**	290	87	**0**	115

The plans for 2010 is to land apply separated manure and retained liquids and solids to utilize the nutrients for crop production. Applications will be in LMUs 1A, 1B, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J and 2K. Although none is planned in 2010 for LMUs 1C, 3A and 3B, this plan does not prohibit waste application to these LMUs in 2010 or in the future. The operator's intent is to apply manures to above indicated LMUs up to the 2010 established maximum rate for each but actual rates may be much lower. Supplemental nutrients in form of commercial fertilizers will be applied as needed to meet 2010 yield goals. In addition, lime will be applied to LMU # 2F at the rate recommended by soils analysis. Manure nutrient values for 2010 were assumed. Soils analysis for 2010 was derived from composite soils samples obtained in Nov. 2009. A weighted average of the amounts of N, P & K in each sampled zone was calculated to represent the composite. LMUs 1A, 1B, 2A & 2B will be supplemental irrigated from irrigation wells and applied with center pivot irrigation systems at rates that will not cause ponding or run off.

LMU # 1A - Effluent will be applied, using existing center pivot, during warm growing season months.

LMU # 1B - Effluent will be applied, using existing center pivot, each month, year-round.

LMU # 1C, 3A & 3B - If 2010 plans changed and effluent was to be applied, a hose & reel sprinkler system would be utilized during warm growing season months.

LMUs # 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J & 2K - In 2010, solid manure will applied to the surface, during warm growing season months.

Although it is not anticipated that the livestock numbers will approach 600 on January 1, the 2010 plan assumes that number for 365 days. It is estimated that LMUs 1A & 1B can utilize all of the 2010 effluent production without exceeding their respective established maximum application rates. LMUs 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, & 2K are planned for solids application in 2010 up to their established maximum rates, but may not utilize all of the estimated solids production. Any excess solids will be hauled offsite and/or composted and hauled offsite.

Waste Utilization and Nutrient Management Plan

Southwest Regional Dairy Center
1229 N Hwy 281
Stephenville, TX
254-485-2076

TCEQ Permit Number:
applied for

Owner
Tarleton State University
P.O. Box T-0180
Stephenville, TX
254-968-9222

Type of Waste Plan:
Other AFO-CAFO Waste Plan
located in Erath County

Prepared By:

(Signature)
Monty Dollar
Agronomist
Certificate Number = TX20135
Expiration Date = December 31, 2010
Self Employed
P.O. Box 98376
Lubbock, TX 79499
806-283-1029

This plan is based on:
590 -633 Plan V 4.0_4

1/12/10 12:54 PM

Waste Utilization and Nutrient Management Plan

EXECUTIVE SUMMARY: Permit #: applied for

This Nutrient Management Plan has fields that meet NMP and/or NUP requirements.

See attached.

LOCATION AND PURPOSE OF THE PLAN

This animal operation is located in Erath County (see attached topo map and plan map for location.) The purpose of this plan is to outline the details of the land application of the effluent and solids produced by this operation. When the plan is fully implemented, it should minimize the effects of the land application of animal wastes on the soil, water, air, plant, and animal resources in and around the application area. This plan, when applied, will meet the requirements of the Natural Resources Conservation Service Waste Utilization Standard and Nutrient Management Standard.

The plan is for the year of 2010 and will remain in effect until revision based on new soil or manure analysis or crop change (yield or crop) result in a new P-Index rating or plan classification (NMP-NUP). The waste has been stored in a Dairy Lagoon . Approximately 600 head will be confined with the average weight of 1400 pounds. The animals will be confined 24 hours per day for 365 days per year.

Values in Table 1 may be based on actual analysis or "book" values during the initial planning to determine land application rates for the initial plan. When "book" values are used, they will be from NRCS, Texas Cooperative Extension or averages from other TX testing lab sources. Site specific data will be used as soon as feasible after production begins. Manure and/or effluent will be tested at least annually or in the year of application if it is stored for more than one year. If the actual values are more than 10% higher or lower than the estimated values, this plan will need to be revised accordingly.

Application of waste products may be made up to the Maximum Rate given in Table 2 or 2a as applicable. Table 2 applies to those that are subject to Nutrient Management Plan (NMP) requirements while Table 2a applies when subject to Nutrient Utilization Plan (NUP) requirements. Current requirements for both the NMP and NUP are given in the headers of the tables. Table 2a has a criteria involving the distance to a named stream when the Soil Test P Level is above 200 ppm in arid areas as well as special requirements when the site is in a TMDL watershed designated by TCEQ. For various P Index Ratings, the maximum rates in Table 2 are based on crop requirements, whereas the maximum rates in Table 2a are based on crop removal rates. County avg. rainfall information can be found in the TX Agronomy Technical Note 15, Phosphorus Assessment Tool for Texas, located in the eFOTG at the address given in the section entitled **"Collecting Soil Samples for Analyses"**.

CROP REMOVAL RATES:

Crop Removal Rates of nitrogen (N), phosphorus (P), and potassium (K) in pounds per acre are given in Table 3 for the crop and yield planned for each field. This Table is included for information only, and should be used during the planning process to compare planned or maximum application rates to crop removal. Crop removal rates may be based on actual analysis of harvested material or default values in the database. P build-up will occur at higher rates when crop removal rates are exceeded..

SOLIDS APPLICATION:

The maximum solids application rates are given in Table 4 along with the current soil test P level, maximum P_2O_5 application rate, maximum tons per acre of solids and the total tons of solids per field that can be applied to each field. The maximum tons of solids that can be utilized on the fields planned is indicated in the box near the lower left corner of Table 4. When the total application acres of the fields are adequate to allow all of the solids to be applied, "Adequate" will be indicated below the tonnage in this box. If "Not Adequate" is indicated, then the lower box will indicate the tons of solids that must be utilized off-site unless more fields/acres are added. This plan is valid only if the application of waste to the crops listed does not exceed the per acre rates by more than 10%. If the yield of a crop does not meet the expected goal, the application rate should be adjusted the following year.

The estimated amounts of N, P_2O_5, and K_2O contained in the solids are provided in Table 5 for the maximum application rate. Supplemental N and K_2O will be applied to achieve the yield goals in Table 4 when recommended by the soil test and the maximum rate of the solids does not meet the crop needs. When the maximum application rate is applied and Table 5 indicates additional commercial nutrients, they **must** be applied to fields as indicated. **NOTE:** If additional nitrogen is recommended, the producer should consider collecting soil samples from the 6 - 36 inch layer to see if there is any additional deep nitrogen available. Additional deep nitrogen within the root zone of the crop can be substituted for supplemental commercial nitrogen, and should be included in the soil test N ppm entry.

SOLIDS APPLICATION: (cont) Permit #: applied for

In situations where more land is available than is needed to utilize the maximum application rate on each field, the application rates in Table 6 have been reduced to the level that does not exceed the amount of solids produced. Table 7 indicates the amount of nutrients provided and, if needed, the supplemental nutrients which **must** be applied when the application is based on these rates. The amounts of supplemental nutrients in Table 7 are based on the actual amount of waste available rather than the **maximum** rate that **"could"** be applied.

The second line from the bottom of Table 6 on the right has a box that will be **"YES"** or **"NO"**. When the reduced rates use all solids to be produced in a year, this box will be **"Yes"**. If the percentages are too low, it will be **"No"**. If **"No"**, either more acreage is needed on which to apply the solids or the solids will need to be transported off-site. The amount is located on the bottom line on the extreme right of the page.

Actual application will be based on the quantities produced, as well as, current manure analyses. **Application at the MAXIMUM rates shown in Table 4 will result in a more rapid build-up of phosphorus than if applied at lower rates. A different percentage may be used as long as the rate does not exceed the maximum shown in Table 4 for the field and the proper amount of supplemental nutrients are applied. Applying a lower rate to the fields with higher soil test P levels will slow down the P buildup and extend their land application life. Phosphorus will also build up more rapidly on pastureland than on hayland or cropland, since very few nutrients are actually removed by grazing animals.**

The solids may be applied to the same acreage every year according to Table 2 or 2a. The annual rates in both Table 4 and 6 may be doubled not to exceed the 2X the annual nitrogen requirement or nitrogen removal rate, as applicable. When the full biennial rate has been used, no additional phosphorus fertilizer or animal wastes may be applied in the alternate year. A column in both tables indicates whether the rates given are Annual Rates (A) or Biennial Rates (B). Rates given are based on Table 2 or 2a as applicable. Annual application rate for fields in a TMDL area with a Soil Test P level equal to or greater than 500 ppm or any field in a TMDL area with P Index Rating of Very High is 0.5 annual crop removal rate.

EFFLUENT APPLICATION:

The maximum effluent application rates are given in Table 8 for each field. This table provides the current soil test P level, maximum P_2O_5 application rate, effluent either in gallons per acre or acre inches per acre and the amount of effluent that can be applied per field. The maximum amount of effluent that can be utilized on the fields planned is indicated in a box near the lower left corner of Table 8. When the total application acres are adequate to allow all of the effluent to be applied, "Adequate" will be indicated below this box. If "Not Adequate" is indicated, then the lower box will indicate the amount of effluent that must be utilized off-site unless more field acres are added.

The estimated amounts of N, P, and K contained in the effluent are provided in Table 9 for the maximum application rate indicated in Table 8. Supplemental N and K_2O will be applied to achieve the yield goals when recommended by the soil test and the maximum rates of the effluent do not meet the crop requirements. **NOTE:** If additional nitrogen is recommended, the producer should consider collecting soil samples from the 6 - 36 inch layer to see if there is any additional deep nitrogen available. Additional deep nitrogen within the root zone of the crop can be substituted for supplemental commercial nitrogen.

EFFLUENT APPLICATION: (cont) Permit #: applied for

In situations where more land is available than is needed to utilize the maximum application rate on each field, the application rates in Table 10 have been reduced to the level that does not exceed the amount of effluent produced. Table 11 indicates the amount of nutrients provided and, if needed, the supplemental nutrients which **must** be applied when application is made based on the rates in Table 10. These amounts of supplemental nutrients in Table 11 are based on the planned amount of effluent available rather than the **maximum** rate that **"could"** be applied.

The bottom line on the right of Table 10 has a box that will be **"YES"** or **"NO"**. When the reduced rates uses all effluent to be produced in a year, this box will be **"Yes"**. If the percentages are too low, it will be **"No"**. If **"No"** is indicated, either more acreage is needed on which to apply the effluent or the effluent will need to be transported off-site.

Actual application will be based on the quantities produced, as well as, current manure analyses. **Application at the MAXIMUM rates shown in Table 8 will result in a more rapid build-up of phosphorus than if applied at lower rates. A different percentage may be used as long as the rate does not exceed the maximum shown in Table 8 for the field and the proper amount of supplemental nutrients are applied. Applying a lower rate to fields with higher soil test P levels will slow down the P buildup and extend their land application life. Phosphorus will also build up more rapidly on pastureland than on hayland or cropland, since very few nutrients are actually removed by grazing animals.**

The effluent may be applied to the same acreage every year according to Table 2 or 2a. The annual rates in both Table 8 and 10 may be doubled not to exceed the 2X the annual nitrogen requirement or nitrogen removal rate, as applicable, when the full biennial rate has been used, no additional phosphorus fertilizer or animal wastes may be applied in the alternate year. A column in both tables indicates whether the rates given are Annual Rates (A) or Biennial Rates (B). Rates given are based on Table 2 or 2a as applicable. Annual application rate for fields in a TMDL area with a Soil Test P level equal to or greater than 500 ppm or any field in a TMDL area with P Index Rating of Very High is 0.5 annual crop removal rate.

Maximum Hourly Application Rate - The maximum hourly application rate is determined by the texture of the soil layer with the lowest permeability within the upper 24 inches of the of the predominant soil in each field. The hourly application rate must be low enough to avoid runoff and/or ponding. For effluent with 0.5% solids or less, **DO NOT** exceed the rates shown in Table 1 of the attached Job Sheet titled, *"Waste Utilization, Determining Effluent Application Rates"*. If the effluent contains more than 0.5% solids, those values must be reduced by the appropriate amount shown in Table 2 of the attached *"Waste Utilization, Determining Effluent Application Rates"* Job Sheet.

Maximum One-Time Application Rate - The maximum amount of effluent that can be applied to a given field at any one-time is the amount that will bring the top 24 inches of the soil to 100% field capacity. This amount is determined by subtracting the amount of water stored in the soil (estimated by feel and appearance method) from the available water holding capacity (AWC) of the soil. The available water holding capacity of the top 24 inches of the predominant soil of each field receiving effluent and the texture of the most restrictive layer in the upper 24 inches are given in Table 12.

EFFLUENT APPLICATION: (cont) Permit #: applied for

To determine any one-time application amount, the current percent of field capacity (FC) of the upper 24 inches of the predominant soil in the field should be estimated using the guidance in Table 3 of the attached Job Sheet, *"Waste Utilization, Determining Effluent Application Rates, rev 4/06"*. Additional information on estimating soil moisture can be found in the NRCS Program Aid 1619, *"Estimating Soil Moisture by Feel and Appearance"*, or from the University of Nebraska Extension publication No. G84-690-A by the same name. Both of these publications have pictures of various soils at different percentages of field capacity to be used as a guide to estimating soil moisture. Once the current percent of FC is estimated, it is subtracted from the AWC amount in Table 12 for the given field and the difference is the maximum application for those soil conditions on that day. Remember, the maximum hourly application and the maximum one time application rates are only estimates to be used as a guide.

Solids/Effluent Land Application: - Land application of solids and/or effluent should be made at appropriate times to meet crop needs, but can be made at any time as long as the total annual (or biennial) rate, maximum hourly rate, and the maximum one time application rates are not exceeded. Effluent should be surface applied uniformly. No runoff or ponding should occur during application thus frequent observations should be made. Neither effluent or solids will be applied to slopes >8% with a runoff curve >80, or steeper than 16% slope with a runoff curve of 70 or greater, unless the application is part of an erosion control plan. Waste will not be spread at night, during rainfall events, or on frozen or saturated soils if a potential risk for runoff exists. Waste will not be applied to frequently flooded soils during months wher the soils typically flood. If frequently flooded soil occur on any potential application field see attached, "Water Features Table", for months when flooding is expected. Solids should be applied with a manure spreader as uniformly as feasible. Surface applications with trucks should only be made when soil conditions are favorable in order to minimize soil compaction.

Managing Runoff -
A minimum 100 ft. setback or vegetated buffer (Filter Strip, Field Border, Riparian Forested Buffer, etc.) will be established and maintained between the application area and all surface water bodies, sink holes, and watercourses as designated on Soil Survey sheets or USGS topographic maps. A minimum application distance from private and public will be 150 ft. and 500 ft. respectively. A minimum application distance from water wells used exclusively for agricultural irrigation will be 100 ft. Table 9 provides a summary of the setbacks and out areas of each field.

Managing Leaching -
When soils with sandy, loamy sand, or gravelly surface textures have a Nitrogen Leaching Index score of >2 appropriate measures will be used to minimize the potential of leaching. These measures will include, split applications of waste, and may include double cropping, or cover crops, and irrigation water management (on fields that receive supplemental or full irrigation).

MORTALITY MANAGEMENT:
All mortality will be disposed of properly within 3 days according to the Texas Commission on Environmental Quality (TCEQ) rules. The preferred method for disposal of routine mortality is by a rendering plant. Before planning this method, contact the facility or its representative to be informed of special handling procedures, equipment needs, scheduling requirements, etc. Maintain a list of contact phone numbers so information will be readily available following a catastrophic die-off. Verify that local companies which have previously picked up and/or rendered dead animals are still doing so. A number of rendering companies across the state have stopped dead animal pick up service, and others have raised their fees significantly. Periodically review the availability and cost of rendering so that the plan can be modified if necessary. This can be an excellent option if mortality can be loaded and transported while still fresh or the mortality can be refrigerated until loaded and transported.

MORTALITY MANAGEMENT: (cont) Permit #: applied for

Disposal in a landfill may be an option in some locations. Before planning this option, the closest commercial, regional, county, or municipal landfill should be contacted to determine if the landfill has a permit which would allow acceptance of dead animals (swine, sheep, cattle, etc.). Also ask if there are any restrictions on type and volume of animal mortality that will be accepted at the facility. Landfill fees and transport, offloading, and handling procedures should be discussed with landfill managers and documented for reference when needed. The landfill is not a viable option if the producer does not own or have access to a vehicle capable of transporting mortality quickly in an emergency situation. After a catastrophic die off is not a good time to find out that a driver and truck to transport mortality will not be available for several weeks **(MAKE ARRANGEMENTS NOW, NOT AFTER THE ANIMALS ARE DEAD).**

On-farm disposal of catastrophic mortality may be considered if site conditions permit. On-farm methods include burial, composting, and incineration. Incinerators and composters are excellent options for routine mortality but usually do not have the capacity to handle mortality volumes associated with catastrophic events. Composting and incineration should not be relied on for catastrophic mortality handling without a documented evaluation of worst anticipated mortality condition (number, type, and weight of animals), and the anticipated capacity of the system (i.e., lb./hr. incineration rate, hrs/day of operation). NRCS Mortality Facility Standard 316 will be used for all mortality management.

See the attached soil interpretation, ENG - Animal Mortality Disposal (Catastrophic) Trench, to make a preliminary assessment of the limitations of the soils on this farm for burial of catastrophic mortality. The attached TX NRCS Technica Guidance, Catastrophic Animal Mortality Management (Burial Method) should be used as a guide to overcome minor limitations and as design criteria for the construction of burial pits for catastrophic mortality. Mortality burial sites shall be located outside the 100 -year floodplain. Mortality burial will not be less than 200 feet from a well, spring, or water course. A FIELD INVESTIGATION BY A QUALIFIED PROFESSIONAL SHOULD BE MADE BEFORE AN AREA IS USED FOR A BURIAL SITE FOR CATASTROPHIC MORTALITY EVENTS. **The TCEQ Industrial and Hazardous Waste Permits Section, MC-130, must be contacted before burial of catastrophic mortality.**

TCEQ
Industrial and Hazardous Waste Permits Section, MC-130
PO Box 13087
Austin, TX 78711-3087
Phone: 512-239-2334 Fax: 512-239-6383

Air Quality:

The following steps should be taken when spreading effluent or solids to reduce problems associated with odor.

1. Avoid spreading effluent or solids when wind will blow odors toward populated areas.
2. Avoid spreading effluent or solids immediately before weekends or holidays, if people are likely to be engaged in nearby outdoor activities.
3. Avoid spreading effluent or solids near heavily traveled highways.
4. Make applications in the morning when the air is warming, rather than in the late afternoon.
5. All materials will be handled in a manner to minimize the generation of particulate matter, odors, and greenhouse gas emissions.

EFFLUENT AND SOLIDS STORAGE & TESTING: Permit #: applied for

Effluent and solids will be stored in facilities designed, constructed, and maintained according to USDA NRCS Standards and specifications.

Effluent and solids sampling is needed to get a better idea of the nutrients actually being applied. Effluent and/or solids samples will be collected at least annually, or in the year of its use if waste is typically stored for more than 1 year. The samples will be submitted immediately to a lab for testing. If sent to Texas A&M soil lab or SFASU Soil Testing Lab for analysis, use the "plant and forage analysis" form and note the type of operation. Request that the manure be analyzed for percent dry matter, solids, total nitrogen, total phosphorus, and total potassium. Further information on collecting effluent and manure samples for analysis can be found in the TCE publication No. L-5175, *"Managing Crop Nutrients Through Soil, Manure and Effluent Testing"*. **TCEQ sampling rules and testing requirements will be followed on permitted sites.**

COLLECTING SOIL SAMPLES FOR ANALYSIS:

Collect a composite sample for each field (or area of similar soils and management not more than 40 acres in size) comprised of 10 - 15 randomly selected cores. Each core should represent 0 - 6 inches below the surface except for when injection has been done over 6" in depth, then the core should represent the 3-9" layer. Thoroughly mix each set of core samples, and select about a pint of the mixture as the sample for analysis. Label each sample for the field that it represents. Request that the samples be analyzed for nitrate nitrogen, plant-available phosphorus, potassium, sodium, magnesium, calcium, sulfur, boron, conductivity; and pH. Also note on the samples that they are from an effluent or solids application area. **TCEQ sampling rules and testing requirements will be followed on permitted sites.** A weighted average of 0-2 and 2-6 inch layers will be used for calculations on permitted sites.

Further information on collecting soil samples can be found on the TCE Form D-494, p 2, TCE Publication No. L-1793, and TCEQ RG-408. Additional NRCS guidance and requirements can be found in the Nutrient Management (590) standard located in the Texas electronic Field Office Technical Guide (eFOTG) at:

http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=TX

Click the county desired.
Click Section IV in the left column under eFOTG
Type: 590 in the Search Menu above eFOTG and click: **GO**
Click on the desired item under Nutrient Management in the left column

SOIL ANALYSIS:

A soil analysis will be completed for all areas to be used for all effluent or solids application areas. The soil test analysis method will be **Mehlich III with inductively coupled plasma (ICP)**. The area will be tested and analyzed at least annually to monitor P build up.

RECORD KEEPING: Permit #: applied for

Detailed records should be maintained by the producer for all application of animal waste to land owned and operated by the producer. Records should include date, time, location, amount of application, weather conditions, estimated wind speed and direction, etc. A rain gauge should be in place at the application site and accurate records of rainfall should be maintained at the site. All records must be kept for at least 5 years. **TCEQ requirements will be followed on permitted sites.**

Records should also be kept showing amounts of litter given or sold to others. **A copy of the effluent analysis and/or solids analysis and a Waste Utilization Guidelines Sheet should be given to anyone who will use either the effluent or solids off-site. If they routinely use animal wastes for fertilizer, they should be directed to the local Soil and Water Conservation District or NRCS office to develop a Waste Utilization and Nutrient Management Plan for their land.**

This portion may be completed by producer, if desired or recorded elsewhere.

Record of waste leaving the farm or used as feed. **Estimated Annual Excess** | |

Date	Amount	Hauler or Recipient

Excess Remaining | | May be continued on additional sheets

Waste Utilization and Nutrient Management Plan

OPERATION AND MAINTENANCE: Permit #: applied for

Application equipment should be maintained in good working order and it should be calibrated annually so that the desired rate and amount of effluent and solids will be applied.

Information on calibrating manure spreaders can be found in the TCE publication No. L-5175, *"Managing Crop Nutrients Through Soil, Manure and Effluent Testing"*. Information on calibrating big gun sprinklers can be found in the Arkansas Extension publication, *"Calibrating Stationary Big Gun Sprinklers for Manure Application"*. For information on calibrating tank spreaders, traveling guns, and additional information on other manure spreading equipment, see Nebraska Extension publication No. G95-1267-A, *"Manure Applicator Calibration"*. Observe and follow manufacturer's recommended maintenance schedules for all equipment and facilities involved in the waste management system. For information on lagoon functions, refer to TCE publication E9, *"Proper Lagoon Management"*.

Any changes in this system should be discussed with the local Soil and Water Conservation District, USDA Natural Resources Conservation Service, or other qualified professional prior to their implementation.

Plan Prepared by: **Monty Dollar** Date: **1/12/2010**

Plan Approved by: _____ Date: _____

Producer Signature: _____ Date: _____

The producer's signature indicates that this plan has been discussed with him/her.
If this plan is not signed by the producer, indicate how the plan was provided to the producer.

Waste Utilization and Nutrient Management Plan

Table 1 - Estimated Effluent and Solids Quantities Produced Permit #: applied for

Avg. Number of Animals	Type of Waste
600	Dairy Lagoon
	Dairy Solids

Contact the local Soil and Water Conservation District or USDA Natural Resources Conservation Service office if the total number of animals change by more than 10% so your plan can be revised.

Estimated Acre Inches of Effluent to be Available Annually* 376

Estimated Tons Solids to be Land Applied Annually (on or off site)* 3,369.2

*From engineering design.

Estimated Nutrient Availabilty Effluent

	pounds/yr	Pounds / 1000 gal	Pounds / Acre Inch	
N	10,607	1.04	28.2	*
P2O5	3,060	0.30	8.1	
K2O	23,458	2.30	62.5	

*** Assumed Manure Value**

Estimated Nutrient Availabilty Solids

	pounds / yr	pounds / ton	
N	75,471	22.4	*
P2O5	37,062	11.0	
K2O	87,600	26.0	

*** Assumed Manure Value**

Default values were used on all fields for plant removal of nutrients and yield levels.

Waste Utilization and Nutrient Management Plan

TABLE 2. A Nutrient Management Plan (NMP) is required where Soil Test P Level [1/] is:

- **less than 200 ppm statewide or**
- **or < 350 ppm in arid areas 2/ with a named stream > one mile.**

P – Index Rating	Maximum TMDL Annual P Application Rate [5/]	Maximum Annual P Application	Maximum Biennial Application Rate
Very Low, Low	Annual Nitrogen (N) Requirement	Annual Nitrogen (N) Requirement	2.0 Times Annual N Requirement
Medium	2.0 Times Annual Crop P Requirement [3/]	2.0 Times Annual Crop P Requirement [3/]	2.0 Times Annual N Requirement
High	1.5 Times Annual Crop P Requirement [3/]	1.5 Times Annual Crop P Requirement [3/]	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Requirement
Very High	1.0 Times Annual Crop P Requirement [3/]	1.0 Times Annual Crop P Requirement [3/]	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Requirement

TABLE 2a. A Nutrient Utilization Plan (NUP) is required by TCEQ where Soil Test P Level [1/] is:

- **equal to or greater than 200 ppm in non-arid areas [2/] or**
- **equal to or greater than 350 ppm in arid areas [2/] with a named stream greater than one mile or**
- **equal to or greater than 200 ppm in arid areas [2/] with a named stream less than one mile.**

P – Index Rating	Maximum TMDL Annual P Application Rate [5/]	Maximum Annual P Application	Maximum Biennial Application Rate
Very Low, Low	1.0 Times Annual Crop P Removal [4/]	Annual N Crop Removal	2.0 Times Annual N Removal
Medium	1.0 Times Annual Crop P Removal [4/]	1.5 Times Annual Crop P Removal [4/]	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Crop Removal
High	1.0 Times Annual Crop P Removal [4/]	1.0 Times Annual Crop P Removal [4/]	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Crop Removal
Very High or soil test P [1/] => 500 ppm in nutrient impaired TMDL areas.[5/]	0.5 Times Annual Crop P Removal [4/]	0.5 Times Annual Crop P Removal [4/]	Double the Maximum Annual P Application Not to Exceed 2 times the Annual N Crop Removal

Footnotes Applicable to both Tables

1/ Soil test P will be Mehlich III by inductively coupled plasma (ICP).

2/ Non-arid areas, counties receiving => 25 inches annual rainfall, will use the 200 ppm P level while arid areas, counties receiving < 25 inches of annual rainfall, will use the 350 ppm P level. See map in TX Agronomy Technical Note 15, Phosphorus Assessment Tool for Texas, for county designations.

3/ Not to exceed the annual nitrogen requirement rate.

4/ Not to exceed the annual nitrogen removal rate.

5/ TMDL watersheds are designated by Texas Commission on Environmental Quality (TCEQ).

Waste Utilization and Nutrient Management Plan

Table 3 - Crop Removal Rates (For Information Only) Permit #: applied for

LMU or Field No.	Acres	Crop and P Index Level	TCEQ Plan Type	Actual Crop Analysis or Default	Total Est. N Removal lbs/Ac/Yr	Total Est. P_2O_5 Removal lbs/Ac/Yr	Total Est. K_2O Removal lbs/Ac/Yr
1A	17.4	Peanut Hay Irrigated 3 Tons VL - L	NMP	Default	140	33	126
1B	17.6	Coastal GC (30%DM) 21-23T; SG GC 6-7T VL - L	NMP	Default	503	155	320
1C	14.4	Coastal 3 Cut Hay VL - L	NMP	Default	238	74	202
2A	21.3	Coastal 5-6 Cut Hay M	NMP	Default	297	93	252
2B	25.9	Coastal 5-6 Cut Hay M	NMP	Default	297	93	252
2C	16.8	Coastal 3 Cut Hay M	NMP	Default	238	74	202
2D	8.9	Coastal Grazing 1 AU/1 ac M	NMP	Default	198	62	168
2E	9.6	Coastal Grazing 1 AU/1 ac M	NMP	Default	198	62	168
2F	6.9	Coastal Grazing 1 AU/1 ac M	NMP	Default	198	62	168
2G	19.5	Native Grazing or Hay 3000# VL - L	NMP	Default	33	25	52
2H	5.9	Coastal Grazing 1 AU/1 ac M	NMP	Default	198	62	168
2I	7.6	Old World Bluestem- 6000 # VL - L	NMP	Default	66	51	104
2J	6.4	Old World Bluestem- 6000 # VL - L	NMP	Default	66	51	104
2K	3.0	Native Grazing or Hay 3000# VL - L	NMP	Default	33	25	52
3A	5.9	Coastal 3 Cut Hay VL - L	NMP	Default	238	74	202
3B	9.6	Coastal 3 Cut Hay VL - L	NMP	Default	238	74	202

NOTE: When crops are used for grazing, only a portion of the nutrients used by the crop are removed from the field in the live weight gain of the livestock, the remainder is returned to the land in manure and urine. The book "Southern Forages" estimates the N, P, & K removed in 100 pounds live weight gain as follows: **2.5 lbs N, 0.68 lbs P, 0.15 lbs K**

Waste Utilization and Nutrient Management Plan

Table 4 - Maximum Solids Application per Field Permit #: applied for

Est. Solids Produced Annually (wet tons)	LMU or Field No.	Acres	Crop Management and PI runoff potential	Current Soil Test P Level (ppm)	Max Annual P2O5 lbs/acre	Annual/Biennial	Maximum Solids Allowable Tons/Acre	Maximum Allowable Application Per field (Tons)
3,369	1A							
	1B							
	1C							
	2A	21.3	Coastal 5-6 Cut Hay M	7	246	A	22.3	475
	2B	25.9	Coastal 5-6 Cut Hay M	6	246	A	22.3	579
	2C	16.8	Coastal 3 Cut Hay M	8	147	A	13.4	226
	2D	8.9	Coastal Grazing 1 AU/1 ac M	10	118	A	10.7	95
	2E	9.6	Coastal Grazing 1 AU/1 ac M	15	118	A	10.7	103
	2F	6.9	Coastal Grazing 1 AU/1 ac M	11	118	A	10.7	73
	2G	19.5	Native Grazing or Hay 3000# VL - L	13	20	A	1.8	35
	2H	5.9	Coastal Grazing 1 AU/1 ac M	9	118	A	10.7	64
	2I	7.6	Old World Bluestem- 6000 # VL - L	6	39	A	3.6	27
	2J	6.4	Old World Bluestem- 6000 # VL - L	10	39	A	3.6	23
	2K	3.0	Native Grazing or Hay 3000# VL - L	6	20	A	1.8	5
	3A							
	3B							
Total Solids Application Acres								
131.95								
Max. Solids Application Allowable on site (tons)								
1705.0								
Not Adequate								
Solids to be used off site (tons)								
1,664.2								

End of Table 4

Waste Utilization and Nutrient Management Plan

Table 5 - Nutrients Applied/Needs at Maximum Solids Rates Permit #: applied for

	Nutrients Applied When Application is at Maximum Rates			Supplemental Nutrients Needed When Application is at Maximum Rates			
LMU / Field #	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	Lime T/Ac
1A							
1B							
1C							
2A	500	246	580	0	0	0	0
2B	500	246	580	0	0	0	0
2C	300	147	348	0	0	0	0
2D	240	118	279	0	0	0	0
2E	240	118	279	0	0	0	0
2F	240	118	279	0	0	0	0
2G	40	20	46	0	20	0	0
2H	240	118	279	0	0	0	1
2I	80	39	93	0	10	0	0
2J	80	39	93	0	5	0	0
2K	40	20	46	0	30	0	0
3A							
3B							

Waste Utilization and Nutrient Management Plan

Table 6 - Planned Solids Application Rates Permit #: applied for

LMU or Field No.	Double crop	Acres	Crop Management and PI runoff potential	Current Soil Test P ppm	Annual / Biennial	Max Rate tons/ac	% of Maximum to apply	Planned Solids tons/ac	Planned Solids per field (tons)
1A									
1B									
1C									
2A		21.3	Coastal 5-6 Cut Hay M	7	A	22.3	100	22.3	475.4
2B		25.9	Coastal 5-6 Cut Hay M	6	A	22.3	100	22.3	578.6
2C		16.8	Coastal 3 Cut Hay M	8	A	13.4	100	13.4	225.5
2D		8.9	Coastal Grazing 1 AU/1 ac M	10	A	10.7	100	10.7	94.9
2E		9.6	Coastal Grazing 1 AU/1 ac M	15	A	10.7	100	10.7	103.1
2F		6.9	Coastal Grazing 1 AU/1 ac M	11	A	10.7	100	10.7	73.4
2G		19.5	Native Grazing or Hay 3000# VL - L	13	A	1.8	100	1.8	34.9
2H		5.9	Coastal Grazing 1 AU/1 ac M	9	A	10.7	100	10.7	63.5
2I		7.6	Old World Bluestem- 6000 # VL - L	6	A	3.6	100	3.6	27.3
2J		6.4	Old World Bluestem- 6000 # VL - L	10	A	3.6	100	3.6	23.0
2K		3.0	Native Grazing or Hay 3000# VL - L	6	A	1.8	100	1.8	5.4
3A									
3B									
Acres		132.0		Will the planned per acre application rates use all of the Solids?					1705.0
3369			Tons of wet solids produced Annually						NO
0			Tons to be used off-site at Max. rates	Tons to be used off-site at planned rates					1664

 Printed: 1/12/10 12:59 PM

Plan is based on: 590 -633 Plan V 4.0_4

Waste Utilization and Nutrient Management Plan

Table 7 - Nutrients Applied/Needed at Planned Solids Rates Permit #: applied for

Red cells? Proceed to adjustment page and fix.

	Nutrients Applied at Planned Rates			Supplemental Nutrients Needed at Planned Rates			
LMU / Field #	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	Lime T/Ac
1A							
1B							
1C							
2A	500	246	580	0	0	0	0
2B	500	246	580	0	0	0	0
2C	300	147	348	0	0	0	0
2D	240	118	279	0	0	0	0
2E	240	118	279	0	0	0	0
2F	240	118	279	0	0	0	0
2G	40	20	46	0	20	0	0
2H	240	118	279	0	0	0	1
2I	80	39	93	0	10	0	0
2J	80	39	93	0	5	0	0
2K	40	20	46	0	30	0	0
3A							
3B							

Waste Utilization and Nutrient Management Plan

Table 8 - Maximum Effluent Application Per Field Permit #: applied for

Est. Available Effluent (ac inches)	LMU or Field No.	Acres	Double crop	Crop Management and PI runoff potential	Current Soil Test P Level (ppm)	Max Annual P_2O_5 (lbs/acre)	Annual/Biennial	Maximum Effluent Allowable (ac in/ac)	Maximum Effluent Allowable / Field (ac in)
376	1A	17.4		Peanut Hay Irrigated 3 Tons VL - L	11	43	A	5.3	92
Source:	1B	17.6		Coastal GC (30%DM) 21-23T; SG GC 6-7T VL - L	4	173	A	21.2	372
	1C	14.4		Coastal 3 Cut Hay VL - L	7	87	A	10.6	
	2A								
Dairy Lagoon	2B								
	2C								
	2D								
	2E								
	2F								
	2G								
	2H								
	2I								
	2J								
	2K								
	3A	5.9		Coastal 3 Cut Hay VL - L	3	87	A	10.6	
	3B	9.6		Coastal 3 Cut Hay VL - L	4	87	A	10.6	

Total Effluent Application Acres
64.88

Maximum Effluent Application Allowable On-Site (ac in)
465

Adequate

Effluent to be used Off-Site (ac in)
0

End of Table 8

Waste Utilization and Nutrient Management Plan

Table 9 - Nutrients Applied/Needed at Maximum Effluent Rates Permit #: applied for

	Nutrients Applied When Application is at Maximum Rates			Supplemental Nutrients Needed When Application is at Maximum Rates			
LMU / Field #	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	Lime T/Ac
1A	150	43	331	0	30	0	0
1B	599	173	1324	0	70	0	0
1C							0
2A							
2B							
2C							
2D							
2E							
2F							
2G							
2H							
2I							
2J							
2K							
3A							0
3B							0

Waste Utilization and Nutrient Management Plan

Table 10 - Planned Effluent Application Rates Permit #: applied for

LMU or Field No.	Acres	Double crop	Crop Management and PI runoff potential	Current Soil Test P ppm	Annual / Biennial	Maximum Effluent (ac in/ac)	% of Maximum to apply	Planned Effluent (ac in/ac)	Planned Effluent / field (Ac. In)
1A	17.4		Peanut Hay Irrigated 3 Tons VL - L	11	A	5.3	3.0	0.2	3
1B	17.6		Coastal GC (30%DM) 21-23T; SG GC 6-7T VL - L	4	A	21.2	100.0	21.2	372
1C	14.4		Coastal 3 Cut Hay VL - L	7	A	10.6	0.0	0	0
2A									
2B									
2C									
2D									
2E									
2F									
2G									
2H									
2I									
2J									
2K									
3A	5.9		Coastal 3 Cut Hay VL - L	3	A	10.6	0.0	0	0
3B	9.6		Coastal 3 Cut Hay VL - L	4	A	10.6	0.0	0	0
Acres	64.9					Will the planned application rates use all of the Effluent?			376 YES

Plan is based on: 590 -633 Plan V 4.0_4

Waste Utilization and Nutrient Management Plan

Table 11 - Nutrients Applied/Needed at the Planned Effluent Rates Permit #: applied for

Red cells? Proceed to adjustment page and fix.

	Nutrients Applied at Planned Rates			Supplemental Nutrients Needed at Planned Rates			
LMU / Field #	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	N Lb/ac	P_2O_5 Lb/ac	K_2O Lb/ac	Lime T/Ac
1A	5	1	10	5	70	10	0
1B	600	173	1327	0	70	0	0
1C	0	0	0	290	105	120	0
2A							
2B							
2C							
2D							
2E							
2F							
2G							
2H							
2I							
2J							
2K							
3A	0	0	0	295	115	25	0
3B	0	0	0	290	115	15	0

Table 12 - Available Water Capacity to 24 inches(or less) of predominant soil in fields receiving effluent and Texture of the most restrictive soil layer in the upper 24 inches

Permit #: applied for

LMU / Field #	AWC (inches)	Restrictive Texture
1A	3.455	Sandy loam
1B	3.455	Sandy loam
1C	3.42	Sandy loam
2A		
2B		
2C		
2D		
2E		
2F		
2G		
2H		
2I		
2J		
2K		
3A	3.455	Sandy loam
3B	3.44	Sandy loam

LMU / Field #	AWC (inches)	Restrictive Texture

Waste Utilization and Nutrient Management Plan

Table 13 - Non Application Areas by Field Permit #: applied for

FS = 393-Filter Strip; **FB** = 386-Field Border, **RFB** = 391-Riparian Forest Buffer; **OLEA** = Other Land Excluded Are

LMU / Field #	FS Acres	FB Acres	RFB Acres	OLEA Acres	Total Excluded
1A	0.0	0.0			
1B	0.0	0.0			
1C	0.0	0.0			
2A	0.0	0.0			
2B	0.0	0.0			
2C	0.0	0.0			
2D	0.0	0.0			
2E	0.0	0.0			
2F	0.0	0.0			
2G	0.0	0.0			
2H	0.0	0.0			
2I	0.0	0.0			
2J	0.0	0.0			
2K	0.0	0.0			
3A	0.0	0.0			
3B	0.0	0.0			

LMU / Field #	FS Acres	FB Acres	RFB Acres	OLEA Acres	Total Excluded
Totals	0.0	0.0	0.0	0.0	0.0

See Application Map for location of buffers

Total 590-633 application acres: 196.8

Total 590-633 Field Acres: 196.8

Waste Utilization and Nutrient Management Data Entries

General Data

Date :	1/12/2010
Farmer Name :	Southwest Regional Dairy Center
County in which the Land is located :	Erath
Type of Waste Plan :	Other AFO-CAFO Waste Plan
Is this plan in a TMDL watershed for nutrients? Yes or No :	Yes
Is any field PERMITTED by TCEQ? Yes or No :	Yes
Permit # :	applied for

All other entries on General Page appear on the Cover Page

Animal Information

Plan Year :	2010
Are you receiving waste from another producer?	No
Number of animals :	600
Approximate Weight :	1400
Days per year in confinement :	365
Hours per day confined :	24
ACRE FEET of effluent to be irrigated* :	31.3
Estimated annual gallons of effluent to be irrigated/applied annually :	10199042.4
For effluent, do you want application rates shown in gallons or acre inches? :	acre inches
Estimated Tons Solids to be Land Applied Annually (on or off site)* :	2190
Is this the first Year of the AFO-CAFO Operation? :	Yes

Analysis Information

Effluent Information

Date of Analysis:	
Manure Source:	Dairy Lagoon
Nitrogen % From Analysis:	n/a
Phosphorus % From Analysis:	n/a
Potassium % From Analysis:	n/a
Moisture % From Analysis:	99.5

Manure / Solids Information

Date of Analysis:	
Manure Source:	Dairy Solids
Nitrogen % From Analysis:	n/a
Phosphorus % From Analysis:	n/a
Potassium % From Analysis:	n/a
Moisture % From Analysis:	35
What will be Applied to Fields on this Farm?	Both Effluent and Solids
Is this Farm part of an AFO-CAFO?	No

This plan is based on:	590 -633 Plan V 4.0
Printed on:	1/12/10 1:04 PM

Field and Buffer Entries

Permit #: applied for

Printed on: 1/12/10 1:05 PM

Plan is based on: 590 -633 Plan V 4.0_4

FS = 393-Filter Strip, FB = 386-Field Border, RFB = 391-Riparian Forest Buffer, OLEA = Other Land Exclusion Areas or non-application areas (i.e. headquarters, freq. flooded areas, wooded areas, water bodies, etc)

NOTE: Field Border (FB) is expressed in ACRES on this spreadsheet, but as LINEAR FEET on the CPO.

Field No.	Total LMU or Field Acres	FS	FB	RFB	OLEA	Total Buffer Acres	Actual Application Acres	
1A	17.38					0.0	17.4	
1B	17.57					0.0	17.6	
1C	14.42					0.0	14.4	
2A	21.3					0.0	21.3	
2B	25.92					0.0	25.9	
2C	16.84					0.0	16.8	
2D	8.86					0.0	8.9	
2E	9.62					0.0	9.6	
2F	6.85					0.0	6.9	
2G	19.53					0.0	19.5	
2H	5.93					0.0	5.9	
2I	7.63					0.0	7.6	
2J	6.44					0.0	6.4	
2K	3.03					0.0	3.0	
3A	5.87					0.0	5.9	
3B	9.64					0.0	9.6	

Soil Test, Crop Information and Plant Analysis Data Entries

Printed on: 1/12/10 1:07 PM Plan is based on: 590 -633 Plan V 4.0_4 Permit #: applied for

Soil Test Analysis				This column only for Dry Poultry	LMU or Field #	Appl. Area Acres	Crop/Land-Use and P Index Runoff Potential VL - L; M; H; or VH	E = Effluent S = Solids	Plant Analysis (Y / N)	Plant Analysis & Yield (optional) Use Only When Crop Removal is Required			
N (ppm)	P (ppm)	K (ppm)	Lime (enter amt or leave blank)							% N	% P	% K	Yield Air Dry Production(lbs/ac/yr)
4	11	153			1A	17.4	Peanut Hay Irrigated 3 Tons VL - L	E	N				
3	4	162			1B	17.6	Coastal GC (30%DM) 21-23T. SG GC 6-7T VL - L	E	N				
6	7	113			1C	14.4	Coastal 3 Cut Hay VL - L	E	N				
3	7	115			2A	21.3	Coastal 5-6 Cut Hay M	S	N				
5	6	120			2B	25.9	Coastal 5-6 Cut Hay M	S	N				
3	8	123			2C	16.8	Coastal 3 Cut Hay M	S	N				
2	10	121			2D	8.9	Coastal Grazing 1 AU/1 ac M	S	N				
5	15	268			2E	9.6	Coastal Grazing 1 AU/1 ac M	S	N				
3	11	183			2F	6.9	Coastal Grazing 1 AU/1 ac M	S	N				
3	13	176			2G	19.5	Native Grazing or Hay 3000# VL - L	S	N				
5	9	136			2H	5.9	Coastal Grazing 1 AU/1 ac M	S	N				
2	6	187			2I	7.6	Old World Bluestem- 6000 # VL - L	S	N				
3	10	197			2J	6.4	Old World Bluestem- 6000 # VL - L	S	N				
1	6	190			2K	3.0	Native Grazing or Hay 3000# VL - L	S	N				
3	3	202			3A	5.9	Coastal 3 Cut Hay VL - L	E	N				
5	4	213			3B	9.6	Coastal 3 Cut Hay VL - L	E	N				

Solids Application Rate Entries

Solids - Set the Planned Application Rates

Permit #: a

3369 "Wet tons" of solids produced Annually						Will the planned rates use all of the Tons to be used off-site at plann	
LMU or Field No.	Acres	Crop Management and PI runoff potential	Current Soil Test P ppm	Crop P_2O_5 Req.	Annual or Biennial Application Cycle	Maximum Solids Allowable Tons/Ac	Enter % of Maximum Planned to Apply
1A							
1B							
1C							
2A	21.3	Coastal 5-6 Cut Hay M	7	170	Annual	22.3	100.0
2B	25.9	Coastal 5-6 Cut Hay M	6	170	Annual	22.3	100.0
2C	16.8	Coastal 3 Cut Hay M	8	125	Annual	13.4	100.0
2D	8.9	Coastal Grazing 1 AU/1 ac M	10	70	Annual	10.7	100.0
2E	9.6	Coastal Grazing 1 AU/1 ac M	15	70	Annual	10.7	100.0
2F	6.9	Coastal Grazing 1 AU/1 ac M	11	70	Annual	10.7	100.0
2G	19.5	Native Grazing or Hay 3000# VL - L	13	55	Annual	1.8	100.0
2H	5.9	Coastal Grazing 1 AU/1 ac M	9	70	Annual	10.7	100.0
2I	7.6	Old World Bluestem- 6000 # VL - L	6	55	Annual	3.6	100.0
2J	6.4	Old World Bluestem- 6000 # VL - L	10	55	Annual	3.6	100.0
2K	3.0	Native Grazing or Hay 3000# VL - L	6	55	Annual	1.8	100.0
3A							
3B							

Printed on: 1/12/10 1:07 PM

Plan is based on: 590 -633 PI

Effluent Application Rate Entries

Effluent - Set the Planned Application Rates

Permit #: applied for

10199042	Gallons of Effluent to be used annually	Will the planned rates use all of the effluent?	Yes
376	Acre inches of Effluent to be used annually		

LMU or Field No.	Acres	Crop Management and PI runoff potential	Current Soil Test P (ppm)	Crop P2O5 Req.	Annual or Biennial Application Cycle	Max Effluent Allowable (ac in/ac)	Enter % of Maximum Planned to Apply	Planned Effluent (ac in/ac)	Planned Effluent per field (acre inches)
1A	17.4	Peanut Hay Irrigated 3 Tons VL - L	11	95	Annual	5.3	3.0	0.2	3
1B	17.6	Coastal GC (30%DM) 21-23T; SG GC 6-7T VL - L	4	250	Annual	21.2	100.0	21.2	372
1C	14.4	Coastal 3 Cut Hay VL - L	7	125	Annual	10.6	0.0	0	0
2A									
2B									
2C									
2D									
2E									
2F									
2G									
2H									
2I									
2J									
2K									
3A	5.9	Coastal 3 Cut Hay VL - L	3	125	Annual	10.6	0.0	0	0
3B	9.6	Coastal 3 Cut Hay VL - L	4	125	Annual	10.6	0.0	0	0

Total Effluent This Page: 376

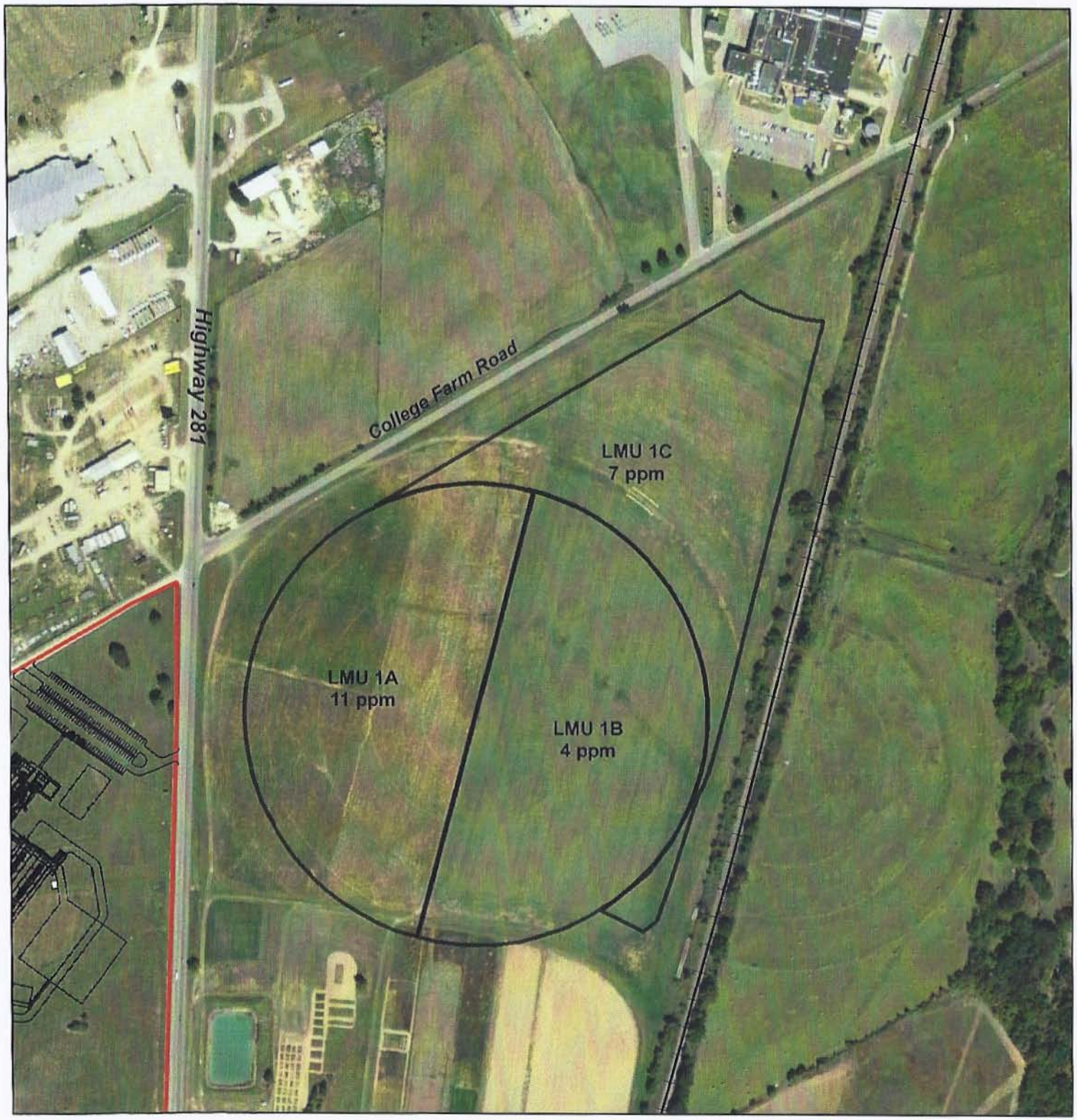
Printed on: 1/12/10 1:08 PM

Plan is based on: 590 -633 Plan V 4.0_4

Available Water Capacity Entries

Printed on: 1/12/10 1:09 PM Plan is based on: 590 -633 Plan V 4.0_4 Permit #: applied for

LMU or Fields receiving Effluent	Texture of the soil layer within the upper 24 inches of the soil profile that has the lowest permeability (Don't Abbreviate)	Depth of First Layer (inches)		AWC of First Layer (in/in)		Depth of Second Layer (inches)		AWC of Second Layer (in/in)		Depth of Third Layer (inches)		AWC of Third Layer (in/in)		Depth of Fourth Layer (inches)		AWC of Fourth Layer (in/in)		Available Water Holding Capacity (AWC) of the upper 24 inches of the soil profile (inches)
	EXAMPLE ENTRIES	0	3	0.12	0.2	3	14	0.16	0.21	14	18	0.08	0.12	18	24	0	0	
		Enter Data for the top 24" only																
1A	Sandy loam	0	5	0.12	0.16	5	40	0.12	0.17	40				0				3.46
1B	Sandy loam	0	5	0.12	0.16	5	40	0.12	0.17	40				0				3.46
1C	Sandy loam	0	18	0.11	0.17	18	55	0.12	0.18	55				0				3.42
3A	Sandy loam	0	5	0.12	0.16	5	40	0.12	0.17	40				0				3.46
3B	Sandy loam	0	8	0.12	0.16	8	34	0.12	0.17	34				0				3.44



Legend

- Dairy Facility
- Land Management Unit
- Railroad

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

N
W E
S

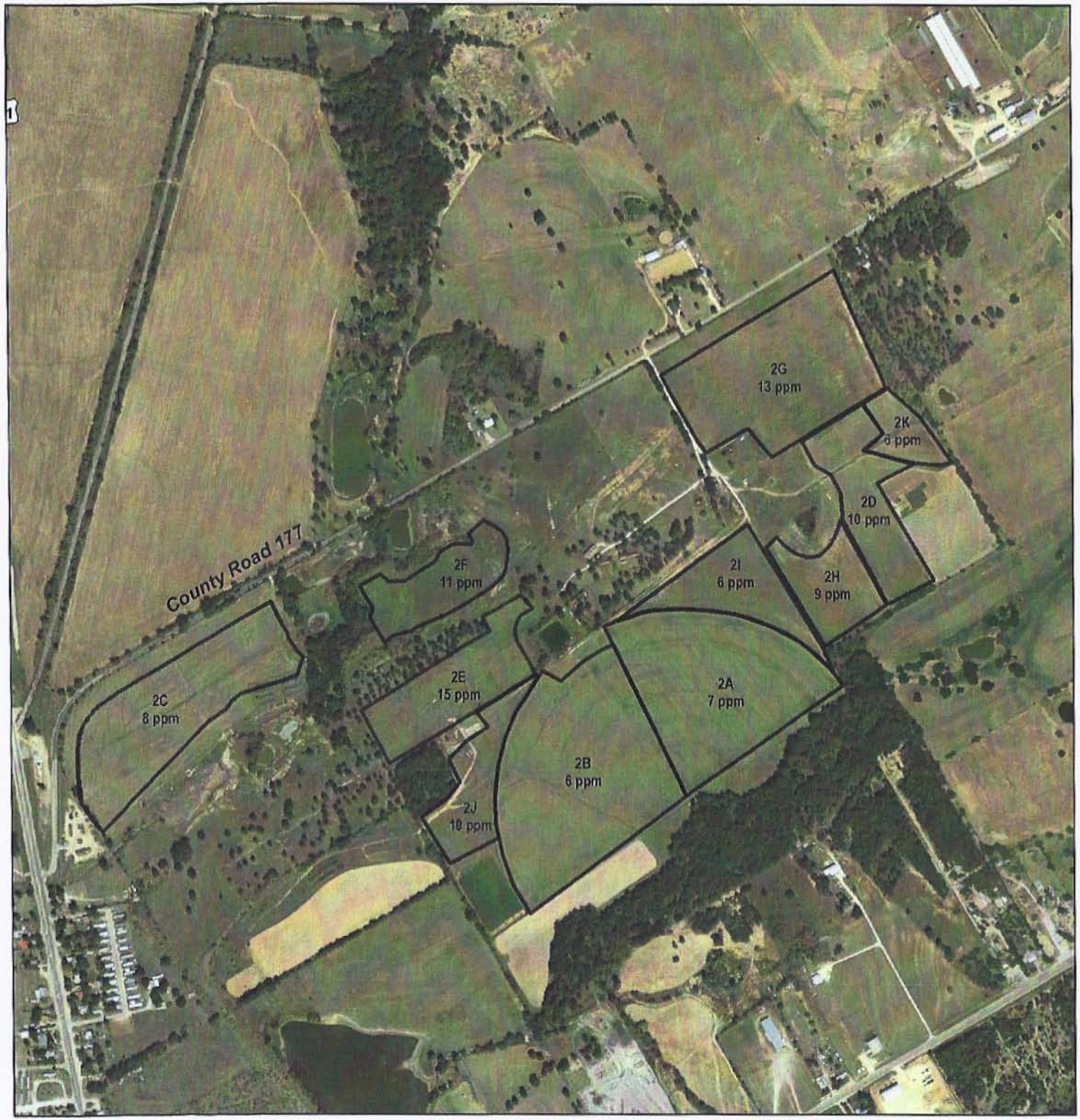
0 125 250 500 750 1,000 Feet

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November 6, 2009

Figure 4.2a
Phosphorus Level Map
Land Management Units 1A, 1B, 1C

Cirrus
Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

Land Management Unit

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

N
W E
S

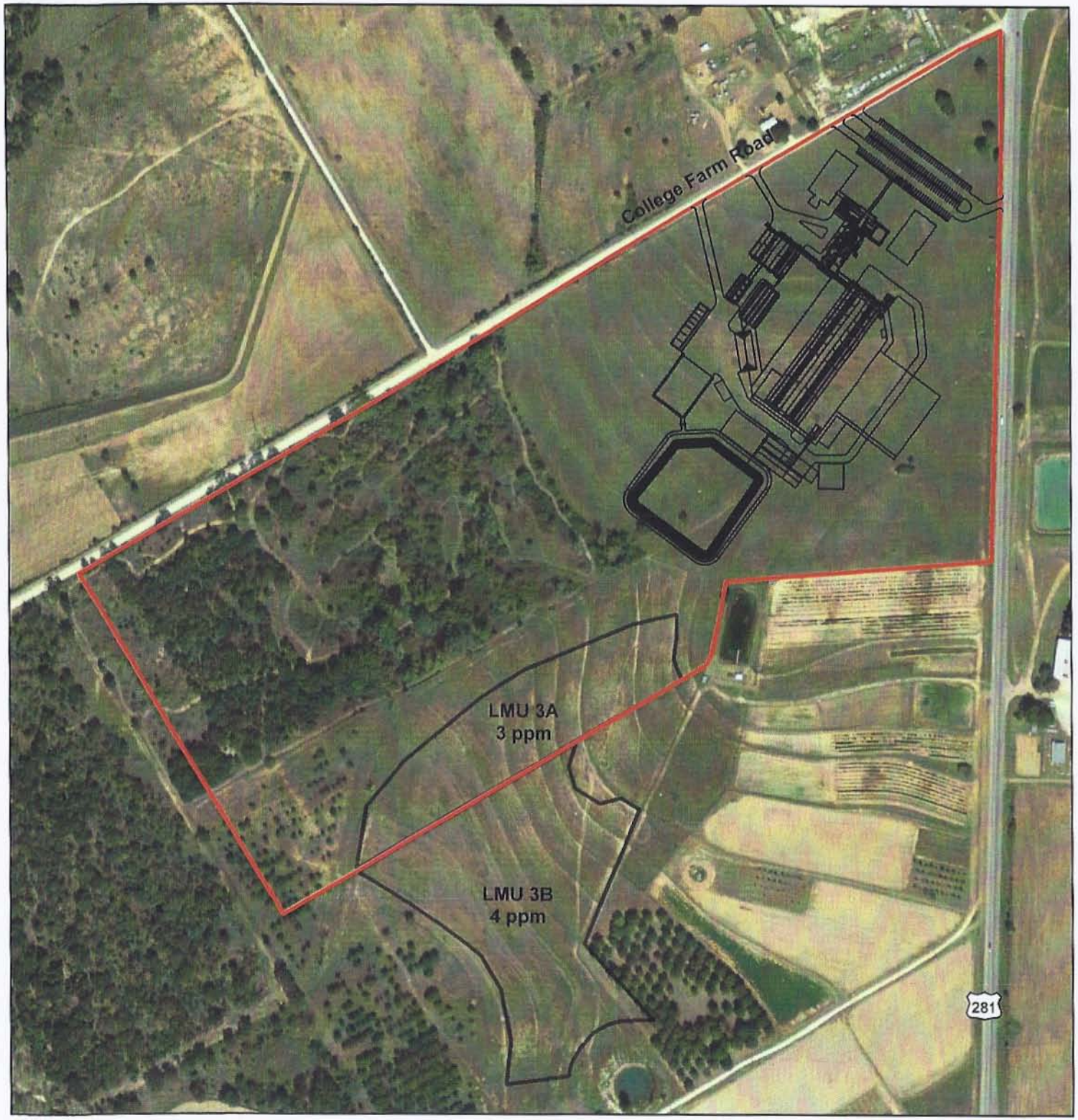
Feet
0 500 1,000 2,000

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November 6, 2009

Figure 4.2b
Phosphorus Level Map
Land Management Units 2A thru 2K

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- TSU Dairy Facility
- Land Management Unit

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

N
W E
S

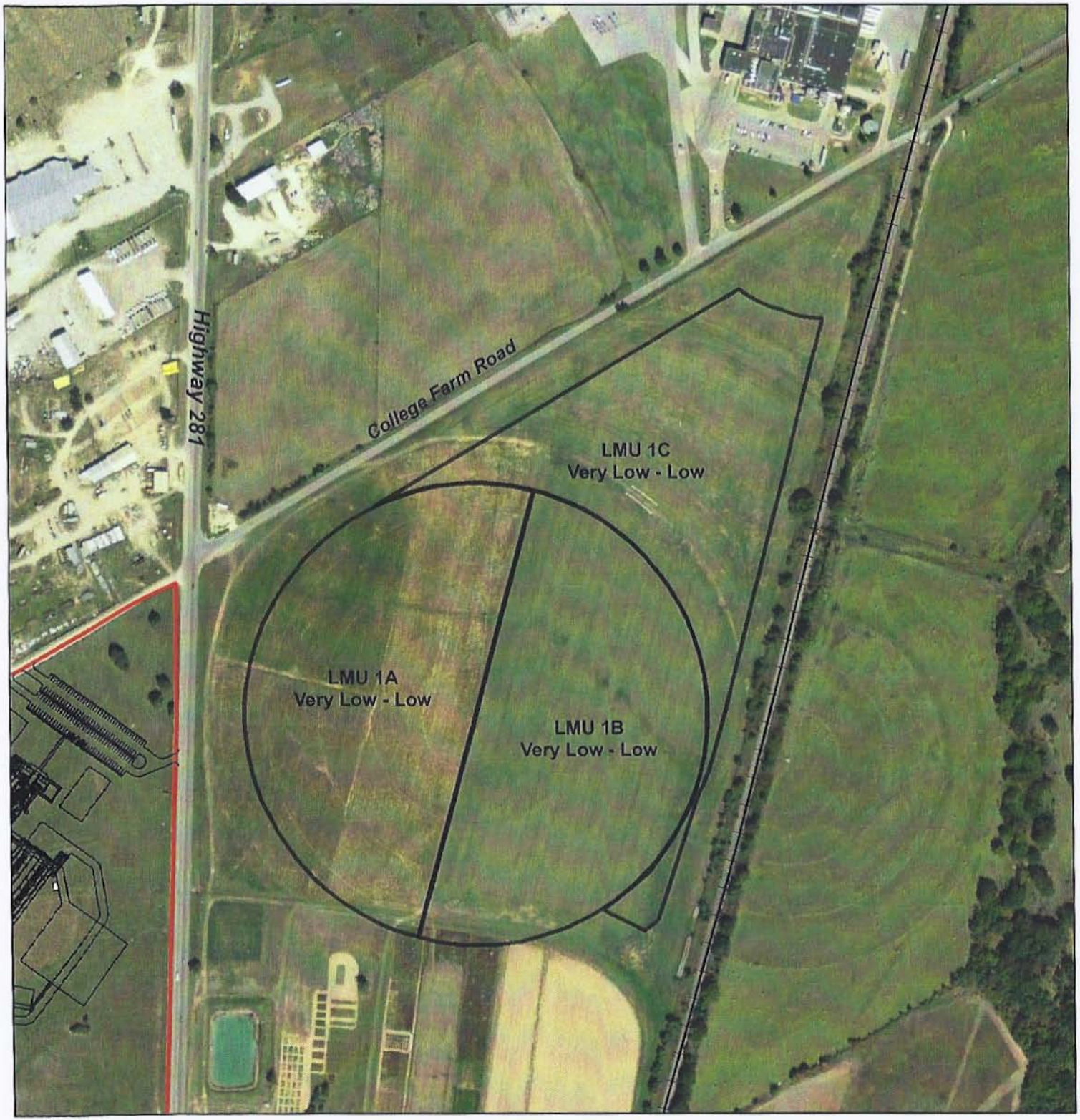
Feet
0 125 250 500 750 1,000

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November 6, 2009

Figure 4.2c
Phosphorus Level Map
Land Management Units 3A & 3B

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Dairy Facility
- Land Management Unit
- Railroad

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

N
W E
S

0 125 250 500 750 1,000 Feet

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November 6, 2009

Figure 4.3a
Phosphorus Index Map
Land Management Units 1A, 1B, 1C

Cirrus
Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081

Legend

Land Management Unit

Digital Orthophoto Quadrangles;
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

N
W E
S

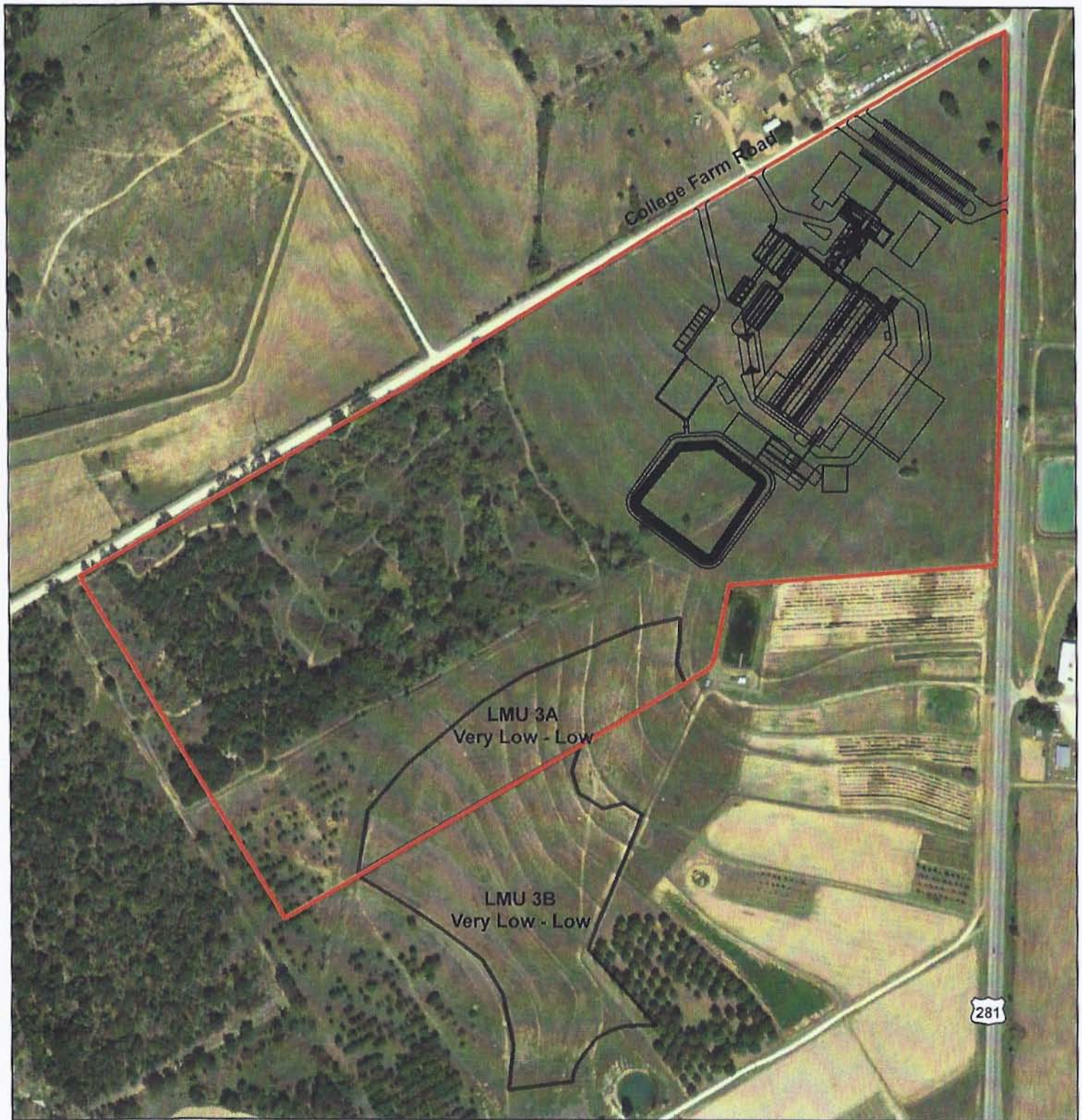
0 500 1,000 2,000 Feet

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November 6, 2009

Figure 4.3b
Phosphorus Index Map
Land Management Units 2A thru 2K

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Dairy Facility
- Land Management Unit

Digital Orthophoto Quadrangles:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

N
W E
S

0 125 250 500 750 1,000 Feet

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November 6, 2009

Figure 4.3c
Phosphorus Index Map
Land Management Units 3A & 3B

Cirrus
Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081

Nitrogen Leaching Index Worksheet TX

Name SW Regional Dairy Center **Assisted by:** Monty Dollar **Date:** 30-Nov-09

County Erath Use button in yellow cells to pick from list. **Annual Inches Additional from Irrigatio** 30

30 year avg. (rainfall inches)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann. Avg.
1.59	2.23	2.62	2.82	4.66	3.78	1.92	2.12	3.39	3.56	2.07	2.31	33.07

	Avg. Annual Rainfall	Avg. Total Non-growing Rainfall	Non-Growing Months
Corn	63.07	10.82	Nov - Mar
Cotton	63.07	13.64	Nov - Apr
Sorghum	63.07	13.64	Nov - Apr
Bermudagrass	63.07	8.20	Nov - Feb
Bermudagrass & Small Grain	63.07	0.00	None
Corn + Small Grain	63.07	3.39	Sep
Corn Silage + Small Grain	63.07	5.51	Aug - Sep
Forage Sorghum (silage) + Small Grain	63.07	5.51	Aug - Sep
Small Grain	63.07	7.43	Jul - Sep
Full Season Double Crop	63.07	3.56	Oct
Spring Watemelons	63.07	not grown	not grown
Fall Watermelons	63.07	16.23	Dec - May
Old World Bluestem	63.07	8.20	Nov - Feb

Guidelines and Recommendations

NLI <2 - probably would not contribute to soluble nutrient leaching below the root zone.

NLI 2 to 10 - may contribute to soluble nutrient leaching below the root zone.

NLI >10 - will contribute to soluble nutrient leaching below the root zone. Nutrient management should be maximized or soluble nutrients should not be applied. Additonal practices to reduce leaching should be considered.

(Manual Entry Data for Any Other Crop can be done in the appropriate

Field #	Predominant Soil Symbol *	Hydrologic Group	Corn	Cotton	Sorghum	Bermuda	Bermuda & Small Grain	Corn & Small Grain	Corn Silage & Small Grain	Forage Sorghum Silage & Small Grain	Small Grain	Full Season Double Crop	Spring Watermelons	Fall Watermelons	Old World Bluestem
1A	WoB2	C	2	2	2	2	0	1	2	2	2	1	0	2	2
1B	WoB2	C	2	2	2	2	0	1	2	2	2	1	0	2	2
1C	WkA	D	1	1	1	1	0	1	1	1	1	1	0	1	1
2A	WoB	C	2	2	2	2	0	1	2	2	2	1	0	2	2
2B	WoB	C	2	2	2	2	0	1	2	2	2	1	0	2	2
2C	WoB	C	2	2	2	2	0	1	2	2	2	1	0	2	2
2D	WaB	D	1	1	1	1	0	1	1	1	1	1	0	1	1
2E	WsC2	C	2	2	2	2	0	1	2	2	2	1	0	2	2
2F	WsC2	C	2	2	2	2	0	1	2	2	2	1	0	2	2
2G	WaB	D	1	1	1	1	0	1	1	1	1	1	0	1	1
2H	DfB	B	4	4	4	4	0	3	3	3	4	3	0	5	4
2I	WoB	C	2	2	2	2	0	1	2	2	2	1	0	2	2
2J	WoB	C	2	2	2	2	0	1	2	2	2	1	0	2	2
2K	WoB	C		2	2	2	0	1	2	2	2	1	0	2	2
3A	WoB2	C		2	2	2	0	1	2	2	2	1	0	2	2
3B	WoB2	C		2	2	2	0	1	2	2	2	1	0	2	2

Feed management can be an important aspect of a CNMP, especially where there is a lack of adequate land to utilize all animal wastes produced at a facility. Careful diet formulation can help to ensure that the nutritional needs of the animals fed are met while minimizing the amount of excess nutrients excreted in the urine and feces of the animal. There are many methods that can be utilized by dieticians and producers to meet these needs, including phase feeding and the use of enzymes to increase feed digestibility. The economics and availability of various feedstuffs also dictates the potential for implementing a feed management plan at an operation.

At this time, the producer is not planning to implement a formal feed management plan. However, if this becomes desirable in the future, the feed management plan should be signed by a qualified feed specialist or animal dietician in accordance with NRCS requirements and Conservation Practice Standard 592, Feed Management.

Although this facility plans to land apply the animal wastes produced on site, there are often many ways to utilize animal wastes other than land application. There are several alternative utilization activities that are planned at this facility which will reduce nutrient loading on the Land Management Units associated with the operation, including off-site application, composting, and bioenergy production.

At the option of the operator or when necessary, manure may be hauled off-site for land application on land not included in the permit. Records of the amount and analysis of the manure, along with the name of the recipient, will be kept in the recordkeeping section of the Pollution Prevention Plan (PPP).

Another very good option to enhance the value and usefulness of raw manure is to compost it. A composting pad is planned at the dairy site for future use. The perimeter of the composting pad will be bermed to prevent drainage into the Runoff Control Structure (RCS). All liquids within the composting area will be evaporated. For further information on this, please refer to the PPP.

Proper composting methods will be followed to protect natural resources and to optimize the quality of compost produced. Achieving a suitable carbon to nitrogen ratio, aeration method and timing, moisture content and temperature monitoring are all important considerations when planning a composting system. Composting of manure is not planned initially, but when the operator decides to begin composting, this section of the CNMP will be updated accordingly.

Additionally, Tarleton State University has future plans to utilize some or all of the manure produced at the facility for bioenergy production. There are plans for Tarleton State University to partner with Texas A&M University to utilize manure from this dairy for ethanol production and in an anaerobic digestor. When there are more specific plans for the amount of manure to be used, the timing of the delivery of manure, and the planned date for the bioenergy facility(s) to be in operation, this section of the CNMP will be updated accordingly.

Record keeping is a very important tool for managing any Animal Feeding Operation, and is required by the permit for this operation.

A copy of the application agreement between Southwest Regional Dairy Center and Texas AgriLife Research is located in Section 7.1.

For more information on crop rotations, please reference the Nutrient Management Plan in Section 4 and the Conservation Plan of Operations in Section 2.

All records will be kept in the Pollution Prevention Plan. As such, please see Section 9 for more information.

AgriLIFE RESEARCH
Texas A&M System

November 30, 2009

TCEQ Registration
Review and Reporting Division
Permits Administrative Review Section
Water Quality Applications Team (MC161)
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

RE: Lease Agreement between Southwest Regional Dairy Center and Texas A&M AgriLife Research for application of effluent and solids on Land Management Units

Dear Sir or Madam:

This is to document an agreement between Texas A&M AgriLife Research and the Tarleton State University Southwest Regional Dairy Center. Texas A&M AgriLife Research grants permission to the Southwest Regional Dairy Center to land apply effluent and/or solids on the AgriLife Research properties listed below.

1.) Land Management Unit 3B

2.) Land Management Units 1A, 1B, and 1C

3.) Land Management Units 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2K

This agreement becomes effective when the TCEQ operating permit is issued and will remain in effect for a period of 5 years, after which the agreement will be subject to review and renewal. Please find attached three maps showing the locations and boundaries of the Land Management Units listed (Figures 1 through 3).

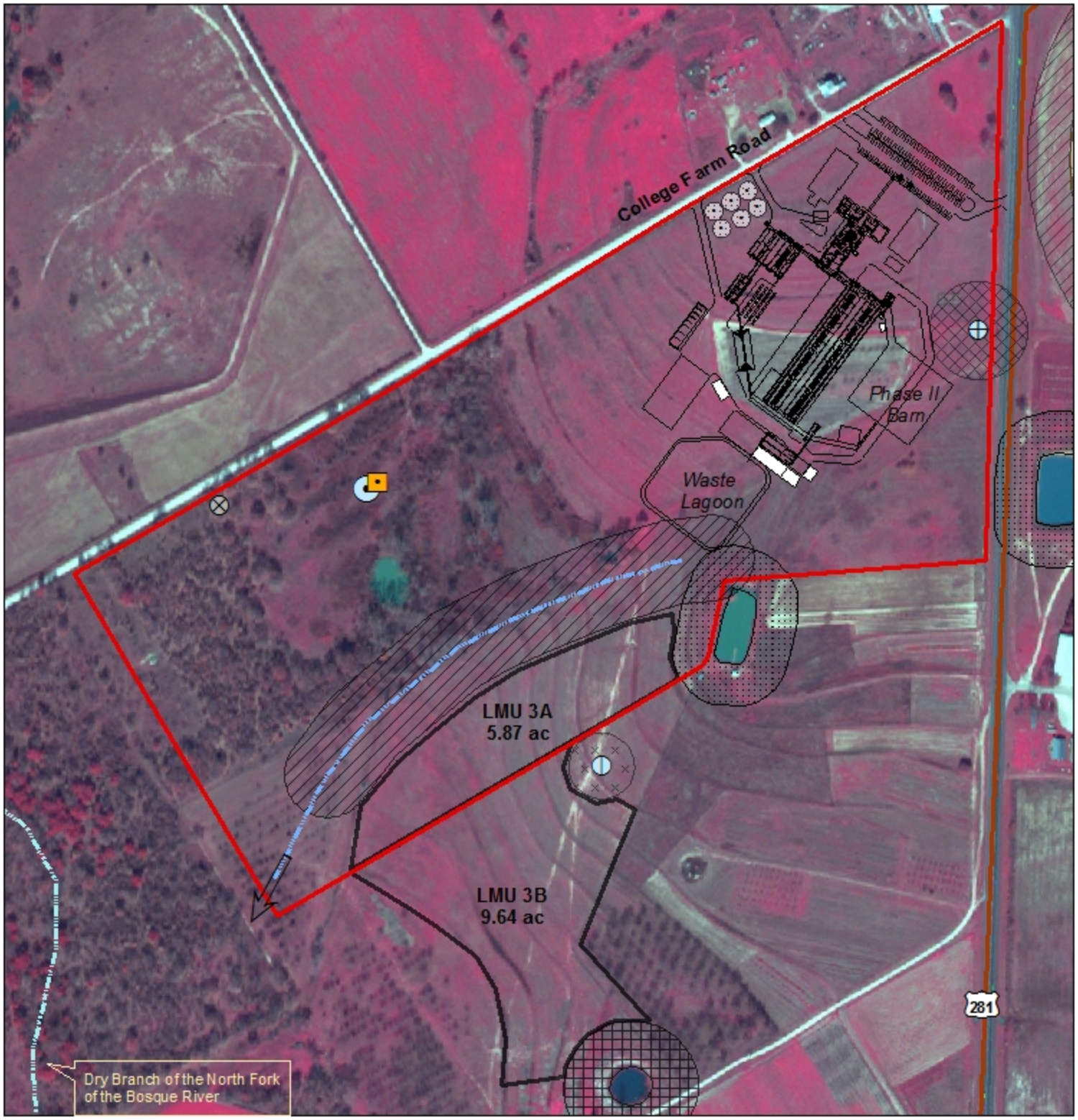
Sincerely,

William A. Dugas
Interim Director

Attachments

Texas AgriLife Research
113 Jack K. Williams Administration Building
2142 TAMU
College Station, TX 77843

Tel. (979) 845-4747
Fax: (979) 458-4765



Legend

- TSU Dairy Facility
- Land Managment Unit
- Public Water Supply Well
- Irrigation Well (Agr/Animal Use)
- Vineyard Well (Agri Only)
- Windmill (plugged and abandoned)
- Potable Water Tank/Pump Station
- Pond
- Drainage
- 100 ft. Buffer
- 128 ft. Buffer
- 130 ft. Buffer
- 140 ft. Buffer
- 150 ft. Buffer
- 500 ft. Buffer

Digital Orthophoto Quads: 2006 NAIP 2m CIR
Stephenville NWQQ/NEQQ
Knob Hill SWQQ/SEQQ

N W E S

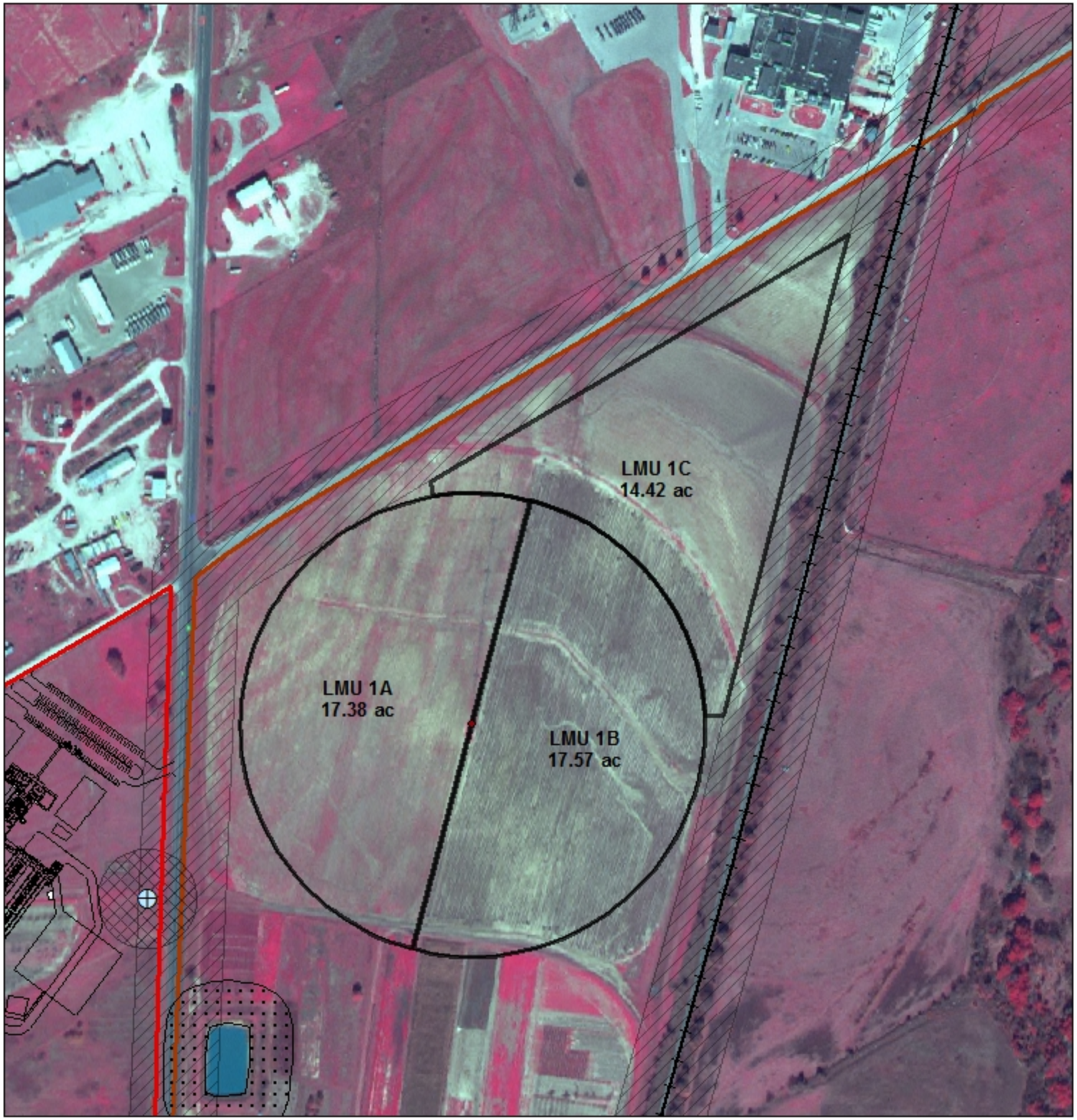
0 125 250 500 750 1,000 Feet

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November 2009

Figure 1
Land Management Unit 3B

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- TSU Dairy Facility
- Land Management Unit
- Irrigation Well (Agr/Animal Use)
- Roadway
- Railroad
- Pond

Buffer Distances

- 128 ft.
- 130 ft.
- 150 ft.

Digital Orthophoto Quads: 2006 NAIP 2m CIR
Stephenville NWQQ/NEQQ
Knob Hill SWQQ/SEQQ

N
W E
S

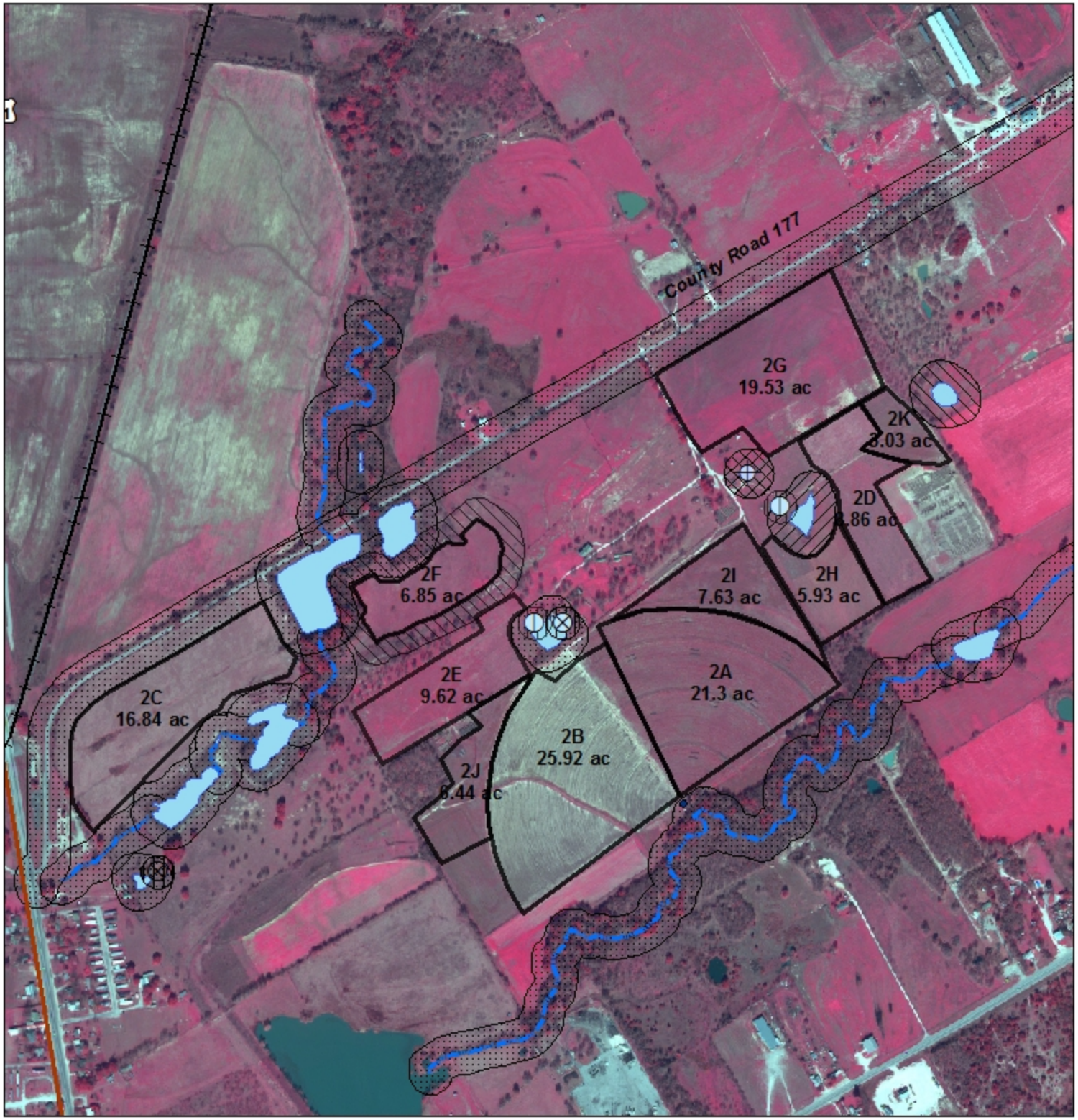
0 125 250 500 750 1,000 Feet

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November, 2009

Figure 2
Land Management Units 1A, 1B, 1C

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081



Legend

- Land Management Unit
- Domestic well
- Irrigation Well (Agri only)
- Irrigation Well (Unused)
- Windmill (Unused)
- Railroad
- Pond
- Intermittent Stream

Buffer Distances

- 100 ft.
- 128 ft.
- 130 ft.
- 133 ft.
- 150 ft.

Digital Orthophoto Quads: 2006 NAIP 2m CIR
Stephenville NWQQ/NEQQ

N W E S

0 500 1,000 2,000 Feet

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	November, 2009

Figure 3
Land Management Units 2A thru 2K

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081

8.1. Emergency Action Plan

In Case of an Emergency Storage Facility Spill, Leak or Failure

Implement the following first containment steps:

a. Stop all other activities to address the spill.
b. Use skid loader or tractor with blade to contain or divert spill or leak, if possible.
c. Call for help and excavator if needed.
d. Complete the clean-up and repair the necessary components.
e. Sample the discharge for analysis when safe to do so.
f. Assess the extent of the emergency and request additional help if needed.

In Case of an Emergency Spill, Leak or Failure During Transport or Land Application

Implement the following first containment steps:

a. Stop all other activities to address the spill.
b. If the spill posed a hazard to local traffic, call for local traffic control assistance and clear the road and roadside of spilled material.
c. Contain the spill or runoff from entering surface waters using straw bales, saw dust, soil or other appropriate materials.
d. If flow is coming from a tile, plug the tile with a tile plug immediately.
e. Sample the discharge for analysis when safe to do so.
f. Assess the extent of the emergency and request additional help if needed.

Emergency Contacts

Department / Agency	Phone Number
Emergency Fire, Ambulance, and/or Police	911
Hospital	(254) 965-1500
Sheriff's Office	(254) 965-3318
Poison Control	1-800-222-1222

Available equipment/supplies for responding to emergency

Equipment Type	Contact Person	Phone Number
Nearest excavation equipment	Frontend loader on site	-----
Animal rendering service		

Contacts to be made by the owner or operator within 24 hours

Organization	Phone Number
EPA Emergency Spill Hotline	1-800-424-8802
County Health Department	1-800-452-2791
TCEQ Regional Office (Region 4)	1-800-687-7078

Be prepared to provide the following information:

a. Your name and contact information.
b. Farm location and other pertinent identification information.
c. Description of emergency.
d. Estimate of the amounts, area covered, and distance traveled.
e. Whether manure has reached surface waters or major field drains.
f. Whether there is any obvious damage: employee injury, fish kill, or property damage.
g. Current status of containment efforts.

8.2. Mortality Management

To decrease non-point source pollution of surface and ground water resources, reduce the impact of odors that result from improperly handled animal mortality, and decrease the likelihood of the spread of disease or other pathogens, approved disposal methods should be implemented in the handling of normal mortality losses. NRCS Standard 316, Animal Mortality Facility, will be followed for proper management of dead animals.

Off-site rendering will be the primary method of disposing of animal mortality. Mortality will be removed from the facility within 72 hours of death by a commercial rendering service.

Plan for Catastrophic Death Animal Disposal

In case of catastrophic death loss, dairy operator plans utilize a commercial rendering service. In the event that the rendering service is unable to accept all or some of the mortality, owner plans to dispose of dead animals on site; refer to NRCS practice code 316 (Animal Mortality Facility) and Technical Guidance on Catastrophic Animal Mortality Management (Burial Method) dated 10/26/05 (copy this section).

Important! In the event of catastrophic animal mortality, contact the following authority before beginning carcass disposal:

Authority name: TCEQ
Contact name: Industrial & Hazardous Waste Permits Section
Phone number: 512-239-2334 Fax: 512-239-6383

8.3. Monitoring and Sampling Procedures

Soil Sampling

Soil samples will be collected annually within the same 45-day time frame from the LMUs according to the steps outlined in the PPP and as required by TCEQ. For LMUs planted to a permanent cover such as grass, soil samples will be needed for 0-2", 2-6", and 6-24". Soil samples will be collected by a Certified Nutrient Management Specialist in Texas. These soil samples will be used in the Nutrient Management Plan (NMP) to determine waste application rates.

Manure and Wastewater Sampling

Representative manure and wastewater samples will be collected annually as per the PPP guidelines and TCEQ requirements. The results from these samples will be used in the NMP to determine waste application rates.

8.4. Inspection Procedures

Daily inspections of all water lines located in the drainage area of the RCS are required. Weekly inspections are required for land application equipment, the RCS and all other control facilities. Monthly inspections are required for the mortality management system and chemical storage. A complete site inspection of the dairy and land management units will be conducted at least once per year. Once every five years, a licensed Texas professional engineer will conduct a thorough review of all structural controls, including the RCS, and all documentation. For more information concerning required inspections and forms, see the PPP.

8.5. Odor Control Plan

The following is a list of Best Management Practices that may be implemented at the facility to decrease odors.

1. Pen surface drainage will be maintained to reduce ponding.
2. The manure which collects in the confinement pens over time will be removed on a regular basis (at least once annually) to prevent manure buildup.
3. Removal of manure and pond solids will be done in favorable wind conditions carrying odors away from nearby receptors. The TCEQ must be notified prior to cleanout.
4. Dead animals will be promptly disposed of within 72 hours.

8.6. Land Application Procedures

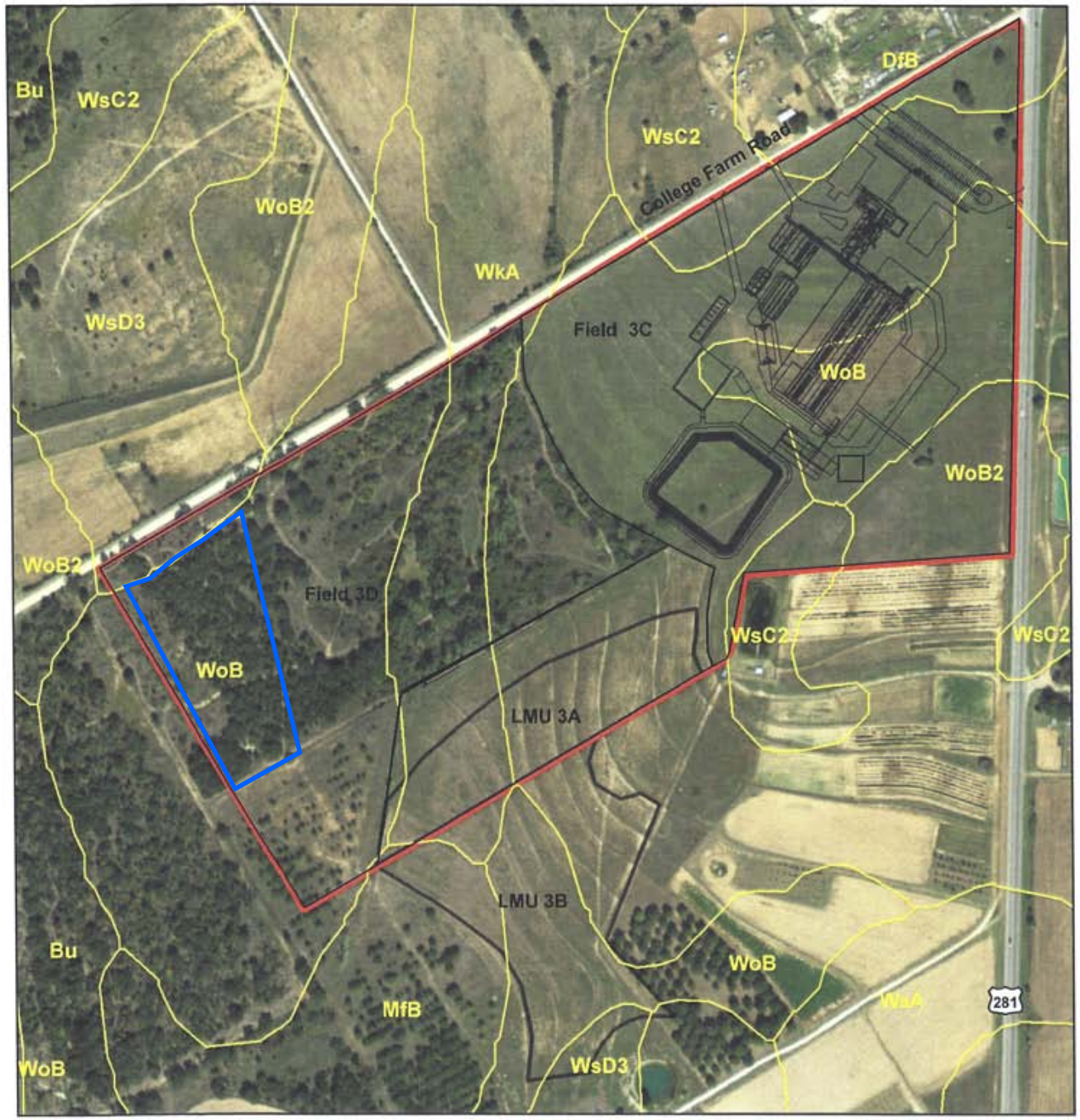
No application of manure, wastewater, or sludge shall occur in buffered areas or application setbacks. Calibrate application equipment regularly to ensure that the planned amount of manure and/or wastewater is being applied. Land application shall not occur when the ground is frozen or saturated, or during rainfall events, unless dewatering of the RCS is necessary to prevent imminent overflow. Application amounts will not be in excess of planned crop requirements, as specified in the NMP. Irrigation practices will be managed to minimize ponding or puddling of wastewater on the LMU, to prevent discharges to state waters and to prevent nuisance conditions. Irrigation wells on LMUs will be equipped with backflow prevention devices in accordance with 16 TAC 76. Application of animal wastes will not occur at night without the express written permission of occupied residences within 0.25 mile of the LMUs.

8.7. Employee and Dairy Outreach Program Area Training

Employees are responsible for work activities relating to compliance with the PPP and will be regularly trained or informed of information necessary for the proper operation and maintenance of the facility and land application of manure, sludge and wastewater.

Employee training shall address all levels of responsibility of the general components and goals of the PPP. Records of all training shall be kept in the PPP.

For more specific information on employee training, see Section 11 of the PPP.



Legend

- TSU Dairy Facility
- Field
- Mortality Management

Digital Orthophoto Quadrangle:
2008 USDA-FSA National Agricultural Imagery Program
(from TNRIS)

NRCS Soils from SSURGO

N
W E
S

Feet
0 125 250 500 750 1,000

Southwest Regional Dairy Center
Tarleton State University

Project No. 02-014300.07	April, 2010

Figure 8.2a
Mortality Management Map

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081

Large Animal Carcass Disposal

Erath County, Texas

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Map symbol and soil name	Pct. of map unit	Large Animal Carcass Disposal, Pit		Large Animal Carcass Disposal, Trench	
		Rating class and limiting features	Value	Rating class and limiting features	Value
WkA:					
Hassee	80	Very limited		Very limited	
		Wetness	1.00	Wetness	1.00
		Water gathering surface	0.30	Water gathering surface	0.30
		Clay content	0.25	Clay content	0.25
		Unstable excavation walls	0.07	Unstable excavation walls	0.07
WoB:					
Windthorst	100	Somewhat limited		Somewhat limited	
		Clay content	0.12	Clay content	0.12
WoB2:					
Windthorst, eroded	100	Somewhat limited		Somewhat limited	
		Clay content	0.16	Clay content	0.16

Catastrophic Animal Mortality Management (Burial Method)

Technical Guidance

USDA/Natural Resources Conservation Service
Texas State Soil and Water Conservation Board

October 26, 2005

General Information Relating To All Type Animals

This guidance applies to all catastrophic animal mortality with the exception of diseased animal carcasses. Texas law has separate requirements for disposal of animal carcasses when death results from one of the diseases listed in Appendix C. Appendix C contains information for disposal of these diseased carcasses.

Each producer should have an established method to handle day-to-day mortality. However, in the event of an unexpected disaster, each producer should have a Catastrophic Animal Mortality Management Plan. The plan should include a detailed action plan and a list of emergency phone numbers of contact persons. The Texas Natural Resources Conservation Commission (TNRCC), Industrial and Hazardous **Waste Permits Section must be contacted before burial of catastrophic mortality:**

TNRCC
Industrial and Hazardous Waste Permits Section, MC-130
PO Box 13087
Austin, TX, 78711-3087
phone: 512/239-6595, fax: 512/239-6383

Further information concerning regulations pertaining to mortality management can be obtained from TNRCC. Proper disposal of carcasses is important to prevent disease transmission, avoid nuisance problems, and protect air and water quality. TNRCC Rules require disposal of dead animals within 72 hours in a manner which prevents contamination of waters of the state or creation of a nuisance or public health hazard.

Disposal by a rendering company is the preferred method of carcass disposal. Before planning this option contact the rendering facility or its representative to ensure the producer is informed of special handling procedures, equipment needs, scheduling requirements, etc. The producer should maintain a list of contact phone numbers so information will be readily available following a catastrophic die-off. Verify that local companies which have previously picked up and/or rendered dead animals are still doing so. A number of rendering companies across the state have stopped dead animal pick up service, and others have raised their fees significantly. The producer should periodically review the availability and cost of rendering so that the plan can be modified if necessary. This can be an excellent option if mortality can be loaded and transported while still fresh, or the mortality can be refrigerated until loaded and transported.

Disposal in a landfill may be an option in some locations. Before planning this option the closest commercial, regional, county, or municipal landfill should be contacted to determine if the landfill has a permit which would allow acceptance of dead animals (poultry, sheep, cattle, etc.). Also ask if there are any restrictions on type and volume of animal mortality that will be accepted at the facility. Landfill fees and transport, offloading, and handling procedures should be discussed with landfill managers and included in the plan. The use of a landfill is an excellent option if mortality can be loaded and transported while still fresh, or can be refrigerated until transport. The landfill is not a viable option if the producer does not own or have access to a vehicle capable of transporting mortality quickly in an emergency situation. After a catastrophic die-off is not a good time to find out that a driver and truck

to transport mortality will not be available for several weeks (MAKE ARRANGEMENTS NOW, NOT AFTER THE ANIMALS ARE DEAD).

On-farm disposal of catastrophic mortality may be considered if site conditions permit. On-farm methods include burial, composting, and incineration. Incinerators and composters are excellent options for routine mortality but usually do not have the capacity to handle mortality volumes associated with catastrophic events. Composting and incineration should not be relied on for catastrophic mortality handling without a documented evaluation of worst anticipated mortality condition (number, type, and weight of animals), and the anticipated capacity of the system (i.e., lb./hr. incineration rate, hrs/day of operation).

Information Specific To Poultry

For purposes of mortality disposal, Texas Law defines poultry as chickens and ducks (Texas Water Code § 26.301). TNRCC Rules allow storage of carcasses on-site for no more than 72 hours, provided that storage is in a varmint-proof receptacle to prevent odor, leakage, or spillage. Storage beyond 72 hours must be in a freezer or refrigerator at 40 degrees Fahrenheit or lower. Burial of birds is not allowed for day-to-day mortality under Texas law. Rules prohibit on-site burial of poultry carcasses, except in the event of a major die-off, which is defined as a mortality rate of 0.3% of the total poultry inventory or more per day. **Only the die-off that exceeds the capacity of the normal means of mortality management may be buried.**

Planning For Burial Of Catastrophic Animal Mortality For All Type Animals (excluding disposal of diseased carcasses)

The producer, with assistance from NRCS, Texas State Soil and Water Conservation Board personnel, or other qualified professionals should select burial pit sites. During the planning process, the proposed burial site should be evaluated for the following:

- Soil Properties
  - Soil texture
  - Soil permeability
  - Surface fragments (Cobbles or Stones)
  - Slope
  - Depth to high water table (perched) **1/**
  - Depth to high water table (apparent) **2/**
  - Depth to bedrock
  - Flooding hazard
  - Ponding
- Presence of fractured or cavernous bedrock
- Proximity to water bodies (rivers, streams, ponds, lakes, etc.)
- Proximity to wells
- Distance to public areas
- Distance to residences and property lines

1/ Perched high water table is defined as a zone of saturation above an unsaturated zone at the highest average depth during the wettest season.
2/ Apparent high water table is the level at which water stands in a freshly dug unlined bore hole after adequate time for adjustments in the surrounding soil at the highest average depth during the wettest season (actual ground water level).

Where applicable, local NRCS offices maintain a listing of suitability for Animal Mortality Burial (Catastrophic) by soil map unit. Each soil that is mapped in the county will fall into one of the following categories:

- **Not Limited**—Soils are expected to be suitable for burial. These soils are preferred areas for locating burial pits.
- **Somewhat Limited—**Soils may be used for burial, as long as limitations shown in the FOTG, Section 2, Animal Mortality Burial (Catastrophic) Interpretation are addressed. Soils in this category may have slight to moderate limitations. Care should be taken in evaluating a potential burial site on these soils (See Table 1, below).
- **Very Limited**—Soils are generally not suited for burial pits without overcoming major limitations. These locations are not recommended for burial. Alternative methods of disposal will normally be required if these are the only available soils on the farm.

It should be noted that Soil Interpretations are a preliminary planning tool. They only provide flags for things that need to be considered. Soil Interpretations do not provide criteria for pit design or construction. The chance of an inclusion of a contrasting soil at a particular soil map location varies. For this reason a planned site for burial of catastrophic mortality should never be selected without a site visit to verify assumptions about the location. When a building is full of dead birds is not a good time to discover a high water table at the planned animal burial site.

Site Evaluation Criteria

- Watch for perched water tables. A site would not be acceptable without cutoffs and drainage or other special design features if any water table (apparent, perched, seasonal, etc.) is likely to result in water being above the level of the bottom of the pit or flowing down gradient into the pit.
- Soils rated “Not Limited” for Animal Mortality Burial (Catastrophic), FOTG, Section 2, are suitable for burial sites.
- Soils that have a Unified Soil Classification of CH, MH, CL, GC, or SC are suitable for burial sites. Some of these soils will, however, have limitations relating to high clay content (i.e. difficulty in excavation, handling and compacting fill.
- Do not locate the burial pit on soil mapping units that are frequently or occasionally flooded.
- Do not locate the burial pit on soil mapping units that are rarely flooded without constructing measures to protect the site from flood waters.
- Do not locate the burial pit with planned bottom elevation within 2 feet of an apparent water table, highly permeable soils, or fractured bedrock.
- Do not locate the burial pit within 150 feet of private wells, springs, streams, public areas, or within 500 feet of a public well.
- Do not locate the burial pit where surface runoff could enter the pit.
- Do not locate the burial pit within 50 ft of residences or property lines; a distance of 200 ft is recommended if space allows.
- Assess potential impact of and existing hydraulic connections (i.e. tile drains, or drainage ditches)

Table 1—Required Practices for Burial Pits located in Soils that are "Somewhat Limited"

Limitation	Method to Overcome Limitation
Slope	Overhead water must be diverted away from the burial area.
Depth to Rock	Bottom of pit must be at least 2 feet above bedrock. If additional depth of pit is needed it must be created by "mounding" of sidewalls above original ground elevation. Cover over the animals must consist of a minimum of one foot of soil on intermediate layers and two feet of compacted soil on top.
Flooding and Ponding	Areas subject to frequent or occasional flooding or ponding are not suited. Rarely flooded or ponded areas are not to be used during periods of high flooding and ponding probability (see soil survey for dates likely to flood). Alternate areas should be planned for use during these periods.
Fragments or Stones	The main problem with these soils is difficulty in mechanical excavation of pit. Implements suited to working in rocky soil should be used. Soils with high percentages of fragments and stones are not suitable.
Perched Water Table	Do not use during wet seasons unless drainage is provided.
Apparent Water Table	Bottom of pit must be at least 2 feet above apparent water table (see soil survey for apparent water table depth). If additional depth of pit is needed it must be created by "mounding" of side walls above original ground elevation. Cover over the animals must consist of a minimum of one foot of soil on intermediate layers and two feet of compacted soil on top.
Seepage	Clay or synthetic liner can be used to prevent or control seepage.
Texture	Sandy—Cut-banks cave: Extra care will be needed during construction to prevent safety problems. Pit top dimensions may have to be enlarged and side slopes flattened (over-sizing the hole) in order to physically construct the pit. Flattened side slopes and vegetation establishment can be used to address potential erosion of burial pit covers. Clayey—Sticky when wet: Select alternate burial sites in case of wet conditions. If no other sites are available, be aware that digging a pit when wet conditions prevail is going to be more difficult, time consuming, and expensive, than if conditions were drier.

Procedures for Estimating Burial Pit Volume

Document design assumptions for the worst case scenario (maximum number of animals to be buried and maximum expected average weight of animals). Determine total weight of mortality for disposal in pounds (lb.). Divide total weight of mortality by 62.4 lb./cu. ft. The result is the approximate volume of mortality to be buried in cu. ft. Additional pit volume will be required to account for voids in placed

mortality. In addition, the burial pit should be excavated large enough for both mortality and (where planned) alternate layers of approximately equal thickness of soil (see Appendix A). The volume of pit excavation required to provide for burial of the mortality would be between 2 and 4 times the mortality volume. A spreadsheet developed for computing volumes of sediment removed from ponds is available on request for aid in determining planned trench dimensions for anticipated volumes of animals and fill.

Evaluate the site to determine areas with suitable soils. Determine practical and safe pit width, depth, and side slopes for the equipment available. Select a cross-sectional geometry for the pit. Determine the pit length with assumed cross sectional area that would be required to provide the total required excavated volume in cu.ft.

An area of suitable soil must be available that is larger than the total planned burial pit surface area before burial is a viable option. Depending on shape of the area containing suitable soils this might require multiple pits. If adequate suitable soils are not available, an alternative or secondary method of catastrophic mortality disposal must be planned.

Actual application would involve a similar analysis. However, when determining pit size, the actual number and weight of animals for burial should be considered rather than worst case. The rest of the procedure would be identical. When a portion of the land area devoted to or planned for catastrophic mortality is utilized, the area should be surveyed (not necessarily a legal survey) and recorded in the producer's plan, or the area should be staked with reference points and survey notes included in the producers plan. This provides the producer with information needed to manage the burial area. With this information it should be possible to avoid a previously utilized area should another catastrophic event occur.

Sample calculations are included in Appendix B.

Additional Burial Considerations and Recommendations

Burial of dead animals (all animal types) requires a backhoe, scraper, bulldozer or other equipment capable of excavation and/or trenching for construction of a burial pit. Burial pits should be dug to an appropriate depth for the specific soil and geologic conditions. Burial pits should be a minimum of 4 ft wide and 3 ft deep with a length adequate to accommodate mortality. Pit bottoms should be relatively level. If excavation depths greater than 6 ft below existing natural ground are anticipated, test pits and/or augured soil samples should be examined to a depth two ft below lowest planned excavation. Site limitations may dictate the use of multiple pits. If more than one pit is required, they should be separated by 3 ft. of undisturbed or compacted soil.

Excavation and trench safety should be taken into account when selecting planned geometry of a burial pit. If there is any chance of the producer or his employees getting into a trench to place or rearrange animals, shovel dirt, or anything else, trench safety must be considered. Trenches or pits 5 ft or deeper are covered by OSHA trench safety criteria and shallower excavations can be dangerous. People constructing or working in or around these burial pits should be aware of trench cave-in hazards (See referenced web sites at the end of this document). Appropriate OSHA safety measures shall be used during excavation and material placement. Excavations greater than 5 feet deep should have a minimum side slopes of 1.5 (horizontal) to 1 (vertical).

For small animals (poultry, nursery pigs, etc.) place carcasses in a layer no thicker than one foot and cover each layer with at least one foot of soil. Carcasses of large animals (hogs, cattle, etc.) should be placed in one layer and covered with a minimum of two feet of soil. For deep soils (where bedrock is not a concern), carcasses and soil can be placed in multiple layers up to a total depth of eight feet.

The burial site should be mounded with a covering of at least two feet of soil, and surface water should be diverted away from the mound. Specifying earth fill compaction is not recommended. Compaction will be very difficult to achieve and could have a negative impact on the natural decay process. As animals

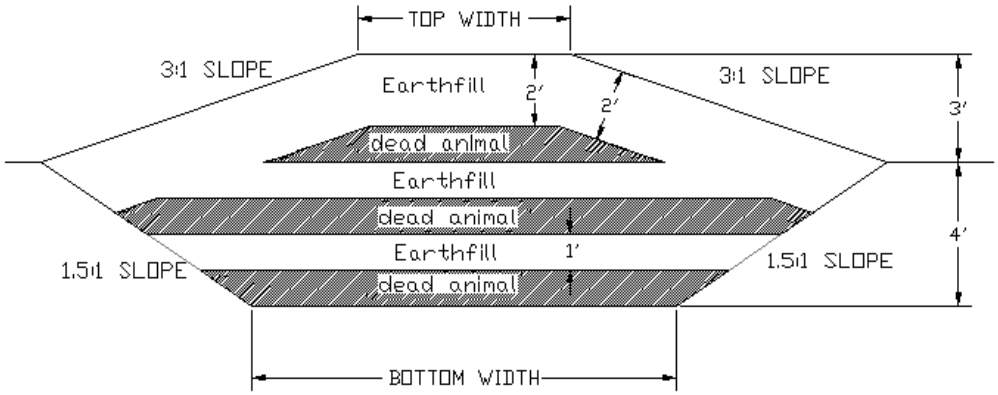
begin to decay, it may be necessary to place additional soil material in areas that subside. If a potential exists for varmints such as coyotes, dogs, opossums, etc., to dig into the burial site, either use more than the two feet of cover material (recommended) or use an appropriate temporary fence to exclude these animal types.

The burial site should be vegetated as soon as practical to prevent erosion of the soil cover.

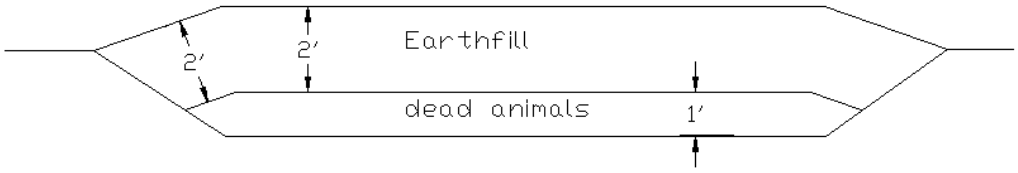
Personnel planning mortality management must follow current state policy concerning utilities found in the National Engineering Manual, Part 503(Safety), Subpart A (Engineering Activities Affecting Utilities). The State of Texas has initiated a One Call System to help excavators locate pipelines and utilities. The One Call Board of Texas (1-800-545-6005) or other State approved notification center, should be called before excavation to ascertain the existence of underground utilities in the general work area.

APPENDIX A

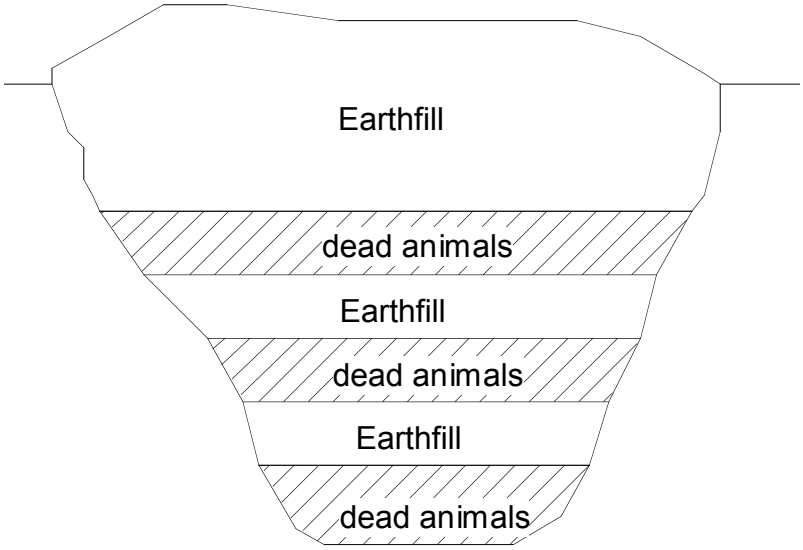
A Few Possible Cross Sections For Burial Pits



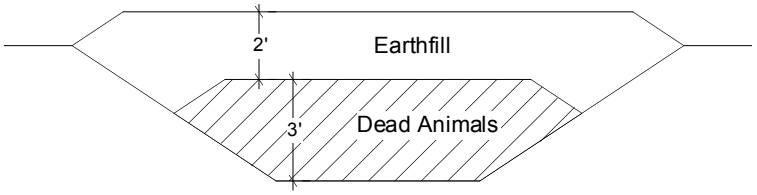
Typical for greater depth and wider pit with variable length.



Typical for shallower depth and wider pit with variable length.



Typical for backhoe trench with 4-6 ft depth, at least 3 ft width, and variable length.



Typical for deeper depth for larger animals.

Appendix B

Sample Calculations

Symbols:		Basic Assumptions:
W_b = bottom width	A_{xs} = cross-sectional area	Bulk density of chickens = 62.4 lb/cu ft
W_t = top width	Z_s:1 = side slope	Average weight of chickens at die-off = 3 lb
L_b = bottom length	Z_e:1= end slope	$V_e = 3 \times V_m$
L_t = top length	V_e = excavation volume	Farm contains 5 houses with 20,000
A_b = bottom area	V_m = mortality volume	birds/house or 100,000 birds total
A_t = top area		

Case 1: 0.3% of Chickens Die.

Number of mortality = 100,000 x 0.003 = 300 birds
V_m = 300 x 3 lb/bird x (1cu ft/62.4 lb) = 14.4 cu ft
V_e = 3 x 14.4 = 43.2 cu ft (1.6 cu yd)

Assume
W_b = 4 ft
D = 3 ft
Vertical Side and End Slopes (backhoe construction, depth < 3.5 ft): $Z_s = Z_e = 0$
Then L_b = 43.2 / (4 x 3) = 3.6 ft.(round to 4 ft)

The pit size then would be 4 ft x 4 ft x 3 ft. The Estimated Actual Constructed Volume from the Burial Pit Volume Calculator is 48 $ft.^3$ (1.8 yd^3)

Case 2: 20% of Chickens Die.

Number of mortality = 100,000 x 0.2 = 20,000 birds
V_m = 20,000 x 3 lb/bird x (1cu ft/62.4 lb) = 962 cu ft
$V_e = 3 \times 962 = 2886\ ft^3$ (107 yd^3)

Assume
W_b = 6 ft
D = 5
Z_s = 2
Z_e = 4
$A_{xs} = Z_sD^2 + W_bD = 80\ ft^2$
Then L_b = 2886 / 80 = 36 ft
$W_t = W_b + 2Z_sD = 6 + (2 \times 2 \times 5) = 26$ ft
$L_t = L_b + 2Z_eD = 36 + (2 \times 4 \times 5) = 76$ ft
A_t = Wt x Lt = 26 x 76 = 1976 sq. ft.

The pit size would be 6 ft. bottom width, 36 ft. bottom length, 26 ft. top width, 76 ft top length, 5 ft. depth, 2:1 side slopes, and 4:1 end slopes. The Estimated Actual Constructed Volume from the Burial Pit Volume Calculator is 4813 $ft.^3$ (178 yd^3). If desired, the Burial Pit Volume Calculator can be used through trial and error to find a volume closer to the requirement. (Other dimensions same as given with 12 ft bottom length, and 52 ft top length would yield 2893 $ft.^3$ (107 yd^3).

Case 3: 50% of Chickens Die.

Number of mortality = 100,000 x 0.5 = 50,000 birds
V_m = 50,000 x 3 lb/bird x (1cu ft/62.4 lb) = 2404 cu ft
V_e = 3 x 2404 = 7212 cu ft (267 cu yd)

Assume
W_b = 10 ft
D= 6 ft
Z_s = : 1.5
Z_e = : 4
$A_{xs} = Z_sD^2 + W_bD = 114$ ft^2
Then L_b = 7212 / 114 = 63 ft
$W_t = W_b + 2Z_sD$ = 10 + (2 x 1.5 x 6) = 28 ft
$L_t = L_b + 2Z_eD$ = 63 + (2 x 4 x 6) = 111 ft
A_t = Wt x Lt = 28 x 111 = 3108 sq. ft.

The pit size would be 10 ft. bottom width, 63 ft. bottom length, 28 ft. top width, 111 ft top length, 6 ft. depth, 1.5:1 side slopes and 4:1 end slopes. The Estimated Actual Constructed Volume from the Burial Pit Volume Calculator is 10350 ft.$^{3.}$ If desired the Burial Pit Volume Calculator can be used to trial and error to find a volume closer to that required. (Other dimensions same as given with a 36 ft bottom length, and 84 ft top length would yield a volume of 7272 ft.^{3} (269 yd^3).

Appendix C

Statutes, Rules, and References

Disposal of Diseased Animal Carcasses

Animals that die from one of the following diseases have separate disposal requirements (Texas Agriculture Code §§161.004, 161.041):

tuberculosis	anthrax	glanders
infectious abortion	hemorrhagic septicemia	hog cholera
Malta fever	foot-and-mouth disease	rabies in animals other than canines
bacillary white diarrhea among fowl	equine infectious anemia	other diseases recognized as communicable by the veterinary profession

These carcasses must be disposed of within 24 hours by

1. digging a five foot deep grave and covering the carcass with lime and filling with dirt, or
2. setting fire to the carcass and burning until it is thoroughly consumed.

Specific Rules and Regulations Dealing with Poultry Mortality

Mortality is a normal part of animal feeding operations. Normal poultry mortality should be addressed with composters, incinerators, rendering or other approved carcass disposal methods (§335.25, Handling, Storing, Processing, Transporting, and disposal of Poultry Carcasses, of Title 30, Texas Administrative Code, Chapter 335, Industrial Solid Waste and Municipal Hazardous Waste). The local NRCS or conservation district office should be contacted for assistance in dealing with normal mortality. Note: burial of routine poultry mortality is not allowed by state law (Texas Water Code §26.303 Handling and Disposal of Poultry Carcasses).

State legislators passed SB 1910 during the 75th Texas Legislature (1997) which added "Subchapter H. Poultry Operations" to the Texas Water Code (§26.301 – 26.303). It applies to any facility where chickens or ducks are raised or kept for profit on any premises in the State, including commercial hatcheries for producing chicks or ducklings. TNRCC Rules (Texas Administrative Code (TAC), §335.25 Handling, Storing, Processing, Transporting, and Disposing of Poultry Carcasses) were developed to provide regulations for meeting requirements of SB 1910. These regulations are intended to ensure poultry facilities have an adequate means to handle and dispose of poultry carcasses. These regulations prohibit on-site burial of poultry carcasses, except in the event of a major die-off, which is defined as a mortality rate of 0.3% or more per day of the total poultry inventory. Only the die-off that exceeds the capacity of the normal means of mortality management may be buried.

SB 1339, 77th Texas Legislature, 2001, amended §26.302 of the Texas Water Code to require owners or operators of poultry facilities to implement and maintain certified water quality management plans from the State Soil and Water Conservation Board.

Additional References

NRCS TX Conservation Practice Standards: Code 316 - Animal Mortality Management

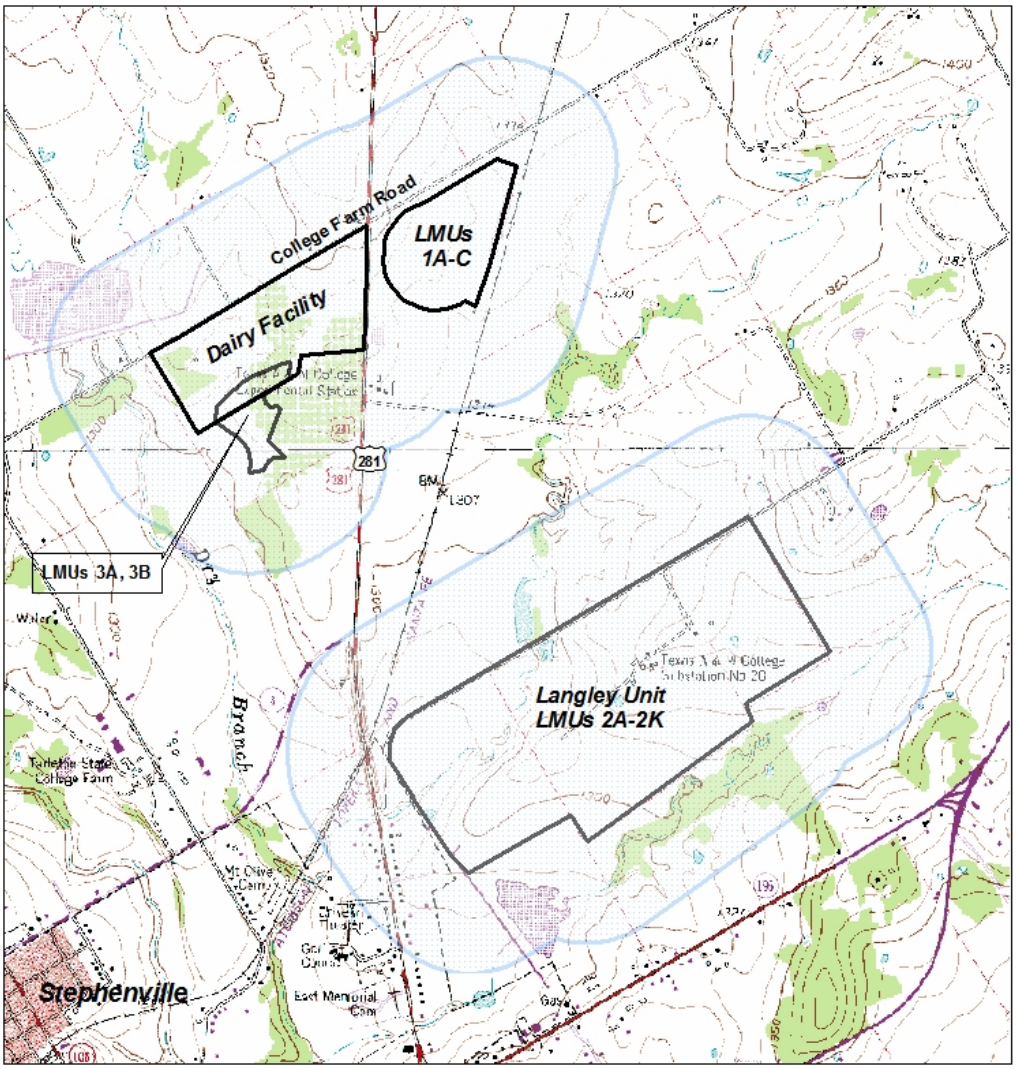
OSHA Construction rules: http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926.html

OSHA Excavation Rules: http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_P.html

State laws and regulations specific to poultry: Title 30, Texas Administrative Code, Chapter 335, Industrial Solid Waste and Municipal Hazardous Waste, §335.25, Handling, Storing, Processing, Transporting, and disposal of Poultry Carcasses: http://lamb.sos.state.tx.us/tac/index.html

Title 2, Texas Water Code, Chapter 26, Subchapter H, Poultry Operations: http://www.capitol.state.tx.us/statutes/statutes.html

Texas Bills: SB 1339, HB 3355 (77th Legislature, 2001): http://www.lrl.state.tx.us/isaf/lrlhome.cfm



Legend

0.25 Mile Air Quality Buffer Zone

USGS 7.5' Quadrangles
Knob Hill and Stepheville, Texas
Contour Interval = 10 ft.

N
W E
S

0 500 1,000 2,000 3,000 4,000 Feet

Southwest Regional Dairy Center Tarleton State University	
Project No. 02-014300.07	July 2010

Figure 8.5a
Air Quality Map

Cirrus Associates, LLC
1771 International Pkwy, Ste 107
Richardson, Texas 75081

9.1. Closure of Facility

The producer is responsible for the closure of the facility and waste treatment lagoon in the event that the operation ceases. Prior to closure of the waste treatment lagoon and removal of all potential pollutants, the producer shall continue to operate the waste treatment lagoon to protect the environment. If the facility is sold, a conveyance of responsibility should be signed by the new owner.

Requirements for closure can be found in "Closure of Waste Storages – Conservation Practice Standard Code No. 360".

9.2 Utilities Information

Information regarding notification of underground utilities prior to construction, as well as permit information for the boring under US Highway 281 is provided in this section.

9.3 CAFO Individual Permit Application

Referenced information from the Individual Permit Application is provided in hard copy in Section 9.3. This information includes the Recharge Features Certification, Soils Tests, Manure and Wastewater Handling and Storage calculations, and the 100-Year Floodplain Maps. This information is also available electronically on the included CD, as is the entire CAFO Individual Permit Application.

9.4 Pollution Prevention Plan

Referenced information from the Pollution Prevention Plan is provided in hard copy in Section 9.4. This information includes Retention Control Structure Management plans and the required Public Notice. This information is also available electronically on the included CD, as is the entire Pollution Prevention Plan.