BRUNS FEEDLOT, LLC

NDEQID# - 72328

NUTRIENT MANAGEMENT PLAN

NUTRIENT ADVISORS

449 E. Deere Street • West Point, NE 68788 • Phone: 402.372.2236 • Fax: 402.372.1942
www.nutrientadvisors.com

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
110032594798	NE0135399	Bruns Feedlot, LLC	

Form 1 NPDES

EPA

U.S. Environmental Protection Agency
Application for NPDES Permit to Discharge Wastewater

GENERAL INFORMATION

SECTION 1. ACTIVITIES REQUIRING AN NPDES PERMIT (40 CFR 122.21(f) and (f)(1))

Activities Requiring an NPDES Permit

1.1 Applicants *Not Required* to Submit Form 1

1.1.1	Is the facility a new or existing **publicly owned treatment works?** If yes, STOP. Do NOT complete Form 1. Complete Form 2A. ☑ No	1.1.2	Is the facility a new or existing **treatment works treating domestic sewage?** If yes, STOP. Do NOT complete Form 1. Complete Form 2S. ☑ No

1.2 Applicants *Required* to Submit Form 1

1.2.1	Is the facility a **concentrated animal feeding operation** or a **concentrated aquatic animal production facility?** ☑ Yes → Complete Form 1 ***and*** Form 2B. ☐ No	1.2.2	Is the facility an **existing** manufacturing, commercial, mining, or silvicultural **facility** that is **currently discharging process wastewater?** ☐ Yes → Complete Form 1 ***and*** Form 2C. ☑ No
1.2.3	Is the facility a **new** manufacturing, commercial, mining, or silvicultural **facility** that has **not yet commenced to discharge?** ☐ Yes → Complete Form 1 ***and*** Form 2D. ☑ No	1.2.4	Is the facility a **new or existing** manufacturing, commercial, mining, or silvicultural **facility** that **discharges only nonprocess wastewater?** ☐ Yes → Complete Form 1 ***and*** Form 2E. ☑ No
1.2.5	Is the facility a **new or existing facility** whose discharge is composed entirely of **stormwater associated with industrial activity** or whose discharge is composed of **both stormwater and non-stormwater?** ☐ Yes → Complete Form 1 ***and*** Form 2F unless exempted by 40 CFR 122.26(b)(14)(x) or (b)(15). ☑ No		

SECTION 2. NAME, MAILING ADDRESS, AND LOCATION (40 CFR 122.21(f)(2))

Name, Mailing Address, and Location

2.1 Facility Name

Bruns Feedlot, LLC

2.2 EPA Identification Number

110032594798

2.3 Facility Contact

Name (first and last)	Title	Phone number
Joel Bruns	Member	(402) 922-0112

Email address
brunsfdltlm@dishmail.net

2.4 Facility Mailing Address

Street or P.O. box
1172 I Avenue

City or town	State	ZIP code
Pender	NE	68047

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
110032594798	NE0135399	Bruns Feedlot, LLC	

Name, Mailing Address, and Location Continued

2.5 **Facility Location**

Street, route number, or other specific identifier
1172 I Avenue

County name	County code (if known)	
Thurston		

City or town	State	ZIP code
Pender	NE	68047

SECTION 3. SIC AND NAICS CODES (40 CFR 122.21(f)(3))

SIC and NAICS Codes

3.1

SIC Code(s)	Description (optional)
0211	Beef Cattle Feedlot

3.2

NAICS Code(s)	Description (optional)
NA	

SECTION 4. OPERATOR INFORMATION (40 CFR 122.21(f)(4))

Operator Information

4.1 **Name of Operator**

Bruns Feedlot, LLC

4.2 Is the name you listed in Item 4.1 also the owner?

☐ Yes ☑ No

4.3 **Operator Status**

☐ Public—federal ☐ Public—state ☐ Other public (specify)_____
☑ Private ☐ Other (specify) _____

4.4 **Phone Number of Operator**

(402) 922-0112

Operator Information Continued

4.5 **Operator Address**

Street or P.O. Box
1172 I Avenue

City or town	State	ZIP code
Pender	NE	68047

Email address of operator
brunsfdltlm@dishmail.net

SECTION 5. INDIAN LAND (40 CFR 122.21(f)(5))

Indian Land

5.1 Is the facility located on Indian Land?

☑ Yes ☐ No

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SECTION 6. EXISTING ENVIRONMENTAL PERMITS (40 CFR 122.21(f)(6))

Existing Environmental Permits

6.1 **Existing Environmental Permits** (check all that apply and print or type the corresponding permit number for each)

☑ NPDES (discharges to surface water) NE0135399	☐ RCRA (hazardous wastes)	☐ UIC (underground injection of fluids)
☐ PSD (air emissions)	☐ Nonattainment program (CAA)	☐ NESHAPs (CAA)
☐ Ocean dumping (MPRSA)	☐ Dredge or fill (CWA Section 404)	☐ Other (specify)

SECTION 7. MAP (40 CFR 122.21(f)(7))

Map

7.1 Have you attached a topographic map containing all required information to this application? (See instructions for specific requirements.)

☐ Yes ☐ No ☑ CAFO—Not Applicable (See requirements in Form 2B.)

SECTION 8. NATURE OF BUSINESS (40 CFR 122.21(f)(8))

Nature of Business

8.1 Describe the nature of your business.

Bruns Feedlot, LLC is an open lot beef cattle feeding operation.

SECTION 9. COOLING WATER INTAKE STRUCTURES (40 CFR 122.21(f)(9))

Cooling Water Intake Structures

9.1 Does your facility use cooling water?

☐ Yes ☑ No → SKIP to Item 10.1.

9.2 Identify the source of cooling water. (Note that facilities that use a cooling water intake structure as described at 40 CFR 125, Subparts I and J may have additional application requirements at 40 CFR 122.21(r). Consult with your NPDES permitting authority to determine what specific information needs to be submitted and when.)

SECTION 10. VARIANCE REQUESTS (40 CFR 122.21(f)(10))

Variance Requests

10.1 Do you intend to request or renew one or more of the variances authorized at 40 CFR 122.21(m)? (Check all that apply. Consult with your NPDES permitting authority to determine what information needs to be submitted and when.)

☐ Fundamentally different factors (CWA Section 301(n))	☐ Water quality related effluent limitations (CWA Section 302(b)(2))
☐ Non-conventional pollutants (CWA Section 301(c) and (g))	☐ Thermal discharges (CWA Section 316(a))
☑ Not applicable	

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
110032594798	NE0135399	Bruns Feedlot, LLC	

SECTION 11. CHECKLIST AND CERTIFICATION STATEMENT (40 CFR 122.22(a) and (d))

Checklist and Certification Statement

11.1 In Column 1 below, mark the sections of Form 1 that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing to alert the permitting authority. Note that not all applicants are required to provide attachments.

Column 1	Column 2
☑ Section 1: Activities Requiring an NPDES Permit	☐ w/ attachments
☑ Section 2: Name, Mailing Address, and Location	☐ w/ attachments
☑ Section 3: SIC Codes	☐ w/ attachments
☑ Section 4: Operator Information	☐ w/ attachments
☑ Section 5: Indian Land	☐ w/ attachments
☑ Section 6: Existing Environmental Permits	☐ w/ attachments
☐ Section 7: Map	☐ w/ topographic map ☐ w/ additional attachments
☑ Section 8: Nature of Business	☐ w/ attachments
☐ Section 9: Cooling Water Intake Structures	☐ w/ attachments
☐ Section 10: Variance Requests	☐ w/ attachments
☑ Section 11: Checklist and Certification Statement	☐ w/ attachments

11.2 **Certification Statement**

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

Name (print or type first and last name)	Official title
Joel Bruns	Owner
Signature	**Date signed**
Joel M Bruns member	3-6-2020

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
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Form 2B NPDES

U.S. Environmental Protection Agency
Application for NPDES Permit to Discharge Wastewater

CONCENTRATED ANIMAL FEEDING OPERATIONS and CONCENTRATED AQUATIC ANIMAL PRODUCTION FACILITIES

SECTION 1. GENERAL INFORMATION (40 CFR 122.21(l)(1))

General Information

1.1 Indicate the facility/business type. (Check only one response.)

☑ CAFO → Complete Sections 1 through 6 and Section 8.

☐ CAAP → Complete Sections 1, 7, and 8.

1.2 Indicate the operational status of the facility. (Check one.)

☑ Existing facility ☐ Proposed facility

SECTION 2. CAFO OWNER/OPERATOR CONTACT INFORMATION (40 CFR 122.21(f)(2) and (4) and 122.21(i)(1)(i))

CAFO Owner/Operator Contact Information

2.1 **Owner/Operator Contact**

Name (first and last)	Title
Joel Bruns	Member
Phone number	**Email address**
(402) 922-0112	brunsfdltlm@dishmail.net

2.2 **Owner/Operator Mailing Address**

Street or P.O. box		
1172 I Avenue		
City or town	**State**	**Zip code**
Pender	NE	68047

SECTION 3. CAFO LOCATION AND CONTACT INFORMATION (40 CFR 122.21(i)(1)(ii and iii))

CAFO Location and Contact Information

3.1 **CAFO Location and Contact**

Name		
Bruns Feedlot, LLC		
Address (street, route number, or other specific identifier)		**County**
1172 I Avenue		Thurston
City or town	**State**	**Zip code**
Pender	NE	68047
Facility contact name	**Phone number**	**Email address**
Joel Bruns	(402) 922-0112	brunsfdltlm@dishmail.net

3.2 **Latitude/Longitude of Entrance to Production Area** (see instructions)

Latitude	Longitude
42° 9′ 46.61″ N	-96° 48′ 30.79″ E

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CAFO Location and Contact Information Continued

3.3 **Integrator Name and Address**

Name		
NA		
Street address		
NA		
City or town	**State**	**Zip code**
NA	NA	

SECTION 4. CAFO TOPOGRAPHIC MAP (40 CFR 122.21(i)(1)(iv))

CAFO Topographic Map

4.1 Have you attached a topographic map containing all required information to this application? (See instructions for specific requirements.)

☑ Yes ➔ SKIP to Section 5. ☐ No

SECTION 5. CAFO CHARACTERISTICS (40 CFR 122.21(i)(1)(v ix))

CAFO Characteristics

5.1 Provide information on the type and number of animals in the table below.

Animal Type	Number in Open Confinement	Number Housed Under Roof	Animal Type	Number in Open Confinement	Number Housed Under Roof
☐ Mature dairy cows			☐ Sheep or lambs		
☐ Dairy heifers			☐ Chickens (broilers)		
☐ Veal calves			☐ Chickens (layers)		
☑ Cattle (not dairy or veal calves)	4,000		☐ Ducks		
☐ Swine (55 lbs. or more)			☐ Other (specify)		
☐ Swine (under 55 lbs.)			☐ Other (specify)		
☐ Horses			☐ Other (specify)		
☐ Turkeys			**Total Animals**	4,000	

5.2 Indicate the type of containment and storage, total number of days, and total capacity for manure, litter, and process wastewater storage in the table below.

Type of Containment and Storage	Total Number of Days	Total Capacity (specify gallons or tons)	Type of Containment and Storage	Total Number of Days	Total Capacity (specify gallons or tons)
☐ Anaerobic lagoon			☐ Belowground storage tanks		
☐ Evaporation			☐ Roofed storage shed		
☐ Aboveground storage tanks			☐ Concrete pad		
☑ Storage pond	180	13,716,584 gallons	☐ Impervious soil pad		
☐ Underfloor pit			☐ Other (specify)		

5.3 Indicate the total number of acres drained and collected in the containment and storage structure(s) reported under Item 5.2.

62.4 acres

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
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CAFO Characteristics Continued

Manure, Litter, and/or Process Wastewater Production and Use

5.4 How many tons of manure or litter and gallons of process wastewater are generated annually at the CAFO?

Manure	5,710 tons
Litter	NA tons
Process wastewater	13,858,750 gallons

5.5 Is manure, litter, and/or process wastewater generated at the CAFO land applied?

☑ Yes ☐ No ➔ SKIP to Item 5.8.

5.6 How many acres of land under the control of the applicant are available for applying the CAFO's manure, litter, or process wastewater?

557.76 acres

5.7 Check all land application best management practices that are being implemented.

☐ Buffers ☐ Infiltration field
☑ Setbacks ☐ Grass filter
☑ Conservation tillage ☐ Terrace
☐ Constructed wetlands ☐ Other (specify)

5.8 Is manure, litter, and/or process wastewater transferred to any other persons?

☑ Yes ☐ No ➔ SKIP to Item 5.10.

5.9 How many tons of manure or litter and gallons of process wastewater, produced by the CAFO, are transferred annually to other people?

Manure	1,590 tons
Litter	NA tons
Process wastewater	NA gallons

5.10 Describe alternative use(s) of manure, litter, or process wastewater, if any.

NA

SECTION 6. CAFO NUTRIENT MANAGEMENT PLANS (40 CFR 122.21(i)(1)(x))

CAFO Nutrient Management Plans

6.1 Has the applicant attached a nutrient management plan that satisfies the requirements at 40 CFR 122.42(e) and, if applicable, the requirements at 40 CFR 412.4(c)? **Note:** A permit application is not complete until a nutrient management plan is submitted to the NPDES permitting authority.

☑ Yes ➔ SKIP to Item 6.3. ☐ No

6.2 Explain why a nutrient management plan is not attached to the application.

6.3 Is a nutrient management plan being implemented at the CAFO?

☑ Yes ☐ No

6.4 What was the date of the last review or revision of the nutrient management plan? Date 04/23/2018

SECTION 7. CAAP FACILITY CHARACTERISTICS (40 CFR 122.21(i)(2))

CAAP Facility Characteristics

7.1 Is the CAAP facility located on land?

☐ Yes ☐ No ➔ SKIP to Item 7.3.

7.2 Provide the maximum daily and maximum average monthly discharge at CAAP by outfall.

Outfall Number	Discharge	
	Maximum Daily Discharge	Maximum Average Monthly Discharge
	gpd	gpd
	gpd	gpd
	gpd	gpd

7.3 Indicate the type and number of discharge structures at the CAAP. Provide a brief description of each structure. Also note the name of the receiving water and the source of the intake water for each structure.

Structure Type	Number of Each	Description	Receiving Water Name	Source of Intake Water
Ponds				
Raceways				
Net pens				Not applicable
Submerged cages				Not applicable
Similar structures (specify) _____				

7.4 List the cold-water and/or warm-water aquatic species raised/produced in the table below. For each species listed, indicate the total yearly and maximum harvestable weight (in pounds).

Cold Water Species			Warm Water Species		
Species	Harvestable Weight		Species	Harvestable Weight	
	Total Yearly	Maximum		Total Yearly	Maximum
	lbs.	lbs.		lbs.	lbs.
	lbs.	lbs.		lbs.	lbs.
	lbs.	lbs.		lbs.	lbs.
	lbs.	lbs.		lbs.	lbs.

7.5 Indicate the calendar month of maximum feeding and the total mass of food fed (in pounds) during that month.

Month of Maximum Feeding	Total Mass of Food Fed
	lbs.

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SECTION 8. CHECKLIST AND CERTIFICATION STATEMENT (40 CFR 122.22(a) and (d))

Checklist and Certification Statement

8.1 In Column 1, below, mark the sections of Form 2B that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing to alert the permitting authority. Note that not all applicants are required to provide attachments.

Column 1	Column 2
☑ Section 1: General Information	☐ w/ attachments
☑ Section 2: CAFO Owner/Operator Contact Information	☐ w/ attachments
☑ Section 3: CAFO Location and Contact Information	☐ w/ attachments
☑ Section 4: CAFO Topographic Map	☑ w/ topographic map ☐ w/ additional attachments
☑ Section 5: CAFO Characteristics	☐ w/ attachments
☑ Section 6: CAFO Nutrient Management Plans	☑ w/ nutrient management plan ☐ w/ attachments
☐ Section 7: CAAP Facility Characteristics	☐ w/ attachments
☑ Section 8: Checklist and Certification Statement	☐ w/ attachments

8.2 **Certification Statement**

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

Name (print or type first and last name)	Official title
Joel Bruns	Owner
Signature	**Date signed**
Joel A Bruns member	3-6-2020

Bruns Feedlot, LLC

Introduction

- Bruns Feedlot, LLC is located approximately 5 miles west and 3 miles north of Pender, NE in Thurston County. It is an existing open-lot beef cattle operation with a maximum one-time capacity of 4,000 head.
- Bruns Feedlot, LLC is submitting this Nutrient Management Plan for the renewal of their NPDES permit. They are not expanding at this time.

Bruns Feedlot, LLC

Table of Contents

BRUNS FEEDLOT, LLC

Tue Mar 17 08:22:40 2020

SOS Account Number
10041316
Status
Active

Principal Office Address
1172 I AVE
PENDER, NE 68047
Registered Agent and Office Address
LEON BRUNS
1172 I AVE
PENDER, NE 68047
Designated Office Address
1172 I AVE
PENDER, NE 68047

Nature of Business
Not Available
Entity Type
Domestic LLC
Qualifying State: NE
Date Filed
Jan 07 2003

Filed Documents

To purchase copies of filed documents check the box to the left of the document code. If no checkbox appears, contact the Secretary of State's office to request the document(s).

	Document	Date Filed	Price
☐	Articles Limited	Jan 07 2003	$1.80 = 4 page(s) @ $0.45 per page
☐	Proof of Publication	Jul 16 2003	$0.45 = 1 page(s) @ $0.45 per page
☐	Biennial Report	Jan 19 2007	$0.45 = 1 page(s) @ $0.45 per page
☐	Biennial Report	Jan 13 2009	$0.45 = 1 page(s) @ $0.45 per page
☐	Change of Agent or Office	Feb 09 2009	$0.45 = 1 page(s) @ $0.45 per page
☐	Biennial Report	Jan 24 2011	$0.45 = 1 page(s) @ $0.45 per page
☐	Biennial Report	Jan 24 2013	$0.45 = 1 page(s) @ $0.45 per page
☐	Biennial Report	Jan 28 2015	$0.45 = 1 page(s) @ $0.45 per page

Section 1

Narrative

Bruns Feedlot, LLC

Nutrient Management Plan

001 Operation & Maintenance Plan

001.01 Facility Description & Operation

Bruns Feedlot, LLC is an open-lot beef cattle operation covering approximately 62 acres in Thurston County. The facility has a maximum one-time capacity of 4,000 head of beef cattle weighing an average of 850 pounds. The manure will primarily be applied to cropland by solid manure spreaders and through a center pivot system. Manure generated in pens or sediment cleaned from the basins and holding pond may be stockpiled on application sites throughout the growing season and applied after crop removal. Bruns Feedlot, LLC has 557.7 acres available for manure application. Bruns Feedlot, LLC may also transfer manure to other recipients in any given year.

001.02 Manure Estimates

It is estimated that the operation will produce approximately 4,709 tons of solid cattle manure and 11.3 million gallons of effluent water annually (based on CAFO Annual Reports, Section 6). These are estimates and will vary depending on annual stocking rates and weather conditions.

Actual manure analysis are used and summarized for the purpose of nutrient management planning for Bruns Feedlot, LLC. The manure nutrient analysis reports and the summary are found in Section 6.

001.03 Best Management Practices

Bruns Feedlot, LLC will be operated and maintained to prevent water pollution and to protect the environment. Best management practices will be implemented to prevent or reduce the discharge of pollutants to waters of the state and control odor where appropriate. Manure contained at Bruns Feedlot, LLC may be land applied onto application sites at a rate that prevents field runoff.

001.03A Adequate Storage

Any time the waste storage volume in the livestock waste control facility exceeds the "Must Pump Level," manure will be land applied on all available days until adequate storage is restored. Care will be taken to monitor field conditions so that effluent water is not applied to saturated soils to prevent field runoff. Each fall, the LWCF will be pumped down to the "Pre Winter Pumpdown Level" to ensure enough capacity to store production throughout the winter months. The sludge level will be inspected at the time that the winter pump-down level is achieved. Liquid levels are inspected weekly and after precipitation events to ensure adequate storage.

001.03B Waste Handling Equipment

Appropriate waste handling equipment for cleaning and emptying the facilities will be available as needed to operate and maintain the facility to meet the capacity and storage requirements. Bruns Feedlot, LLC may apply manure fertilizer primarily with a 12 ton pull-type solid spreader. Other equipment is available for use if necessary. Bruns Feedlot, LLC owns their own equipment and may also contract additional custom services for the application of manure. Bruns Feedlot, LLC may apply effluent water as fertilizer using a center pivot system (see Effluent Distribution Plan, Section 8). Adequate application area will be available to meet land application needs each year.

001.03C Waste Removal and Land Application

All livestock wastes removed from the LWCF will be land applied in a manner which will not contribute to water pollution. Stockpiles of manure will be managed as necessary by strategic placement, berms and/or other means to prevent discharges until the stockpile is utilized for application. The owner or authorized representative shall remain responsible for manure applied from the operation to land under their control.

The protocols for land application of manure are based on: 1) preventing discharges to the waters of the state; 2) not exceeding the capacity of the soil; and 3) not exceeding the expected crop nutrient uptake between applications. Site specific nutrient management practices will be followed to ensure appropriate agricultural utilization of the nutrients in the manure.

Some livestock wastes removed from the facility may be land applied on acres that are not in the Nutrient Management Plan and beyond the control of Bruns Feedlot, LLC. If Bruns Feedlot, LLC is hired for custom application on these acres, a Manure Agreement will be signed (Section 6). Bruns Feedlot, LLC will supply purchasers with a manure fertilizer product and the purchaser will control the timing of application and the application rate.

For manure transferred to other recipients, but not applied by Bruns Feedlot, LLC, the manure nutrient analysis results, the date of the analysis, recipient name and address, and approximate amount transferred will be held as a record. The manure nutrient analysis will be supplied to the recipient.

001.03D Sludge Accumulation Levels

Sludge will be removed when sludge levels are at or exceed the "Maximum Sludge" (Pre Winter Pumpdown Level) identified in the facility design. When sludge, sediment, or other solid or liquid accumulations are removed from the LWCF, the equipment used for the removal will not be allowed to compromise the structure of the facility. Sludge or solids will not be allowed to accumulate such that it cannot be utilized at agronomic rates.

001.03E Emergency Response Plan

In the event of an accident or emergency, such as a spill, release or discharge of animal waste, the owner or authorized representative will take actions as needed to stop the cause, contain and control any release, and cleanup any affected areas. Any discharge of waste will be reported to NDEQ within 24 hours of the event. A written report will be submitted to NDEQ within five days of the event.

 JS 2.24

Joel Bruns can be contacted at 402-385-3650 and/or Thurston County dispatch at 402-385-3018.

001.03F LWCF Maintenance

Bruns Feedlot, LLC will be maintained in proper operating condition. Weed growth will be routinely controlled so that it does not prevent or limit facility inspections. Animals shall not be allowed access to livestock waste control facility liners or allowed to otherwise compromise liner integrity. Animal contact with facility structures will be prevented or minimized to avoid damage to these structures. Structures subject to animal contact will be included in routine inspections. Structures will be maintained to prevent the growth of trees and shrubs, and any such growth will be routinely controlled.

001.03G Clean Water Diversions

Clean water will be diverted from waste storage facilities according to the engineering plans.

001.03H Closure Plan

The animal feeding operation shall maintain the production area for periods of time when it is not in operation. NDEQ shall be notified if and when the operation will close. If the operation is discontinued and ceases operation, the following minimum closure requirements will also be followed:

001.03H1 Removal of All Manure

Accumulated manure, including any sludge and sediment will be removed. The product will be sampled and tested and applied in an agronomic manner.

001.03I Ground Water Monitoring

Bruns Feedlot, LLC will continue ground water monitoring, as required, unless EPA and/or NDEQ has vacated the monitoring requirement. If the ground water monitoring requirement has been vacated, monitoring wells shall be properly decommissioned.

001.03J Chemical Management Plan

Refer to the Chemical Management Plan in Section 3.

001.03K Livestock Mortality Management Plan

Mortalities will not be disposed of in the LWCF. The primary method of carcass disposal is rendering and the secondary method is burial. The temporary storage areas for mortalities will be placed in a manner so that runoff does not affect waters of the state. See Livestock Mortality Management Plan in Section 3.

001.03L Odor Control Plan

In order to minimize the effect of odor, the following practices shall be utilized by the management of Bruns Feedlot, LLC based upon physical and economic conditions, opportunities and constraints.

001.03L1 Livestock Production Area

Pens will be kept as clean and dry as possible to avoid anaerobic decomposition of organic material. Manure buildup will be avoided when possible. Basins will be cleaned periodically.

001.03L2 Livestock Waste Control Facility

The holding pond will be managed properly with respect to dewatering. The holding pond is large enough to consistently hold all runoff, store production, store excess runoff and apply in a timely manner to cropland. The holding pond will be inspected and monitored as specified in the Operation and Maintenance Plan to prevent excess sludge accumulation and odor production associated with normal holding pond activities.

001.03L3 Land Application Sites

Management will be sensitive to neighbors in regard to manure application timing. Manure will be injected or incorporated into the soil if management feels it is necessary. Wind speed and direction will be monitored and application sites will be selected accordingly when possible.

Management will review this plan as needed. New technology will be reviewed and implemented where appropriate.

002 Nutrient Management Plan

002.01 Nutrient Form, Source and Removal

The source of manure is an open-lot beef feedyard. The forms of manure are solids scraped from the pens, sediment cleaned from the basins, and effluent water from the holding pond. Other sources of nutrients to be used to produce crops may include commercial fertilizers, previous legume crop residues, nutrients in the soil, nitrogen in irrigation water, and manure fertilizer obtained from other livestock feeding operations.

All of these sources will be accounted for on each application site being utilized. The expected requirement for nitrogen in the harvested crop is shown on Page 39 of the Ward Guide (Section 6), and the expected removal of other nutrients is on Page 58 of the Ward Guide (Section 6).

002.02 Land Application of Nutrients

Manure from the facility will be applied to land at agronomic rates for nitrogen utilization necessary for crop production, unless the Phosphorus Risk Assessment for a specific site requires a phosphorous-based application. Manure will primarily be applied after crops have been harvested and prior to planting the following crop. Manure may be applied to crops during growing season or between alfalfa cuttings. If weather does not allow land application, stockpiles of manure will be managed as necessary by strategic placement, berms and/or other means to prevent discharges until the stockpile is utilized for application. Effluent may be applied before, during or after the growing season.

002.03 Minimization of Nitrogen and Phosphorus Mobilization

All manure will be applied at agronomic rates to minimize movement of nitrogen into ground water. This will also minimize the movement of nitrogen and phosphorus to surface waters.

002.04 Each field used for land application will show:

002.04A Application Site Maps

The legal description and maps of planned manure application sites to be utilized by the operation are shown in Section 7. The maps also show the location and extent of any surface water or wetlands within the boundaries of the field, as well as the location and extent of any surface water within 200 ft of the field. Also indicated on the maps are any wells in the field, or within 200 ft of the field boundary. Setbacks from surface water and wells are indicated on the maps. One-hundred-foot setbacks are maintained from concentrated surface water drainage, streams, wells, and tile inlets unless a 35 ft vegetative buffer exists, then 35 ft of buffer is sufficient. Setbacks will be maintained unless a satisfactory demonstration that a setback or buffer is not necessary because implementation of alternative conservation practices will provide pollutant reductions equal to or better than reductions that would be achieved by the 100-foot setback. Site specific soil-type maps are included in Section 7.

002.04B Site Summary

The application sites are summarized in the site summary (Section 5). The summary includes the useable acres for each site as well as the land use, the

dominant soil type and slope, the legal description and landowner contact information.

002.04C Land Application Agreements

Land application agreements were obtained for areas not owned by the permittee or an owner or authorized representative of the operation. These include the landowner's name, address, legal description, number of acres, and the landowner's signature. The agreements clearly identify the area and allow for the agronomic application of manure within the parameters of this Nutrient Management Plan to the land areas identified (Section 7).

002.04D Shared Manure Application Sites

On any shared acres (application site receiving manure fertilizer from more than one animal feeding operation), both parties will cooperate to ensure that nutrient application will not exceed agronomic rates.

002.05 Sampling Methods

002.05A Soil Sampling and Analysis Guidelines

University of Nebraska (NebGuide G1740, Section 6) guidelines for soil sampling and analysis may be used. All samples will be taken and analyzed prior to manure application. The soil sample will be sent to a professional lab and analyzed for nitrogen, phosphorus, potassium and organic matter. Forty-acre composite sampling, grid sampling or zone sampling methods may be used as well.

002.05B Manure/Effluent Sampling Procedures

University of Nebraska (NebGuide G1450, Section 6) guidelines for manure sampling and analysis may be used. Manure will be sampled at least once annually and submitted to a professional laboratory for analysis of total nitrogen, organic nitrogen, ammonium nitrogen, phosphorus, moisture content, and additional nutrients.

002.05C Soil Sampling Procedures for Nitrogen

Management will have a soil sample taken on all land prior to application that is to receive manure as fertilizer. Samples will be submitted to a professional laboratory for analysis (possible soil analysis methods can be found in the Midwest Memo, Section 6). The samples will be a representative sample, with a sample representing no more than 40 acres (unless the field is less than 50 acres). A 0 to 6-10 in. sample will be taken for surface nitrogen.

Deep nitrate samples will be taken annually whenever manure will be applied unless the following exceptions apply. The depth will be determined by management but will be no less than 24 in. The following exceptions and guidelines will apply:

- Non-legume crops following annual and biennial legumes (corn following soybeans/edible beans/sweet clover); deep nitrate tests are not necessary unless there is a reason to believe nitrate levels are elevated due to previous applications of manure or nitrogen fertilizer, drought, crop failure, or any other reason there might be residual nitrogen in the soil profile;

- Non-legume crops following alfalfa or other perennial legume (corn following alfalfa); deep nitrate tests are not necessary unless there is a reason to believe they are elevated;

- Pastures/CRP—deep nitrate tests are not necessary unless there is a reason to believe they are elevated due to previous applications of manure or nitrogen fertilizer. Refer to NebGuide G78-406-A "Fertilizing Grass Pastures and Haylands";

- Deep nitrate tests are not required when the only source of N is a starter fertilizer and less than 25 lb of N will be applied; and

- When deep nitrate tests are not taken, an assumed value of at least 3 ppm for residual nitrate values will be used in the nutrient budget in addition to appropriate N-credits when following legumes.

002.05D Irrigation Water Sampling Procedures for Nitrogen

An irrigation water sample will be obtained, submitted to a professional lab, and analyzed for nitrates prior to initial land application and prior to subsequent applications that are five years or more past the previous analysis.

002.05E Sampling Procedures for Phosphorus

The initial 0 to 6-10 in. surface soil samples taken for nitrogen will also be analyzed at the professional laboratory for Phosphorus levels. This sample will represent no more than 40 acres (unless the field is less than 50 acres). The laboratory will select the analysis method that is appropriate for the soil type and geography of the sample, example soil analysis methods can be found in the Midwest Memo, Section 6. Application site soils will be analyzed for phosphorus content before the initial application and then analyzed at least every five years thereafter if used for application.

002.06 Record Keeping

Bruns Feedlot, LLC shall maintain production area and land application area records at the concentrated animal feeding operation for a period of at least five years. A complete copy of the following information is required:

- Records to document the weekly inspections at the production area of all LWCFs. Records will document any actions taken to correct deficiencies found as a result of required inspections. For any deficiencies not corrected within 30 days, the record shall include an explanation of the factors preventing immediate correction;

- Daily inspection of water lines at the production area;

- The production area and the LWCF will be inspected weekly; liquid levels will be checked by the levels indicated on the slope of the holding pond and all levels will be recorded;

- Inspections at least once a year to determine the sludge and sediment accumulation level in the LWCF;

- Records of mortality management, chemical management, and related practices used by the operation;

- The completed NPDES permit application and/or the state operating permit, including the records documenting the current design of any manure storage structures, total design capacity for manure, all sampling and test results related to the design and construction of the facility, and approximate number of days of storage capacity, which demonstrates that the facility capacity is adequate to meet the design storage requirements;

- The nutrient management plan, which also includes the test methods used to sample and analyze manure and soil;

- The date, time and estimated volume of any overflow or discharge; and

- Record of correspondence with EPA and/or NDEQ as to adjustments necessary to this plan.

The following information will be kept for each manure application, and retained at the CAFO facility office for at least five years. The records will be available to EPA and/or NDEQ upon request.

- Expected crop yields for the land application areas;

- The date(s) manure was applied to each field;

- Weather conditions at the time of application and for 24 hours prior to and following application;

- Results from manure, irrigation water, and soil sampling and testing;

- Explanation of the basis for determining manure application rates, as required by EPA and/or NDEQ;

- Results of the most recent phosphorus risk assessment for each field or field segment including the legal description, date assessed, name of the person or consulting firm who completed the assessment, and the level of risk assessed;

- Calculations that show the maximum nitrogen and/or phosphorus to be applied to each field;

- Total amount of nitrogen and phosphorus actually applied to each field;

- The method used to apply the manure;

- For manure transferred to others, the nutrient analysis results and the date, recipient name and address, and approximate amount transferred; and

- Dates of inspections of equipment used to apply manure.

002.07 Application Rates—Effluent

Application rates of effluent water will not exceed the intake rate of the soil in order to minimize the risk of field runoff.

002.08 Conservation Practices

Site-specific conservation practices may be implemented at the discretion of management. This may include appropriate setbacks or equivalent practices to control runoff of nutrients.

002.09 Phosphorus Risk Assessment

The phosphorus risk assessment used for each field or field segment will be the University of Nebraska model or the NRCS model found in Nebraska Title 130. The planned application rates for manure will be consistent with the risk assessment for each field, or field segment. A P-Index for each application site was completed; see Section 7 Site 1 for an example; see the Best Management Practices in Section 5 for site-specific ratings. Subsequent assessments will be conducted if risk factors change significantly or five years have passed since the previous assessment.

002.09A Low or Medium Risk

For a field or field segment with a low or medium risk of phosphorus movement from the field, a single year's application of manure may be based on the expected annual nitrogen requirement for the planned crop.

002.09B High Risk

For a field or field segment where there is a high risk of phosphorus movement from the field, the manure will be applied at a rate equal to or less than the expected phosphorus removal in harvested plant biomass for a planned crop sequence of five years or less. The total nutrient application will not exceed the expected annual nutrient requirement for the planned crop.

002.09C Very High Risk

For a field or field segment with a very high risk of phosphorus movement from the field, manure will not be applied.

002.10 Narrative Approach

002.10A Maximum Amount of Nitrogen and Phosphorus Application

002.10A1 Planned Crop Rotations

The planned crop rotation for the majority of fields is a corn-corn rotation (see Five Year Field Plans, Section 6). Fields may also have a rotation that includes alfalfa, corn silage, grain sorghum, oats, potatoes, sugar beets, soybeans, sunflowers or wheat, or may be used as pasture or left fallow. Phosphorus and Nitrogen requirements for crops are found on Pages 39 and 58 of the Ward Guide (Section 6). Yields for alternative crops may or may not come from the 2016 Nebraska Agricultural Overview (Section 6).

002.10A2 Yield Goals

Realistic yield goals have been determined using an average of Thurston and Wayne County average yields +10%. Actual production records may also be used in determining realistic yield goals. The yields used in these calculations are 222 bu/ac for irrigated corn and 202 bu/ac for dryland corn; 66 bu/ac for irrigated soybeans and 62 bu/ac for dryland soybeans. Average alfalfa yields are 4.6 ton/ac (Section 4).

002.10A3 Nitrogen and Phosphorus Application Rates

Nitrogen will be applied at a rate consistent with the Ward Guide (Section 6). If the High Phosphorus Risk category applies, then maximum phosphorus application rates will be calculated by the expected yield goal of the five year crop sequence multiplied by the Phosphate factor in the Quantities of Plant Nutrients in Crops Table on Page 58 of the Ward Guide (Section 6).

002.10B Methodology for Accounting Factors

002.10B1 Results of soil tests

The nutrient management plan accounts for the results of soil tests conducted. To find the available pounds of nitrogen in the soil sample, the following equation is used: (ppm topsoil × 0.3 × depth in inches) + (ppm subsoil × 0.3 × depth in inches). For planning purposes, 30 lb N soil credit is used. See Ward Guide Page 60 in Section 6.

002.10B2 Credits for Nitrogen

Ammonium and organic nitrogen available from manure will be determined using NebGuide G1335, Determining Crop Available Nutrients from Manure, Figure 2 (Section 6).

All sources of nitrogen are taken into consideration when planning for fertilizer application. Using a realistic yield goal, the amount of nitrogen needed to produce the crop is figured using crop removal rates from the Ward Guide. Next the credits are accounted for: the amount of N available in the soil (see equation above; for planning purposes, 30 lb N credit is used), irrigation water (for planning purposes, we assume 5 ppm with 10 acre-inches applied; ppm × acre-inches of application × 0.2266), previous legume crop contributions (45 lb if soybeans, 80 lb if alfalfa) and nitrogen credit from previous manure fertilizer applications are added together. When all of the credits are subtracted from the nitrogen requirement for the intended crop, the remaining amount of nitrogen needed is found. This number is then divided by the pounds of nitrogen available in each manure unit (tons or acre-inches) to give an amount of manure to apply.

Example (dryland corn-Corn rotation, field plan I): 278 (total crop N needed lb/ac) – 30 (soil credits) – 0 (previous crop soybeans) – 0 (no previous manure) – 0 (no fresh irrigation water) = 248 lb/ac of nitrogen required. If the manure sample has 3.55 lb of N per ton available the first year, then 248 ÷ 3.55 = 69.85 tons of manure can be applied per acre.

002.10B3 Volatilization and Mineralization of Nitrogen

The volatilization of nitrogen is accounted for by NebGuide G1335, Determining Crop Available Nutrients from Manure, Figure 2 (Section 6). The volatilization of ammonium nitrogen for solid manure that is not incorporated is 100% of the total, leaving 0% of the ammonium nitrogen available to the crop. The volatization of ammonium nitrogen in effluent water applied by sprinkler is 50% of the total, leaving 50% of the ammonium nitrogen available to the crop. These figures for volatilization will be used to determine actual application rates.

The mineralization of nitrogen is also accounted for by NebGuide G1335, Determining Crop Available Nutrients from Manure, Figure 2 (Section 6), indicating that 25% of the organic nitrogen in solid manure will be available to the first-year crop, 15% to the second-year crop and 7% to the third-year crop. Effluent applications will have 35% of organic nitrogen available to the first-year crop, 15% to the second-year crop and 7% to the third-year crop. These figures for mineralization will be used to determine actual application rates

Other volatization and mineralization factors from NebGuide G1335, Determining Crop Available Nutrients from Manure, Figure 2 (Section 6), may be used if alternative application methods or conditions apply.

002.10B4 Methodology for Phosphorus Application

This plan uses nitrogen recommendations from Ward Laboratories in order to determine nitrogen utilization rates, and uses phosphorus removal rates (Ward Guide, Section 6) in order to determine phosphorus utilization rates. This is because some sites may or may not require phosphorus to be applied as an agronomic recommendation; however the phosphorus risk assessment will allow for phosphorus to be applied if there is a low, medium or high risk. Removal rates will be used to balance phosphorus additions over time.

002.10B5 Multi-year Phosphorus Application

If the high phosphorus risk category applies, then phosphorus application rates will be calculated by the expected yield goal of the five year crop sequence multiplied by the phosphate factor in the "Quantities of Plant Nutrients in Crops Table" on Page 58 of the Ward Guide (Section 6). The manure phosphorus application rate in a five year period will not exceed the expected phosphorus removal.

Example (dryland corn-corn rotation, field plan I): the amount of phosphorus used per bushel of corn is 0.33 lb. For a 202 bu corn yield goal, the phosphorus quantity is 67 lb/yr. In a five year rotation the crop will use 334 lb of phosphorus. Based on the manure analysis, the pounds of phosphorus per ton are divided into the total phosphorus used by the crop; 334 lb of P ÷ 23.05 lb of P in manure = 14.49 tons of manure per acre to be applied over the five year period. If further soil samples and a P-Index are completed prior to the end of the initial five year period that indicate a medium or low phosphorus risk assessment, another

application may be made prior to the end of the five-year period on a nitrogen based application.

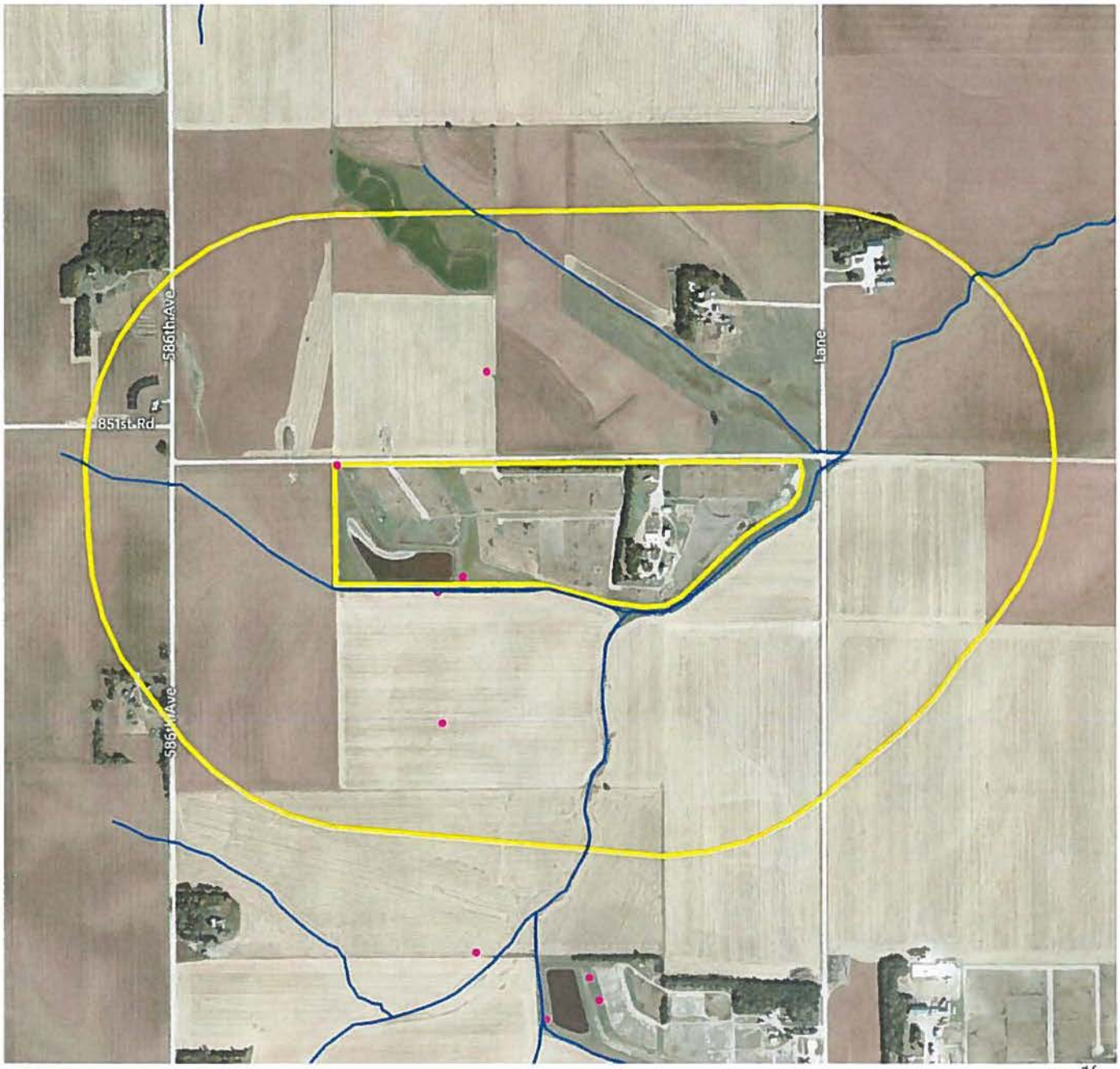
002.10B6 Other Additions of Nitrogen and Phosphorus

When manure nutrients applied plus the other nitrogen credits added together do not supply the crop with the necessary nutrients, nitrogen and phosphorus may be supplemented with commercial fertilization. If nutrient deficiencies are suspected, in season soil sampling or plant tissue tests may be used to determine if additional nutrients are necessary.

Section 2

Manure & Waste Water Handling & Storage

Bruns Feedlot, LLC



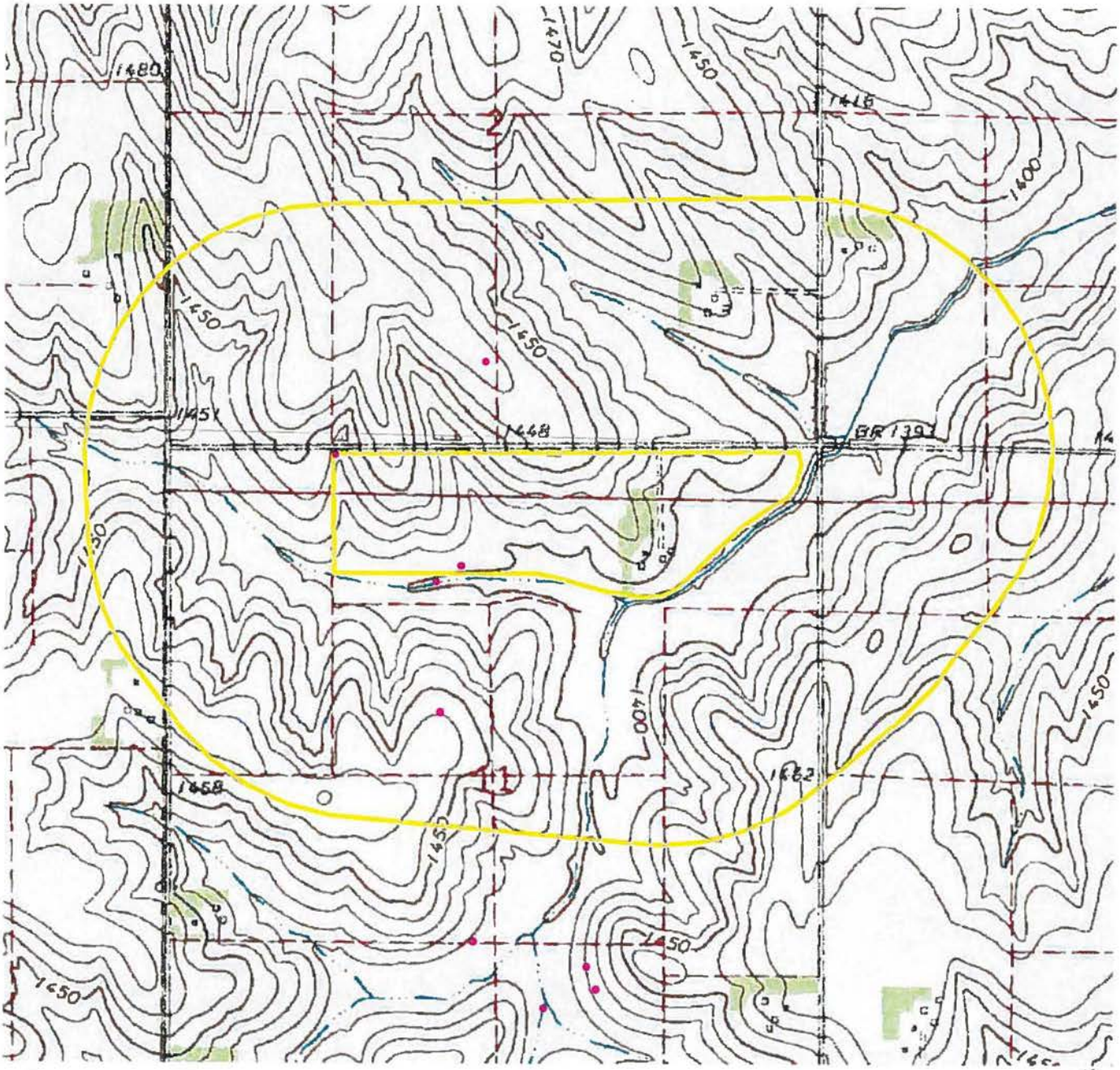
Operational Site Map 2000 ft

Boundary
Streams
Wells

County: Thurston
Township: Thayer
Legal: S11 T25N R5E
Latitude: 42° 9' 46.61" N
Longitude:- 96° 48' 30.79" E

NUTRIENT ADVISORS

Bruns Feedlot, LLC



Operational Topography Map 2000 ft

Boundary
Streams
Wells

County: Thurston
Township: Thayer
Legal: S11 T25N R5E
Latitude: 42° 9' 46.61" N
Longitude:- 96° 48' 30.79" E

NUTRIENT ADVISORS

Processed by State of Nebraska Department of Natural Resources Data(Bank) 4/1/2013 9:06:41 AM
Subsection: NENW Section: 11 Township: 25 Range: 5E
Footage: 1168 feet from the North section line and 2175 feet from the West section line.
Latitude: 42° 9' 36.24" Longitude: -96° 48' 54.54"

Legend

Zooming – 3 options

- Double click on Map to zoom in
- Plus(+) and minus(-) signs in upper left corner of map also zoom in and out. Hover with mouse over area and when pointer disappears, click. Plus is on top and minus is below it.
- Click on map and use mouse wheel to zoom in or out.

Panning – Moving around map
Click on map and hold, drag mouse direction to move map

DISCLAIMER

The well location computations are based on calculated section corners, and not surveyed information or GPS coordinates. Therefore, **ALWAYS** check with the water well owner for the land description (including Footage, Quarter/Quarter, Section, Township, Range and County) of the property where the well is located. This computed well location information is for checking purposes only.

Return to Search Page

Nebraska Department of Natural Resources
Database Through: 1/30/2013
Processed: 1/31/2013 3:40:54 PM

REGISTERED GROUNDWATER WELLS DATA RETRIEVAL

Note:
Information on Public Water Supply Wells is not available through this interface. Contact the Department of Natural Resources (Data Bank) at 402-471-2363 for more information. All registration documentation for water wells registered after January 1, 1997, except Public Water Supply wells, are now available.

Due to possibility of a well being in more than one series, an individual well might be listed more than once.

9 Records found.

Registration# / Well ID / Permit Number / Well Log	Use / Status	County Name / NRD Name / Well Location / Footage / Latitude / Longitude	Completion Date / Filing Date / Decommission Date / Times Replaced	Acres Irrig / Gallons/Min / Static Level / Pumping Level / Series	Pump Col Dia / Pump Depth / Well Depth	Owner's Name and Address / Owner ID
G-134758B WellID: 169047 Other Info Logs View as PDF	Q A	**Thurston** Lower Elkhorn 25N 5E 11 NENW Map It 42° 9' 36.24" 96° 48' 54.54"	**7/8/2005** 7/19/2005	— --- 6 ft --- PRO	— --- 14 ft	**Bruns Feedlot** OwnerID: 82321 RR 3 Box 158 Pender ,NE 68047
G-134758C WellID: 169048 Other Info Logs View as PDF	Q A	**Thurston** Lower Elkhorn 25N 5E 11 NENW Map It 42° 9' 37.50" 96° 48' 51.90"	**7/8/2005** 7/19/2005	— --- 5 ft --- PRO	— --- 13.5 ft	**Bruns Feedlot** OwnerID: 82321 RR 3 Box 158 Pender ,NE 68047
G-135653 WellID: 168147 LE-05100 Other Info Logs View as PDF	S A	**Thurston** Lower Elkhorn 25N 5E 11 SENW 2215 N 2205 W Map It 42° 9' 25.89" 96° 48' 54.06"	**7/8/2005** 9/2/2005	— 75 gpm 55 ft 80 ft PRO	**2 in** 77 ft 95 ft	**Leon Bruns** OwnerID: 59137 RR 3 Box 158 Pender ,NE 68047
G-134758A WellID: 169046 Other Info Logs View as PDF	Q A	**Thurston** Lower Elkhorn 25N 5E 11 NWNE Map It 42° 9' 46.26" 96° 49' 5.34"	**7/7/2005** 7/19/2005	— --- 27 ft --- PRO	— --- 30 ft	**Bruns Feedlot** OwnerID: 82321 RR 3 Box 158 Pender ,NE 68047
G-122986 WellID: 150256 LE-03096 Other Info Logs View as PDF	I A	**Thurston** Lower Elkhorn 25N 5E 11 SWSE 23 S 2156 E Map It 42° 8' 55.09" 96° 48' 41.91"	**6/16/2003** 8/20/2003	**120** 700 gpm 35 ft 46 ft PRO	**6 in** 80 ft 98 ft	**Ronald H Bruns Feedyard** OwnerID: 72684 RR 3 Box 172 Pender ,NE 68047

G-126912B WellID: 158324 Other Info Logs View as PDF	Q A	**Thurston** Lower Elkhorn 25N 5E 11 SWSE 1122 S 1798 E Map It 42° 9' 5.86" 96° 48' 37.20"	**4/13/2004** 4/22/2004	— --- 34.2 ft --- Mon	— --- 40 ft	**Ronald H Bruns Feedyard** OwnerID: 72684 RR 3 Box 172 Pender ,NE 68047
G-126912A WellID: 158326 Other Info Logs View as PDF	Q A	**Thurston** Lower Elkhorn 25N 5E 11 SWSE 797 S 2060 E Map It 42° 9' 2.71" 96° 48' 40.65"	**4/13/2004** 4/22/2004	— --- 13.5 ft --- Mon	— --- 19 ft	**Ronald H Bruns Feedyard** OwnerID: 72684 RR 3 Box 172 Pender ,NE 68047
G-126912C WellID: 158327 Other Info Logs View as PDF	Q A	**Thurston** Lower Elkhorn 25N 5E 11 SWSE 948 S 1785 E Map It 42° 9' 4.16" 96° 48' 37.03"	**4/13/2004** 4/22/2004	— --- 25.2 ft --- Mon	— --- 32 ft	**Ronald H Bruns Feedyard** OwnerID: 72684 RR 3 Box 172 Pender ,NE 68047
G-134783 WellID: 169035 Other Info Logs View as PDF	Q A	**Thurston** Lower Elkhorn 25N 5E 11 SWSE 1300 S 2800 E Map It	**5/9/2005** 7/20/2005	— --- 5.5 ft --- Mon	— --- 13 ft	**Ronald H Bruns Feedyard** OwnerID: 72684 RR 3 Box 172 Pender ,NE 68047

Data copy of requested wells.
Data copy of Geo Logs for requested wells.
Data copy of Casing Screen for requested wells.
Data copy of Grout Gravel for requested wells.

Legend and Notes

April 2018 Additional Information Engineering Documents

ProAg Engineering, Inc.
Nicholaus J. Rowe, P.E.
77402 U.S. Highway 71
P.O. Box 181
Jackson, MN 56143
507-849-7200
nic@proageng.com

23 April 2018

Mr. Daniel LeMaistre
Nebraska DEQ
PO Box 98922
1200 N Street, Suite 400
Lincoln, Nebraska 68509-8922

RE: Bruns Feedlot, L.L.C.
Proposed Cattle Feedlot Expansion
Thurston County, Nebraska
ProAg Job #17-119

Mr. LeMaistre:

Please accept our response to the request for additional information on behalf of the Bruns Feedlot, L.L.C. A narrative summary of the specific items requested is outlined below:

1. Existing Debris Basins.
   The facility maintains three existing debris basins that are identified on the attached engineering plans.
2. Contour lines.
   We have included a copy of the plans without contour lines for legibility, as requested.
3. Benchmark.
   The benchmark on site is the center of the road I Avenue at the half mile marker north of the site with an elevation of 1447.0. The benchmark is shown on the attached engineering plans.
4. Holding pond calculations.
   All holding pond design calculations with supporting documentation are enclosed. The original submission used the precipitation values from NE-ENG-81 worksheet as conservative established values. The updated attachment uses the most up to date information from NOAA Atlas 14 for the site location. These updated precipitation values were input to the NE-ENG-81 worksheet for runoff calculations.

Enclosed please find the original and five (5) copies of the following:

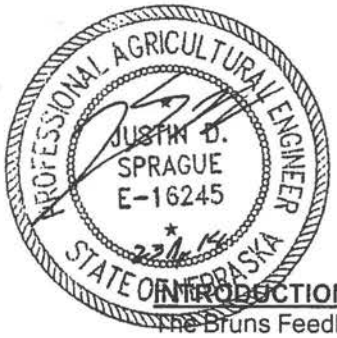
a. Design Report with Stage Storage Tables
b. Engineering Site Plan
c. Engineering Site Plan with contours

We trust the above information is adequate for your review and approval. Should you have any questions, please do not hesitate to call me at 507-329-2440.

Respectfully Submitted

Justin D. Sprague, P.E.
ProAg Engineering, Inc.

cc: Joel Bruns, Bruns Feedlot
Allen Kampschneider, Nutrient Advisors



DESIGN REPORT
BRUNS FEEDYARD
PROPOSED CATTLE FEELOT EXPANSION
THURSTON COUNTY, NEBRASKA

INTRODUCTION

The Bruns Feedlot is an existing beef cattle operation consisting of open dirt lots. The site is now proposing to expand to a one-time capacity of 4,000 head of beef cattle weighting an average of 850 pounds. The proposed construction will consist of two open dirt lots currently located within the existing drainage area. No additional drainage area will be added to the site; the proposed change is only a land use change within the established drainage area. No changes are proposed to the existing settling basins or the existing runoff holding pond. All open lots drain down gradient to the existing settling basins. The proposed lots will both drain to Basin 1A. The settled effluent is transferred from Basin 1A to the runoff holding pond by an existing lift station through an existing 8-inch pipe. No changes are proposed in the feedlot areas draining to Basin 1B and Basin 1C. All of the existing livestock waste control facility structures appear in good condition.

The site is located in the N ½, Section 11, T-25-N, R-05-E, approximately six miles northwest of Pender, Nebraska, in Thurston County.

EARTHEN FEEDLOT RUNOFF HOLDING POND DESIGN

Design data for the holding pond:

- Will store at a minimum the runoff from the 25-year, 24-hour rainfall, the direct precipitation from the 25-year, 24-hour rainfall on the pond surface, plus the average runoff from the month of June
- Inner and outer dikes have 3:1 slopes
- Pond has 1.5 feet of freeboard
- 25 year, 24 hour rainfall Design Storm = 4.85 inches
  - Design Storm runoff (feedlot area) = 3.7 inches
  - Design Storm runoff (contributing area) = 2.2 inches
- Month of June Design Precipitation
  - Average monthly runoff (feedlot area) = 1.2 inches
  - Average monthly runoff (contributing area) = 0.3 inches
- Minimum required runoff storage volume
  - Minimum required design runoff volume (feedlot area) = 4.9 inches
  - Minimum required design runoff volume (contributing area) = 2.5 inches
- Total Contained Drainage Area = 62.4 acres
  - Total Contained Feedlot Area = 52.2 acres
  - Total Contained Contributing Area = 10.2 acres
- Runoff Holding Pond Surface Area = 6.2 acres

FEEDLOT RUNOFF HOLDING POND

- 25-Year, 24-Hour Precipitation Event
  - Feedlot Area Runoff volume = 52.2 Acres x 43,560 S.F./Acre x 3.7" ÷ 12"/Ft. = 701,098 C.F. = 5,244,215 gallons
  - Contributing Area Runoff volume = 10.2 Acres x 43,560 S.F./Acre x 2.2" ÷ 12"/Ft. = 81,457 C.F. = 609,300 gallons
  - Direct Pond Precipitation Volume = 6.2 Acres x 43,560 S.F./acre x 4.85" ÷ 12"/Ft. = 109,154 C.F. = 816,473 gallons

  Total 25-yr, 24-hr event Storage Volume Required = 5,244,215 + 609,300 + 816,473 **= 6,669,988 gallons**

- Runoff from contained drainage area during the month of June

- Feedlot Area Runoff volume = 52.2 Acres x 43,560 S.F./Acre x 1.19" ÷ 12"/Ft. = 225,488 C.F. = 1,686,653 gallons
- Contributing Area Runoff volume = 10.2 Acres x 43,560 S.F./Acre x 0.29" ÷ 12"/Ft. = 10,738 C.F. = 80,317 gallons
- Direct Precipitation Volume
  Evaporation (5.30 inches) is greater than precipitation (4.05 inches) for the month of June, but no credit for the evaporation is included in this calculations.

Total June storage volume required = 1,686,653 gal. + 80,317 gal. + 0 gal. = 1,766,970 gallons

- **Minimum Design storage volume required = 24yr, 24hr + June**
  Total Required Minimum Design Storage Volume = 6,669,988 + 1,766,970 = 8,436,958 gallons

- Additional required storage volume from overflow waterers drained to the holding pond
  - Overflow volume = 106,522 C.F. = 796,785 gallons

  Total Required Storage Volume = 8,436,958 gal. + 796,785 gal. = **9,233,743 gallons**

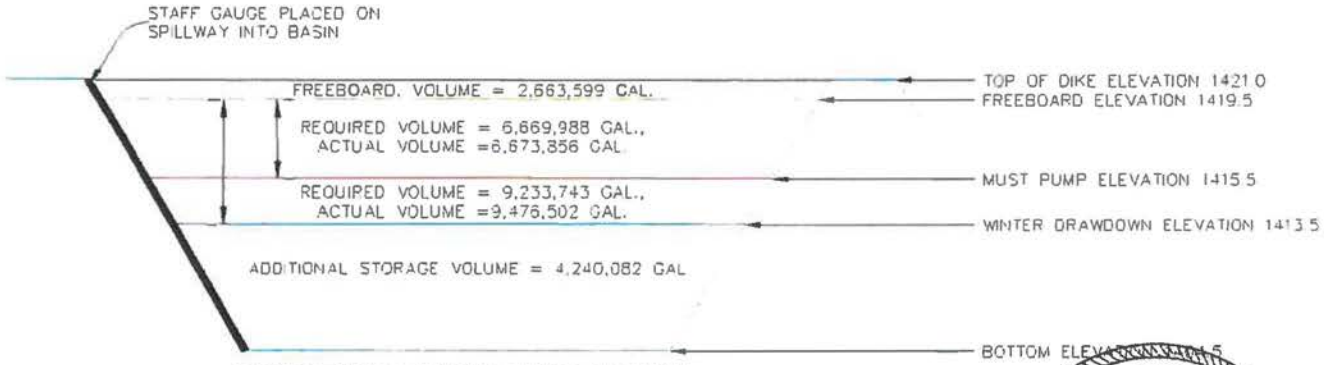
- Volume of Runoff Holding Pond below freeboard = **13,716,584 gallons**

BRUNS FEEDYARD

STAGE STORAGE TABLE

EXISTING EARTHEN SETTLED OPEN FEEDLOT EFFLUENT BASIN

STORAGE BASIN LIQUID ELEVATION	DEPTH FROM BOTTOM	STORAGE BASIN VOLUME AT LIQUID ELEVATION (GAL)	
1421.0	16.5	16,380,183	Top of Dike Elevation
1420.5	16.0	15,492,279	
1419.5	15.0	13,716,584	Freeboard Elevation
1418.5	14.0	11,967,766	
1417.5	13.0	10,271,877	
1416.5	12.0	8,628,448	
1415.5	11.0	7,042,728	25yr-24hr "Must Pump" Elevation
1415.0	10.5	6,289,572	
1414.5	10.0	5,569,668	
1413.5	9.0	4,240,082	Winter Drawdown Elevation
1413.0	8.5	3,642,253	
1412.5	8.0	3,098,796	
1411.5	7.0	2,156,954	
1410.5	6.0	1,393,285	
1409.5	5.0	802,537	
1408.5	4.0	400,246	
1407.5	3.0	176,004	
1406.5	2.0	57,781	
1405.5	1.0	8,397	
1404.5	0.0	0	Bottom



EXISTING HOLDING POND
CRITICAL VOLUME & ELEVATIONS

PROFESSIONAL AGRICULTURAL ENGINEER
JUSTIN D. SPRAGUE
E-16245
23.10.18
STATE OF NEBRASKA

Precipitation, Evaporation, Runoff for Animal Waste Systems

Landowner: Bruns Feedlot
NRD:
Field Office:

Practice: Runoff Holding Pond
By: JDS Date: 04/23/18
Checked: Date:

County: Thurston
Design Storage Period From: Jan thru Dec

Storm Rainfall (Inches)	
10-yr Rainfall	4.0
25-yr Rainfall	4.9
100-yr Rainfall	

Storm Runoff (Inches)	Unpaved	Paved	Cont. DA CN_1 = 74
10-yr Runoff	2.9	3.7	1.6
25-yr Runoff	3.7	4.5	2.2
100-yr Runoff			

CN_{30} = 48

Monthly Rainfall / Runoff / Evaporation (Inches)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Monthly Rainfall	0.46	0.95	2.01	2.43	4.14	4.05	3.49	2.75	3.35	2.04	1.14	0.87	27.7
Primary Design Period	0.46	0.95	2.01	2.43	4.14	4.05	3.49	2.75	3.35	2.04	1.14	0.87	27.7
Secondary Design Period													
Monthly Evaporation	0.50	0.70	1.50	3.00	3.60	5.30	6.60	6.50	5.40	3.50	2.00	0.70	39.3
Primary Design Period	0.50	0.70	1.50	3.00	3.60	5.30	6.60	6.50	5.40	3.50	2.00		38.6
Secondary Design Period												0.70	0.7
Monthly Runoff (Paved)	0.12	0.38	0.80	1.19	2.28	2.39	2.11	1.60	1.88	1.06	0.54	0.28	14.6
Primary Design Period	0.12	0.38	0.80	1.19	2.28	2.39	2.11	1.60	1.88	1.06	0.54	0.28	14.6
Secondary Design Period													
Monthly Runoff (Unpaved)	0.04	0.10	0.23	0.45	0.95	1.19	0.98	0.72	0.94	0.41	0.17	0.09	6.3
Primary Design Period	0.04	0.10	0.23	0.45	0.95	1.19	0.98	0.72	0.94	0.41	0.17	0.09	6.3
Secondary Design Period													
Contributing DA				0.01	0.32	0.29	0.15	0.03	0.13				0.9
Primary Design Period				0.01	0.32	0.29	0.15	0.03	0.13				0.9
Secondary Design Period													

Summary

The NDEQ minimum runoff storage volume for open lots is the sum of runoffs from the 25-yr storm and the month of June.
The NDEQ minimum is: 4.9 inches of runoff for unpaved lots.

Rainfall

Total rainfall during primary design period	27.7	inches
Total rainfall during secondary design period		inches

Evaporation

Total Evap. during primary design period	38.6	inches
Total Evap. during secondary design period	0.7	inches

Runoff (Paved Lots)

Total runoff from paved lots during primary design period	14.6	inches
Total runoff from paved lots during secondary design period		inches

Runoff (Unpaved Lots)

Total runoff from unpaved lots during primary design period	6.3	inches
Total runoff from unpaved lots during secondary design period		inches

Runoff (Contributing Drainage Area)

Total runoff from contributing DA during primary design Period	0.9	inches
Total ruoff from contributing DA during secondary design period		inches

NOAA Atlas 14, Volume 8, Version 2
Location name: Pender, Nebraska, USA*
Latitude: 42.1615°, Longitude: -96.8101°
Elevation: 1424.29 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.372 (0.302-0.470)	0.434 (0.351-0.549)	0.539 (0.435-0.682)	0.630 (0.505-0.800)	0.761 (0.591-0.992)	0.867 (0.656-1.14)	0.976 (0.713-1.30)	1.09 (0.763-1.48)	1.25 (0.839-1.72)	1.37 (0.896-1.91)
10-min	0.545 (0.442-0.689)	0.636 (0.515-0.803)	0.790 (0.637-0.999)	0.923 (0.740-1.17)	1.12 (0.866-1.45)	1.27 (0.961-1.67)	1.43 (1.04-1.90)	1.60 (1.12-2.16)	1.83 (1.23-2.52)	2.01 (1.31-2.79)
15-min	0.665 (0.539-0.840)	0.775 (0.628-0.980)	0.963 (0.777-1.22)	1.13 (0.902-1.43)	1.36 (1.06-1.77)	1.55 (1.17-2.03)	1.74 (1.27-2.32)	1.95 (1.36-2.64)	2.23 (1.50-3.07)	2.45 (1.60-3.40)
30-min	0.945 (0.766-1.19)	1.10 (0.891-1.39)	1.37 (1.10-1.73)	1.60 (1.28-2.03)	1.93 (1.50-2.51)	2.20 (1.67-2.88)	2.48 (1.81-3.30)	2.77 (1.94-3.75)	3.18 (2.13-4.38)	3.50 (2.28-4.85)
60-min	1.22 (0.985-1.54)	1.41 (1.14-1.78)	1.74 (1.41-2.20)	2.04 (1.63-2.58)	2.47 (1.92-3.23)	2.82 (2.14-3.71)	3.19 (2.34-4.26)	3.59 (2.51-4.87)	4.14 (2.79-5.72)	4.58 (2.99-6.36)
2-hr	1.49 (1.22-1.86)	1.72 (1.40-2.14)	2.12 (1.72-2.65)	2.48 (2.00-3.11)	3.01 (2.37-3.89)	3.45 (2.64-4.49)	3.91 (2.89-5.17)	4.41 (3.12-5.93)	5.11 (3.47-7.00)	5.67 (3.74-7.80)
3-hr	1.63 (1.35-2.03)	1.88 (1.55-2.33)	2.32 (1.90-2.88)	2.71 (2.21-3.38)	3.30 (2.62-4.25)	3.79 (2.93-4.91)	4.31 (3.21-5.68)	4.88 (3.48-6.53)	5.67 (3.88-7.74)	6.31 (4.19-8.64)
6-hr	1.88 (1.56-2.30)	2.16 (1.80-2.65)	2.67 (2.21-3.27)	3.12 (2.57-3.84)	3.80 (3.05-4.85)	4.38 (3.41-5.61)	4.99 (3.75-6.50)	5.65 (4.07-7.50)	6.58 (4.55-8.90)	7.33 (4.92-9.96)
12-hr	2.12 (1.78-2.57)	2.46 (2.06-2.97)	3.04 (2.54-3.69)	3.56 (2.96-4.33)	4.33 (3.50-5.45)	4.97 (3.91-6.29)	5.64 (4.29-7.27)	6.37 (4.64-8.36)	7.38 (5.16-9.88)	8.19 (5.56-11.0)
24-hr	2.40 (2.04-2.87)	2.78 (2.36-3.32)	3.44 (2.90-4.11)	4.01 (3.37-4.82)	4.85 (3.95-6.01)	5.53 (4.40-6.92)	6.25 (4.80-7.96)	7.01 (5.16-9.10)	8.06 (5.70-10.7)	8.90 (6.11-11.9)
2-day	2.74 (2.35-3.23)	3.16 (2.70-3.72)	3.86 (3.30-4.57)	4.48 (3.80-5.31)	5.36 (4.42-6.56)	6.08 (4.88-7.50)	6.82 (5.29-8.58)	7.60 (5.65-9.76)	8.68 (6.20-11.4)	9.53 (6.62-12.6)
3-day	2.99 (2.58-3.50)	3.43 (2.95-4.01)	4.17 (3.58-4.89)	4.81 (4.11-5.66)	5.73 (4.74-6.95)	6.46 (5.22-7.92)	7.22 (5.64-9.02)	8.02 (6.00-10.2)	9.12 (6.56-11.9)	9.98 (6.98-13.1)
4-day	3.20 (2.78-3.73)	3.66 (3.17-4.26)	4.43 (3.82-5.17)	5.09 (4.36-5.96)	6.03 (5.01-7.28)	6.79 (5.51-8.27)	7.57 (5.93-9.40)	8.38 (6.30-10.6)	9.50 (6.86-12.3)	10.4 (7.29-13.6)
7-day	3.77 (3.29-4.34)	4.26 (3.72-4.92)	5.10 (4.43-5.89)	5.81 (5.02-6.73)	6.82 (5.72-8.13)	7.62 (6.24-9.19)	8.45 (6.68-10.4)	9.31 (7.06-11.7)	10.5 (7.65-13.5)	11.4 (8.09-14.9)
10-day	4.30 (3.78-4.92)	4.83 (4.24-5.53)	5.72 (5.00-6.57)	6.48 (5.63-7.46)	7.55 (6.36-8.94)	8.39 (6.91-10.1)	9.26 (7.36-11.3)	10.2 (7.75-12.7)	11.4 (8.35-14.6)	12.3 (8.80-16.0)
20-day	5.87 (5.22-6.63)	6.54 (5.80-7.39)	7.63 (6.75-8.64)	8.53 (7.50-9.70)	9.77 (8.31-11.4)	10.7 (8.92-12.7)	11.7 (9.39-14.1)	12.7 (9.75-15.6)	13.9 (10.3-17.6)	14.9 (10.8-19.2)
30-day	7.19 (6.43-8.06)	7.99 (7.13-8.96)	9.26 (8.24-10.4)	10.3 (9.11-11.6)	11.7 (9.98-13.5)	12.7 (10.6-14.9)	13.7 (11.1-16.4)	14.8 (11.4-18.1)	16.1 (12.0-20.2)	17.0 (12.4-21.8)
45-day	8.85 (7.96-9.84)	9.82 (8.82-10.9)	11.3 (10.2-12.7)	12.6 (11.2-14.1)	14.1 (12.1-16.1)	15.3 (12.8-17.7)	16.4 (13.3-19.4)	17.4 (13.6-21.2)	18.7 (14.1-23.4)	19.7 (14.4-25.0)
60-day	10.2 (9.27-11.3)	11.4 (10.3-12.6)	13.1 (11.8-14.6)	14.5 (13.0-16.1)	16.2 (14.0-18.4)	17.5 (14.7-20.1)	18.6 (15.2-21.9)	19.7 (15.4-23.8)	21.0 (15.8-26.0)	21.9 (16.1-27.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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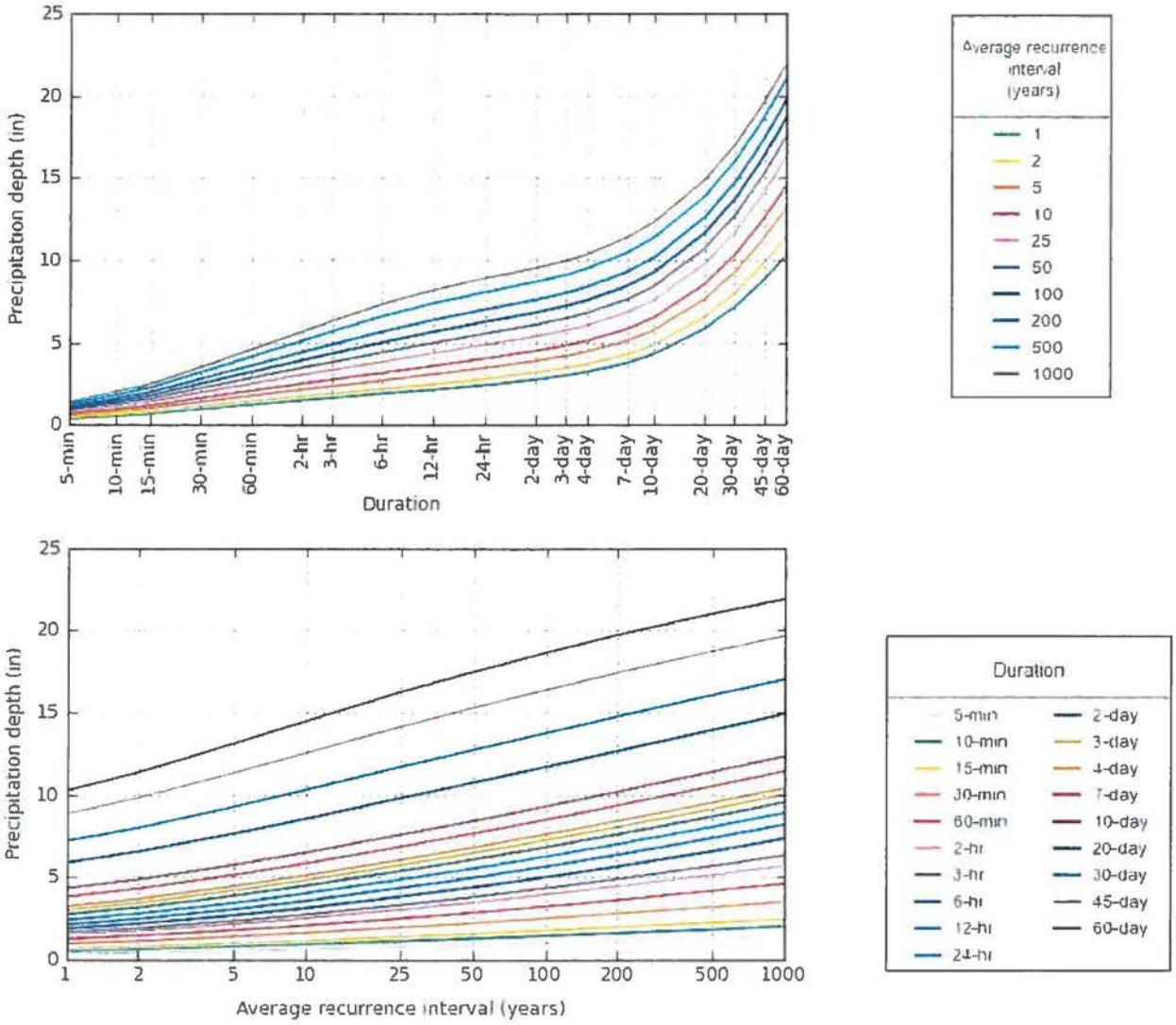
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 42.1615°, Longitude: -96.8101°



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Created (GMT): Mon Apr 23 20:27:51 2018

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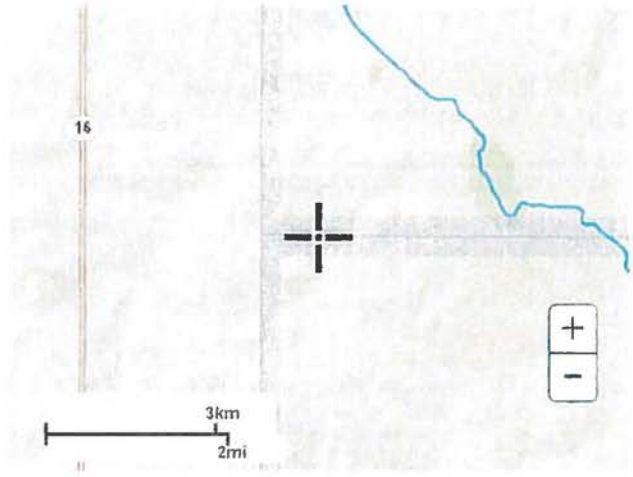
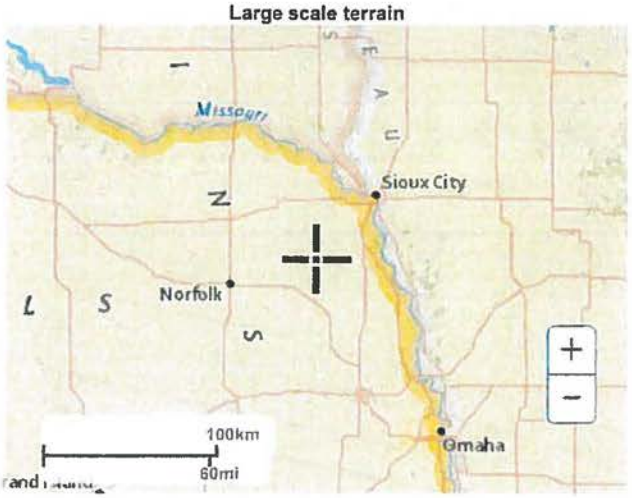
Maps & aerials

Small scale terrain

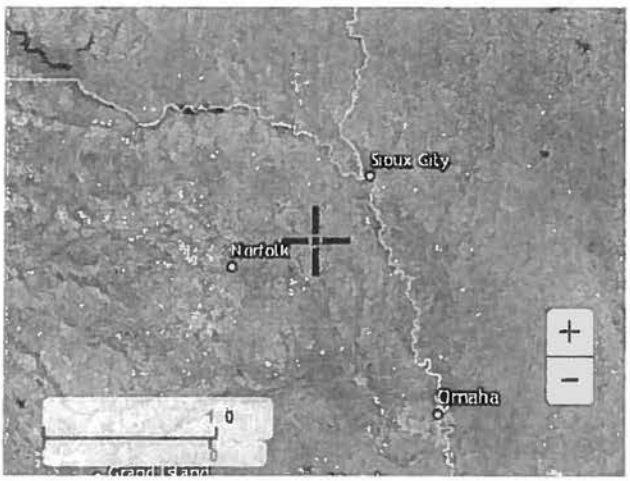


Large scale terrain



Large scale map

Large scale aerial



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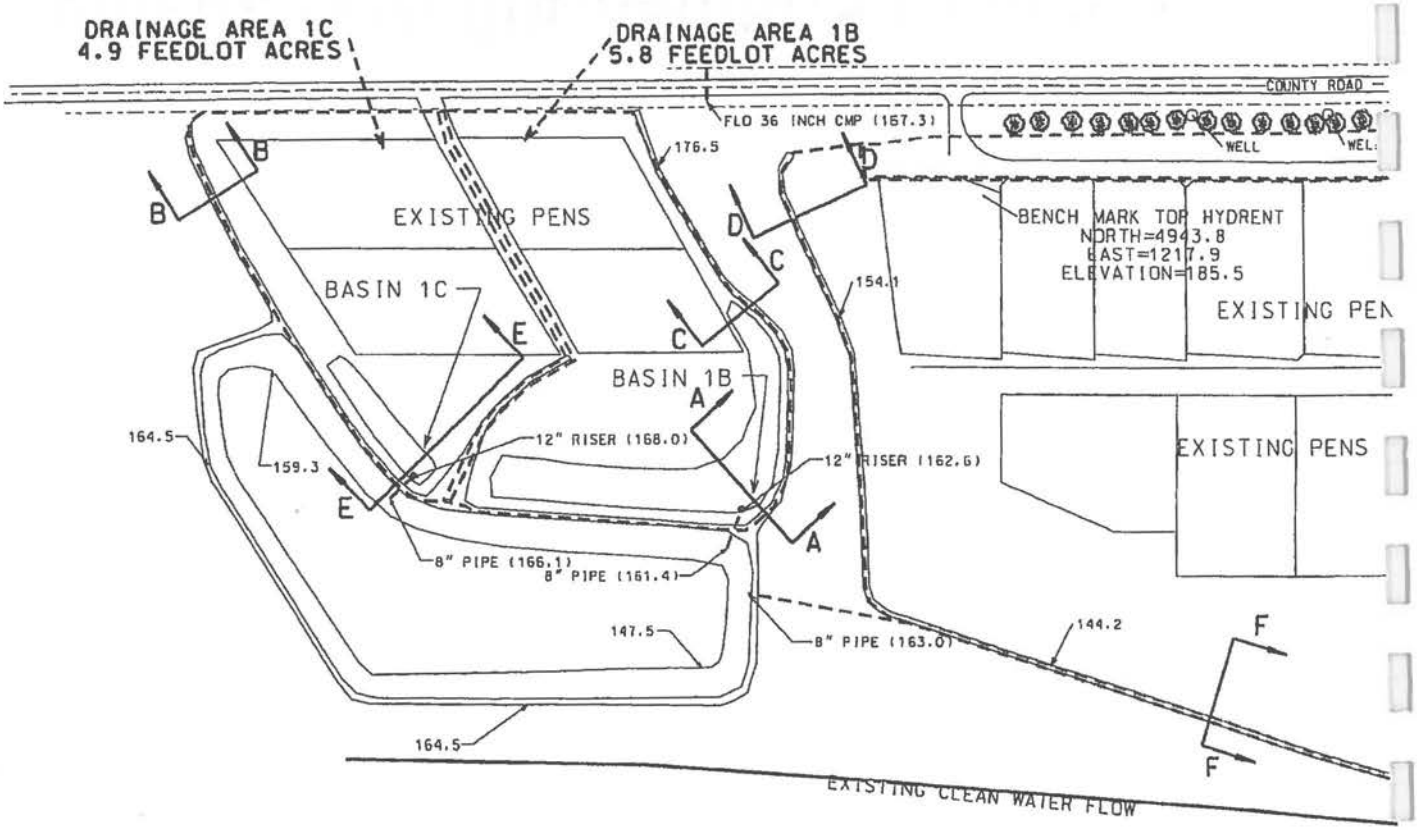
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring MD 20910
Questions? HDSC.Questions@noaa.gov

Disclaimer

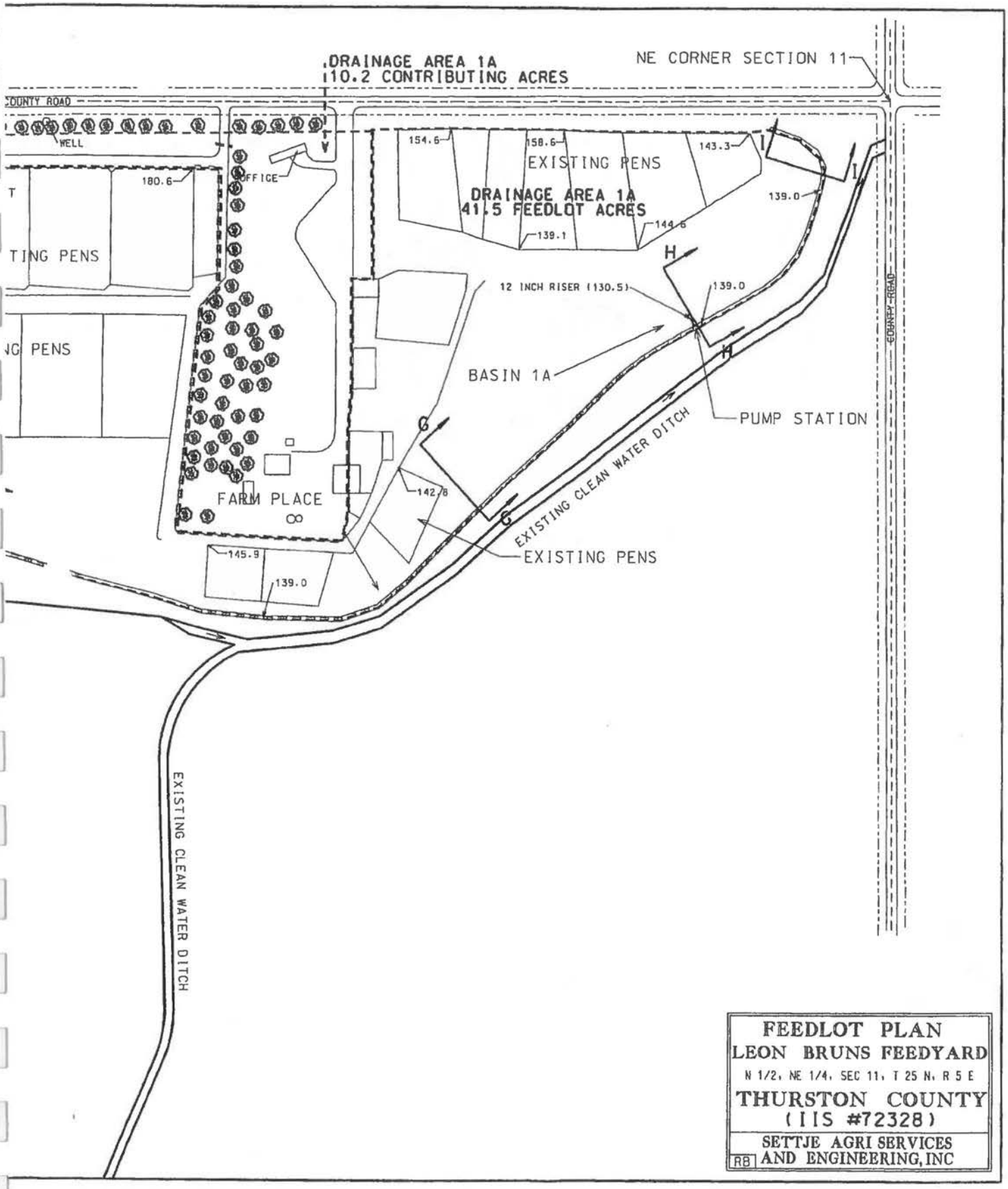
February 2018 Major Modification Engineering Documents

Existing Engineering Documents


DRAINAGE AREA 1C
4.9 FEEDLOT ACRES
DRAINAGE AREA 1B
5.8 FEEDLOT ACRES
COUNTY ROAD
FLO 36 INCH CMP (167.3)
176.5
EXISTING PENS
BASIN 1C
BASIN 1B
BENCH MARK TOP HYDRENT
NORTH=4943.8
EAST=1217.9
ELEVATION=185.5
154.1
EXISTING PEN
EXISTING PENS
164.5
159.3
12" RISER (168.0)
12" RISER (162.6)
8" PIPE (166.1)
8" PIPE (161.4)
147.5
8" PIPE (163.0)
144.2
164.5
EXISTING CLEAN WATER FLOW
A
B
C
D
E
F


N
W
E
S

SCALE: 1"=300'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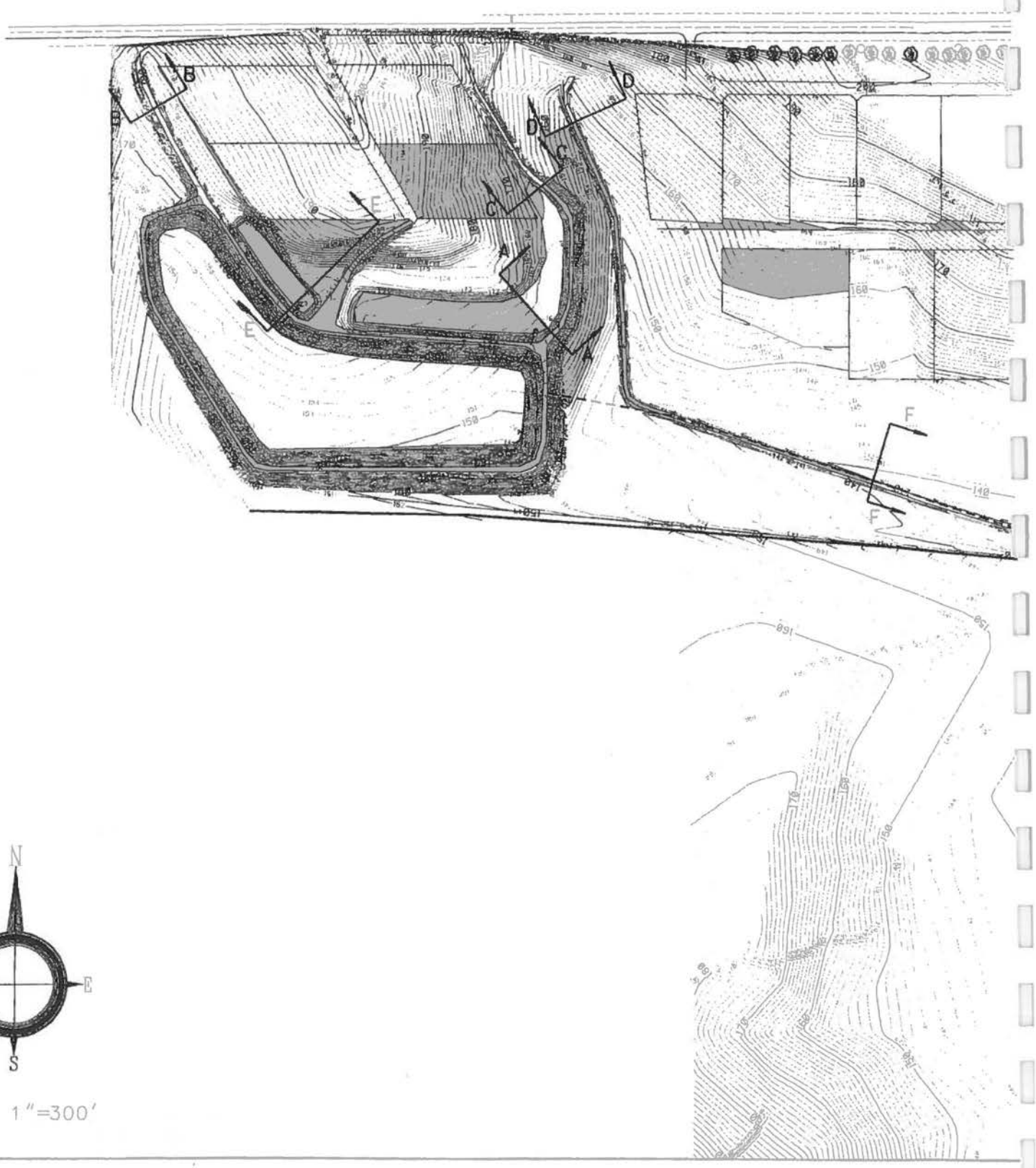
10.2 CONTRIBUTING ACRES
NE CORNER SECTION 11
COUNTY ROAD
WELL
OFFICE
180.6
TING PENS
NG PENS
154.6
158.6
143.3
EXISTING PENS
DRAINAGE AREA 1A
41.5 FEEDLOT ACRES
139.1
144.6
139.0
12 INCH RISER (130.5)
139.0
BASIN 1A
PUMP STATION
COUNTY ROAD
EXISTING CLEAN WATER DITCH
FARM PLACE
142.8
EXISTING PENS
145.9
139.0
EXISTING CLEAN WATER DITCH
FEEDLOT PLAN
LEON BRUNS FEEDYARD
N 1/2, NE 1/4, SEC 11, T 25 N, R 5 E
THURSTON COUNTY
(IIS #72328)
SETTJE AGRI SERVICES
AND ENGINEERING, INC
RB



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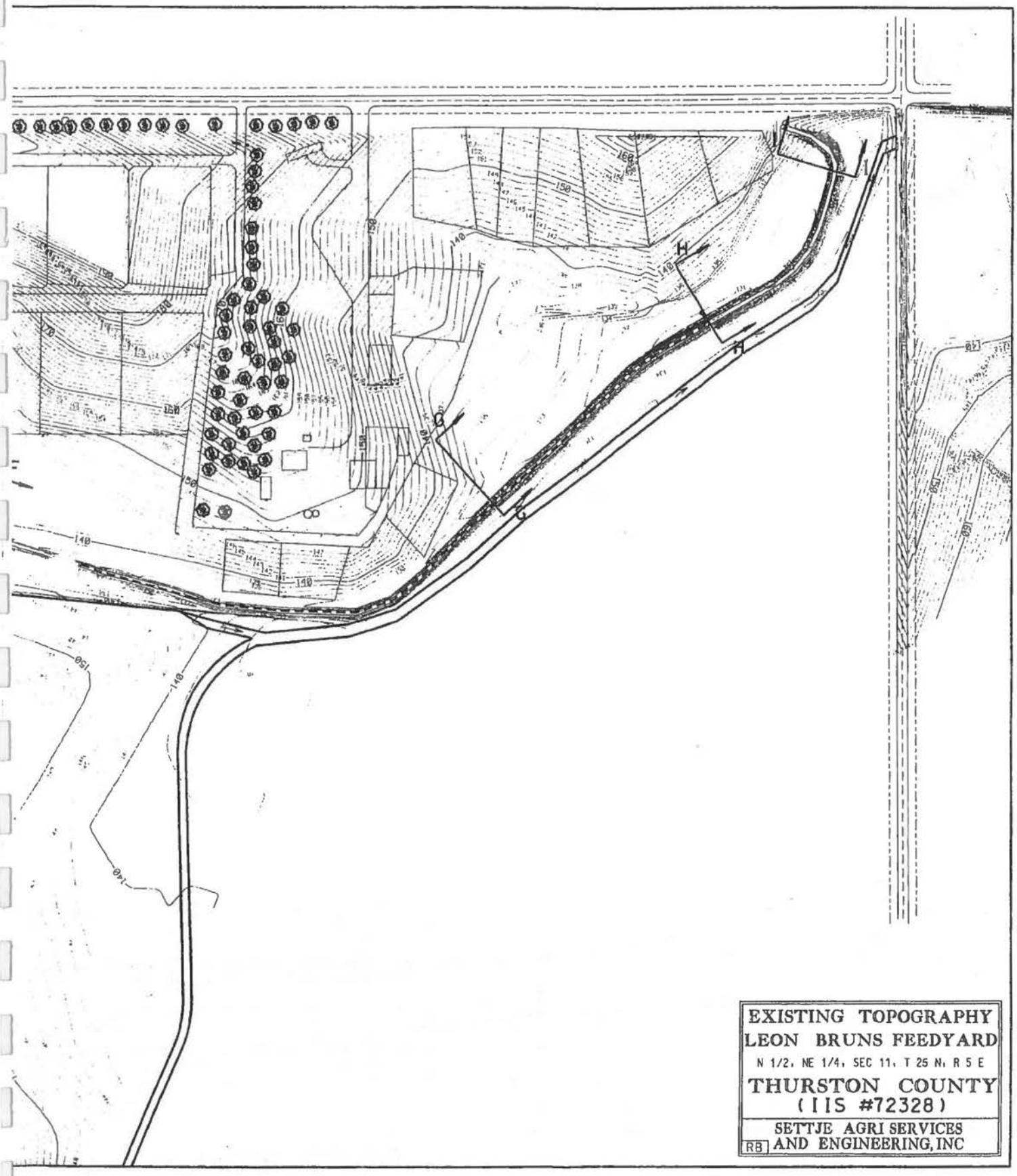
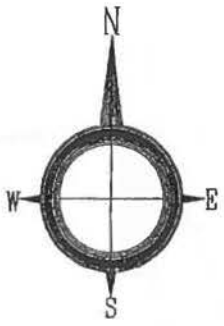
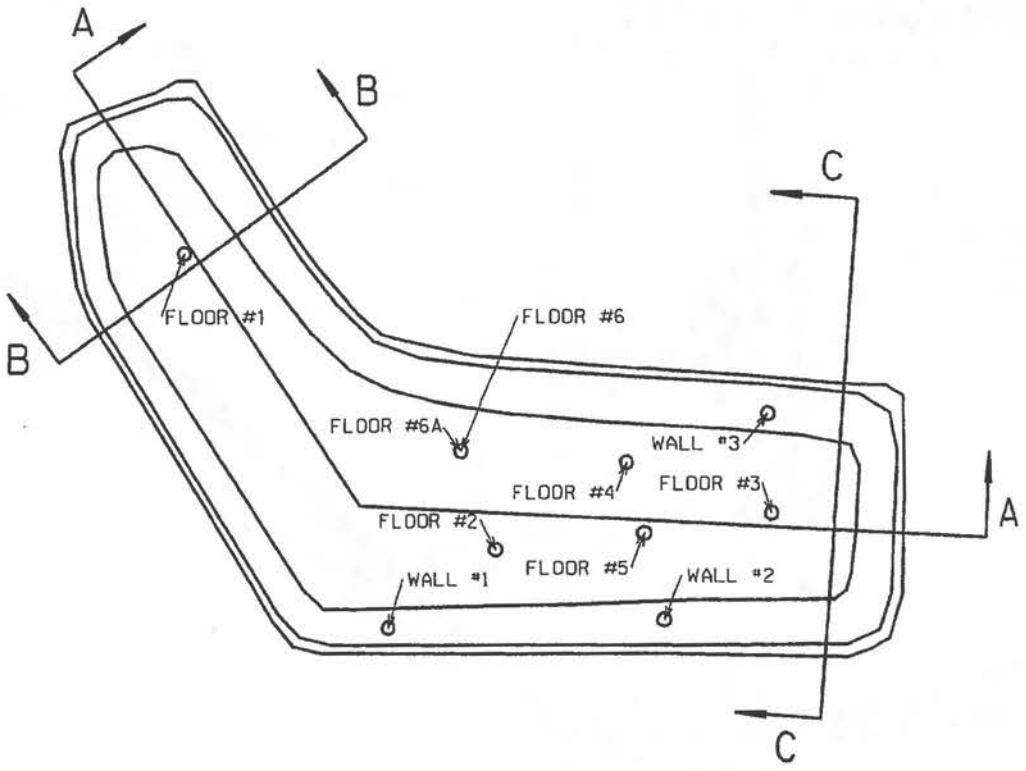

EXISTING TOPOGRAPHY
LEON BRUNS FEEDYARD
N 1/2, NE 1/4, SEC 11, T 25 N, R 5 E
THURSTON COUNTY
(IIS #72328)
SETTJE AGRI SERVICES
AND ENGINEERING, INC
RB





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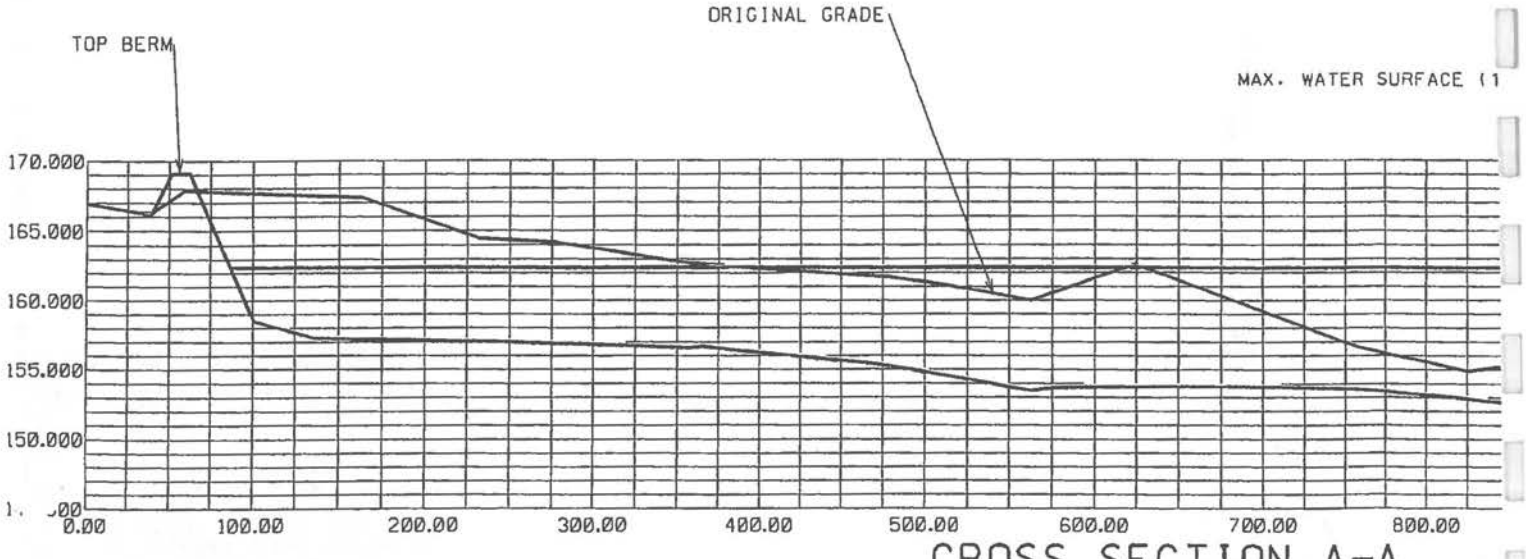

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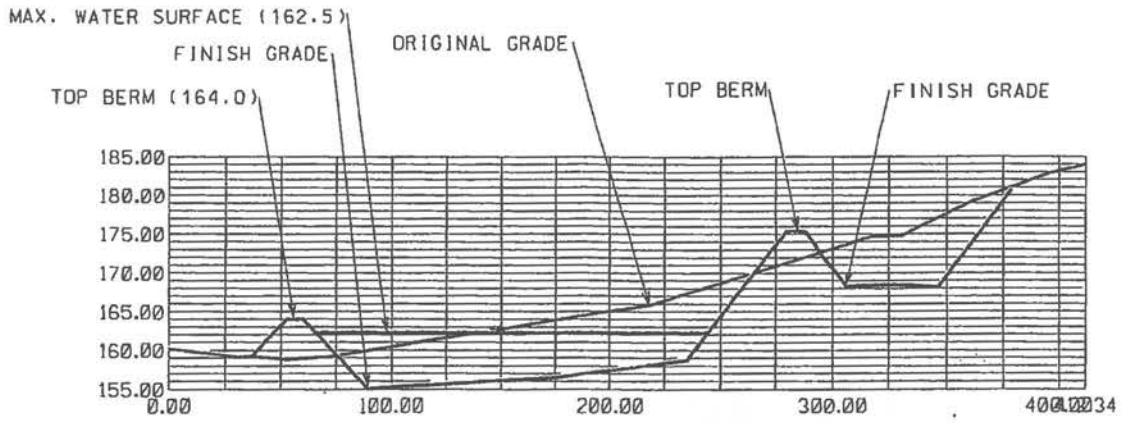

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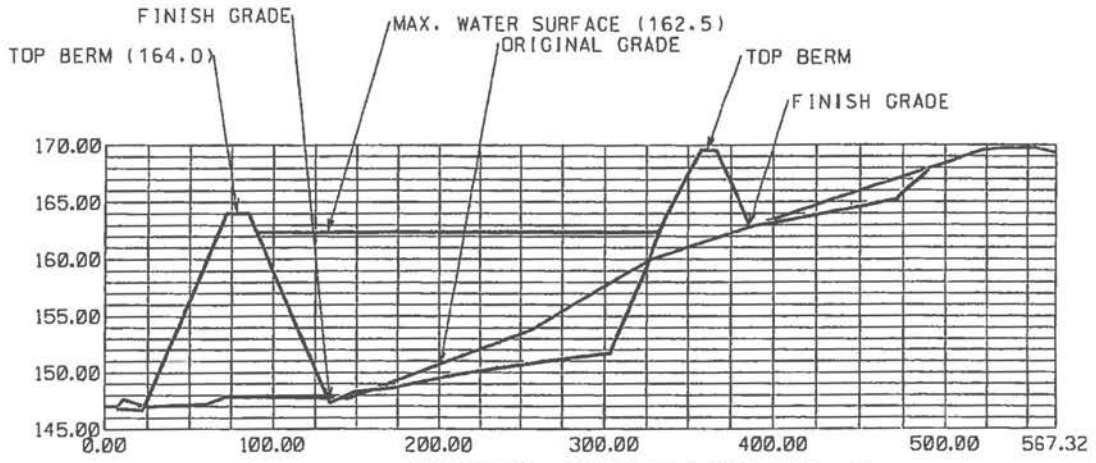

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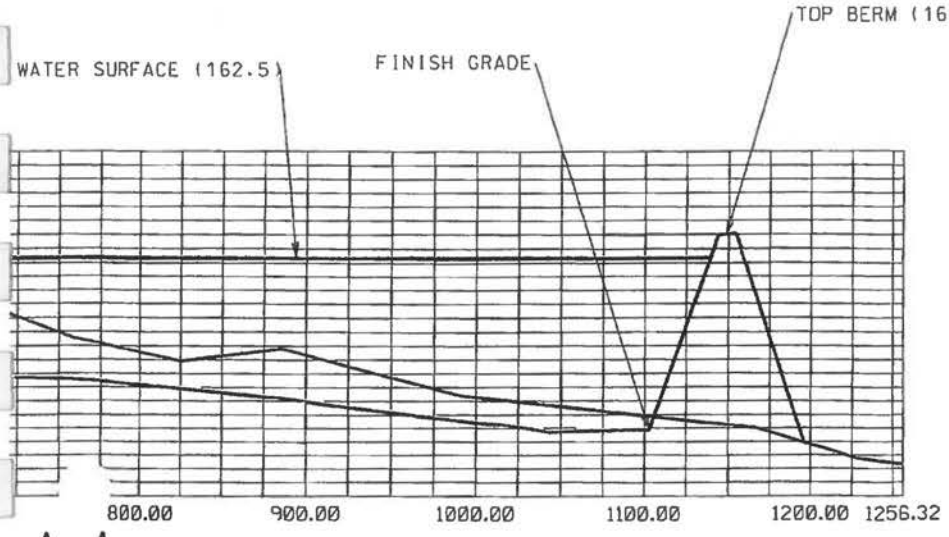
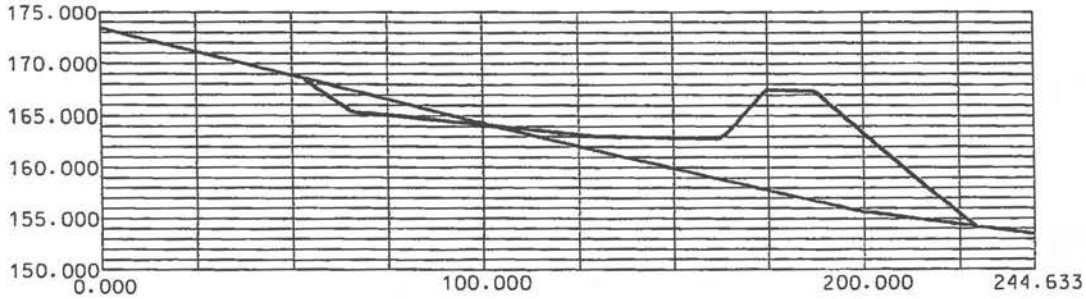


A-A

PERM LOCATIONS
LEON BRUNS FEEDYARD
N 1/2, NE 1/4, SEC 11, T 25 N, R 5 E
THURSTON COUNTY
SETTJE AGRI SERVICES
RB AND ENGINEERING, INC



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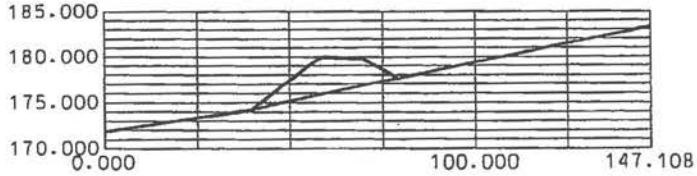

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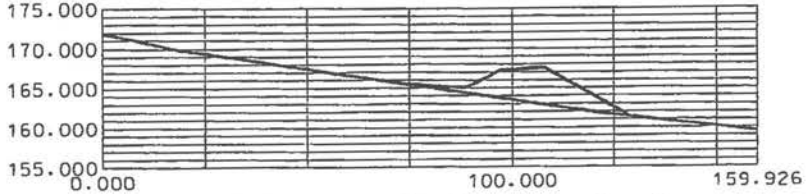

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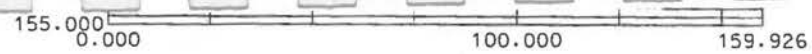

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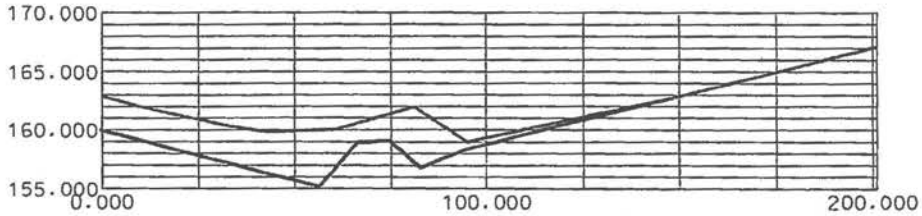

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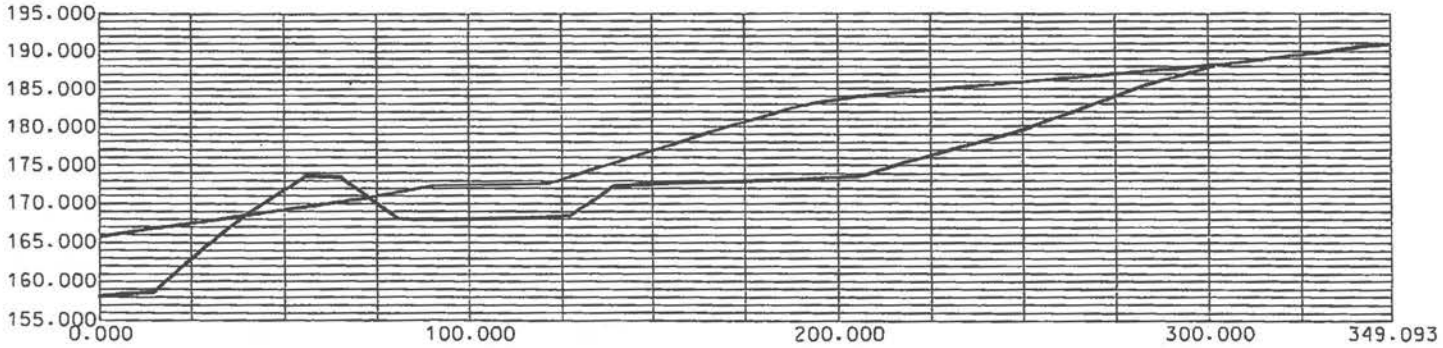
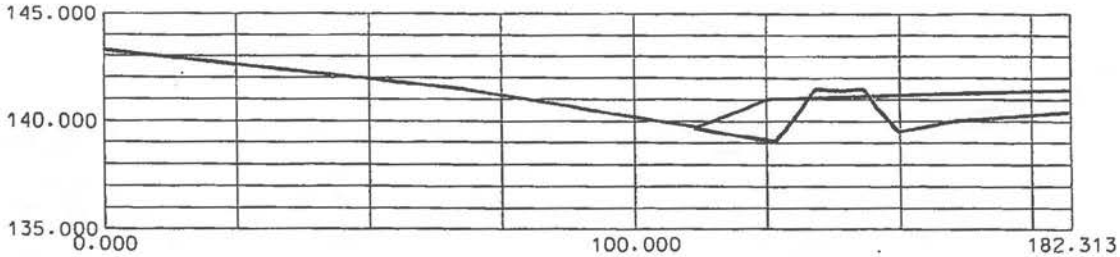


CROSS SECTION E-E

CROSS SECTION
LEON BRUNS FEEDYARD
N 1/2, NE 1/4, SEC 11, T 25 N, R 5 E
THURSTON COUNTY
SETTJE AGRI SERVICES
RB AND ENGINEERING, INC



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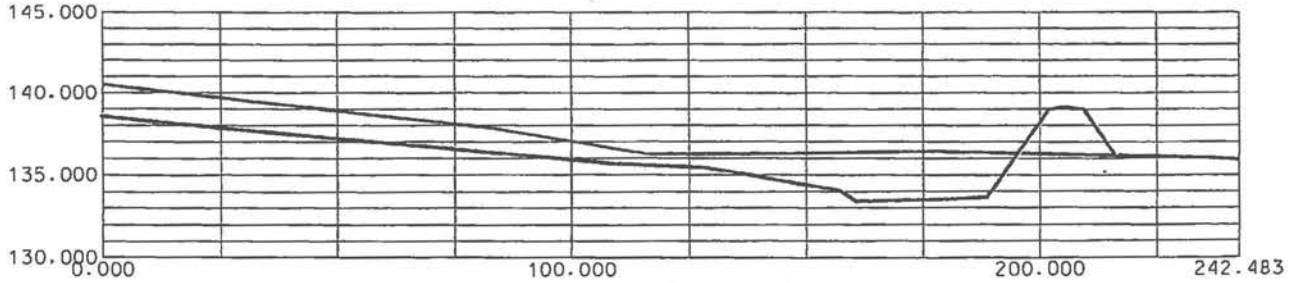

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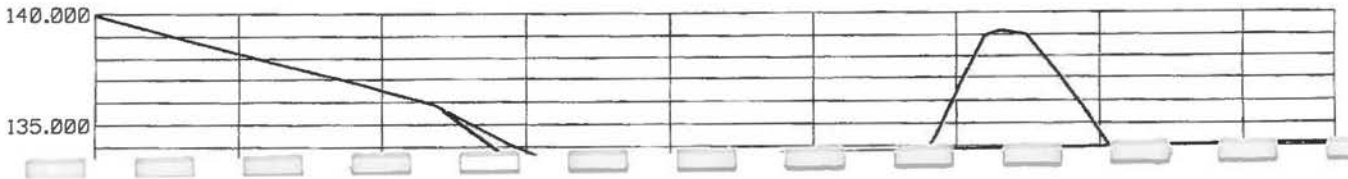
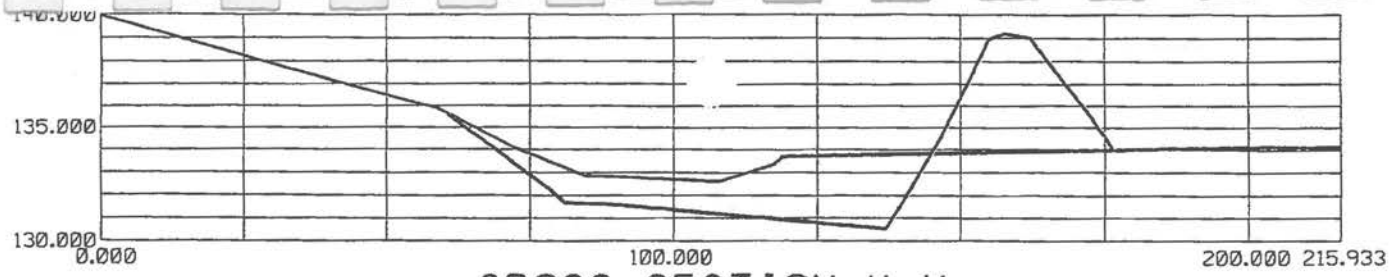
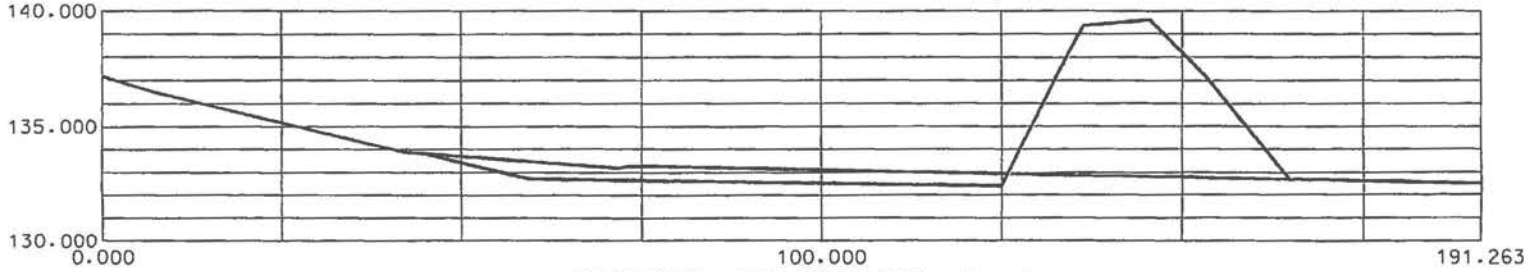




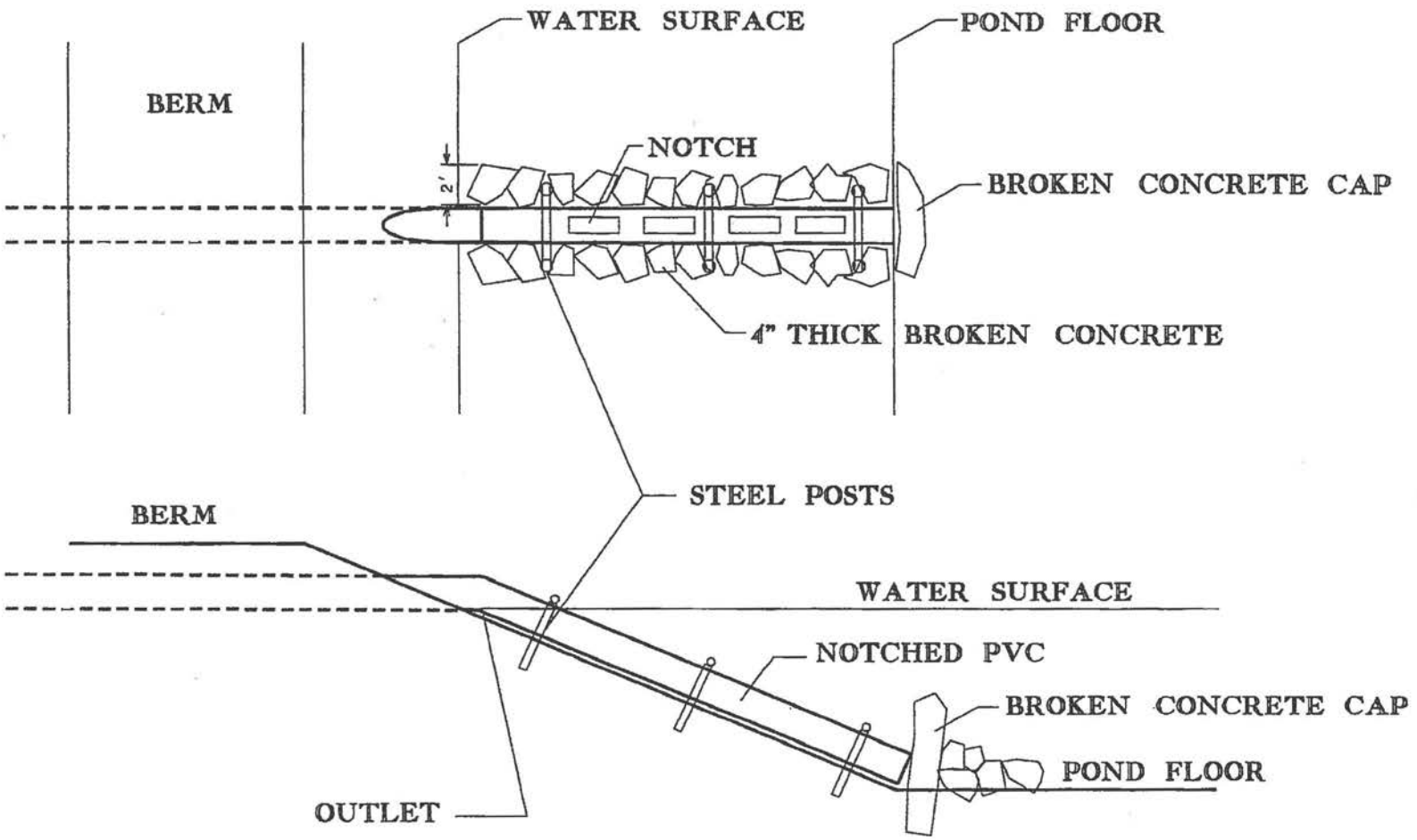
CROSS SECTION H-H



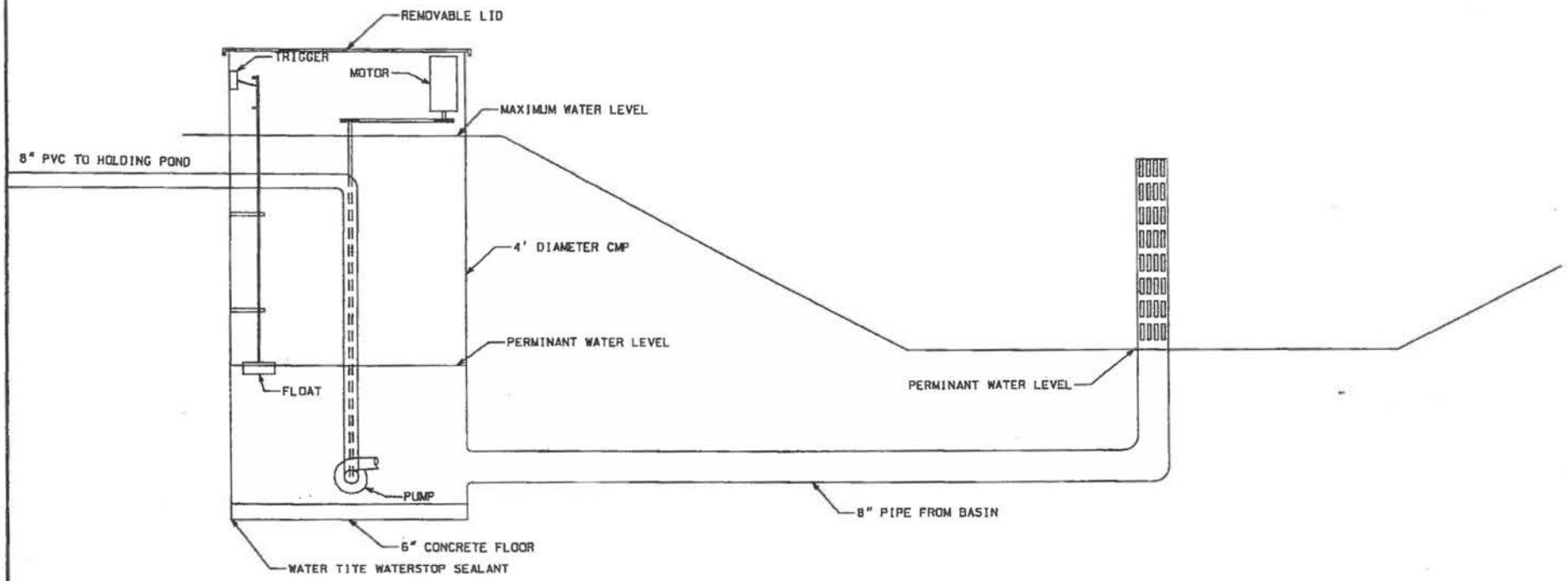
CROSS SECTION I-I

CROSS SECTION
LEON BRUNS FEEDYARD
N 1/2. NE 1/4. SEC 11. T 25 N. R 5 E
THURSTON COUNTY
SETTJE AGRI SERVICES
AND ENGINEERING INC

SPLASH PAD DETAIL #2



ANCHORED BY STEEL POSTS



PUMPING STATION DETAIL

NOT TO SCALE

Leon Bruns

Section II - Waste Production
Pond 1 Drainage Area

A. Background Information:

1. Type of Construction: ..... *Existing Pens and New Holding Pond*
2. Animal Type: ..... *feeder or fat cattle*
3. Feedlot Capacity: *4,000*
4. Average Animal Weight .... *850* pounds
5. Type of Feedlot Surface: .... *Dirt*
6. Are overflow waterers used and piped to pond? ..... *yes*

B. Minimum Runoff Storage Requirement:

1. Drainage Area

   (a) Feedlot Area ..... *52.2* acres

   (b) Contributing Drainage Area. ..... *10.2* acres

   (c) Total Runoff Area ..... *62.4* acres

2. Runoff

   (d) Minimum Runoff ... (see Appendix, Figure 1) . *6.0* inches

   (e) Runoff Volume ..... (see calculations on next page) = *29.5* acre feet

   Volume Needed to Contain Tank Overflow Water ..... *2.4* acre feet
   (SEE ATTACHED CALCS.)

3. Solids

   (f) Minimum Solids Accumulation Allowance ..... (a)x(0.5)/12 = *2.2* acre feet

4. Freeboard

   (g) Minimum Freeboard Requirement ..... = *1.5* feet

5. Storage

   (h) Minimum Runoff Storage Requirement ... (e + f + overflow) = *34.1* acre feet

Optional Conversions:

(acre feet) x 43,560 = *1,484,189* cubic feet (cubic feet) / 27 = *54,970* cubic yards

Section II -Waste Production (continued)
Pond 1 Drainage Area

Additional Information Provided by Settje Agri-Services and Engineering

A. Curve Number Calculation

1. Enter Variables

(a)	Precipitation	6	inches
(b)	Curve Number for Feedlot	90	
(c)	Curve Number for Contributing Drainage	74	
(d)	Soil Type	Nora Silt Loam	
(e)	Hydrologic Soil Group	B	

2. Calculate Curve Number

Curve Number		90	74
Find S	CN=1000/(10+S)	1.11	3.51
Solve for Runoff	Q=((P-(.2*S))2)/(P+(.8*S))	4.85	3.18
Ratio of Contributing Acres to Feedlot Acres		0.66	

Feedlot Acres	52.2	acres
Feedlot Runoff	6.0	inches
Feedlot Runoff Volume	26.1	acre feet
Contributing Acres	10.2	acres
Contributing Runoff	3.9	inches
Contributing Runoff Volume	3.4	acre feet
Total Drainage Area Runoff	29.5	acre feet

B. Tank Overflow Calculations

A 30,000 head feedyard was observed to have the following characteristics

(a) Time of overflow during the year	4	months
(b) Overflow Pipe Diameter	4	inch
(c) Amount of Pipe Used During Overflow Conditions	0.25	full
(d) Overflow Volume	0.076	cubic feet per sec.

Based on the 30,000 head feedyard, a 4000 head feedyard should have these characteristics

(e) Volume of Overflow Water Per Head	(d) / 30,000 =	0.0000025	cubic feet per sec.
(f) Number of Cattle		4,000	head
(g) Volume produced per second	(e) * (f) =	0.010	cubic feet per sec.
(h) Volume produced per 4 months	(g)*seconds in 4 months =	106,522	cubic feet
		2.4	acre feet

106522 cubic feet are required to contain the overflow from the tanks

Leon Bruns

Section III - Waste Storage
Pond 1 Drainage Area

A. Runoff Storage Provided

Capacity Calculation Method Used *Method III*

Method I - Capacity Calculations for Irregular Shaped Pond $V=D/3*(A_f+A_s+(A_f*A_s)^{0.5})$

V=Estimated Capacity; A_f=Pond Floor Area; A_s=Pond Surface Area; D=Design Full Depth

1. Holding Pond Dimensions:

Area of Pond Floor (ft^2)	*0*	Side Slopes	*3* :1
Area of Pond Surface (ft^2)	*0*	End Slopes	*3* :1
Design Full Depth (feet)	*0.0*		
Overflow Depth (feet)	*1.5*		
Provided Freeboard (feet)	*1.5*	(Overflow Depth) - (Design Full Depth)	

2. Holding Pond Capacity:

0	Cubic Feet	*0.0*	Acre Feet	*0*	Cubic Yards
1,484,189	Cubic Feet Required (from section II)				
0	% of required capacity				

Method II - Capacity Calculations for Rectangular Shaped Pond

Capacity = Vulume Above Rectangular Floor + Volume Above Side Slopes

1. Holding Pond Dimensions:

Bottom Length (feet)	*0*	Bottom Width (feet)	*0* feet
Top Length (feet)	*0*	Top Width (feet)	*0* feet
Design Full Depth (feet)	*0.0*	End Slopes	*0* :1
Overflow Depth (feet)	*0.0*	Side Slopes	*0* :1
Provided Freeboard (feet)	*0.0*	(Overflow Depth) - (Design Full Depth)	

2. Holding Pond Capacity:

0	Cubic Feet	*0.0*	Acre Feet	*0*	Cubic Yards
1,484,189	Cubic Feet Required (from section II)				
0	% of required capacity				

Method III - Capacity Calculated Using Digital Terrain Modeling

1. Holding Pond Dimensions:

Design Full Depth (feet)	*15.0*		
Overflow Depth (feet)	*16.5*		
Provided Freeboard (feet)	*1.5*	(Overflow Depth) - (Design Full Depth)	

2. Holding Pond Capacity:

1,833,768	Cubic Feet	*42.1*	Acre Feet	*67,917*	Cubic Yards
1,484,189	Cubic Feet Required (from section II)				
124	% of required capacity				

B. Provide Liner or Sealing Information

1. Soil Type or Unified Soil Classification at Bottom of Excavation: *Lamo Silt Clay Loam*

2. Soil Type or Unified Soil Classification of Soil Liner (if used): *Lamo Silt Clay Loam*

3. Depth to Water Table from the BOTTOM of the Excavation: *35'*

4. Describe in detail the Type of Sealing Provided: *See Construction Specifications*

Section III - Waste Storage (continued)
Pond 1 Drainage Area

A. Debris Basin Sizing

BASIN 1A

1. Required Capacity:

Feedlot Area (Acres)	*41.5*	25 Year-24 Hour Design Storm (in)	*5*	
Contributing Drainage Area (Acres)	*10.2*	Minimum Solids Storage (acre-in)	*20.8*	
Feedlot Curve Number	*90*	Feedlot Runoff (in)	*3.9*	
Contributing Area Curve Number	*74*	Contributing Area Runoff (in)	*2.4*	
Total Runoff Area (Acres)	*51.7*	Full Detention Capacity	*205.7*	acre inches
			17.1	acre feet
			746,808	cubic feet

Capacity Calculation Method Used *Method II*

Method I - Capacity Calculations for Rectangular Shaped Basin (See Attached Calculations)

2. Debris Basin Dimensions:

Total Water Depth	*0*	feet
Bottom Length		feet
Maximum Detention Depth		feet
Basin Channel Grade		%
Bottom Width		feet

Pen Side		Dike Side	
Depth Before Add. Storage (feet)		Depth Before Add. Storage (feet)	
Lot Slope	%	Lot Slope	%
Side Slopes	:1	Side Slopes	:1

3. Debris Basin Capacity: *0.0* acre inches; *0.0* acre feet; *0* cubic feet= *0* % Full Detention

Method II - Capacity Calculated Using Digital Terrain Modeling

2. Debris Basin Dimensions:

Maximum Detention Depth	*8.5*	feet
Max. Water Elevation (at capacity below)	*139*	feet

3. Debris Basin Capacity ..... *395.9* acre inches; *33.0* acre feet; *1,437,012* cubic feet= *192* % Full Detention

B. Debris Basin Flow

Aperture Type (Circular or Slotted)	*Circular*		
Aperture Size	*1.5-Inch-Diameter*		(See attached calculations)
Aperture Vertical Spacing (inches)	*8.0*	(See attached calculations)	
Aperture Horizontal Spacing (inches)	*9.4*	(See attached calculations)	
Riser Diameter (inches)	*12*	(See attached calculations)	
Riser Height (feet)	*8.5*	Is a Pump Used?	*yes*
Discharge Pipe Diameter (inches)	*8*	Is an Orifice Plate Used?	*No*
Outflow Location	*POND 1*	Flowrate (cfs)	*2.23*

BASIN 1A IS PUMPED TO POND 1 AT 2.23 CFS

Leon Bruns

BASIN FLOW CALCULATIONS

BASIN 1A

Required Basin Vol. (ft^3)	*746,808*	Limiting Device	*PUMP*
In-Flow Volume (ft^3)	*0*	Limiting Flowrate (cfs)	*2.23*
Maximum Head (feet)	*8.5*	In-Flow (cfs)	*0*
Pump Capacity (gpm)	*1000*	Release Time (hours)	93
Pump Capacity (cfs)	*2.23*		

PIPE TO PUMP FLOW CALCULATIONS $Q=VA$; $V=(2g\Delta Z/(1+fL/D+\Sigma K_L))^{1/2}$

Q=flowrate; A=inside pipe area; V=velocity in pipe; g=acceleration of gravity; ΔZ=total head; f=friction losses due to pipe roughness; L=pipe length; D=inside pipe diameter; ΣK_L=total minor losses from entrances, exits, valves, etc.

L, Pipe Length (ft)	*25*	Pipe Material	*PVC*
D, Inside Pipe Diameter (in)	*8*	ε, Roughness	*0.0E+00*
Inside Pipe Area (in^2)	*50.3*	Re, Reynold's Number	*6.37E+05*
ΔZ, Average Head (ft)	*4.75*	Turbulent/Laminar?	*Turbulent*
ΣK_L, Total Minor Losses	*0.8*	V, Avg. Velocity (ft/s)	*11.56*
Seed Friction Factor	*0.013*	Q, Avg. Flowrate (cfs)	*4.03*
f, Friction Factor (calculated)	*0.013*	Q, Avg. Flowrate (gpm)	*1811*

RISER CALCULATIONS-CIRCULAR HOLES $Q=C_dA(2gH)^{0.5}$

Q=Flowrate; Cd=Discharge Coefficient (0.61); A=Orifice Area; H=head

Riser Diameter (inches)	*12*	Hole Diameter (inches)	*1.5*
Riser Cicumference (inches)	*37.7*	Portion of H Used	*1/2*
Vertical Hole Spacing (inches)	*8*	0.5H (feet)	*4.25*
Horizontal Hole Spacing (inches)	*9.42*	Flowrate at 0.5H (cfs)	*2.38*

ıter of hole from bottom (feet)	Head on orifice (feet)	Number of orifices in row	Flow Through Orifice (cfs)	Flow Through Row (cfs)	Cumulative Flow (cfs)
0.0	4.2	4	0.124	0.497	0.497
0.7	3.6	4	0.114	0.456	0.953
1.3	2.9	4	0.103	0.412	1.365
2.0	2.2	4	0.090	0.362	1.726
2.7	1.6	4	0.076	0.303	2.030
3.3	0.9	4	0.058	0.231	2.260
4.0	0.2	4	0.030	0.120	2.381

Section III - Waste Storage (continued)
Pond 1 Drainage Area

A. Debris Basin Sizing

BASIN 1B

1. Required Capacity:

Feedlot Area (Acres)	5.8	25 Year-24 Hour Design Storm (in)	5	
Contributing Drainage Area (Acres)	0	Minimum Solids Storage (acre-in)	2.9	
Feedlot Curve Number	90	Feedlot Runoff (in)	3.9	
Contributing Area Curve Number	74	Contributing Area Runoff (in)	2.4	
Total Runoff Area (Acres)	5.8	Full Detention Capacity	25.4	acre inches
			2.1	acre feet
			92,139	cubic feet

Capacity Calculation Method Used *Method II*

Method I - Capacity Calculations for Rectangular Shaped Basin (See Attached Calculations)

2. Debris Basin Dimensions:

Total Water Depth	0	feet
Bottom Length		feet
Maximum Detention Depth		feet
Basin Channel Grade		%
Bottom Width		feet

Pen Side		Dike Side	
Depth Before Add. Storage (feet)		Depth Before Add. Storage (feet)	
Lot Slope	%	Lot Slope	%
Side Slopes	:1	Side Slopes	:1

3. Debris Basin Capacity:

0.0	acre inches		
0.0	acre feet		
0	cubic feet=	0	% Full Detention

Method II - Capacity Calculated Using Digital Terrain Modeling

2. Debris Basin Dimensions:

Maximum Detention Depth	4.9	feet
Max. Water Elevation (at capacity below)	167.5	feet

3. Debris Basin Capacity . . . . . 35.5 acre inches
3.0 acre feet
129,026 cubic feet= 140 % Full Detention

B. Debris Basin Flow

Aperture Type (Circular or Slotted)	Circular		
Aperture Size	1.5-Inch-Diameter		(See attached calculations)
Aperture Vertical Spacing (inches)	6.0	(See attached calculations)	
Aperture Horizontal Spacing (inches)	6.3	(See attached calculations)	
Riser Diameter (inches)	12	(See attached calculations)	
Riser Height (feet)	5	Is a Pump Used?	NO
Discharge Pipe Diameter (inches)	8	Is an Orifice Plate Used?	No
Outflow Location	POND 1	Flowrate (cfs)	2.10

BASIN 1B FLOWS BY GRAVITY TO POND 1 AT 2.1 CFS
NOTE: CUSTOM RISER REQUIRED TO CONTROL FLOWRATE

Leon Bruns

BASIN FLOW CALCULATIONS

BASIN 1B

Required Basin Vol. (ft^3)	*92,139*	Limiting Device	*RISER*
In-Flow Volume (ft^3)	*0*	Limiting Flowrate (cfs)	*2.10*
Maximum Head (feet)	*4.9*	In-Flow (cfs)	*0.00*
Pump Capacity (gpm)	*0*	Release Time (hours)	12
Pump Capacity (cfs)	*0.00*		

DISCHARGE PIPE FLOW CALCULATIONS $Q=VA$; $V=(2g\Delta Z/(1+fL/D+\Sigma K_L))^{1/2}$

Q=flowrate; A=inside pipe area; V=velocity in pipe; g=acceleration of gravity; ΔZ=total head; f=friction losses due to pipe roughness; L=pipe length; D=inside pipe diameter; ΣK_L=total minor losses from entrances, exits, valves, etc.

L, Pipe Length (ft)	*65*	Pipe Material	*PVC*
D, Inside Pipe Diameter (in)	*8*	ε, Roughness	*0.0E+00*
Inside Pipe Area (in^2)	*50.3*	Re, Reynold's Number	*4.72E+05*
ΔZ, Average Head (ft)	*3.5*	Turbulent/Laminar?	*Turbulent*
ΣK_L, Total Minor Losses	*0.8*	V, Avg. Velocity (ft/s)	*8.57*
Seed Friction Factor	*0.013*	Q, Avg. Flowrate (cfs)	*2.99*
f, Friction Factor (calculated)	*0.013*	Q, Avg. Flowrate (gpm)	*1342*

RISER CALCULATIONS-CIRCULAR HOLES $Q=C_dA(2gH)^{0.5}$

Q=Flowrate; Cd=Discharge Coefficient (0.61); A=Orifice Area; H=head

Riser Diameter (inches)	*12*	Hole Diameter (inches)	*1.5*
Riser Cicumference (inches)	*37.7*	Portion of H Used	*1/2*
Vertical Hole Spacing (inches)	*6*	0.5H (feet)	*2.45*
Horizontal Hole Spacing (inches)	*6.28*	Flowrate at 0.5H (cfs)	*2.10*

ıter of hole from bottom (feet)	Head on orifice (feet)	Number of orifices in row	Flow Through Orifice (cfs)	Flow Through Row (cfs)	Cumulative Flow (cfs)
0.0	2.4	6	0.094	0.566	0.566
0.5	1.9	6	0.084	0.505	1.071
1.0	1.4	6	0.073	0.435	1.506
1.5	0.9	6	0.059	0.352	1.859
2.0	0.4	6	0.040	0.243	2.101

Section III - Waste Storage (continued)
Pond 1 Drainage Area

A. Debris Basin Sizing

BASIN 1C

1. Required Capacity:

Feedlot Area (Acres)	4.9	25 Year-24 Hour Design Storm (in)	5	
Contributing Drainage Area (Acres)	0	Minimum Solids Storage (acre-in)	2.5	
Feedlot Curve Number	90	Feedlot Runoff (in)	3.9	
Contributing Area Curve Number	74	Contributing Area Runoff (in)	2.4	
Total Runoff Area (Acres)	4.9	Full Detention Capacity	21.4	acre inches
			1.8	acre feet
			77,841	cubic feet

Capacity Calculation Method Used *Method II*

Method I - Capacity Calculations for Rectangular Shaped Basin (See Attached Calculations)

2. Debris Basin Dimensions:

Total Water Depth	0	feet
Bottom Length		feet
Maximum Detention Depth		feet
Basin Channel Grade		%
Bottom Width		feet

Pen Side		Dike Side	
Depth Before Add. Storage (feet)		Depth Before Add. Storage (feet)	
Lot Slope	%	Lot Slope	%
Side Slopes	:1	Side Slopes	:1

3. Debris Basin Capacity:

0.0	acre inches		
0.0	acre feet		
0	cubic feet=	0	% Full Detention

Method II - Capacity Calculated Using Digital Terrain Modeling

2. Debris Basin Dimensions:

Maximum Detention Depth	5.2	feet
Max. Water Elevation (at capacity below)	173.2	feet

3. Debris Basin Capacity . . . . . 18.9 acre inches
1.6 acre feet
68,722 cubic feet= 88 % Full Detention

B. Debris Basin Flow

Aperture Type (Circular or Slotted)	Circular		
Aperture Size	1.5-Inch-Diameter		(See attached calculations)
Aperture Vertical Spacing (inches)	10.0	(See attached calculations)	
Aperture Horizontal Spacing (inches)	9.4	(See attached calculations)	
Riser Diameter (inches)	12	(See attached calculations)	
Riser Height (feet)	5.5	Is a Pump Used?	No
Discharge Pipe Diameter (inches)	8	Is an Orifice Plate Used?	No
Outflow Location	POND 1	Flowrate (cfs)	1.02

BASIN 1C FLOWS BY GRAVITY TO POND 1 AT 1.02 CFS
NOTE: CUSTOM RISER REQUIRED TO CONTROL FLOWRATE

Leon Bruns

BASIN FLOW CALCULATIONS

BASIN 1C

Required Basin Vol. (ft^3)	*77,841*	Limiting Device	*RISER*
In-Flow Volume (ft^3)	*0*	Limiting Flowrate (cfs)	*1.02*
Maximum Head (feet)	*5.2*	In-Flow (cfs)	*0.00*
Pump Capacity (gpm)	*0*	Release Time (hours)	21
Pump Capacity (cfs)	*0.00*		

DISCHARGE PIPE FLOW CALCULATIONS $Q=VA$; $V=(2g\Delta Z/(1+fL/D+\Sigma K_L))^{1/2}$

Q=flowrate; A=inside pipe area; V=velocity in pipe; g=acceleration of gravity; ΔZ=total head; f=friction losses due to pipe roughness; L=pipe length; D=inside pipe diameter; ΣK_L=total minor losses from entrances, exits, valves, etc.

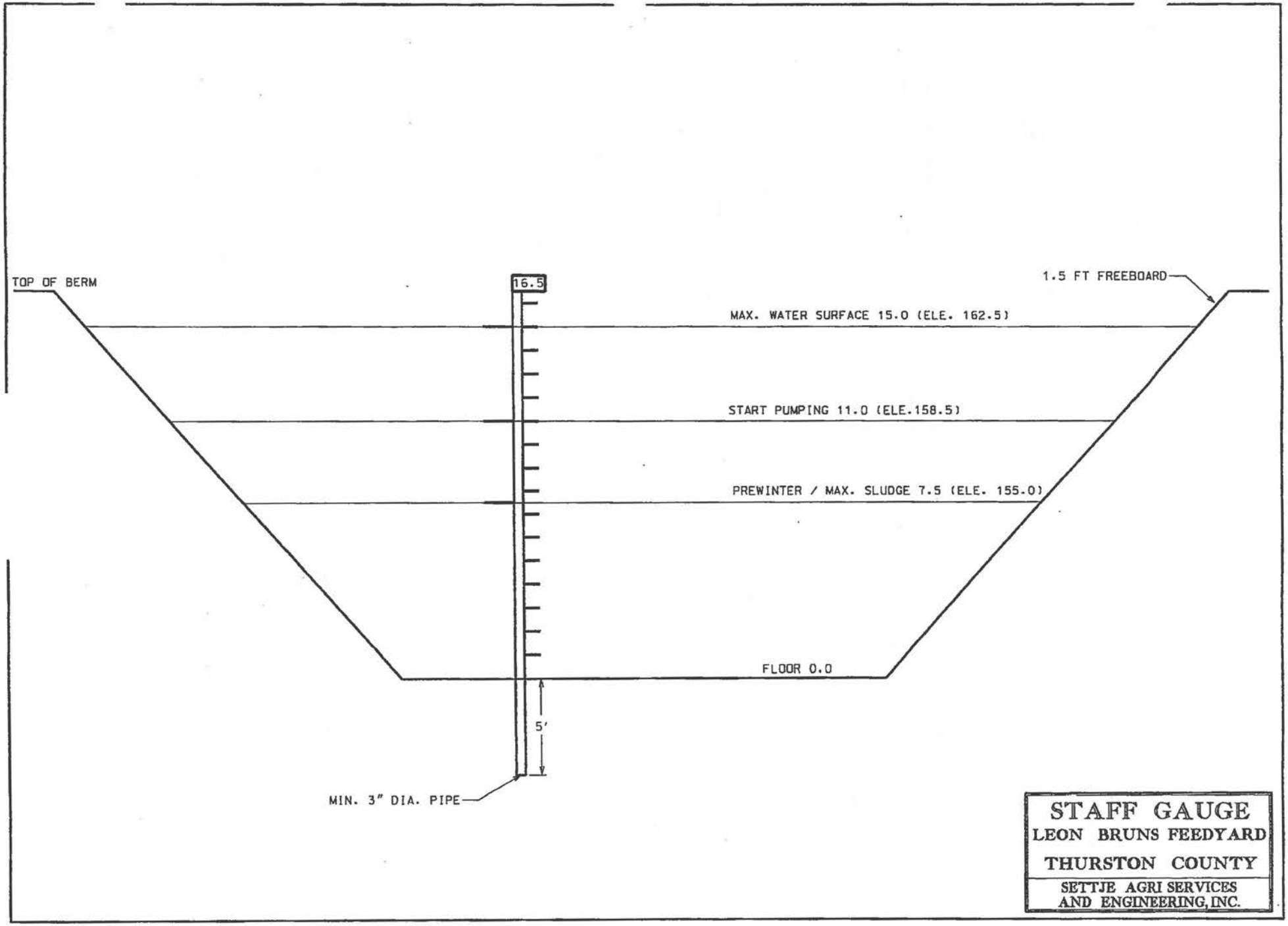
L, Pipe Length (ft)	*50*	Pipe Material	*PVC*
D, Inside Pipe Diameter (in)	*8*	ε, Roughness	*0.0E+00*
Inside Pipe Area (in^2)	*50.3*	Re, Reynold's Number	*4.96E+05*
ΔZ, Average Head (ft)	*3.5*	Turbulent/Laminar?	*Turbulent*
ΣK_L, Total Minor Losses	*0.8*	V, Avg. Velocity (ft/s)	*9.01*
Seed Friction Factor	*0.013*	Q, Avg. Flowrate (cfs)	*3.14*
f, Friction Factor (calculated)	*0.013*	Q, Avg. Flowrate (gpm)	*1411*

RISER CALCULATIONS-CIRCULAR HOLES $Q=C_dA(2gH)^{0.5}$

Q=Flowrate; Cd=Discharge Coefficient (0.61); A=Orifice Area; H=head

Riser Diameter (inches)	*12*	Hole Diameter (inches)	*1.5*
Riser Cicumference (inches)	*37.7*	Portion of H Used	*1/2*
Vertical Hole Spacing (inches)	*10*	0.5H (feet)	*2.6*
Horizontal Hole Spacing (inches)	*9.42*	Flowrate at 0.5H (cfs)	*1.02*

,nter of hole from bottom (feet)	Head on orifice (feet)	Number of orifices in row	Flow Through Orifice (cfs)	Flow Through Row (cfs)	Cumulative Flow (cfs)
0.0	2.6	4	0.097	0.389	0.389
0.8	1.8	4	0.080	0.320	0.709
1.7	0.9	4	0.058	0.233	0.942
2.5	0.1	4	0.019	0.076	1.018



STAFF GAUGE
LEON BRUNS FEEDYARD
THURSTON COUNTY
SETTJE AGRI SERVICES
AND ENGINEERING, INC.

Stage Storage Data
Leon Bruns Pond 1

Feedlot Area (Acres)	52.2	Head count in drainage area	4,000
Feedlot Curve Number	90	Design Full Depth (feet)	15
Contributing Drainage Area (Acres)	10.2	25-Year 24-Hour Storm (in)	5
Contributing Area Curve Number	74	Runoff for 25-Year Storm + June	6
Total Runoff Area (Acres)	62.4	25 Year Storm Runoff Volume (ft^3)	829,038
Eff. Runoff Area At Feedlot CN	58.9	25 Yr Storm Vol.+ June + tanks (ft^3)	1,484,189
Do tanks overflow to pond	yes	Total Pond Capacity (ft^3)	1,833,768

	Depth	Volume			
	From Bottom	Cubic ft.	Acre ft.	Acre in.	Gallons
	16.5	2,189,864	50.3	603.3	16,380,183
	16	2,071,160	47.5	570.6	15,492,279
	15.5	1,952,457	44.8	537.9	14,604,375
Max. Water Surface	15	1,833,768	42.1	505.2	13,716,584
	14.5	1,715,980	39.4	472.7	12,835,530
	14	1,599,969	36.7	440.8	11,967,766
	13.5	1,485,727	34.1	409.3	11,113,235
	13	1,373,246	31.5	378.3	10,271,877
	12.5	1,262,518	29.0	347.8	9,443,634
	12	1,153,536	26.5	317.8	8,628,448
	11.5	1,046,306	24.0	288.2	7,826,367
Start Pumping	11	941,541	21.6	259.4	7,042,728
	10.5	840,852	19.3	231.6	6,289,572
	10	744,608	17.1	205.1	5,569,668
	9.5	653,093	15.0	179.9	4,885,138
	9	566,856	13.0	156.2	4,240,082
	8.5	486,932	11.2	134.1	3,642,253
	8	414,277	9.5	114.1	3,098,796
Sludge	7.5	348,265	8.0	95.9	2,605,022
	7	288,363	6.6	79.4	2,156,954
	6.5	234,475	5.4	64.6	1,753,875
	6	186,268	4.3	51.3	1,393,285
	5.5	143,802	3.3	39.6	1,075,636
	5	107,291	2.5	29.6	802,537
	4.5	77,022	1.8	21.2	576,122
	4	53,509	1.2	14.7	400,246
	3.5	36,253	0.8	10.0	271,170
	3	23,530	0.5	6.5	176,004
	2.5	14,246	0.3	3.9	106,557
	2	7,725	0.2	2.1	57,781
	1.5	3,480	0.1	1.0	26,028
	1	1,123	0.0	0.3	8,397
	0.5	168	0.0	0.0	1,257
	0	0	0.0	0.0	0

Section 3

Facility Safety & Security

Livestock Mortality Management Plan - Supplement

Name of Operation & Address (please print)

Bruns Feedlot LLC

1172 I Ave

Pender NE 68047

City *State* *Zip Code*

Phone No. 402-385-3650

For NDEQ use

IIS No. 72328 (if known)

Indicate your primary and secondary means of carcass disposal.

	Burial	Render	Compost	Incinerate	Landfill
Primary		X			
Secondary	X				

Is temporary on-site storage used? ☒ Yes ☐ No

If yes indicate the means to control runoff from the temporary storage area:

- o Area controlled by Livestock Waste Control Facility: (yes) no
- o Carcasses containerized or covered (tarped): yes (no)
- o Storage area controlled by berms or diversion: yes (no)
- o If controlled by other means or practices please describe: _____

Attach an aerial photo or site map showing the location and extent of temporary storage areas, burial sites or compost sites.

Disposal of animal carcasses in the Livestock Waste Control Facility is prohibited.

Additional information on mortality management is available through Nebraska Department of Agriculture.

Leon Bruns

**Printed or typed name of Authorized representative*

_____ Date: _____

**Signature of Authorized Representative:*

**Signature not required if supplement submitted within a complete application*

Chemical Management Plan - Supplement

Name of Operation & Address (please print)

Bruns Feedlot LLC

1174 I Ave

Pender NE 68047

City/Town *State* *Zip Code*

Phone No. 402-385-3650

IIS No. 72328 (if known)

For NDEQ use

Does your operation store chemicals (insecticides, herbicides or other pesticides or disinfectants) on or adjacent to the animal feeding operation (including chemicals used for farming practices as well as livestock production)? (yes) no

If yes, indicate the area chemicals are stored on a site map or describe the storage area location(s)

See Componant Map

If pesticides are mixed or loaded into application equipment on site please indicate the location where this normally occurs. All mixed at fields

Does your operation store petroleum products, fuels, lubricants or oils, used oils or antifreeze on or adjacent to the animal feeding operation? ☒ **Yes** ☐ **No**

If yes, indicate the area chemicals are stored on a site map or describe the storage area location(s) _____

If used, attach an aerial photo or site map showing the location of storage areas and mixing/loading area.

Disposal of Chemicals in the Livestock Waste Control Facility is prohibited.

Additional information on chemical management for pesticides is available through Nebraska Department of Agriculture and UNL Extension.

For additional information on bulk fuel storage contact the Nebraska State Fire Marshal.

Leon Bruns

**Printed or typed name of Authorized representative*

_____ Date: _____

**Signature of Authorized Representative*

**Signature not required if supplement submitted within a complete application.*

Bruns Feedlot, LLC

Facility Component Map

Temporary Mortality Site

Burial Site

Chemical Storage Site

Fuel Storage

Stockpile or Compost Site

Section 4

Crop Yield Data

USDA United States Department of Agriculture
National Agricultural Statistics Service

Year	Geo Level	State	County	Data Item	Value
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	203.7
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	206.8
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	196.8
2013	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	214
2012	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	196.9
				County Average	204
				County Average +10%	224
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	183.1
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	193.3
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	179.7
2013	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	179.2
				County Average	184
				County Average +10%	202
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	63.9
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	61.9
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	55
2013	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	62.9
2012	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	54.2
				County Average	60
				County Average +10%	66
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	59.1
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	56.9
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	52.7
2013	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	57.2
				County Average	56
				County Average +10%	62
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	4.75
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	4.5
2013	COUNTY	NEBRASKA	THURSTON	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	3.9
2012	COUNTY	NEBRASKA	THURSTON	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	3.8
				County Average	4.2
				County Average +10%	5

USDA United States Department of Agriculture
National Agricultural Statistics Service

Year	Geo Level	State	County	Data Item	Value
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	203.7
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	206.8
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	196.8
2013	COUNTY	NEBRASKA	WAYNE	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	211.2
2012	COUNTY	NEBRASKA	WAYNE	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	180.9
				County Average	200
				County Average +10%	220
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	183.1
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	193.3
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	179.7
2013	COUNTY	NEBRASKA	WAYNE	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	179.3
				County Average	184
				County Average +10%	202
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	63.9
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	61.9
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	55
2013	COUNTY	NEBRASKA	WAYNE	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	60.4
2012	COUNTY	NEBRASKA	WAYNE	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	56.7
				County Average	60
				County Average +10%	66
2016	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	59.1
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	56.9
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	52.7
2013	COUNTY	NEBRASKA	WAYNE	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	53.3
				County Average	56
				County Average +10%	61
2015	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	4.75
2014	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	4.5
2013	COUNTY	NEBRASKA	WAYNE	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	3.8
2012	COUNTY	NEBRASKA	WAYNE	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	3.5
				County Average	4.1
				County Average +10%	5

Weighted Average for Bruns Feedlot, LLC

Thurston

County 1 Yields	
Crop	Yield
Irrigated Corn	224
Non Irrigated Corn	202
Irrigated Soybeans	66
Non Irrigated Soybeans	62
Alfalfa	4.7

County 1 Acres	338
Weight Factor	0.61

Wayne

County 2 Yields	
Crop	Yield
Irrigated Corn	220
Non Irrigated Corn	202
Irrigated Soybeans	66
Non Irrigated Soybeans	61
Alfalfa	4.6

County 2 Acres	220
Weight Factor	0.39

Weighted Average

Crop	Yield
Irrigated Corn	222
Non Irrigated Corn	202
Irrigated Soybeans	66
Non Irrigated Soybeans	62
Alfalfa	4.6

Total Acres: 558

NUTRIENT ADVISORS

1- Proven Yieds are 5 year averages from Production History Summary

Section 5

Site Information

Bruns Feedlot, LLC

Application Site Summary

Total Acres: 557.76

Application Site # / Name	Useable Acres	Land Use	Dominate Soil Slope [A]	Legal Description	Land Owner	Application Agreement	Shared Manure Application Site
Site 1 McGuires	112.00	Dryland Crop	Belfore Silty Clay Loam 0 - 2% Slopes	W1/2 SW1/4, W1/2 E1/2 SW1/4 S15-T25N-R5E	Lonnie McGuire 58511 849th Rd Pender, NE 68047	Yes	No
Site 2 SW Pivot	76.48	Effluent Irrigated Crop	Nora Silt Loam 6 - 11% Slopes	SE1/4 NW1/4, E1/2 SW1/4 NE1/4 S11-T25N-R5E	Leon Bruns 1174 I Ave Pender, NE 68047	Owned	No
Site 3 Joels 100	108.10	Dryland Crop	Nora Silt Loam 6 - 11% Slopes	E1/2 NE1/4, Pt. W1/2 NE1/4 S3-T25N-R5E	Marilyn Hansen PO Box 234 Wakefield, NE 68784	Yes	No
Site 4 E Corner	27.54	Dryland Crop	Lamo Silty Clay Loam Occassionally Flooded	Pt. NE1/4 NE1/4, W1/2 SW1/4 NE1/4 S11-T25N-R5E	Leon Bruns 1174 I Ave Pender, NE 68047	Owned	Yes
Site 5 S 80	80.06	Dryland Crop	Nora Silt Loam 6 - 11% Slopes	S1/2 NW1/4 S26-T25N-R5E	Marilyn Hansen PO Box 234 Wakefield, NE 68784	Yes	No
Site 6 Marylin N40 & W80	114.60	Dryland Crop	Nora Silt Loam 6 - 11% Slopes	W1/2 SW1/4, SW1/4 NW1/4 S2-T25N-R5E	Marilyn Hansen PO Box 234 Wakefield, NE 68784	Yes	No
Site 7 N40	38.98	Dryland Crop	Nora Silt Loam 6 - 11% Slopes	SE1/4 SW1/4 S2-T25N-R5E	Mary Bruns 1174 I Ave Pender, NE 68047	Owned	No

A - Soil type and slope provided by Agri-Data Inc.; see site specific soil maps in Section 7

Bruns Feedlot, LLC

Best Management Practices

Application Site #	Phosphorus Risk Assessment[B]	Nitrogen Risk Assessment[C]	Conservation Practices	Setbacks[D]	Best Management Practices Phosphorus	Best Management Practices Nitrogen
Site 1 McGuires	Low Risk 0.4	Silty Clay Loam = Fine Texture Fine Texture and Fall or Spring Application = Low nitrogen leaching potential	Conservation Tillage/No Till	None	Soil Sampling Manure Sampling Conservatin Tillage/No Till	Soil Sampling Manure Sampling Conservation Tillage/No Till
Site 2 SW Pivot	Medium Risk 3.9	Silt Loam = Medium Texture Mediun Texture and Split Application = Low nitrogen leaching potential	Conservation Tillage/No Till	Stream Well	Soil Sampling Manure Sampling Conservatin Tillage/No Till	Soil Sampling Manure Sampling Conservation Tillage/No Till
Site 3 Joels 100	Medium Risk 4.8	Silt Loam = Medium Texture Mediun Texture and Fall or Spring Application = Medium Low nitrogen leaching potential	Conservation Tillage/No Till	None	Soil Sampling Manure Sampling Conservatin Tillage/No Till	Soil Sampling Manure Sampling Conservation Tillage/No Till
Site 4 E Corner	Low Risk 0.8	Silty Clay Loam = Fine Texture Fine Texture and Fall or Spring Application = Low nitrogen leaching potential	Conservation Tillage/No Till	Stream Well	Soil Sampling Manure Sampling Conservatin Tillage/No Till	Soil Sampling Manure Sampling Conservation Tillage/No Till
Site 5 S 80	Medium Risk 2.3	Silty Clay Loam = Fine Texture Fine Texture and Fall or Spring Application = Low nitrogen leaching potential	Conservation Tillage/No Till	None	Soil Sampling Manure Sampling Conservatin Tillage/No Till	Soil Sampling Manure Sampling Conservation Tillage/No Till
Site 6 Marylin N40 & W80	Low Risk 4.9	Silt Loam = Medium Texture Mediun Texture and Fall or Spring Application = Medium Low nitrogen leaching potential	Conservation Tillage/No Till	None	Soil Sampling Manure Sampling Conservatin Tillage/No Till	Soil Sampling Manure Sampling Conservation Tillage/No Till
Site 7 N40	Medium Risk 4.9	Silt Loam = Medium Texture Mediun Texture and Fall or Spring Application = Medium Low nitrogen leaching potential	Conservation Tillage/No Till	Well	Soil Sampling Manure Sampling Conservatin Tillage/No Till	Soil Sampling Manure Sampling Conservation Tillage/No Till

B - The Nebraska Phosphorus Index C-NRCS (S-590) D-as found on site specific site maps, Section 7

Nitrogen Leaching Potential

Timing of Application	Soil Texture		
	Coarse	Medium	Fine
Fall Application	High	Medium-Low	Low
Spring Application, Pre-Plant	High-Medium	Medium-Low	Low
Sidedress or Split Application	Medium-Low	Low	Low

Coarse Texture	(Sand, Loamy sand, sandy loam)
Medium Texture	(Silt, silt loam, loam);
Fine Texture	(silty clay loam, silty clay, clay, clay loam, sandy clay loam, sandy clay)

This table indicates the leaching potential based on soil texture and application timing. This information can be used to make appropriate adjustments in the timing, method and formulation of Nitrogen applied to avoid excessive losses.

Contents of table is from NRCS Nutrient Management (S-590)

NRCS S590 Nitrogen Risk Guide

Section 6

Manure Production & Utilization

Bruns Feedlot, LLC

Nutrient Production Worksheet

Maximum Capacity

A **Manure** Type / Amount (See Manure Production Summary)	B **Nutrient**	C **Lbs. / Unit** (See Manure Analysis Summary)	D **Nutrient Production Actual Inventory** (A x C)	E **Nutrient Production Maximum Inventory** (D x % Increase)	F **% Available After Application** (NebGuide G1335)	G **Total lbs. Nutrient Available** (ExF)
Actual Inventory Feeder Cattle	3,033			**Maximum Capacity Feeder Cattle**	4,000	% Increase 31.9
Solid Manure (Tons) 4,709	Ammonium N	1.08	5,086	6,707	0%	0
	Organic N	14.20	66,868	88,187	47%	41,448
	Phosphorus	23.05	108,542	143,149	100%	143,149
Effluent (Acre Inches) 11,271,197	Ammonium N	49.73	20,642	27,223	50%	13,612
	Organic N	19.13	7,941	10,472	57%	5,969
	Phosphorus	19.50	8,094	10,675	100%	10,675

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Total Ammonium N:	13,612 lbs.
Total 1st Yr. Organic N:	25,712 lbs.
Total 2nd Yr. Organic N:	14,799 lbs.
Total 3rd Yr. Organic N:	6,906 lbs.
Total N Available All Sources:	61,029 lbs.
Total Phosphorus Available:	153,823 lbs.

Bruns Feedlot, LLC		
Percent Nitrogen Available after Application		
Ammonium Nitrogen		Lbs. N Available
Dry Manure Preplant Application and Not Incorporated	**0%**	0
Effluent Sprinkler Application	**50%**	13,612
Availability of Organic Nitrogen in Solid Manure		
Solid Manure First Year Availability	25%	22,047
Solid Manure Second Year Availability	15%	13,228
Solid Manure Third Year Availability	7%	6,173
Total Availability of Solid Manure Application	**47%**	41,448
Availability of Organic Nitrogen in Effluent		
Effluent First Year Availability	35%	3,665
Effluent Second Year Availability	15%	1,571
Effluent Third Year Availability	7%	733
Total Availability of Effluent Application	**57%**	5,969
Values based on NebGuide G1335 Figure 2		

FIELD PLAN - 5 YEAR NUTRIENT PROJECTION

Application Site Summary

Field Management Description:	A. Irrigated Corn Corn Rotation	Site # in Rotation:	2
	Effluent Application		

Field Plan For Nitrogen

Year	Previous Crop	Planned Crop	Expected Yield bu/ac	Total Crop N Need lb/ac	Soil N lb/ac	Nitrogen Credits: Previous Crop Legume N lb/ac	Nitrogen Credits: Prior Manure Organic N 2nd year lb/ac	Nitrogen Credits: Prior Manure Organic N 3rd year lb/ac	Irr. N lb/ac	Nitrogen Need before Manure Application lb/ac	Planned Manure N Application 1st yr Avail lb/ac	Planned Commercial N Application lb/ac	Nitrogen Balance lb/ac
1	Corn	Corn	222	302	30	0	0.0	0.0	0.0	232	143	89	0
2	Corn	Corn	222	302	30	0	13.0	0.0	0.0	219	143	76	0
3	Corn	Corn	222	302	30	0	13.0	6.1	0.0	213	143	70	0
4	Corn	Corn	222	302	30	0	13.0	6.1	0.0	213	143	70	0
5	Corn	Corn	222	302	30	0	13.0	6.1	0.0	213	143	70	0

Field Plan For Phosphorus

Year	Previous Crop	Planned Crop	Expected Yield	Total Crop P Removal		Phosphorus Need before Manure Application lb/ac	Planned Manure P Application lb/ac	Planned Commercial P Application lb/ac	Phosphorus Balance lb/ac
1	Corn	Corn	222	73		73	88	0	15
2	Corn	Corn	222	73		73	88	0	30
3	Corn	Corn	222	73		73	88	0	44
4	Corn	Corn	222	73		73	88	0	59
5	Corn	Corn	222	73		73	88	0	74

* These manure applications are projections only - any of these sites may or may not receive manure in any given year and may receive more or less manure N than is projected in any given year.
* County Averages are used for crop yield goals in this crop rotation projection - Actual yield goals may be based on site specific yield data at time of manure application.
* Projections are for acres that are controlled by the operation - Other manure nutrients may be transfered to acres that are not controlled by the operation.

FIELD PLAN - 5 YEAR NUTRIENT PROJECTION

Application Site Summary

Field Management Description:	G. Dryland Corn Corn Soybean Rotation	Site # in Rotation:	7
	Dry Manure Application		

Field Plan For Nitrogen

Year	Previous Crop	Planned Crop	Expected Yield bu/ac	Total Crop N Need lb/ac	Nitrogen Credits: Soil N lb/ac	Previous Crop Legume N lb/ac	Prior Manure Organic N: 2nd year lb/ac	Prior Manure Organic N: 3rd year lb/ac	Irr. N lb/ac	Nitrogen Need before Manure Application lb/ac	Planned Manure N Application 1st yr Avail lb/ac	Planned Commercial N Application lb/ac	Nitrogen Balance lb/ac
1	Soybeans	Corn	202	278	30	45	0.0	0.0	0.0	203	36	167	0
2	Corn	Corn	202	278	30	0	21.3	0.0	0.0	226	36	191	0
3	Corn	Soybeans	62	228	30	45	21.3	9.9	0.0	122	0	0	0
4	Soybeans	Corn	202	278	30	0	0.0	9.9	0.0	238	36	202	0
5	Corn	Corn	202	278	30	45	21.3	0.0	0.0	181	36	146	0

Field Plan For Phosphorus

Year	Previous Crop	Planned Crop	Expected Yield	Total Crop P Removal		Phosphorus Need before Manure Application lb/ac	Planned Manure P Application lb/ac	Planned Commercial P Application lb/ac	Phosphorus Balance lb/ac
1	Soybeans	Corn	202	67		67	231	0	164
2	Corn	Corn	202	67		67	231	0	328
3	Corn	Soybeans	62	48		48	0	0	280
4	Soybeans	Corn	202	67		67	231	0	444
5	Corn	Corn	202	67		67	231	0	608

* These manure applications are projections only - any of these sites may or may not receive manure in any given year and may receive more or less manure N than is projected in any given year.
* County Averages are used for crop yield goals in this crop rotation projection - Actual yield goals may be based on site specific yield data at time of manure application.
* Projections are for acres that are controlled by the operation - Other manure nutrients may be transferred to acres that are not controlled by the operation.

FIELD PLAN - 5 YEAR NUTRIENT PROJECTION

Application Site Summary

Field Management Description:	H. Dryland Corn Soybean Rotation	Site # in Rotation:	6
	Dry Manure Application		

Field Plan For Nitrogen

Year	Previous Crop	Planned Crop	Expected Yield bu/ac	Total Crop N Need lb/ac	Soil N lb/ac	Nitrogen Credits: Previous Crop Legume N lb/ac	Nitrogen Credits: Prior Manure Organic N 2nd year lb/ac	Nitrogen Credits: Prior Manure Organic N 3rd year lb/ac	Irr. N lb/ac	Nitrogen Need before Manure Application lb/ac	Planned Manure N Application 1st yr Avail lb/ac	Planned Commercial N Application lb/ac	Nitrogen Balance lb/ac
1	Soybeans	Corn	202	278	30	45	0.0	0.0	0.0	203	36	167	0
2	Corn	Soybeans	62	228	30	0	21.3	0.0	0.0	177	0	0	0
3	Soybeans	Corn	202	278	30	45	0.0	9.9	0.0	193	36	157	0
4	Corn	Soybeans	62	228	30	0	21.3	0.0	0.0	177	0	0	0
5	Soybeans	Corn	202	278	30	45	0.0	9.9	0.0	193	36	157	0

Field Plan For Phosphorus

Year	Previous Crop	Planned Crop	Expected Yield	Total Crop P Removal		Phosphorus Need before Manure Application lb/ac	Planned Manure P Application lb/ac	Planned Commercial P Application lb/ac	Phosphorus Balance lb/ac
1	Soybeans	Corn	202	67		67	231	0	164
2	Corn	Soybeans	62	48		48	0	0	116
3	Soybeans	Corn	202	67		67	231	0	280
4	Corn	Soybeans	62	48		48	0	0	233
5	Soybeans	Corn	202	67		67	231	0	396

* These manure applications are projections only - any of these sites may or may not receive manure in any given year and may receive more or less manure N than is projected in any given year.
* County Averages are used for crop yield goals in this crop rotation projection - Actual yield goals may be based on site specific yield data at time of manure application.
* Projections are for acres that are controlled by the operation - Other manure nutrients may be transferred to acres that are not controlled by the operation.

FIELD PLAN - 5 YEAR NUTRIENT PROJECTION

Application Site Summary

Field Management Description:	I. Dryland Corn Corn Rotation	Site # in Rotation:	1-6
	Dry Manure Application		

Field Plan For Nitrogen

Year	Previous Crop	Planned Crop	Expected Yield bu/ac	Total Crop N Need lb/ac	Soil N lb/ac	Nitrogen Credits: Previous Crop Legume N lb/ac	Nitrogen Credits: Prior Manure Organic N 2nd year lb/ac	Nitrogen Credits: Prior Manure Organic N 3rd year lb/ac	Irr. N lb/ac	Nitrogen Need before Manure Application lb/ac	Planned Manure N Application 1st yr Avail lb/ac	Planned Commercial N Application lb/ac	Nitrogen Balance lb/ac
1	Corn	Corn	202	278	30	0	0.0	0.0	0.0	248	36	212	0
2	Corn	Corn	202	278	30	0	21.3	0.0	0.0	226	0	226	0
3	Corn	Corn	202	278	30	0	0.0	9.9	0.0	238	36	202	0
4	Corn	Corn	202	278	30	0	21.3	0.0	0.0	226	0	226	0
5	Corn	Corn	202	278	30	0	0.0	9.9	0.0	238	36	202	0

Field Plan For Phosphorus

Year	Previous Crop	Planned Crop	Expected Yield	Total Crop P Removal		Phosphorus Need before Manure Application lb/ac	Planned Manure P Application lb/ac	Planned Commercial P Application lb/ac	Phosphorus Balance lb/ac
1	Corn	Corn	202	67		67	231	0	164
2	Corn	Corn	202	67		67	0	0	97
3	Corn	Corn	202	67		67	231	0	261
4	Corn	Corn	202	67		67	0	0	194
5	Corn	Corn	202	67		67	231	0	358

* These manure applications are projections only - any of these sites may or may not receive manure in any given year and may receive more or less manure N than is projected in any given year.
* County Averages are used for crop yield goals in this crop rotation projection - Actual yield goals may be based on site specific yield data at time of manure application.
* Projections are for acres that are controlled by the operation - Other manure nutrients may be transferred to acres that are not controlled by the operation.

FIELD PLAN - 5 YEAR NUTRIENT PROJECTION

Application Site Summary

Field Management Description:	J. Dryland Alfalfa	Site # in Rotation:	1
	Dry Manure Application		

Field Plan For Nitrogen

Year	Previous Crop	Planned Crop	Expected Yield bu/ac	Total Crop N Need lb/ac	Nitrogen Credits: Soil N lb/ac	Previous Crop Legume N lb/ac	Prior Manure Organic N: 2nd year lb/ac	Prior Manure Organic N: 3rd year lb/ac	Irr. N lb/ac	Nitrogen Need before Manure Application lb/ac	Planned Manure N Application 1st yr Avail lb/ac	Planned Commercial N Application lb/ac	Nitrogen Balance lb/ac
1	Corn	Alfalfa	5	254	30	0	0.0	0.0	0.0	224	36	188	0
2	Alfalfa	Alfalfa	5	254	30	80	21.3	0.0	0.0	123	0	123	0
3	Alfalfa	Alfalfa	5	254	30	80	0.0	9.9	0.0	134	0	134	0
4	Alfalfa	Alfalfa	5	254	30	80	0.0	0.0	0.0	144	0	144	0
5	Alfalfa	Alfalfa	5	254	30	80	0.0	0.0	0.0	144	0	144	0

Field Plan For Phosphorus

Year	Previous Crop	Planned Crop	Expected Yield	Total Crop P Removal		Phosphorus Need before Manure Application lb/ac	Planned Manure P Application lb/ac	Planned Commercial P Application lb/ac	Phosphorus Balance lb/ac
1	Corn	Alfalfa	5	55		55	231	0	175
2	Alfalfa	Alfalfa	5	55		55	0	0	120
3	Alfalfa	Alfalfa	5	55		55	0	0	64
4	Alfalfa	Alfalfa	5	55		55	0	0	9
5	Alfalfa	Alfalfa	5	55		55	0	0	-47

* These manure applications are projections only - any of these sites may or may not receive manure in any given year and may receive more or less manure N than is projected in any given year.
* County Averages are used for crop yield goals in this crop rotation projection - Actual yield goals may be based on site specific yield data at time of manure application.
* Projections are for acres that are controlled by the operation - Other manure nutrients may be transferred to acres that are not controlled by the operation.

2015 CAFO Annual Report

Submitted to the United States Environmental Protection Agency For:

Bruns Feedlot, LLC
IIS # 72328

RR 3 Box 158
Pender NE 68047
402-385-3650

1. Maximum number of livestock at facility during each month of 2015:

January -	**2,940**	**feeder cattle**	**July -**	**2,517**	**feeder cattle**
February -	**2,940**	**feeder cattle**	**August -**	**2,517**	**feeder cattle**
March -	**3,117**	**feeder cattle**	**September -**	**2,423**	**feeder cattle**
April -	**3,117**	**feeder cattle**	**October -**	**2,278**	**feeder cattle**
May -	**2,695**	**feeder cattle**	**November -**	**2,354**	**feeder cattle**
June -	**2,402**	**feeder cattle**	**December-**	**2,460**	**feeder cattle**

2. Estimated Generated Waste:

=	**4,109**	tons of cattle manure
=	**7,824,000**	gallons of process wastewater

3. Estimated Transferred Waste:

=	**1,900**	tons of cattle manure
=	**0**	gallons of process wastewater

4. Application Area:

Total acres controlled by CAFO used for land application during 2015: **169.1**

5. Discharges from LWCF in 2015:

There were no discharges from this facility in 2015.

6. Nutrient Management Plan Information:

The Nutrient Management Plan was submitted by Nutrient Advisors.

2016 CAFO Annual Report

Submitted to the United States Environmental Protection Agency For:

Bruns Feedlot, LLC
NE0135399

11741 Ave.
Pender NE 68047
402-385-3650

1. Maximum number of livestock at facility during each month of 2016:

January -	**2,659 feeder cattle**	**July -**	**2,200 feeder cattle**
February -	**2,659 feeder cattle**	**August -**	**2,200 feeder cattle**
March -	**2,580 feeder cattle**	**September -**	**2,516 feeder cattle**
April -	**2,652 feeder cattle**	**October -**	**3,053 feeder cattle**
May -	**2,652 feeder cattle**	**November -**	**3,053 feeder cattle**
June -	**2,343 feeder cattle**	**December-**	**2,752 feeder cattle**

2. Estimated Generated Waste:

	=	**3,887**	tons of cattle manure
	=	**13,464,000**	gallons of processed wastewater

3. Estimated Transferred Waste:

	=	**1,400**	tons of cattle manure
	=	**0**	gallons of processed wastewater

4. Application Area:

Total acres controlled by CAFO used for land application during 2016: **198.6**

5. Discharges from LWCF in 2016:

There were no discharges from this facility in 2016.

6. Nutrient Management Plan Information:

The Nutrient Management Plan was completed by Nutrient Advisors.

Note: Land application records represent the 2016 crop year and may include applications in the fall of 2015.

NUTRIENT ADVISORS
449 E. Deere Street ♦ West Point, NE 68788
Phone: 402.372.CAFO nutrientadvisors.com

2017 CAFO Annual Report

Submitted to the United States Environmental Protection Agency For:

Bruns Feedlot, LLC
NE0135399

1174 I Ave.
Pender NE 68047
402-385-3650

1. Maximum number of livestock at facility during each month of 2017:

January -	**2,511 feeder cattle**	**July -**	**2,695 feeder cattle**
February -	**2,511 feeder cattle**	**August -**	**2,559 feeder cattle**
March -	**2,487 feeder cattle**	**September -**	**2,559 feeder cattle**
April -	**2,866 feeder cattle**	**October -**	**2,720 feeder cattle**
May -	**2,866 feeder cattle**	**November -**	**2,928 feeder cattle**
June -	**2,695 feeder cattle**	**December-**	**2,928 feeder cattle**

2. Estimated Generated Waste:

	=	**6,131**	tons of cattle manure
	=	**12,525,590**	gallons of processed wastewater

3. Estimated Transferred Waste:

	=	**2,100**	tons of cattle manure
	=	**0**	gallons of processed wastewater

4. Application Area:

Total acres controlled by CAFO used for land application during 2017: **221.1**

5. Discharges from LWCF in 2017:

There were no discharges from this facility in 2017.

6. Nutrient Management Plan Information:

The Nutrient Management Plan was completed by Nutrient Advisors.

Note: Land application records represent the 2017 crop year and may include applications in the fall of 2016.

NUTRIENT ADVISORS

449 E. Deere Street ♦ West Point, NE 68788
Phone: 402.372.CAFO nutrientadvisors.com

Bruns Feedlot, LLC

Manure Production Summary

Production based on CAFO Annual Reports

Manure Production Calculation Method	Tons of Solid Manure	Gallons of Effluent	Gallons of Slurry Manure	Annual Inventory	Livestock Type
2017	6,131	12,525,590		2,928	Feeder Cattle
2016	3,887	13,464,000		3,053	Feeder Cattle
2015	4,109	7,824,000		3,117	Feeder Cattle
Averages	4,709	11,271,197		3,033	Feeder Cattle

Bruns Feedlot, LLC

Nutrients Required for Crop Growth

Crop	Irrigated Corn	Dryland Corn	Dryland Soybeans	Alfalfa			Totals
Crop Yield bu/ac	222	202	62	5			
Crop Acres	56	435	27	40			558
Total N Required[1] lbs.	14,898	105,590	6,117	10,159			136,765
Total P Required[1] lbs.	4,097	29,037	1,273	2,217			36,624

Total N Required for Crop	136,765	Lbs.	Total P_2O_5 Required for Crop	36,624	Lbs.
Total N Available all Sources[2]	61,029	Lbs.	Total P_2O_5 Available all Sources[2]	153,823	Lbs.
Un-utilized Manure N	0	Lbs.	Un-utilized Manure P_2O_5	117,199	Lbs.
Number of acres to utilize all Nitrogen produced:	249		Number of acres to utilize all Phosphorus produced:	2343	

[1]Nutrient Required based on **Wardguide**

[2]See Nutrient Production Worksheet

Manure Averages for Bruns Feedlot, LLC

	Ammonium Nitrogen			Organic Nitrogen			Phosphorus		
	Solid Manure Lbs. / Ton	Effluent Lbs. / acre inch		Solid Manure Lbs. / Ton	Effluent Lbs. / acre inch		Solid Manure Lbs. / Ton	Effluent Lbs. / acre inch	
Averages	1.08	49.73		14.20	19.13		23.05	19.50	
Report Number									
13-869	1.5			14.4			18.3		
14-1794	1.7			15.6			26.1		
15-2173	0.5			12.8			23.3		
16-1664	0.6			14			24.5		
15-10722		11.3			21.9			18.6	
16-11220		128			19			23.7	
17-10788		9.9			16.5			16.2	

Values from Ward Analysis Reports

WARD Laboratories, Inc.

Ag Testing - Consulting

Account No: 20850

Manure Analysis Report

Date Received: 4/15/2013
Date Reported: 4/16/2013

NUTRIENT ADVISORS LLC
449 E DEERE ST
WEST POINT NE 68788

Lab No.: 869

Results for: BRUNS FEEDLOT
Sample ID: PEN STOCKPILE
Sample Desc.: PEN 5 4/13

	Analysis Dry Basis	Analysis As Received	Lbs./Ton As Received
Ammonium, %N	0.204	0.07	1.5
Organic N, %N	1.97	0.72	14.4
Total N, %N	2.174	0.79	15.9
Phosphorus, %P2O5	2.51	0.91	18.3
Potassium, %K2O	3.08	1.12	22.4
Sulfur, %S	0.7	0.26	5.1
Calcium, %Ca	2.51	0.91	18.3
Magnesium, %Mg	0.8	0.29	5.8
Sodium, %Na	0.36	0.13	2.6
Zinc, ppm ZN	346.7	126	0.3
Iron, ppm Fe	5886.1	2144	4.3
Manganese, ppm Mn	395.3	144	0.3
Copper, ppm Cu	72.8	27	0.1
Soluble Salts, mmho/cm	54.73		25.5
pH	6.4		
Moisture, %	63.57		
Dry Matter (TS), %	36.43		

"<" - Not Detected / Below Detection Limit

Reviewed By: **Nick Ward**

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Fax:308-234-1940
web site
www.wardlab.com
4007 Cherry Ave., P.O. Box 738
Kearney, Nebraska 68848-0788

WARD Laboratories, Inc.

Ag Testing - Consulting

2016 Certified Manure Testing Program — Minnesota Department of Agriculture

Account No: 20850

Manure Analysis Report

Date Received: 9/8/2014
Date Reported: 9/9/2014

NUTRIENT ADVISORS LLC
449 E DEERE ST
WEST POINT NE 68788

Lab No.: 1794

Results for: BRUNS FEEDLOT
Sample ID: FIELD STOCKPILE
Sample Desc.: PENS 1 9-14

	Analysis Dry Basis	Analysis As Received	Lbs./Ton As Received
Ammonium, %N	0.144	0.09	1.7
Organic N, %N	1.31	0.78	15.6
Total N, %N	1.454	0.87	17.3
Phosphorus, %P2O5	2.19	1.3	26.1
Potassium, %K2O	1.64	0.98	19.6
Sulfur, %S	0.5	0.3	5.9
Calcium, %Ca	2.67	1.59	31.8
Magnesium, %Mg	0.86	0.51	10.2
Sodium, %Na	0.26	0.15	3.1
Zinc, ppm ZN	334.8	199	0.4
Iron, ppm Fe	10387	6185	12.4
Manganese, ppm Mn	647.3	385	0.8
Copper, ppm Cu	73.9	44	0.1
Soluble Salts, mmho/cm	28.29		21.6
pH	6.7		
Moisture, %	40.45		
Dry Matter (TS), %	59.55		

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Account No: 20850

Manure Analysis Report

Date Received: 9/11/2015
Date Reported: 9/14/2015

NUTRIENT ADVISORS LLC
449 E DEERE ST
WEST POINT NE 68788

Lab No.: 2173

Results for: BRUNS FEEDLOT
Sample ID: FIELD STOCKPILE
Sample Desc.: PENS 9/15

	Analysis Dry Basis	Analysis As Received	Lbs./Ton As Received
Ammonium, %N	0.046	0.03	0.5
Organic N, %N	1.18	0.64	12.8
Total N, %N	1.226	0.67	13.3
Phosphorus, %P2O5	2.14	1.16	23.3
Potassium, %K2O	2.01	1.09	21.9
Sulfur, %S	0.5	0.27	5.5
Calcium, %Ca	2.24	1.22	24.4
Magnesium, %Mg	0.83	0.45	9
Sodium, %Na	0.3	0.16	3.3
Zinc, ppm ZN	288.6	157	0.3
Iron, ppm Fe	10941.7	5951	11.9
Manganese, ppm Mn	659.8	359	0.7
Copper, ppm Cu	61.7	34	0.1
Soluble Salts, mmho/cm	35.28		24.6
pH	6.6		
Moisture, %	45.61		
Dry Matter (TS), %	54.39		

"<" - Not Detected / Below Detection Limit

Reviewed By: **Nick Ward**

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Account No: 20850

Manure Analysis Report

Date Received: 7/13/2016
Date Reported: 7/14/2016

NUTRIENT ADVISORS LLC
449 E DEERE ST
WEST POINT NE 68788

Lab No.: 1664

Results for: BRUNS FEEDLOT
Sample ID: PEN STOCKPILE
Sample Desc.: PENS 7/16

	Analysis Dry Basis	Analysis As Received	Lbs./Ton As Received
Ammonium, %N	0.045	0.03	0.6
Organic N, %N	1.02	0.7	14
Total N, %N	1.065	0.73	14.6
Phosphorus, %P2O5	1.78	1.23	24.5
Potassium, %K2O	1.23	0.85	17
Sulfur, %S	0.38	0.26	5.3
Calcium, %Ca	1.83	1.26	25.3
Magnesium, %Mg	0.74	0.51	10.2
Sodium, %Na	0.14	0.1	1.9
Zinc, ppm ZN	238	164	0.3
Iron, ppm Fe	14270.3	9854	19.7
Manganese, ppm Mn	653.4	451	0.9
Copper, ppm Cu	43.8	30	0.1
Soluble Salts, mmho/cm	13.49		11.9
pH	7.9		
Moisture, %	30.95		
Dry Matter (TS), %	69.05		

"<" - Not Detected / Below Detection Limit

Reviewed By: **Nick Ward**

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Account No: 20850

Slurry Analysis Report

Date Received: 4/16/2015
Date Reported: 4/17/2015

NUTRIENT ADVISORS LLC
449 E DEERE ST
WEST POINT NE 68788

Lab No.: 10722

Results for: BRUNS FEEDLOT
Sample ID: EFFLUENT
Sample Desc.: POND 1 4/15

	Analysis As Received	Lbs per Acre Inch	Lbs. per 1000 gal.
Ammonium, ppm N	49.7	11.3	0.4
Organic N, ppm N	96.8	21.9	0.8
Total N, ppm N	146.5	33.2	1.2
Phosphorus, ppm P2O5	81.9	18.6	0.7
Potassium, ppm K2O	663.5	150.4	5.6
Sulfur, ppm S	71.5	16.2	0.6
Calcium, ppm Ca	93	21.1	0.8
Magnesium, ppm Mg	78.3	17.8	0.7
Sodium, ppm Na	155.7	35.3	1.3
Zinc, ppm ZN	0.2	0.1	0
Iron, ppm Fe	5.8	1.3	0
Manganese, ppm Mn	0.6	0.1	0
Copper, ppm Cu	< 0.1	0	0
Soluble Salts, mmho/cm	3.66		18
pH	7.8		
Dry Matter (TS), %	0.32		

"<" - Not Detected / Below Detection Limit

Reviewed By: **Raymond Ward**

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Kearney, Nebraska 68848-0788

WARD Laboratories, Inc.

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2016 Certified Manure Testing Program — Minnesota Department of Agriculture

Account No: 20850

Slurry Analysis Report

Date Received: 6/1/2016
Date Reported: 6/2/2016

NUTRIENT ADVISORS LLC
449 E DEERE ST
WEST POINT NE 68788

Lab No.: 11220

Results for: BRUNS FEEDLOT
Sample ID: EFFLUENT
Sample Desc.: POND 1 5/16

	Analysis As Received	Lbs per Acre Inch	Lbs. per 1000 gal.
Ammonium, ppm N	56.7	12.8	0.5
Organic N, ppm N	83.7	19	0.7
Total N, ppm N	140.4	31.8	1.2
Phosphorus, ppm P2O5	104.6	23.7	0.9
Potassium, ppm K2O	553.9	125.5	4.6
Sulfur, ppm S	21.3	4.8	0.2
Calcium, ppm Ca	104.8	23.8	0.9
Magnesium, ppm Mg	80.5	18.2	0.7
Sodium, ppm Na	154.4	35	1.3
Zinc, ppm ZN	0.3	0.1	0
Iron, ppm Fe	18.1	4.1	0.2
Manganese, ppm Mn	1.2	0.3	0
Copper, ppm Cu	0.1	0	0
Soluble Salts, mmho/cm	3.08		15
pH	8.1		
Dry Matter (TS), %	0.3		

"<" - Not Detected / Below Detection Limit

Reviewed By: **Raymond Ward**

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WARD Laboratories, Inc.

Ag Testing - Consulting

2016 Certified Manure Testing Program — Minnesota Department of Agriculture

Account No: 20850

Slurry Analysis Report

Date Received: 4/27/2017
Date Reported: 4/28/2017

NUTRIENT ADVISORS
449 E DEERE ST
WEST POINT NE 68788

Lab No.: 10788

Results for: BRUNS FEEDLOT
Sample ID: EFFLUENT
Sample Desc.: POND 1 4/17

	Analysis As Received	Lbs per Acre Inch	Lbs. per 1000 gal.
Ammonium, ppm N	43.5	9.9	0.4
Organic N, ppm N	73	16.5	0.6
Total N, ppm N	116.5	26.4	1
Phosphorus, ppm P2O5	71.4	16.2	0.6
Potassium, ppm K2O	409.5	92.8	3.4
Sulfur, ppm S	89.3	20.3	0.8
Calcium, ppm Ca	167.3	37.9	1.4
Magnesium, ppm Mg	87.6	19.8	0.7
Sodium, ppm Na	144.5	32.8	1.2
Zinc, ppm ZN	0.3	0.1	0
Iron, ppm Fe	5.7	1.3	0
Manganese, ppm Mn	0	0	0
Copper, ppm Cu	0.4	0.1	0
Soluble Salts, mmho/cm	3		15
pH	7.9		
Dry Matter (TS), %	0.22		

"<" - Not Detected / Below Detection Limit

Reviewed By: **Raymond Ward**

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Table 4–8 Beef waste characterization—as excreted—Continued

(c) Finishing cattle excretion in units per finished animal 1/

Components	Units	Finishing cattle			
		Corn, no supplemental P	Corn with supplemental P	Corn with 25% wet distillers grains	Corn with 30% wet corn gluten feed
Weight	lb/f.a.	9,800	9,800		
Volume	ft^3/f.a.	160	160		
Moisture	% w.b.	92	92		
TS	lb/f.a.	780	780		
VS	lb/f.a	640	640		
BOD	lb/f.a.	150	150		
N	lb/f.a.	53	53	75	66
P	lb/f.a.	6.6	8.3	10	11
K	lb/f.a.	38	38		

1/ Assumes a 983 lb finishing animal fed for 153 days

(d) Finishing cattle in units per day per 1,000 lb animal unit 1/

Components	Units	Finishing cattle			
		Corn, no supplemental P	Corn with supplemental P	Corn with 25%wet distillers grains	Corn with 30% wet corn gluten feed
Weight	lb/d/1000 lb AU	65	65		
Volume	ft^3/d/1000 lb AU	1.1	1.1		
Moisture	% w.b.	92	92		
TS	lb/d/1000 lb AU	5.2	5.2		
VS	lb/d/1000 lb AU	4.3	4.3		
BOD	lb/d/1000 lb AU	1.0	1.0		
N	lb/d/1000 lb AU	0.36	0.36	0.50	0.44
P	lb/d/1000 lb AU	0.044	0.056	0.069	0.076
K	lb/d/1000 lb AU	0.25	0.25		

Table 4–9 Nitrogen content of cattle feedlot runoff (Alexander and Margheim 1974) 1/2

Annual rainfall	Below-average conditions 3/	Average conditions 4/	Above-average conditions 5/
	lb N/acre-in		
<25 in	360	110	60
25 to 35 in	60	30	15
>35 in	15	10	5

1/ Adapted from the 1992 version of the AWMFH

2/ Applies to waste storage ponds that trap rainfall runoff from uncovered, unpaved feedlots. Cattle feeding areas make up 90 percent or more of the drainage area. Similar estimates were not made for phosphorus and potassium. Phosphorus content of the runoff will vary inversely with the amount of solids retained on the lot or in settling facilities.

3/ No settling facilities are between the feedlot and pond, or the facilities are ineffective. Feedlot topography and other characteristics are conducive to high solids transport or cause a long contact time between runoff and feedlot surface. High cattle density—more than 250 head per acre.

4/ Sediment traps, low gradient channels, or natural conditions that remove appreciable amounts of solids from runoff. Average runoff and solids transport characteristics. Average cattle density—125 to 250 head per acre.

5/ Highly effective solids removal measures such as vegetated filter strips or settling basins that drain liquid waste through a pipe to storage pond. Low cattle density—less than 120 head per acre.

Raymond C. Ward, Ph.D.
Certified Professional Soil Scientist

Crop	Nitrogen Requirement	Subsoil Factor
Corn	1.2 lbs / bu	0.3
Milo	1.15 lbs / bu	0.3
Popcorn	0.031 lbs / lb	0.3
Seed Corn	2 lbs / bu	0.3
Corn Silage	10.5 lbs / ton	0.3
Sorghum Silage	9.5 lbs / ton	0.3
Feed-Hay	27 lbs / ton	0.3
Sudan Hay	27 lbs / ton	0.3
Soybeans	See Footnote	
Pinto Beans	3 lbs / cwt	0.3
Gr. No. Beans	3 lbs / cwt	0.3
Peanuts	See Footnote	
W. Wheat	2.4 lbs / bu	0.3
Sp. Wheat	2.5 lbs / bu	0.3
Oats	1.3 lbs / bu	0.3
Rye	1.9 lbs / bu	0.3
Feed Barley	1.5 lbs / bu	0.3
Malting Barley	1.3 lbs / bu	0.3
Sm. Gr. Silage	13 lbs / ton	0.3
Sm. Gr. Hay	40 lbs / ton	0.3
Alfalfa	0	0
New Alfalfa	See Footnote	
Grass-Alfalfa	20 lbs / ton	0.3
Clover	0	0
Bromegrass	40 lbs / ton	0.3
Bermudagrass	40 lbs / ton	0.3
Fescue	40 lbs / ton	0.3
Native Grass	27 lbs / ton	0.3
Lovegrass	32 lbs / ton	0.3
Cool Grass	40 lbs / ton	0.3
Sugar Beets	8 lbs / ton	0.3
Sunflowers	0.05 lbs / lb	0.3
Potatoes	0.5 lbs / cwt	0.3
Cotton	0.1 lbs / lb	0.3
Millet	1.7 lbs / bu	0.3
Onions	0.25 lbs / cwt	0.3
Melons	14 lbs / ton	0.3
Garden	135 lbs / unit	0.3

Footnote: The nitrogen rate for these legume crops is calculated on the basis of the P2O5 requirement. The N requirement is based on a 1:3 ratio (N:P2O5)

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Certified Professional Soil Scientist

Quantities of Plant Nutrients in Crops
(Pounds of Plant Nutrient per Unit Indicated)

Crop	Yield Unit	N (Nitrogen)	P_2O_5 (Phosphate)	K_2O (Potash)	Calcium	Magnesium	Sulfur	Copper	Manganese	Zinc
Corn (Grain)	per bu	0.75	0.33	0.23	0.01	0.05	0.07	0.0004	0.0006	0.001
	200 bu	150	66	60	46	10	14	0.08	0.12	0.2
Soybeans (Grain)	per bu	3.7	0.77	1.4	0.18	0.18	0.32	0.001	0.0013	0.001
	60 bu	222	46.2	84	10.8	10.8	19.2	0.06	0.078	0.06
Wheat (Grain)	per bu	1.2	0.52	0.26	0.015	0.15	0.12	0.0007	0.002	0.003
	60 bu	72	31.2	15.6	1.5	9	7.2	0.042	0.12	0.18
Cotton (Lint and Seed)	per bale	12.5	4.8	5.8	0.67	1.33	0.96	0.02	0.037	0.107
	2 bale	25	9.6	11.6	1.34	2.66	1.34	0.04	0.074	0.214
Sorghum (Grain)	per bu	0.9	0.27	0.2	0.067	0.083	0.083	0.000167	0.0007	0.00067
	100 bu	90	27	20	6.7	8.3	8.3	0.0167	0.07	0.067
Sunflowers (Grain)	per cwt	3.6	1.2	1.1	1.2	0.20	0.22	.002	.002	.005
	20 cwt	72	24	22	2.4	4.0	4.4	0.04	0.04	0.1
Alfalfa (Total)	per ton	55	12	50	28	5.25	5.0	0.015	0.11	0.105
	6 ton	330	72	300	168	31.5	30	0.09	0.66	0.63
Grass (Total)	per ton	30	12	42	8	3.5	3.75	0.01	0.15	0.04
	4 ton	120	48	168	32	14	15	0.04	0.6	0.16
Sugar Beets (Total)	per ton	8	1.4	6.7	2.2	0.50	0.67	0.002	0.05	.002
	25 ton	200	35	160	55	12.5	16.75	0.05	1.25	.05
Oats (Grain)	per bu	0.70	0.25	0.15	0.025	0.0375	0.074	0.0004	0.0015	0.0006
	80 bu	56	20	12	2	3	5.9	0.032	0.12	0.048
Potatoes (Tuber)	per cwt	0.35	0.13	0.60	0.015	0.03	0.03	0.0002	0.0005	0.00025
	100 cwt	35	13	60	1.5	3	3	0.02	0.05	0.025
Peanuts (Nuts)	per cwt	3.7	0.46	0.68	0.6	0.57	0.53	*	*	*
	35 cwt	129.5	16.1	23.8	21	19.95	18.55	*	*	*

*No data for this nutrient

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NITROGEN AND SULFUR FERTILIZER RECOMMENDATION CALCULATIONS

NITROGEN RECOMMENDATIONS

N lbs/A = (yield x N req) – (ppm topsoil NO_3-N x .3 x depth in inches) – (ppm subsoil NO_3-N x .3 x depth in inches) – legume credit – manure credit – irrigation water credit.

If no subsoil sample, assume 2 ppm NO_3-N for sandy soils and 5 ppm NO_3-N for loamy or clayey subsoils.

SULFUR RECOMMENDATIONS

$$\text{S rec} = \frac{\text{(S req-Soil S)}}{\text{.7 or 1.0}}$$

Note: divide by .7 for sandy soils or by 1.0 for loamy and clayey soils.

S req = Yield goal x S req factor
Soil S = ppm S x .3 x depth in inches with a maximum of 8 in.

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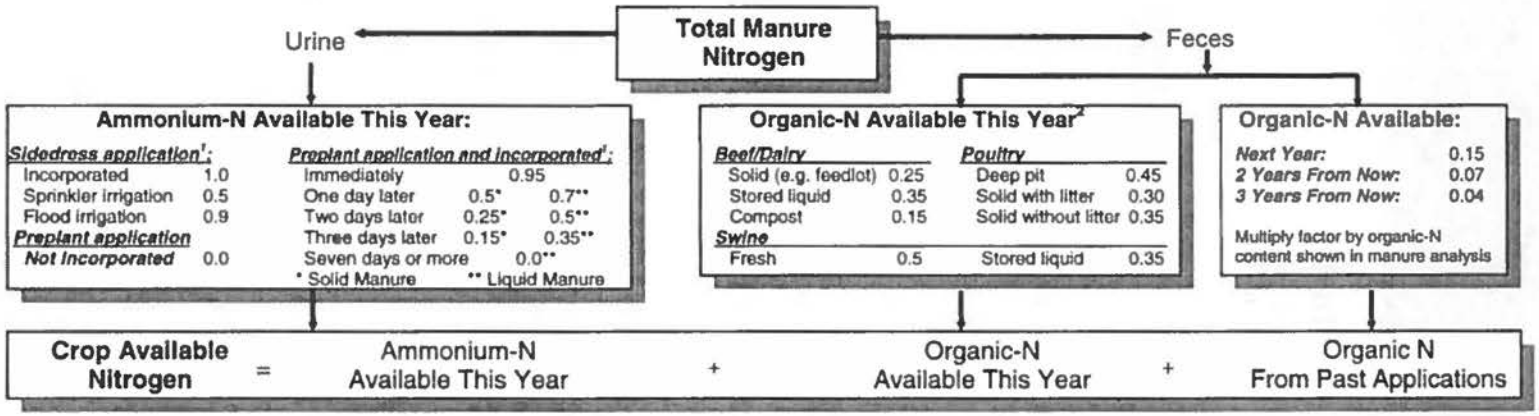

[1]Incorporation can be accomplished by tillage or by a 0.50 inch or greater rainfall.

[2]Organic-N availability assumes spring seeded crops such as corn and soybeans. For winter or spring manure application prior to planting small grains, multiply organic-N availability factor by 0.7.

Figure 2. Availability factors for manure nitrogen.

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SOIL ANALYSIS METHODS

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Analysis	Method	Reference
Organic Matter	Loss of Weight on Ignition	NCR, p. 32
Phosphorus		
a. P_1	Extraction with dilute acid and ammonium fluoride (Weak Bray)/colorimetric	NCR, p. 14-15
b. P_2	Extraction with strong Bray solution (4 times the acid concentration of weak Bray)/colorimetric	
c. Bicarbonate P	Extraction with sodium bicarbonate/colorimetric	ASA, p. 421-422
Potassium, Magnesium, Calcium, Sodium, Sulfur	Neutral ammonium acetate (1 N) extraction/ Inductively Coupled Argon Plasma (ICAP) detection	RMST, p. 60-65 NCR, p.17-18
pH	1:1 Soil:Water mixture/combination electrode.	NCR, p. 5-8
Soil pH, Buffer index		
Cation Exchange Capacity (CEC)	a. Summation of cations, Ca^{++}, Mg^{++}, K^{+}, Na^{+}, and H^{+} (see 3 & 4)	
	b. Ammonium acetate saturation/displacement with NaCl/distillation and titration	ASA, p. 149-151
Nitrate-N	Saturated CaO Extraction/Cadmium Reduction/Segmental Flow Analysis (SFA)	NCR, p. 11
Ammonia-N, Exchangeable	Neutral salt (KCl) extraction/SFA	ASA, p. 648
Zinc, Manganese, Iron, Copper	a. DPTA extraction/ICAP detection b. 0.1 N HCl extraction ICAP detection	NCR, p.18-19 NCR, p. 19-20
Boron	DTPA/Sorbitol ICAP	NAPT
Excess Lime	1 N HCl spot test	-
Soluble Salts	Conductivity meter 1:1 Soil:Water	USDA, P. 89-90
Soil Texture	Hydrometer method	ASA, p. 549-566

Chloride	.01 M $Ca(NO_3)_2$ FIA	NCR 13, p. 26-27
Molybdenum, extractable	Acid ammonium oxalate extraction/ICAP	ASA, p. 491-493
Water Soluble Cations	1:5 Water extraction ICAP det.	RMST, p. 87
Field Capacity (1/3 Bar moisture holding capacity)	Porous plate pressure apparatus	ASTM, D 2325 (1981)
Wilting Point (15 Bar moisture holding capacity)	Porous plate pressure apparatus	ASTM, D 2325 (1981)
Bulk Density	Disturbed sample	Volume weight

References

NCR - Recommended Chemical Soil Test Procedures for the North Central Region. No. 499 (revised). North Dakota State University.

ASA - Methods of Soil Analysis - Part 2: Chemical and Microbiological Properties, Second Edition, 1982. American Society of Agronomy.

RMST - Handbook on Reference Methods for Soil Testing, 1974, Council on Soil Testing and Plant Analysis.

USDA - USDA Agriculture Handbook 60.

ASTM - American Society for Testing and Materials 04.08 Soil and Rock, Building Stones: Geo Textiles

IANR NebGuide

University of Nebraska Lincoln

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G1740

Guidelines for Soil Sampling

Richard B. Ferguson, Gary W. Hergert, Charles A. Shapiro and Charles S. Wortmann
Extension Soil Specialists

Soil samples representative of a field are the best guidelines to determine fertilizer needs. This publication describes proper procedures to collect representative soil samples.

Objectives

The primary objectives of soil sampling are to determine the average nutrient status and degree of variability in a field. Correct fertilizer use, based on accurate information about soil fertility levels in fields, can result in increased crop yield, reduced cost and minimized environmental impact. Knowing a field's nutrient status variability means fertilizer application can be adjusted to more closely meet the supplemental nutrient needs of a crop for specific field areas.

General Guidelines

Determine Sampling Approach

With the development of technologies and procedures for site-specific management of fertilizer and other inputs, producers can collect and quantify information about soil nutrient variability within a field. Prior to sampling, decide how soil nutrient information will be used to manage fertilizer, and that will help determine how samples should be collected. For uniform fertilizer application, collect soil samples randomly within representative areas of the field. If variable rate fertilizer application is anticipated, sample either in predefined management zones or in a grid pattern with known sample locations.

Uniform Fertilizer Application

If fertilizer is to be applied uniformly, it still is helpful to have some idea of the variability in soil fertility within a field. Knowing this variability may allow you to adjust rates, application timing or fertilizer sources accordingly. Collect samples from subareas within fields that are relatively uniform. These areas can be determined based on soil type, slope, degree of erosion, cropping history, known crop growth differences, spatial patterns of crop yield and any other factors that may influence nutrient levels in the soil.

Avoid odd areas in the field (eroded spots, turn rows, abandoned farmsteads or feedlots), or sample them separately. Soil samples from these areas can significantly alter test results for the rest of the field. When sampling furrow-irrigated fields for residual nitrate-nitrogen, collect samples from the upper, middle and lower portions of the field *(Figure 1)*. The amount of irrigation water that infiltrates the soil will influence the amount and depth of nitrate-nitrogen in the soil.

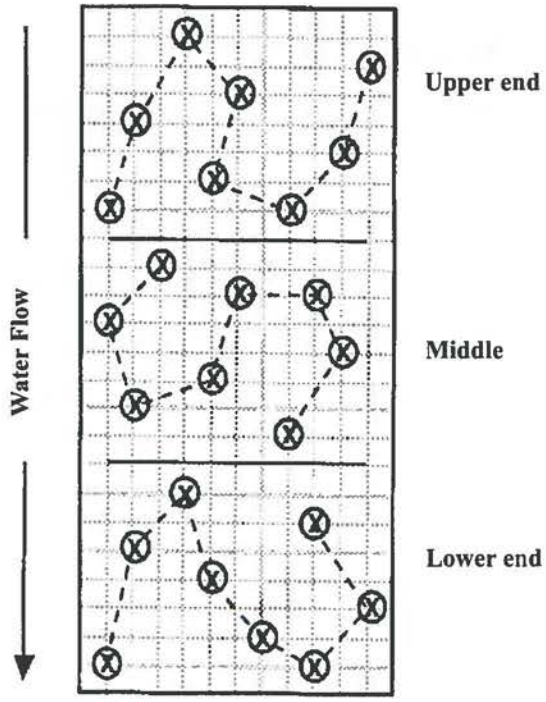

Figure 1. Dividing and sampling a furrow-irrigated field.

Variable Rate Fertilizer Application

There are two basic approaches to soil sampling for site-specific fertilizer management — grid sampling or management zone-based sampling. Both approaches provide more detailed information about the variability of nutrient levels within a field than sampling normally done as described above for uniform fertilization. Grid sampling is more expensive and time-consuming, but can provide useful information for variable rate fertilization for several years. Management zone sampling is based on zones derived from various spatial information resources — yield maps, soil surveys, aerial photographs, soil apparent electrical conductivity, etc. Often information from several spatial data layers can be combined to derive management zones. *Figure 2* illustrates grid and management zone approaches to sampling a field. More detailed information on site-specific sampling is available in two other resources — *Soil Sampling for Precision Agriculture* (EC154) and *Site-Specific Nitrogen Management for Irrigated Corn* (EC163).

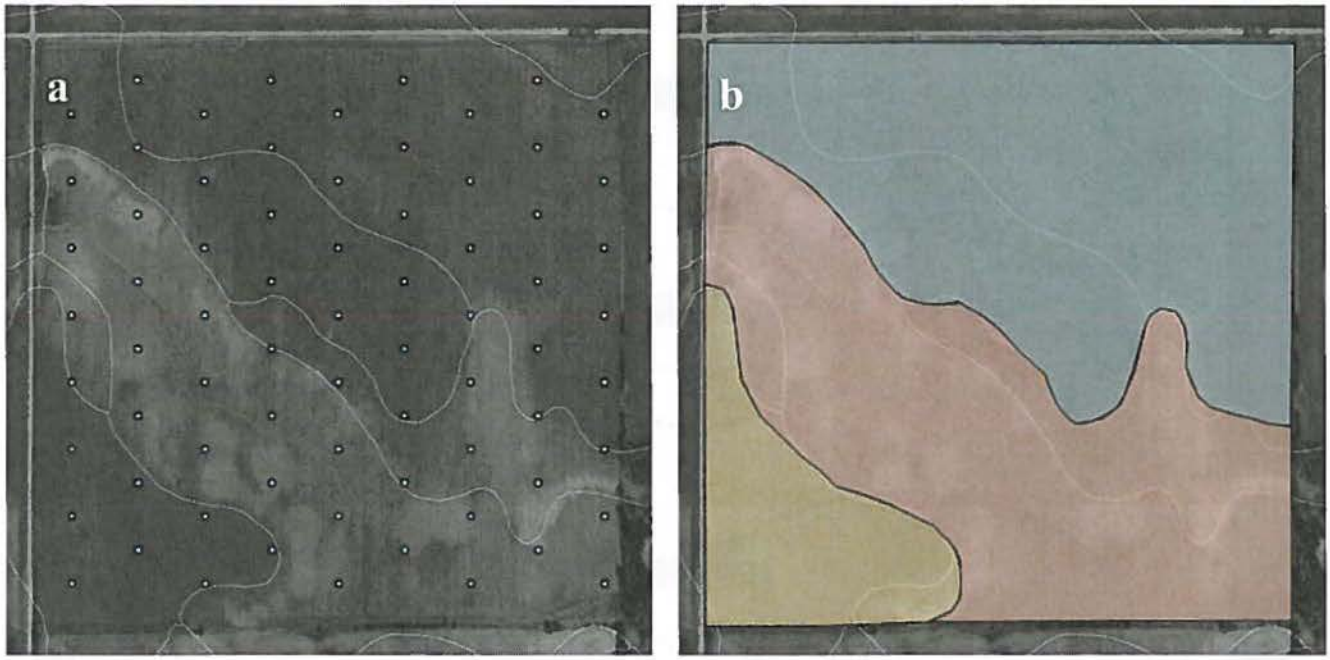

Figure 2. Examples of grid and management zone approaches to collecting soil samples. *Figure 2a* has 72 sample points. Within each of the three management zones in *Figure 2b*, 10-15 cores should be collected and composited into a sample representing each zone.

Select Proper Sampling Depth

Surface samples are used to determine soil pH, lime need, organic matter, phosphorus, potassium, sulfur and zinc. In Nebraska, soil test correlation and calibrations for these tests are based on surface samples collected from 0-8 inches. It is important to use the same sampling depth when re-sampling fields so soil test values over time can be accurately compared. Sampling deeper than 8 inches generally results in lower test values for organic matter, phosphorus and zinc. Potassium and pH may increase, decrease or remain the same with deeper samples. Surface samples are needed for all crops. Fertilizer recommendations for all nutrients except nitrogen are based on nutrient levels in the surface soil sample. Nitrogen recommendations for many crops depend on the organic matter content in the surface soil sample, as well as residual nitrate-nitrogen in surface and subsurface samples.

Stratification of soil nutrients can occur when fields have not been tilled for several years, with higher nutrient concentrations close to the soil surface, often in the top 2-3 inches. Availability of nutrients from fields where stratification exists generally is not a concern, as plant roots can effectively access nutrients at shallow depths. However, it is important to sample to the proper depth of 8 inches, with complete mixing of all cores collected prior to retention of a subsample to send to the lab. If stratification exists and samples are not collected to the proper depth or not well mixed, there is greater risk of a nonrepresentative sample and an inaccurate fertilizer recommendation.

Both surface (0-8 inches) and subsurface (below 8 inches) samples are needed to accurately estimate nitrate-nitrogen in the root zone, because nitrogen in the nitrate form moves easily with water and will leach into the subsoil. Nitrate-nitrogen in the root zone is readily used by plants. For most soils and annual crops, roots will reach a depth of 4 feet or more. To accurately predict nitrate-nitrogen in the root zone, subsurface samples should be collected to a depth of 3 feet. A 2-foot sample is the minimum sampling depth recommended for nitrate-nitrogen, and will not predict plant available nitrate-nitrogen as accurately as a deeper sample. For crops with shallow root zones, such as dry beans, canola and millet, a 2-foot sample is adequate. If rooting depth is limited because of coarse sand or gravel, rock or a high water table, sample to the depth possible. Nitrogen fertilizer recommendations for several crops grown in Nebraska are based on the amount of nitrate-nitrogen in the root zone determined from subsurface samples, as well as organic matter content in the surface sample. If subsurface samples for nitrate-nitrogen aren't taken, nitrogen recommendations for crops will be based on historical average values of nitrate-nitrogen in the root zone, and the accuracy of fertilizer recommendations may decrease.

Collect Soil Cores

A soil core is an individual sample collected at one spot in the field. For each area of the field to be sampled, collect cores randomly throughout the area, unless information is being collected for site-specific fertilizer management. Take care to adequately represent the entire area when sampling. Be sure to sample the entire 0-8 inch layer for general fertility analysis. Place individual soil cores in a clean plastic pail for mixing. Separate pails should be used for subsurface samples. Break up and thoroughly mix soil cores in each pail after collecting samples over the entire area. After mixing, retain a portion of the mixed soil and place it in a properly labeled sample bag or box to send to the laboratory for analysis. Typically, a sample of a pint volume, or one pound in weight, will be adequate for analysis. The sample label should include the producer's name, field ID, sample ID, and depth of sample *(Figure 3)*.

The University of Nebraska–Lincoln recommends that samples represent fields or areas within fields no larger than 40 acres. Larger areas may contain enough variability in soil properties and nutrient values to render the average soil test level from a single sample meaningless. Sampling field areas

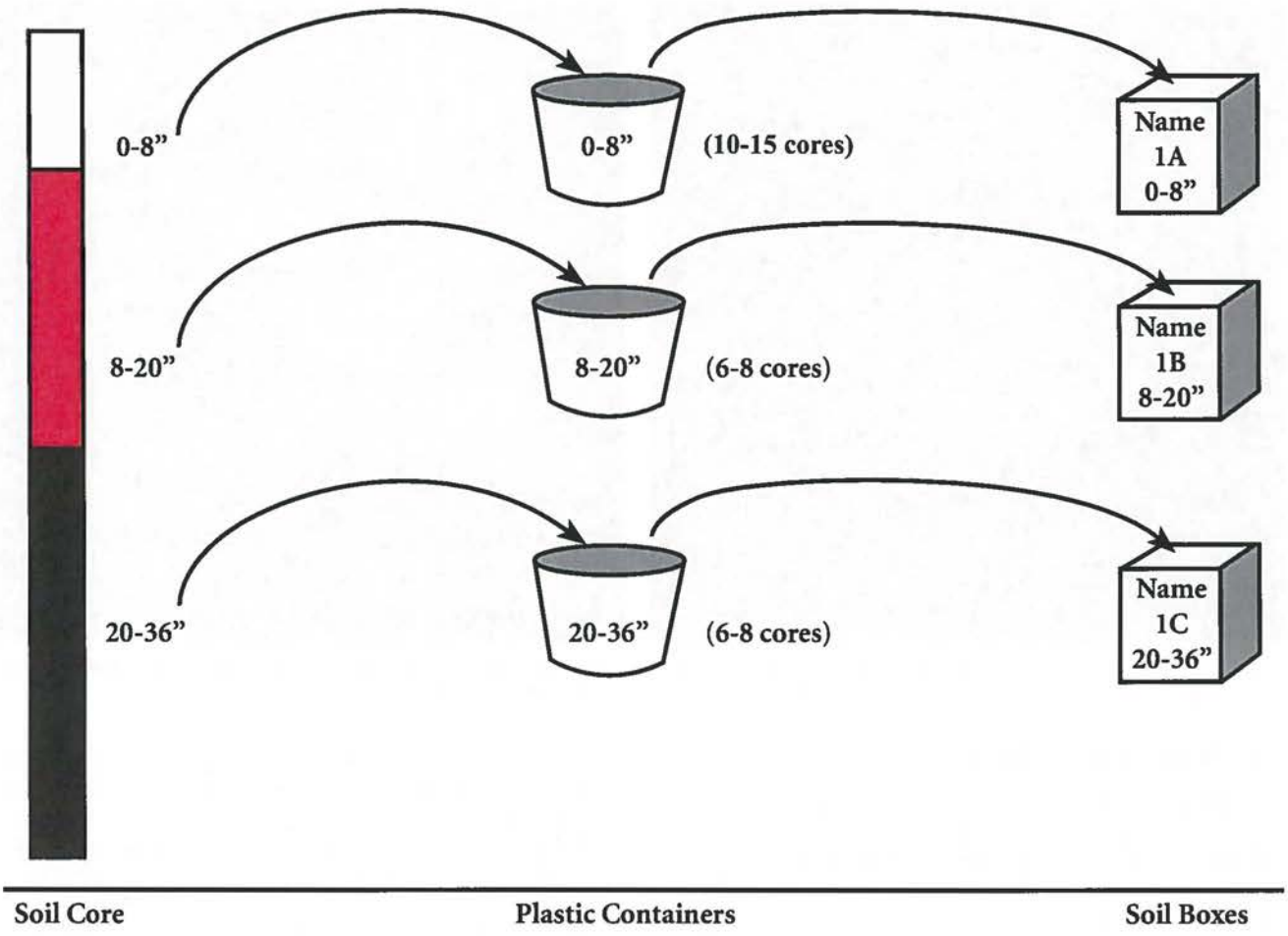

Figure 3. Division of soil cores by depth, with retention of a well-mixed subsample into labeled boxes or sample bags.

smaller than 40 acres in size can increase the accuracy of the test, and provide a measure of variability across the field.

Acceptable measurement of the average nutrient status in a 40-acre area can be obtained with 10 to 15 randomly collected surface cores and six to eight subsoil cores for nitrate-nitrogen analysis. For furrow-irrigated fields, four to five subsurface cores per 20 acres generally will provide more useful estimates of nitrate-nitrogen than six to eight cores per 40 acres, provided the field is divided into upper, middle and lower portions based on the direction of water flow across the field.

Subsurface samples should be continuous to the bottom of the core. For example, with a surface sample of 0-8 inches, collect the subsurface sample from 8-36 inches. However, information about the vertical distribution of nitrate-nitrogen in the field can be obtained if the subsoil sample is broken into segments. A surface sample of 0-8 inches, combined with a subsoil sample separated into depth increments of 8-20 and 20-36 inches, has several advantages over a single subsurface sample. It is difficult to obtain a well-mixed, representative sample from multiple cores covering a large depth range. Variations in soil texture and moisture by depth, coupled with the large volume of soil involved, make mixing difficult. Also, nitrate-nitrogen concentration in the subsoil is likely to vary with depth. The normal pattern is for nitrate-nitrogen concentrations to decrease with depth, but that is not always the case. If nitrate-nitrogen concentrations increase at deeper depths, perhaps caused by dry growing conditions followed by improved moisture and increased crop nitrogen removal, the availability of nitrate-nitrogen in the subsoil may be overestimated. *Figure 4* illustrates two situations where the total amount of root zone nitrate-nitrogen is the same. *Figure 4a* is typical. *Figure 4b* has a significant amount of nitrate-nitrogen deeper in the root zone, which may result in the deeper nitrate-nitrogen leaching below the root zone before crop roots can reach it. For situations like that in *Figure 4b*, it is appropriate to increase nitrogen fertilizer rate recommendations because of uncertainty regarding availability of nitrate-nitrogen deep in the root zone.

Soil Sampling Equipment

Surface soil samples can be collected using a soil probe or soil auger. The soil probe is the most desirable tool for collecting soil samples. It will give a continuous core with minimal disturbance of the soil. Cores can be subdivided for various depth increments. In many soils, a probe can be placed back into the hole left by sampling the surface layer to collect a subsoil sample. Normally very little contamination occurs from one depth to another with a soil probe. A

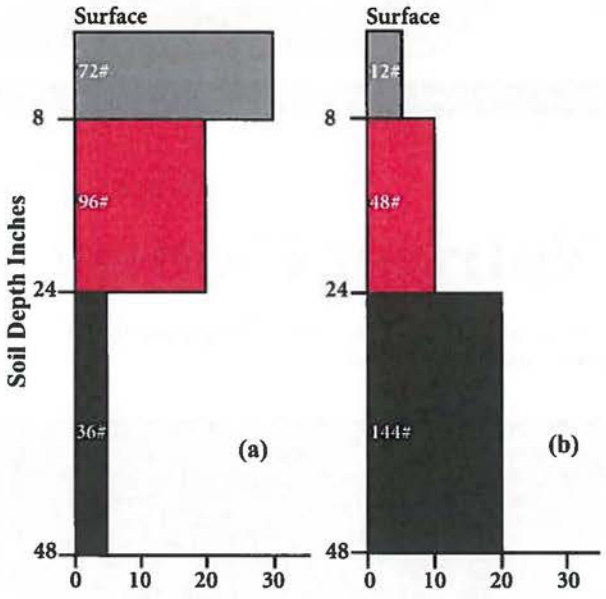

Figure 4. Two potential patterns of vertical distribution of nitrate-N in the root zone. Both contain 204 lb nitrate-N/acre.

soil probe cannot be used when the soil is too wet, too dry, rocky or frozen. High clay content soils can be difficult to sample with a probe, but most problems can be avoided by using a tip intended for high clay soils; avoiding very wet or dry conditions; lubricating the probe with silicone spray; and using a probe that is in good condition.

A soil auger can be used in soils that are frozen or contain gravel; however, care must be taken to obtain representative samples and to avoid mixing soil from different depths. If soils are too wet or dry when sampled with an auger, mixing soil from different depths can occur. A soil auger will not effectively gather dry, powdery soils. Use a soil auger only if a soil probe cannot be used or is unavailable.

A variety of hydraulic or mechanical samplers are available for collecting both surface and subsurface samples. Generally these are designed to push soil probes into the soil, but some may have rotary heads allowing the use of an auger. For commercial use or when sampling many fields, these samplers can be very helpful.

Time of Sampling

Late fall or early winter is a good time for soil sampling, except for testing nitrate-nitrogen on coarse-textured soils. Fall sampling allows more time to get results back from the laboratory and to use the information in designing the fertilizer management program for the following year.

Fall samples should provide meaningful results for all nutrients. However, excessive precipitation between the time of sampling and when crops are grown the next year may result in some leaching of nitrate-nitrogen — either deeper in the root zone, or out of the root zone altogether. If more than 8 inches of effective precipitation (total amount that percolates into the soil) occurs on fine-textured soils, or 4 inches on coarse-textured soils, between the time of sampling and the time the crop is planted, leaching losses of nitrate-nitrogen may have occurred. If leaching loss of nitrate-nitrogen in the root zone is suspected due to winter or spring precipitation, re-sample the field.

Spring sampling prior to planting is the preferred option. Delaying sampling until spring allows soil moisture in the root zone to be replenished, thus easing sampling on many soils. The distribution of nitrate-nitrogen in the subsoil is more likely to be representative of conditions during the growing season with spring sampling.

Handling of Samples

Be careful to avoid contamination when collecting soil samples. Use clean sampling equipment and plastic buckets to receive and mix soil samples. Do not leave samples moist and warm for more than 24 hours after collection. If moist soil samples are stored for extended periods of time, additional mineralization from soil organic matter can occur, increasing soil nitrate concentrations, and perhaps affecting other nutrients as well. If samples cannot be taken to the lab within 24 hours after collection, they should be dried, refrigerated or frozen. Dry soil samples by spreading them out to air dry at room temperature for two to three days, depending on air circulation and humidity. Do not dry soil samples at high temperatures, as this can affect the analysis. Avoid contaminating samples while drying, such as with wind-blown dust. Refrigerating or freezing samples will slow or stop microbial activity adequately until the samples can be dried and ground at the lab.

Acknowledgments

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Index: Soil Management
Fertility
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NebGuide

University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

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G1450
(Revised June 2014)

Manure Testing for Nutrient Content

Charles S. Wortmann, Nutrient Management Specialist; Charles A. Shapiro, Extension Soils Specialist; and Amy M. Schmidt, Livestock Bioenvironmental Engineer

This publication contains guidelines for determining manure nutrient content to improve crop and soil management. Manure testing combined with agronomically sound nutrient management and uniform application optimizes manure nutrient use while protecting water resources.

Manure and Soil Fertility Management

Animal manure has long been recognized as a source of nutrients for crop growth. When substituting manure for chemical fertilizers, farmers need to know the amounts of nutrients supplied to crops in the manure to properly adjust commercial fertilizer rates to meet crop needs while minimizing contamination of water supplies through leaching or runoff.

Typical values for the nutrient content of different animal manures are available in other extension publications, but actual nutrient values can differ significantly from farm to farm due to variations in manure storage and handling conditions, livestock type and age, ration formulation, and other management practices. Weather conditions and variations in management practices can cause manure nutrient contents to vary from month to month and from year to year on the same farm. To determine the nutrient content of manure, submit samples for analysis to one of the laboratories serving Nebraska livestock producers *(see Page 4)*.

Sampling Manure for Nutrient Analysis

If manure is tested before land application, the results can be used to adjust application rates. This may not be practical, however, and livestock feeding operations that are consistent in their feeding and manure management practices can determine application rates based on the average results of past manure analyses. Samples collected at the time of application have several advantages: The manure is mixed and similar to what is being applied; storage and handling losses do not need to be estimated; analysis results can be used to determine if additional nitrogen or other nutrients will be needed; and current analysis records are valuable for maintaining records of manure application.

The manure sample must be properly collected and handled to ensure reliable results. As explained in the following subsection, samples need to be composed of several subsamples for various types of manure to represent the available nutrients. The minimum numbers of subsamples suggested in this document are based upon generating a reliable estimate of manure nitrogen availability.

Figure 1. A soil probe can help provide a representative sample.

Solid and Semisolid Manure

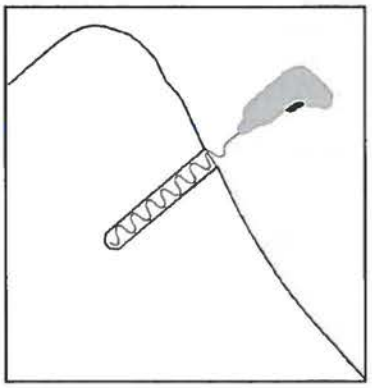


Figure 2. Using an auger bit to sample a manure pile.

Manure with greater than 20 percent dry matter is considered solid manure while manure with 10-20 percent dry matter is considered semisolid. While a spade can be used to sample a manure pile, more representative samples can be obtained using an auger or soil probe, which can reach deep into a manure pile *(Figures 1* and *2)*.

Compared to sampling in open lots or from manure piles, sampling during or after loading the manure spreader is preferred because manure is mixed during loading and a more representative sample is obtained. When sampling during manure loading, a few handfuls — or "grab samples" — of manure should be collected from each spreader load and placed in a clean plastic bucket. The samples should then be thoroughly mixed and a single sample collected from the bucket for analysis. If several spreader loads of manure are being hauled, grab samples should be collected from at least 10 spreader loads to form a composite sample.

Manure can be sampled from open lots by scraping together manure in at least 20 areas of the feedlot and putting grab samples into a 5-gallon plastic bucket. The collection points should be representative of the entire feedlot area from which manure will be removed for spreading. Wet areas near water-

Figure 3. Place solid manure samples in a resealable freezer bag.

Subsampling and Packaging Solid Manure Samples

During sampling, put the manure in a five-gallon bucket and break up the lumps *(Figure 3)*. Mix manure well and subsample enough to fill a resealable, quart-sized freezer bag. Squeeze the bag to remove excess air and seal. Put the bag into a second resealable bag to further ensure against leakage. Refrigerate if the sample cannot be sent to the laboratory immediately. Freeze the sample if delivery will be delayed by several days.

ing points may have a different analysis than manure scraped from mounds. Carefully consider where to sample to obtain a sample that represents the manure that will be land applied. Avoid getting hay or other feedstuffs in the sample.

Manure that is stacked can be sampled by following a few simple rules: The surface crust of the pile should not be included. Rather, begin sampling at least 6 inches below the pile surface. Grab samples should be taken from at least 15 locations in a manure stack, including from the center of the stack. Recent research indicates that taking 30 samples minimizes error.

Solid manure can also be collected during application by spreading a plastic sheet or tarp measuring at least 4 feet by 4 feet in the path of the applicator. After the spreader passes, the manure on the tarp should be weighed. Manure should be gathered in this way five to six times during application, mixed thoroughly, and subsampled. An advantage of this method is that the manure spreader can be calibrated simultaneously. The number of pounds of manure collected on a tarp of 22 square feet — 5.5 feet by 4 feet — equals the number of tons per acre. If a differently sized tarp is used, the application rate can be calculated as shown:

$$\text{Application Rate}\left(\frac{\text{tons}}{\text{acre}}\right) = \frac{\text{lb of manure}}{\text{area of tarp (ft}^2\text{)}} \times 21.78$$

Slurry and Liquid Manure

Manure having 4 to 10 percent dry matter is considered slurry, while liquid manure has less than 4 percent dry matter by weight. Because these types of manure tend to contain a variety of suspended and settleable solids, causing the manure to become stratified, sampling during pumping is recommended to obtain a representative sample. The concentration of phosphorus can be two to eight times greater at a 14-foot depth compared to a 2-foot depth. Nitrogen concentration can be twice as high at the 14-foot depth as near the surface. Therefore, reliability of slurry or liquid manure analysis results is best with agitation.

Figure 4. Liquid out of pump.

Good mixing of manure in a storage facility may require two to four hours of agitation before manure removal and continued mixing during the emptying process.

Collect a sample in a clean container from the pump during loading, or when pumping to an irrigation system or an umbilical cord applicator *(Figure 4)*. Samples can be taken from the unloading port of a tank spreader immediately after loading. Do this for several loads or several times during pumping to ensure a representative sample. Be sure the sampling port does not have an accumulation of solids.

If sampling directly from the storage facility is the only option, a tool made with PVC pipe may be useful for vertical sampling *(Figure 5)*. Again, it is ideal to collect the sample during or immediately following agitation. If a storage structure is sampled without agitation, it is especially important to obtain manure from the various depths due to stratification of the nutrients. A good estimate of manure nitrogen content of liquid manure sampled from unagitated storage requires at least 20 subsamples.

It is hazardous to sample slurry and liquid manures from inside a building storage (e.g., a deep pit under a slatted floor) due to the possibility of falling into the storage unit or breathing potentially lethal gases emitted during agitation of manure in enclosed pits or tanks. To protect animals and workers, all people and animals should be removed from the building during agitation, and all available ventilation options should be implemented, including opening curtains, running ventilation fans, and opening other vents. Take additional precautions: Wear gloves and have someone else present when you are in the building. ***Never enter confined manure storage areas without the appropriate safety equipment.***

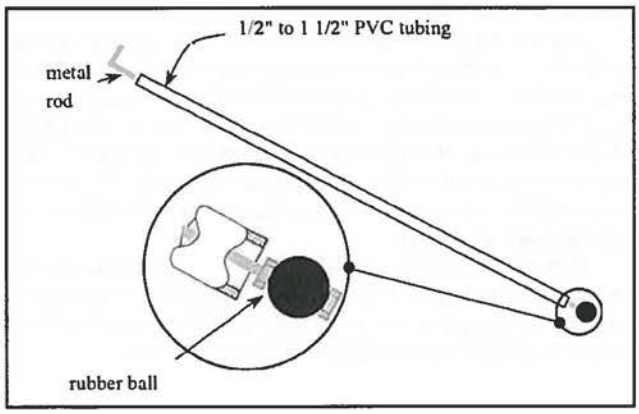


Figure 5. PVC pipe sampler.

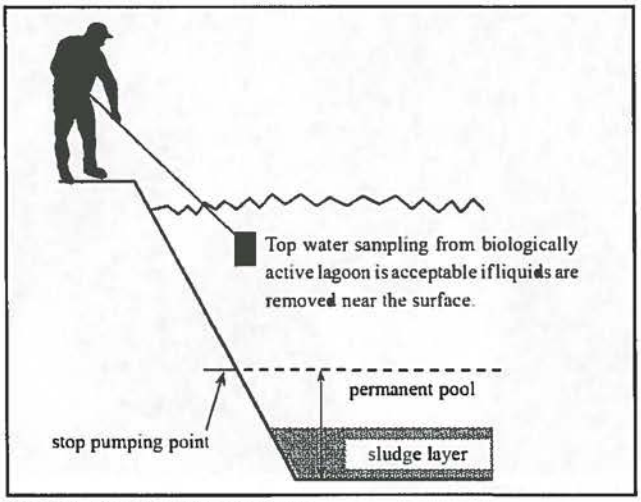


Figure 6. Sampling from a lagoon.

Anaerobic Lagoons

Anaerobic lagoons are not usually agitated before manure removal. When sampled from May through November, the top layer from the surface to the interface with the sludge layer (i.e., effluent) is fairly uniform in nutrient concentration due to biological mixing. If anaerobic lagoons are pumped from near the surface, a representative effluent sample can be obtained by taking several surface samples with a small container attached to a 10-foot pole *(Figure 6)*. Floating solids on the lagoon surface and near the edge of the lagoon should be avoided as these can misrepresent actual nutrient content of the liquid.

Liquid manure applied through sprinkler irrigation systems also can be collected during application. Place collection pans or buckets at eight or more points throughout the application area to collect the manure. This accounts for any dilution if water is added to the manure and for ammonium losses during application; however, ammonium losses from the soil surface will not be accounted for by collecting samples after sprinkler irrigation.

Labeling, Shipping, and Analysis of Samples

Label the sample container for identification, including your name and address, your sample identification, the date of sampling, manure type, and the sample location. Provide additional information with the sample as requested by the laboratory. A link to a generic manure sample submission form is included at the end of this NebGuide. It includes information useful in making a manure application recommendation. Each laboratory has its own sample forms, so check with the lab to determine what information will be required.

If it will take more than a few hours to deliver the sample, it should be refrigerated or frozen to prevent nutrient losses and transformations. Keep in mind that freezing samples will cause them to expand so containers should not be filled completely to the top. If kept at room temperature, the manure may eventually ferment or decompose, with significant breakdown of the solids. Avoid leaving samples in a vehicle where they can become very warm.

If the sample will be shipped, keep the sample chilled during shipping by packing it in an insulated container or wrapping it in layers of newspaper. Cold packs may be added. Avoid weekend delays in shipping by sending it early in the week.

Laboratory Analysis

Tests Desired

The tests most frequently needed to optimize nutrient management are total and ammonium nitrogen, phosphorus, potassium, pH, soluble salts, sodium, and dry matter content.

Nitrogen. Manure contains both organic and inorganic forms of nitrogen. Ammonium-N is the primary inorganic form in manure and is readily available to crops. Nitrate-N is usually too small to affect management decisions, unless the manure is composted. Organic nitrogen is determined as the difference between total nitrogen and inorganic nitrogen. Organic nitrogen becomes available to plants as manure decomposes, with 20 to 50 percent of organic nitrogen available to the first crop after application. Much of the remaining organic nitrogen becomes available in subsequent years.

Phosphorus. Most manure phosphorus (about 75 percent) is in inorganic forms. Phosphorus analysis allows calculation

Figure 7. Put liquid manure samples in plastic, screw-topped containers.

Figure 8. Seal liquid manure samples carefully.

Subsampling and Packaging Liquid of Slurry Manure Samples

During sampling, collect the manure in a five-gallon bucket. Mix well and remove a subsample while the sample is still swirling. Put the subsample in a pint-sized plastic, screw-topped container that can be tightly closed *(Figure 7)*. Never use glass containers. Fill the bottle to 1-2 inches from the top and seal the lid with tape to ensure that it does not become unscrewed *(Figure 8)*. Put the sample in a resealable plastic bag. Chill the sample and send or deliver to the laboratory within a few days. Freeze the sample if delivery will be delayed.

of the most economical manure rates while avoiding overapplication of phosphorus, which can have severe consequences to surface waters.

Other tests. Tests for potassium, sulfur, zinc, and other nutrients may be useful. When manure is applied to meet nitrogen or phosphorus needs, other nutrients are generally adequate for soils in Nebraska. If liquid manure is applied to a crop through sprinkler irrigation, testing for soluble salts, or electrical conductivity (EC), helps predict if there might be potential for leaf burning (See *http://www.ianrpubs.unl.edu/sendIt/ec778.pdf*). Information on soluble salt content or EC is useful in managing anaerobic lagoons. When the surface of a lagoon has a purple color, the microbial processes are functioning well and the odor is less.

Report Information

Units. Specify if the results should be reported in pounds of nutrient per ton (spreader), per 1,000 gallons (tanks or umbilical cord), or per acre-inch (irrigation). This depends on your application method. Phosphorus and potassium should be reported in the oxide form (P_2O_5 and K_2O) so their fertilizer value is easy to calculate.

Moisture. Reporting the results on an "as is" or "wet" basis allows a producer to determine the nutrient application rate without adjusting for water content.

Nutrient availability. Laboratories can estimate the amount of nutrients available in the first year, and the amount of manure nitrogen that will be available during following years. This is especially important for solid manures.

Application basis. Manure is often applied on a "nitrogen basis" to supply enough nitrogen to meet crop needs. When soil test phosphorus is excessive, manure may be applied on a "phosphorus basis" that is at a rate sufficient to match phosphorus removal by the crop.

Land Application and Rate Determination

Some manure nutrients will not be available to the crop in the season following application. The laboratory report should give an estimate of nutrients available to the first crop following manure application as well as total nutrient content. For example, 20-50 percent of the organic nitrogen should be available to the first crop, depending on the manure type; much of the remaining organic nitrogen becomes available in following years. The report also may provide an estimate of ammonium-nitrogen losses, which will vary with application and incorporation practices.

Nebraska Laboratories Providing Manure Testing Services

Midwest Laboratories	Olsen's Agricultural Laboratory	Platte Valley Laboratories	Servi-Tech Laboratories	Ward Laboratories
13611 "B" St.	210 E. 1st St., P.O. Box 370	914 Hwy. 30, P.O. Box 807	1602 Park West Dr., P.O. Box 169	4007 Cherry Ave., P.O. Box 788
Omaha, NE 68144	McCook, NE 69001	Gibbon, NE 68840	Hastings, NE 68902	Kearney, NE 68848-0788
402-334-7770	308-345-3670	308-468-5975	402-463-3522	308-234-2418
https://www.midwestlabs.com/	*http://www.olsenlab.com/*	*http://www.soillab.com/*	800-557-7509	800-887-7645
			http://www.servitechlabs.com	*http://www.wardlab.com/*

This publication has been peer reviewed.

LINK **Generic Manure Sample Submission Form**

Disclaimer

Reference to commercial products or trade names is made with the understanding that no discrimination is intended of those not mentioned and no endorsement by University of Nebraska–Lincoln Extension is implied for those mentioned.

UNL Extension publications are available online at *http://extension.unl.edu/publications*.

Manure-related extension publications are available online at *http://manure.unl.edu*.

Index: Waste Management
Waste Resource Management
2002-2009, Revised June 2014

2016 STATE AGRICULTURE OVERVIEW

Nebraska

† Survey Data from Quick Stats as of: Sep/12/2017

Farms Operations †

Farm Operations - Area Operated, Measured in Acres / Operation	934
Farm Operations - Number of Operations	48,400
Farm Operations - Acres Operated	45,200,000

Livestock Inventory †

Cattle, Cows, Beef - Inventory (First of Jan. 2017)	1,920,000
Cattle, Cows, Milk - Inventory (First of Jan. 2017)	60,000
Cattle, Incl Calves - Inventory (First of Jan. 2017)	6,450,000
Cattle, On Feed - Inventory (First of Jan. 2017)	2,470,000
Goats, Milk - Inventory (First of Jan. 2017)	3,700
Sheep, Incl Lambs - Inventory (First of Jan. 2017)	83,000
Hogs - Inventory (First of Dec. 2016)	3,400,000

Milk Production †

Milk - Production, Measured in Lb / Head	23,317
Milk - Production, Measured in $	236,431,000
Milk - Production, Measured in Lb	1,399,000,000

Crops - Planted, Harvested, Yield, Production, Price (MYA), Value of Production †
Sorted by Value of Production in Dollars

Commodity	Planted All Purpose Acres	Harvested Acres	Yield	Production or Sales	Price per Unit	Value of Production or Sales in Dollars
CORN						
CORN, GRAIN		9,550,000	178 BU / ACRE	1,699,900,000 BU	3.35 $ / BU	5,694,665,000
CORN	9,850,000					
CORN, SILAGE		240,000	19.5 TONS / ACRE	4,680,000 TONS		
CORN, NON-IRRIGATED, GRAIN		3,973,000	147.2 BU / ACRE	584,961,000 BU		
CORN, IRRIGATED, GRAIN		5,577,000	199.9 BU / ACRE	1,114,939,000 BU		
CORN, NON-IRRIGATED	4,088,000					
CORN, IRRIGATED	5,762,000					
SOYBEANS						
SOYBEANS	5,200,000	5,150,000	61 BU / ACRE	314,150,000 BU	9.25 $ / BU	2,905,888,000
SOYBEANS, IRRIGATED	2,479,000	2,462,000	67.5 BU / ACRE	166,150,000 BU		
SOYBEANS, NON-IRRIGATED	2,721,000	2,688,000	55.1 BU / ACRE	148,000,000 BU		
HAY & HAYLAGE						
HAY & HAYLAGE		2,475,000	2.38 TONS / ACRE, DRY BASIS	5,880,000 TONS, DRY BASIS		449,050,000
HAY & HAYLAGE, ALFALFA	110,000	760,000	4.18 TONS / ACRE, DRY BASIS	3,177,000 TONS, DRY BASIS		
HAY & HAYLAGE, (EXCL ALFALFA)		1,715,000	1.58 TONS / ACRE, DRY BASIS	2,703,000 TONS, DRY BASIS		
HAY						
HAY		2,450,000	2.35 TONS / ACRE	5,748,000 TONS	77 $ / TON	439,000,000
HAY, ALFALFA		750,000	4.15 TONS / ACRE	3,113,000 TONS	80 $ / TON	250,597,000
HAY, (EXCL ALFALFA)		1,700,000	1.55 TONS / ACRE	2,635,000 TONS	70 $ / TON	188,403,000
WHEAT						
WHEAT	1,370,000	1,310,000	54 BU / ACRE	70,740,000 BU	3.14 $ / BU	219,294,000
WHEAT, WINTER	1,370,000	1,310,000	54 BU / ACRE	70,740,000 BU	3.14 $ / BU	219,294,000
WHEAT, WINTER, NON-IRRIGATED	1,224,000	1,170,000	51.2 BU / ACRE	59,904,000 BU		
WHEAT, WINTER, IRRIGATED	146,000	140,000	77.4 BU / ACRE	10,836,000 BU		
BEANS						
BEANS, DRY EDIBLE	138,000	122,000	2,270 LB / ACRE	2,766,000 CWT	27.9 $ / CWT	77,171,000
POTATOES						
POTATOES	16,500	16,400	450 CWT / ACRE	7,380,000 CWT	10.1 $ / CWT	74,538,000
SORGHUM						
SORGHUM, GRAIN		175,000	102 BU / ACRE	17,850,000 BU	4.9 $ / CWT	48,980,000
SORGHUM, SILAGE		10,000	14 TONS / ACRE	140,000 TONS		
SORGHUM	200,000					
SUNFLOWER						
SUNFLOWER	41,500	39,000	1,491 LB / ACRE	58,150,000 LB	15.9 $ / CWT	11,179,000
MILLET						
MILLET, PROSO	95,000	88,000	35 BU / ACRE	3,080,000 BU	2.65 $ / BU	8,162,000
OATS						
OATS	135,000	25,000	60 BU / ACRE	1,500,000 BU	2.25 $ / BU	3,075,000
HAYLAGE						

HAYLAGE		45,000	5.96 TONS / ACRE	268,000 TONS		
HAYLAGE, (EXCL ALFALFA)		25,000	5.5 TONS / ACRE	138,000 TONS		
HAYLAGE, ALFALFA		20,000	6.5 TONS / ACRE	130,000 TONS		
SUGARBEETS						
SUGARBEETS	48,000	47,200	29.9 TONS / ACRE	1,411,000 TONS		
PEAS						
PEAS, DRY EDIBLE	55,000	52,000	1,340 LB / ACRE	697,000 CWT	(D) $ / CWT	(D)

(NA) Not Available
(D) Withheld to avoid disclosing data for individual operations
(S) Insufficient number of reports to establish an estimate
(X) Not Applicable
(Z) Less than half the rounding unit

Alternative Crop
Nitrogen and Phosphorus Needs

Alternative Crop	Average Yield[A]	Production Unit	Nitrogen Requirement per Unit[B]	Phosphorus Removal Rate per Unit[C]	Nitrogen Requirement to Raise Average Yield (lbs./acre)[B]	Phosphorus Requirement to Raise Average Yield (lbs./acre)[C]
Irrigated Soybeans	65.5	bushels/acre	3.77	0.77	247	50
Corn Silage	19.5	ton/acre	10.5	5.9	205	110
Grain Sorghum	102.0	bushels/acre	1.15	0.27	117	28
Oats	60.0	bushels/acre	1.3	0.25	78	15
Potatoes	450.0	cwt.	0.5	0.13	225	59
Sugar Beets	29.9	ton/acre	8	1.4	239	42
Sunflowers	15.9	cwt.	5	1.2	80	19
Wheat	54.0	bushels/acre	2.4	0.52	130	28

A - "2016 Nebraska State Agricultural Overview"

B - "Nitrogen Requirement" Ward Guide page 39

C - "Quantities of Plant Nutrients in Crops" Ward Guide page 58

* A different source for providing proven yields may or may not be used at time of alternative crop planting.

Manure Fertilizer Sales Agreement

Seller: Bruns Feedlot LLC

1172 I Avenue

Pender, NE 68047

Date: _____

Buyer: _____

Address: _____

_____

Phone: _____

Cell: _____

Application Site Details

Field Name: _____ Legal Description: _____ Acres: _____

Previous crop: _____ Planned crop: _____ Proven Yield Goal: _____ bu/acre,

Manure: $ _____ / _____ Application fee: $ _____ / _____

Application Rate: _____ _____ /acre **(specified by buyer)**

Total $ _____ **/ton**

Seller and Buyer agree to the above stated field details regarding the application of manure fertilizer on said fields. It will be the buyer's responsibility to notify seller when the fields are ready for application or stockpiling. Seller will supply manure fertilizer on a first available basis to its buyers. The buyer will control the application rate and timing of application of manure fertilizer and will pay the seller the above fee for custom application of the product. Seller shall be excused for failure to provide a saleable product under this agreement by labor problems, adverse weather, acts of God or other events beyond seller's control.

The seller and Nutrient Advisors, LLC will provide buyer with current laboratory results of the manure fertilizer product. Nutrient Advisors, LLC will provide buyer with soil sample analysis of each field and provide recommendations only for the said fields. The buyer will not apply supplemental commercial fertilizers in excess of recommended rates provided by Nutrient Advisors LLC. These recommendations will be itemized on the nutrient budgets provided to buyer for each application site. The seller and Nutrient Advisors, LLC shall not be held liable for crop failures or economic losses from buyer's decisions. By signing this agreement and notifying seller of field availability, the buyer shall have determined that the manure fertilizer product is good and acceptable for its uses. The seller and Nutrient Advisors, LLC makes no expressed or implied representations and warranties beyond what is represented by the laboratory analysis. In no event shall seller be liable to buyer for any consequential or incidental damages in connection with the performance of the manure fertilizer product or its application. The buyer or seller shall have the right to cease applications at any time in the event that either party is dissatisfied. In this event, the buyer shall be responsible to pay seller for tons or acres of the contract that were delivered upon prior to ceasing.

Seller: _____

By: _____

Date: _____

Buyer: _____

By: _____

Date: _____

Section 7

Application Site Maps

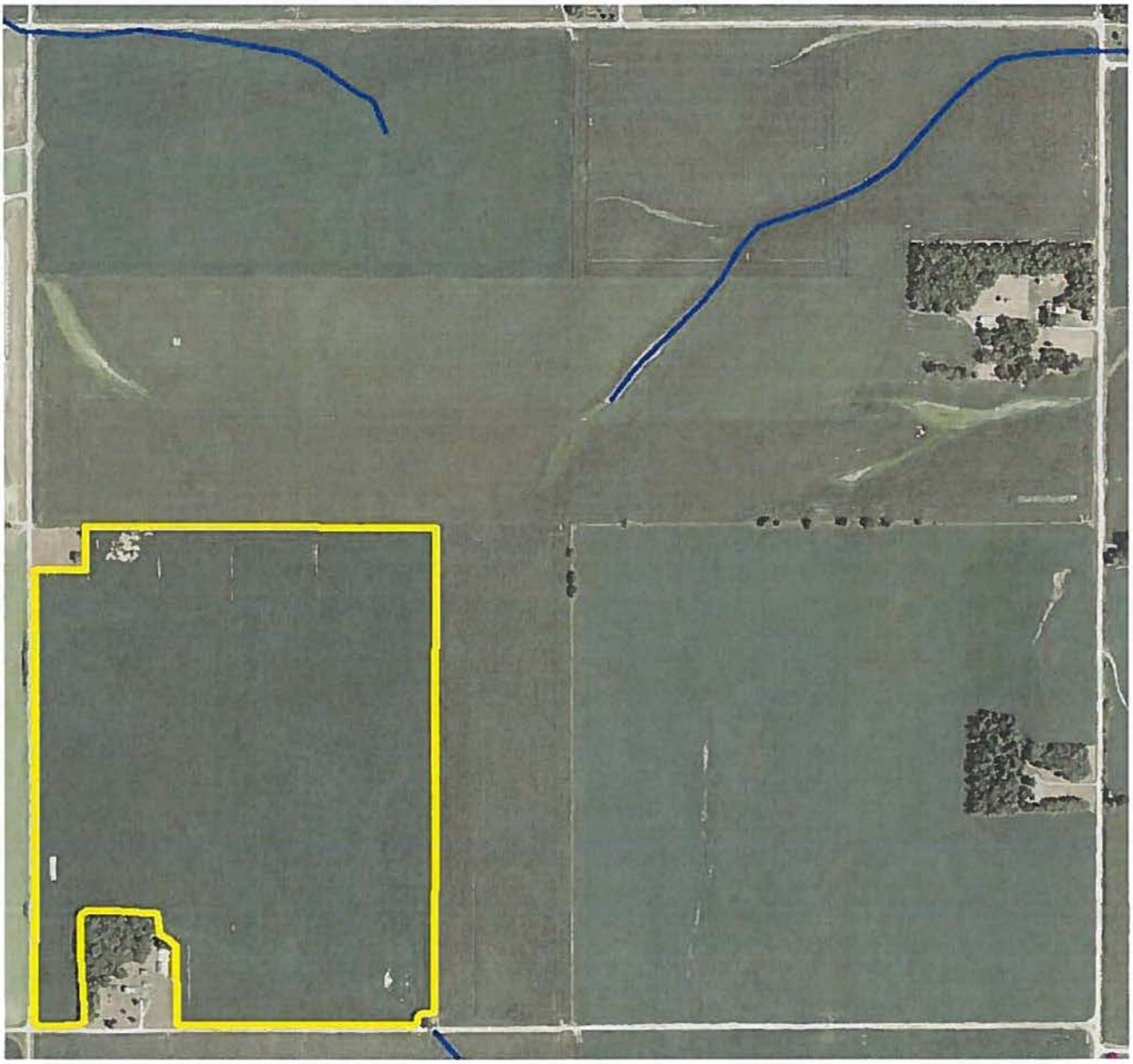
Aerial Maps

Soils Maps

Phosphorus Index

Land Application Agreements

Bruns Feedlot, LLC



Layer Key

- Boundary
- Registered Wells
- Setbacks
- Streams/Water
- Tile Inlets

Name: Site 1 McGuires

Landowner: Lonnie McGuire

Legal: W1/2 SW1/4, W1/2 E1/2 SW1/4 S15-T25N-R5E

Acres: 112.00

NUTRIENT ADVISORS

Bruns Feedlot, LLC

Area Symbol: NE179, Soil Area Version: 15

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	Productivity Index	SRPG
6628	Belfore silty clay loam, 0 to 2 percent slopes	43.27	38.6%	I	I	0	71
6813	Moody silty clay loam, 6 to 11 percent slopes	38.94	34.8%	IIIe	IVe	0	67
6756	Nora silt loam, 6 to 11 percent slopes, eroded	11.73	10.5%	IIIe	IVe	52	64
6811	Moody silty clay loam, 2 to 6 percent slopes	7.25	6.5%	IIe	IIIe	67	73
7716	McPaul silt loam, occasionally flooded	6.44	5.8%	IIw	IIw	0	25
6603	Alcester silty clay loam, 2 to 6 percent slopes	2.17	1.9%	IIe	IIIe	90	73
6754	Nora silt loam, 2 to 6 percent slopes, eroded	1.67	1.5%	IIe	IIIe	50	68
6782	Nora-Moody silty clay loams, 6 to 11 percent slopes	0.53	0.5%	IIIe	IVe	0	65
					Weighted Average	12.3	66.3

Name: Site 1 McGuires

Landowner: Lonnie McGuire

County: Wayne

Legal: W1/2 SW1/4, W1/2 E1/2 SW1/4 S15-T25N-R5E

Acres: 112.00

NUTRIENT ADVISORS

Nebraska Phosphorus Loss Assessment Rating

Livestock Operation: Bruns Feedlot, LLC
Crop Producer: Bruns Feedlot, LLC

Field ID: McGuires
Legal Desc: S15-T25N-R5E
Completion Date: July 2017

Prepared by: Nutrient Advisors

County	Wayne	
Field	McGuires	
Option	6628	
Erosion, S&R	0.6	
Sediment trap	None	
Field radius	1500.0	
Filter width	0-10 ft	
Enrichment	Tillage	
Land use		
	No-Till and Conservation Till without contouring	
	High Residue Crop/Low residue Crop - ntmt	
Soil type	Belfore silty clay loam, 0 to 1 percent slopes	
Soil P ppm	34.0	
Applied P lbs	150.0	
	Surface Application, No Incorporation	
Irrigation	None	
Rate gpm		
Furrow slope%		
Manure	3.0	tons/acre over years
P-Index Value	0.5	
Rating	**Low**	

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Bruns Feedlot LLC

1172 I Avenue	Pender	NE	68047	(402) 385 3650
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Lonnie McGuire

58511 849th Rd	Pender	NE	68047	
(Address)	(City)	(State)	(Zip)	(Phone)

The Landowner/Operator is the owner of the following described Real estate, to wit:

Legal Description: W2 SW4 & W2 E2 SW4 S15 T25N R5E Site: 1

Total Acres: 120 Useable Acres: 112 Irrigated [ ] Dryland [X]

Legal Description: _____ Site: _____

Total Acres: _____ Useable Acres: _____ Irrigated [ ] Dryland [ ]

Legal Description: _____ Site: _____

Total Acres: _____ Useable Acres: _____ Irrigated [ ] Dryland [ ]

Legal Description: _____ Site: _____

Total Acres: _____ Useable Acres: _____ Irrigated [ ] Dryland [ ]

Legal Description: _____ Site: _____

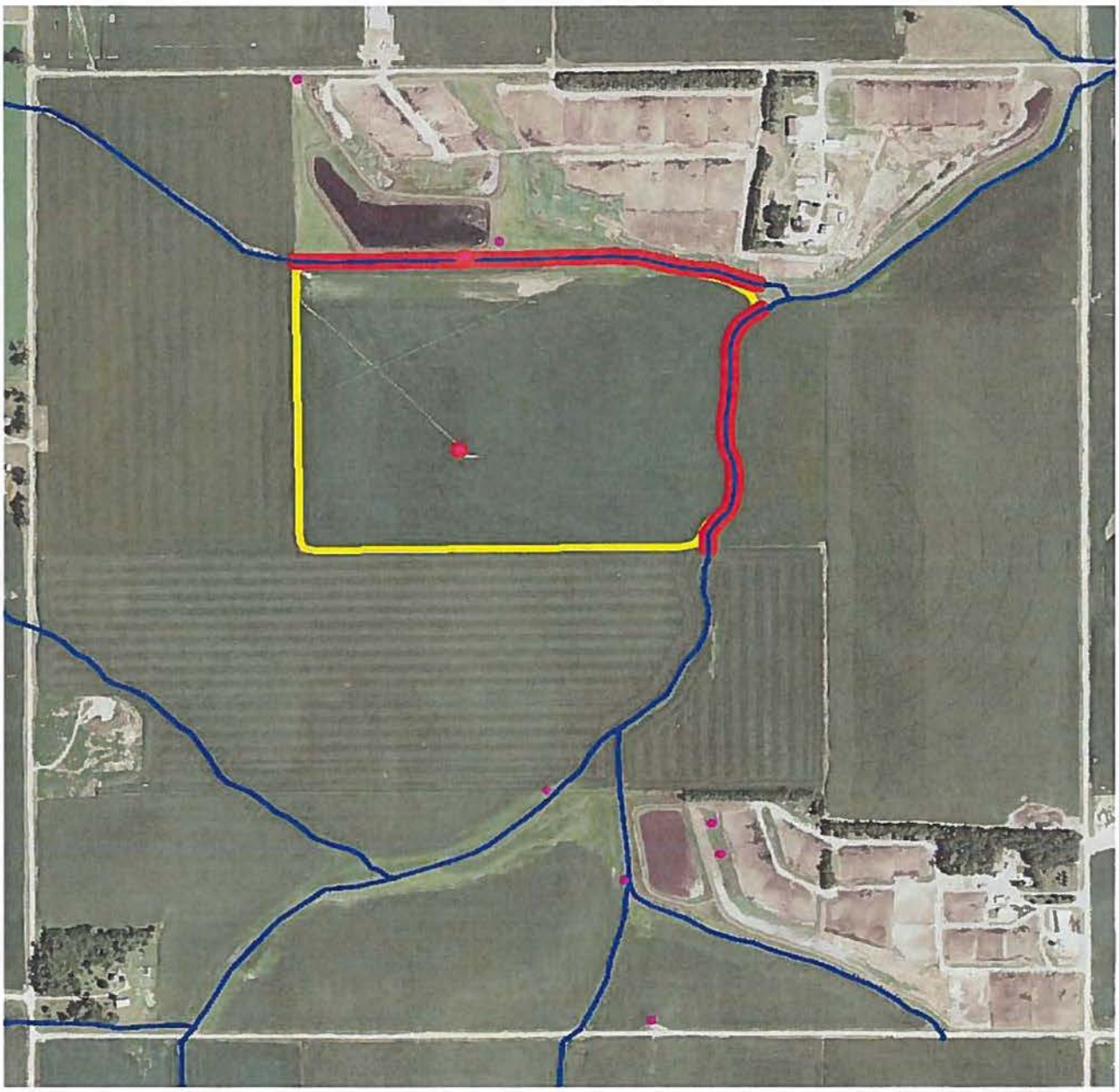
Total Acres: _____ Useable Acres: _____ Irrigated [ ] Dryland [ ]

1. This agreement allows the said Livestock Operation to spread livestock manure on said landowners/operators property.
2. The Landowner/Operator hereby consents to the Operation spreading manure on said premises at such times as are mutually agreeable by the parties. The Operation may or may not spread manure in any given year of this agreement.
3. The livestock operator shall use current manure analysis to establish the amount of nutrients that shall be applied at normal agronomic rates within the parameters of the livestock operations Nutrient Management Plan.
4. Landowner/Operator shall be able to specify the quantity of manure and location on premises to spread manure, within the parameters of the livestock operations Nutrient Management Plan.
5. This agreement shall continue from year to year without further renewal, except if either party desires to cancel this Agreement they shall do so on or before September 1, of any given year.
6. Landowner/Operator agrees to provide the Livestock Operation with information, including crop yields, planned crop rotation and other commercial fertilizer applied (if any), which the Livestock Operation will need to know in order to apply the manure in an environmentally responsible manner.

BY: _____ Date: 3/25/13
Landowner/Operator (Authorized Representative)

Leon Bruns Date: 3-25-13
Livestock Operator (Authorized Representative)

Bruns Feedlot, LLC



Layer Key

- Boundary
- Registered Wells
- Setbacks
- Streams/Water
- Tile Inlets

Name: Site 2 SW Pivot

Landowner: Leon Bruns

Legal: SE1/4 NW1/4, E1/2 SW1/4 NE1/4 S11-T25N-R5E

Acres: 76.48

NUTRIENT ADVISORS

Bruns Feedlot, LLC

Area Symbol: NE173, Soil Area Version: 14

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	Productivity Index	SRPG
6756	Nora silt loam, 6 to 11 percent slopes, eroded	28.95	37.9%	IIIe	IVe	52	55
3518	Lamo silty clay loam, 0 to 2 percent slopes, occasionally flooded	19.45	25.4%	IIw	IIw	0	48
6813	Moody silty clay loam, 6 to 11 percent slopes	18.92	24.7%	IIIe	IVe	0	69
6811	Moody silty clay loam, 2 to 6 percent slopes	7.79	10.2%	IIe	IIIe	67	74
6603	Alcester silty clay loam, 2 to 6 percent slopes	1.37	1.8%	IIe	IIIe	90	
					Weighted Average	28.1	57.6

Name: Site 2 SW Pivot

Landowner: Leon Bruns

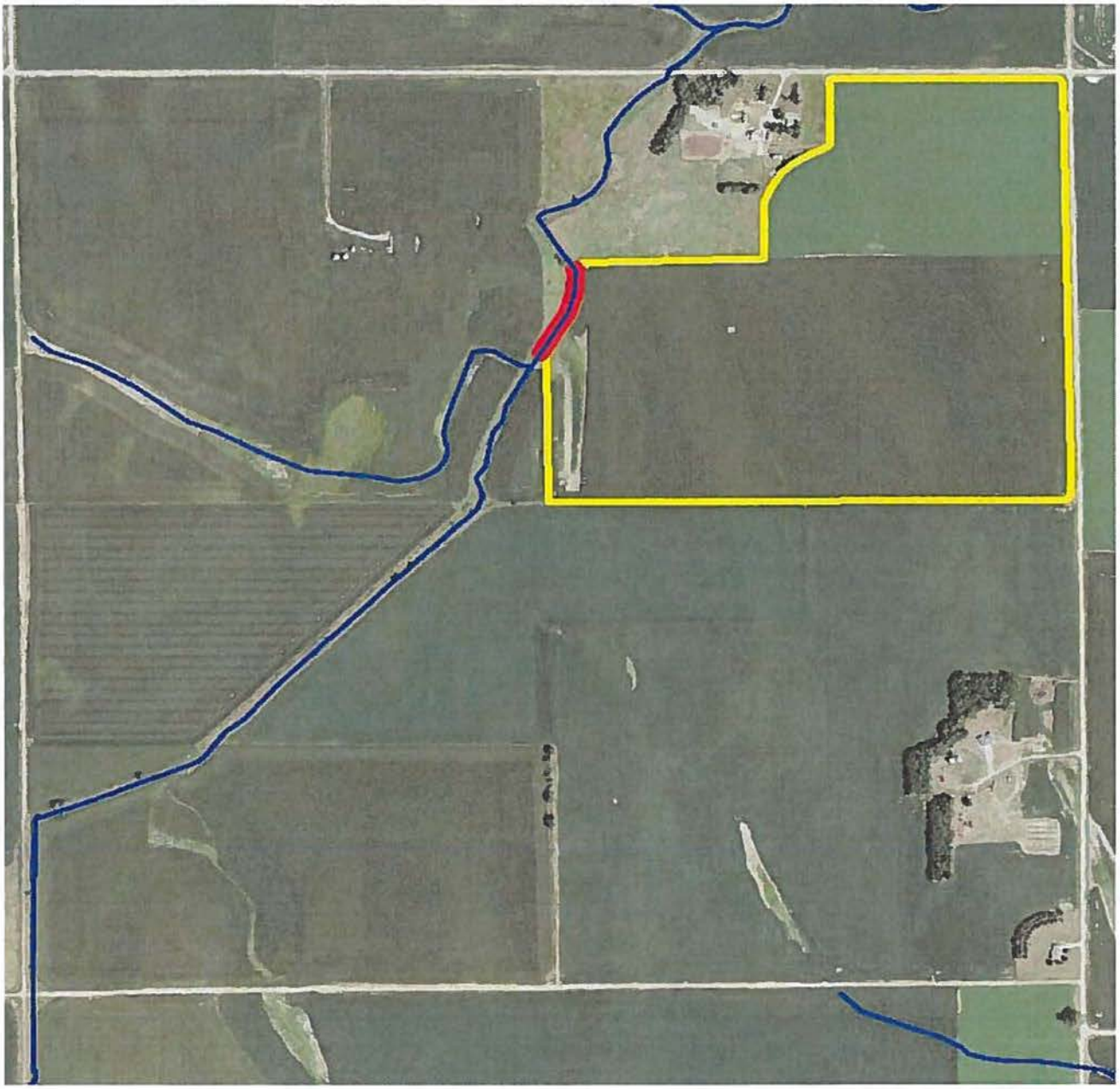
County: Thurston

Legal: SE1/4 NW1/4, E1/2 SW1/4 NE1/4 S11-T25N-R5E

Acres: 76.48

NUTRIENT ADVISORS

Bruns Feedlot, LLC



Layer Key

- Boundary
- Registered Wells
- Setbacks
- Streams/Water
- Tile Inlets

Name: Site 3 Joels 100

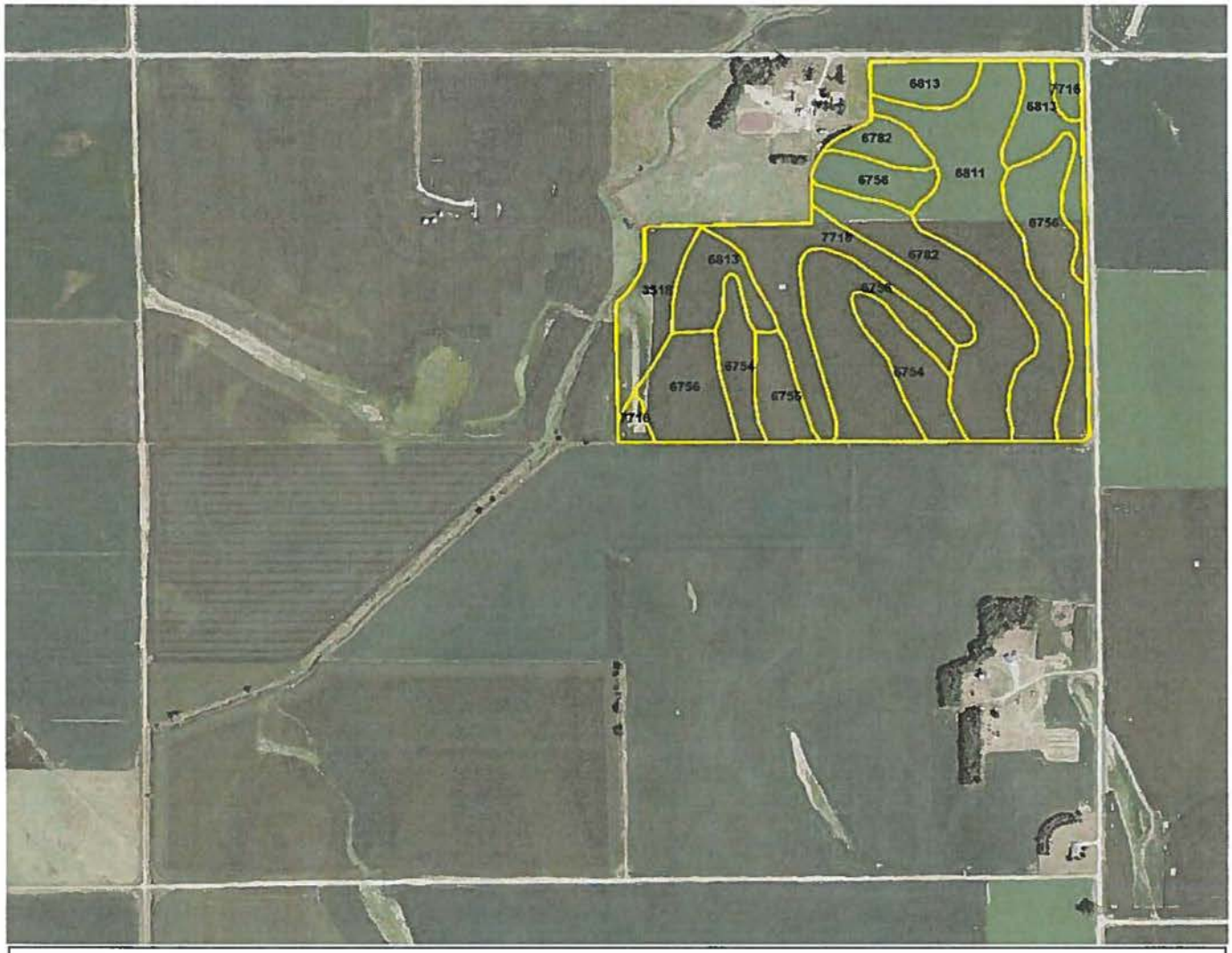
Landowner: Marilyn Hansen

Legal: E1/2 NE1/4, Pt. W1/2 NE1/4 S3-T25N-R5E

Acres: 108.10

NUTRIENT ADVISORS

Bruns Feedlot, LLC



Area Symbol: NE173, Soil Area Version: 14
Area Symbol: NE179, Soil Area Version: 15

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	Productivity Index	SRPG
6756	Nora silt loam, 6 to 11 percent slopes, eroded	34.30	31.7%	IIIe	IVe	52	64
6811	Moody silty clay loam, 2 to 6 percent slopes	18.21	16.8%	IIe	IIIe	67	73
6782	Nora-Moody silty clay loams, 6 to 11 percent slopes	15.30	14.2%	IIIe	IVe	0	65
6813	Moody silty clay loam, 6 to 11 percent slopes	12.93	12.0%	IIIe	IVe	0	67
7716	McPaul silt loam, occasionally flooded	12.91	11.9%	IIw	IIw	0	25
6754	Nora silt loam, 2 to 6 percent slopes, eroded	8.70	8.0%	IIe	IIIe	50	68
3518	Lamo silty clay loam, 0 to 2 percent slopes, occasionally flooded	5.75	5.3%	IIw	IIw	0	54
					Weighted Average	31.8	61.1

Name: Site 3 Joels 100

Landowner: Marilyn Hansen

County: Wayne

Legal: E1/2 NE1/4, Pt. W1/2 NE1/4 S3-T25N-R5E

Acres: 108.10

NUTRIENT ADVISORS

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Bruns Feedlot, LLC

1172 I Rd	Pender	NE	68047	402-385-3650
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Marylin Hansen

PO Box 234	Wakefield	NE	68784	
(Address)	(City)	(State)	(Zip)	(Phone)

The Landowner/Operator is the owner of the following described Real estate, to wit:

Legal Description: E2 NE4, Pt W2 NE4, S3 T25N R5E Site: 3

Total Acres: 131 Useable Acres: 100.2 Irrigated [ ] Dryland [X]

Legal Description: S2 NW4, S26 T25N R5E Site: 5

Total Acres: 80 Useable Acres: 80 Irrigated [ ] Dryland [X]

Legal Description: W2 SW4 & SW4 NW4, S2 T25NR5E Site: 6

Total Acres: 120 Useable Acres: 114.6 Irrigated [ ] Dryland [X]

Legal Description: _____ Site: _____

Total Acres: _____ Useable Acres: _____ Irrigated [ ] Dryland [ ]

Legal Description: _____ Site: _____

Total Acres: _____ Useable Acres: _____ Irrigated [ ] Dryland [ ]

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2. The Landowner/Operator hereby consents to the Operation spreading manure on said premises at such times as are mutually agreeable by the parties. The Operation may or may not spread manure in any given year of this agreement.
3. The livestock operator shall use current manure analysis to establish the amount of nutrients that shall be applied at normal agronomic rates within the parameters of the livestock operations Nutrient Management Plan.
4. Landowner/Operator shall be able to specify the quantity of manure and location on premises to spread manure, within the parameters of the livestock operations Nutrient Management Plan.
5. This agreement shall continue from year to year without further renewal, except if either party desires to cancel this Agreement they shall do so on or before September 1, of any given year.
6. Landowner/Operator agrees to provide the Livestock Operation with information, including crop yields, planned crop rotation and other commercial fertilizer applied (if any), which the Livestock Operation will need to know in order to apply the manure in an environmentally responsible manner.

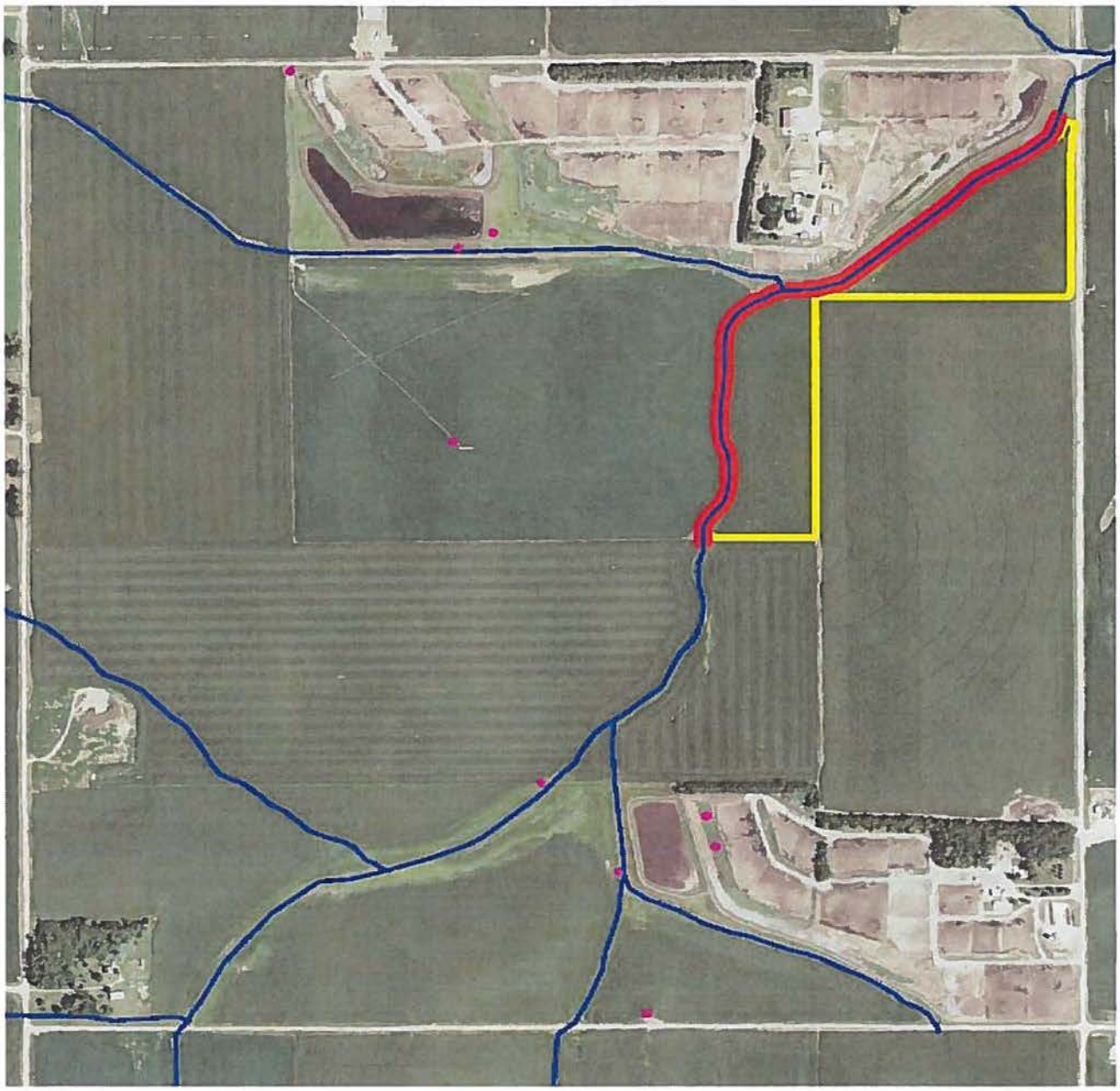
BY: Marilyn Hansen Date: 3-26-13

Landowner/Operator (Authorized Representative)

Leon Bruns Date: 3-25-13

Livestock Operator (Authorized Representative)

Bruns Feedlot, LLC



Layer Key

- Boundary
- Registered Wells
- Setbacks
- Streams/Water
- Tile Inlets

Name: Site 4 E Corner

Landowner: Leon Bruns

Legal: Pt. NE1/4 NE1/4, W1/2 SW1/4 NE1/4 S11-T25N-R5E

Acres: 27.54

NUTRIENT ADVISORS

Bruns Feedlot, LLC

Area Symbol: NE173, Soil Area Version: 14

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	Productivity Index	SRPG
3518	Lamo silty clay loam, 0 to 2 percent slopes, occasionally flooded	19.88	72.2%	IIw	IIw	0	48
6603	Alcester silty clay loam, 2 to 6 percent slopes	3.94	14.3%	IIe	IIIe	90	
6814	Moody silty clay loam, 6 to 11 percent slopes, eroded	3.48	12.6%	IIIe	IVe	0	66
6813	Moody silty clay loam, 6 to 11 percent slopes	0.24	0.9%	IIIe	IVe	0	69
					Weighted Average	12.9	43.6

Name: Site 4 E Corner

Landowner: Leon Bruns

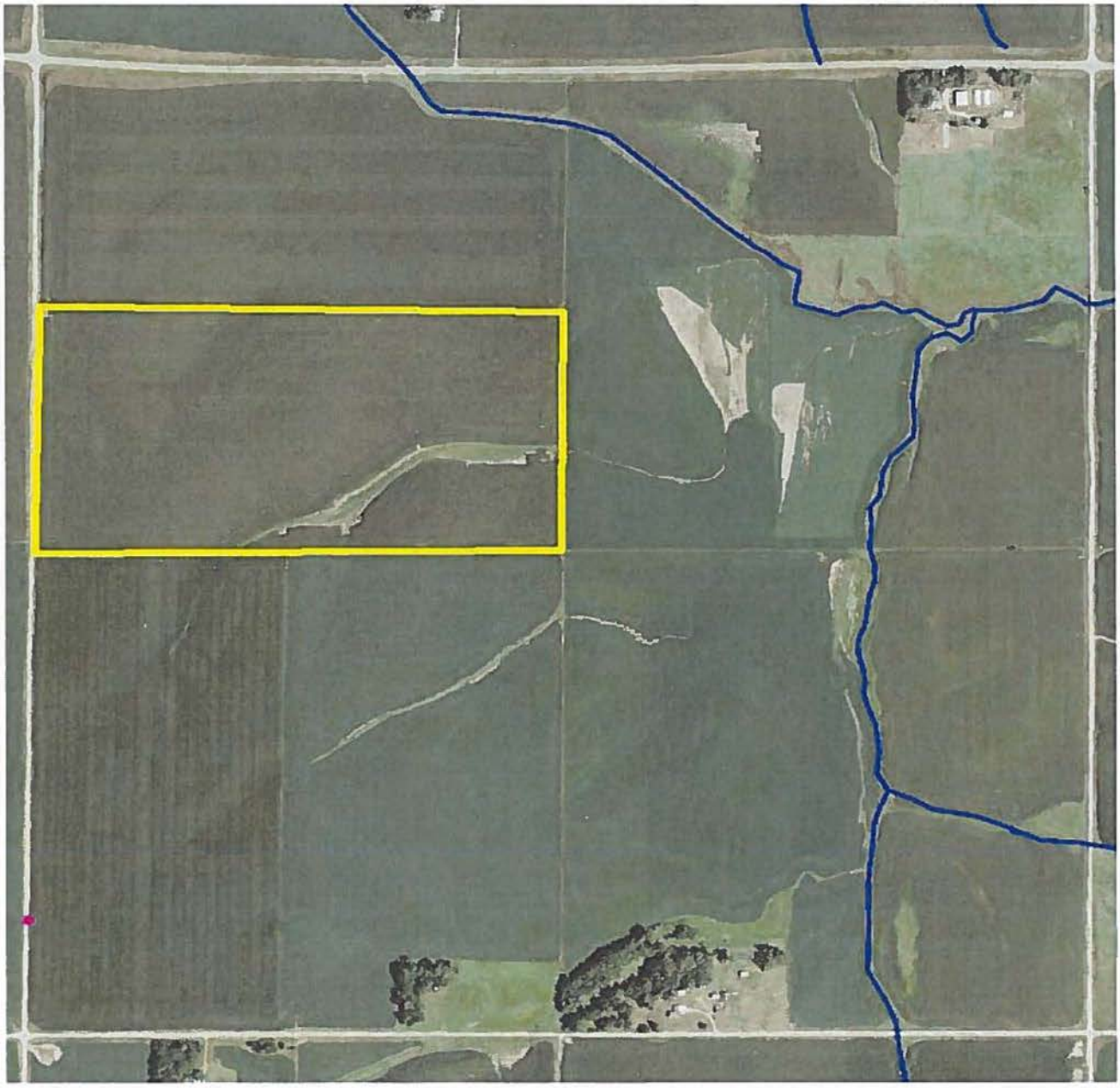
County: Thurston

Legal: Pt. NE1/4 NE1/4, W1/2 SW1/4 NE1/ S11-T25N-R5E

Acres: 27.54

NUTRIENT ADVISORS

Bruns Feedlot, LLC



Layer Key

- Boundary
- Registered Wells
- Setbacks
- Streams/Water
- Tile Inlets

Name: Site 5 S 80

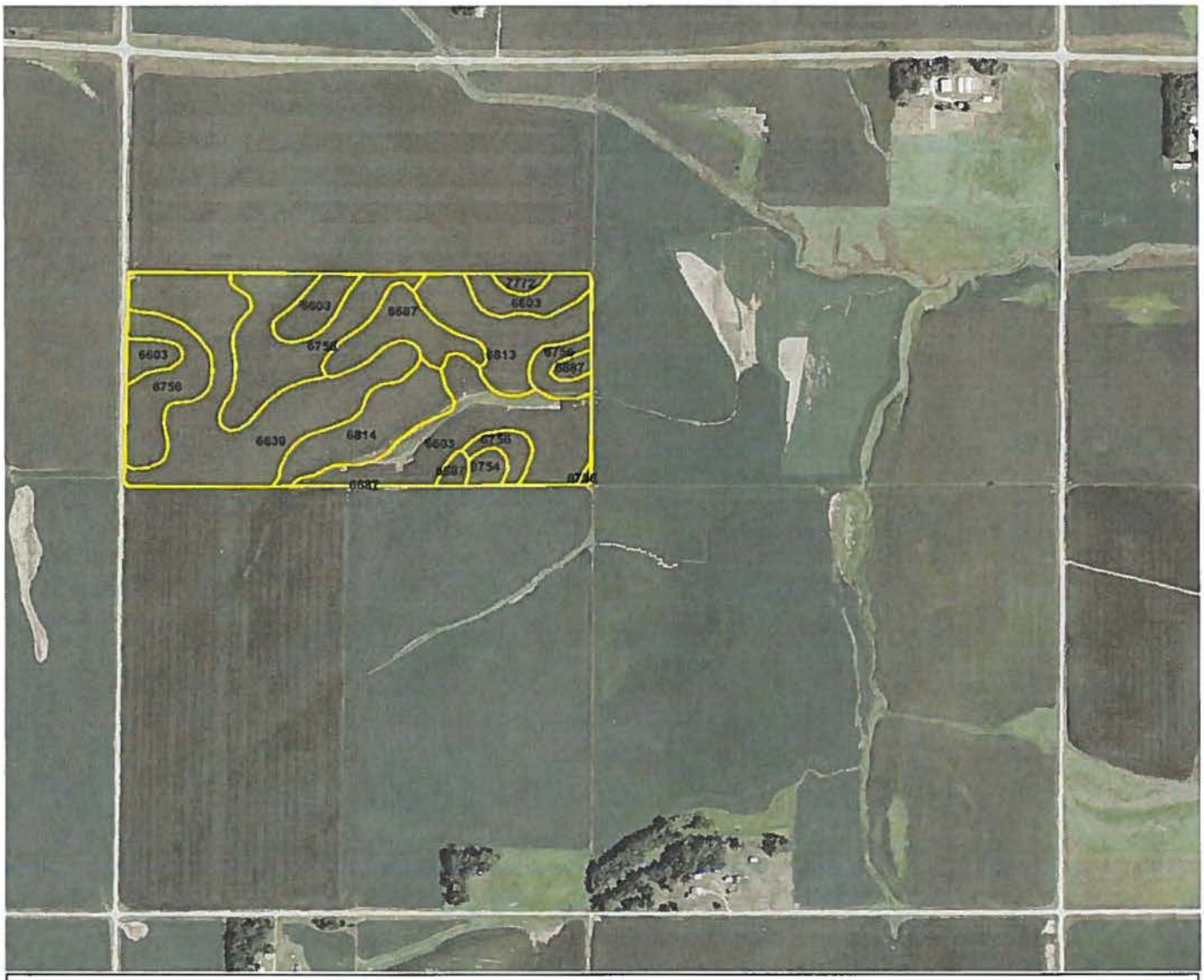
Landowner: Marilyn Hansen

Legal: S1/2 NW1/4 S26-T25N-R5E

Acres: 80.06

NUTRIENT ADVISORS

Bruns Feedlot, LLC



Area Symbol: NE173, Soil Area Version: 14

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	Productivity Index	SRPG
6603	Alcester silty clay loam, 2 to 6 percent slopes	19.34	24.2%	IIe	IIIe	90	
6756	Nora silt loam, 6 to 11 percent slopes, eroded	19.33	24.1%	IIIe	IVe	52	55
6630	Belfore-Moody silty clay loams, 1 to 3 percent slopes	19.31	24.1%	IIe	IIe	0	73
6813	Moody silty clay loam, 6 to 11 percent slopes	7.14	8.9%	IIIe	IVe	0	69
6814	Moody silty clay loam, 6 to 11 percent slopes, eroded	6.93	8.7%	IIIe	IVe	0	66
6687	Crofton silt loam, 6 to 11 percent slopes, eroded	6.32	7.9%	IVe	IVe	0	41
6754	Nora silt loam, 2 to 6 percent slopes, eroded	1.07	1.3%	IIe	IIIe	50	67
7772	Colo and Lamo silty clay loams, occasionally flooded	0.62	0.8%	IIw	IIw	0	54
					Weighted Average	35	47.3

Name: Site 5 S 80

Landowner: Marilyn Hansen

County: Thurston

Legal: S1/2 NW1/4
S26-T25N-R5E

Acres: 80.06

NUTRIENT ADVISORS

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Bruns Feedlot, LLC

1172 I Rd	Pender	NE	68047	402-385-3650
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Marylin Hansen

PO Box 234	Wakefield	NE	68784	
(Address)	(City)	(State)	(Zip)	(Phone)

The Landowner/Operator is the owner of the following described Real estate, to wit:

Legal Description: E2 NE4, Pt W2 NE4, S3 T25N R5E Site: 3

Total Acres: 131 Useable Acres: 100.2 Irrigated [ ] Dryland [X]

Legal Description: S2 NW4, S26 T25N R5E Site: 5

Total Acres: 80 Useable Acres: 80 Irrigated [ ] Dryland [X]

Legal Description: W2 SW4 & SW4 NW4, S2 T25NR5E Site: 6

Total Acres: 120 Useable Acres: 114.6 Irrigated [ ] Dryland [X]

Legal Description: Site:

Total Acres: Useable Acres: Irrigated [ ] Dryland [ ]

Legal Description: Site:

Total Acres: Useable Acres: Irrigated [ ] Dryland [ ]

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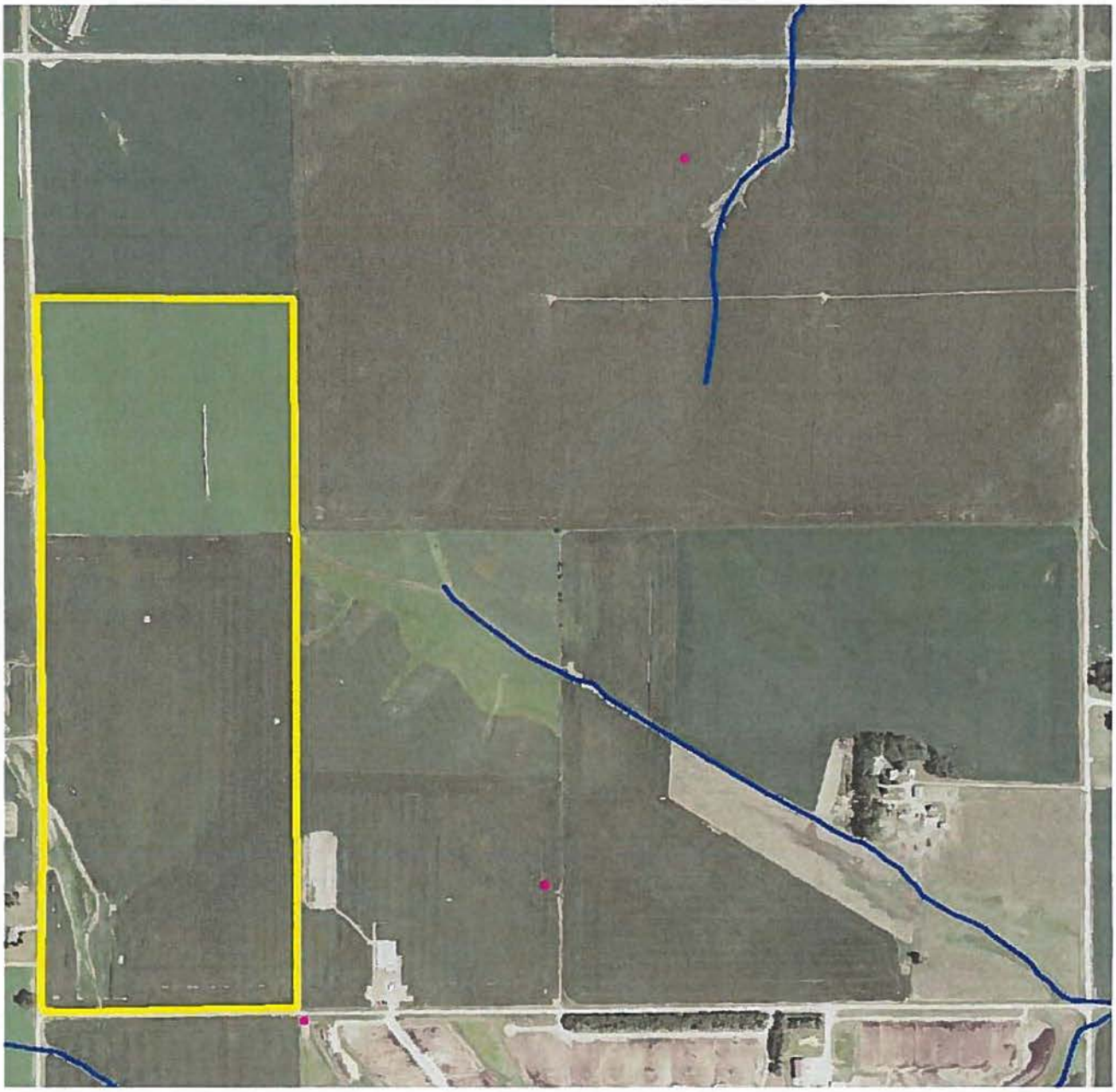
BY: Marilyn Hansen Date: 3-26-13
Landowner/Operator (Authorized Representative)

Leon Bruns Date: 3-25-13
Livestock Operator (Authorized Representative)

Bruns Feedlot, LLC



Layer Key

- Boundary
- Registered Wells
- Setbacks
- Streams/Water
- Tile Inlets

Name: Site 6 Marylin N40 & W80

Landowner: Marilyn Hansen

Legal: W1/2 SW1/4, SW1/4 NW1/4 S2-T25N-R5E

Acres: 114.60

NUTRIENT ADVISORS

Bruns Feedlot, LLC

Area Symbol: NE173, Soil Area Version: 14

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	Productivity Index	SRPG
6756	Nora silt loam, 6 to 11 percent slopes, eroded	41.85	36.5%	IIIe	IVe	52	55
6811	Moody silty clay loam, 2 to 6 percent slopes	31.68	27.6%	IIe	IIIe	67	74
6813	Moody silty clay loam, 6 to 11 percent slopes	27.57	24.1%	IIIe	IVe	0	69
7772	Colo and Lamo silty clay loams, occasionally flooded	4.75	4.1%	IIw	IIw	0	54
6603	Alcester silty clay loam, 2 to 6 percent slopes	4.63	4.0%	IIe	IIIe	90	
6767	Nora silty clay loam, 6 to 11 percent slopes	4.12	3.6%	IIIe	IVe	0	63
					Weighted Average	**41.1**	**61.6**

Name: Site 6 Marylin N40 & W80

Landowner: Marilyn Hansen

County: Thurston

Legal: W1/2 SW1/4, SW1/4 NW1/4 S2-T25N-R5E

Acres: 114.60

NUTRIENT ADVISORS

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Bruns Feedlot, LLC

1172 I Rd	Pender	NE	68047	402-385-3650
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Marylln Hansen

PO Box 234	Wakefield	NE	68784	
(Address)	(City)	(State)	(Zip)	(Phone)

The Landowner/Operator is the owner of the following described Real estate, to wit:

Legal Description: E2 NE4, Pt W2 NE4, S3 T25N R5E Site: 3

Total Acres: 131 Useable Acres: 100.2 Irrigated [ ] Dryland [X]

Legal Description: S2 NW4, S26 T25N R5E Site: 5

Total Acres: 80 Useable Acres: 80 Irrigated [ ] Dryland [X]

Legal Description: W2 SW4 & SW4 NW4, S2 T25NR5E Site: 6

Total Acres: 120 Useable Acres: 114.6 Irrigated [ ] Dryland [X]

Legal Description: Site:

Total Acres: Useable Acres: Irrigated [ ] Dryland [ ]

Legal Description: Site:

Total Acres: Useable Acres: Irrigated [ ] Dryland [ ]

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BY: Marilyn Hansen Date: 3-26-13

Landowner/Operator (Authorized Representative)

Leon Bruns Date: 3-25-13

Livestock Operator (Authorized Representative)

Bruns Feedlot, LLC

Layer Key

- Boundary
- Registered Wells
- Setbacks
- Streams/Water
- Tile Inlets

Name: Site 7 N40

Landowner: Mary Bruns

Legal: SE1/4 SW1/4 S2-T25N-R5E

Acres: 38.98

NUTRIENT ADVISORS

Bruns Feedlot, LLC

Area Symbol: NE173, Soil Area Version: 14							
Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	Productivity Index	SRPG
6756	Nora silt loam, 6 to 11 percent slopes, eroded	19.77	50.7%	IIIe	IVe	52	55
6811	Moody silty clay loam, 2 to 6 percent slopes	12.80	32.8%	IIe	IIIe	67	74
6603	Alcester silty clay loam, 2 to 6 percent slopes	4.34	11.1%	IIe	IIIe	90	
6813	Moody silty clay loam, 6 to 11 percent slopes	2.07	5.3%	IIIe	IVe	0	69
					Weighted Average	58.4	55.9

Name: Site 7 N40

Landowner: Mary Bruns

County: Thurston

Legal: SE1/4 SW1/4 S2-T25N-R5E

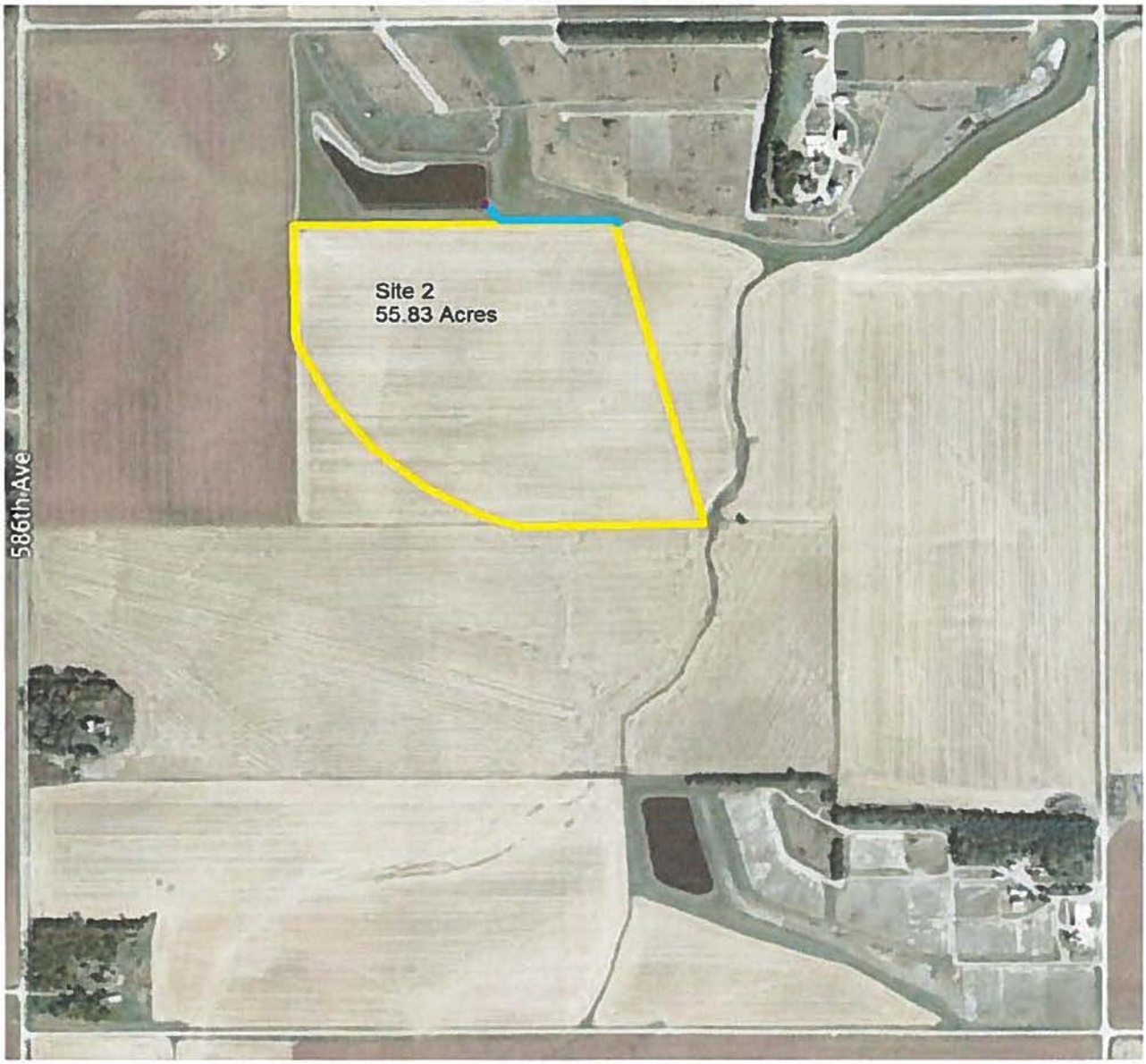
Acres: 38.98

NUTRIENT ADVISORS

Section 8

Effluent Distribution Plan

Effluent Distribution Plan



Layer Key

- Boundary
- Pump
- Surface Hose/Pipe
- Underground Pipe

Bruns Feedlot, LLC

County: Thurston

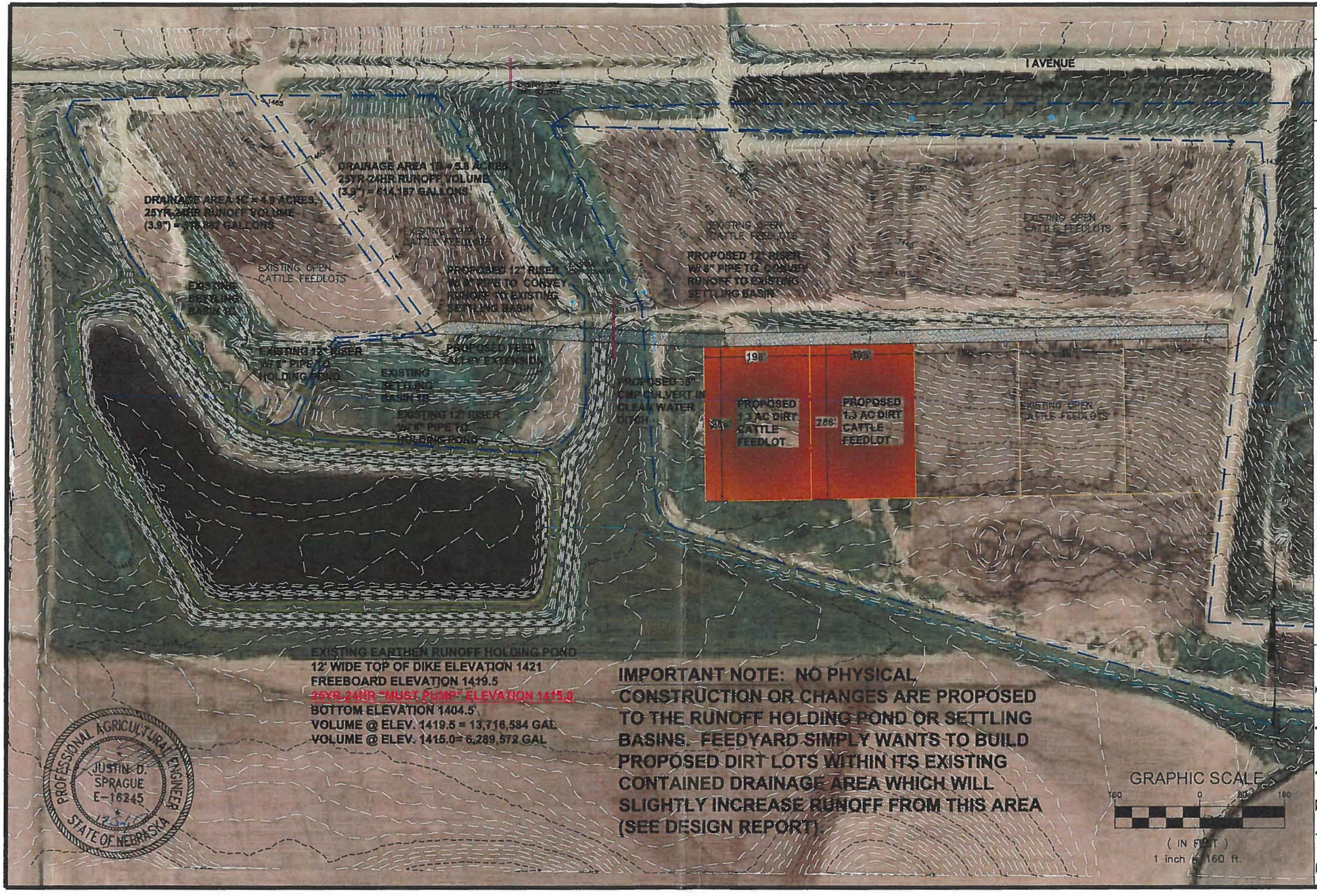
Township: Thayer

Legal: S11-T25N-R5E

NUTRIENT ADVISORS

Bruns Feedlot, LLC
Effluent Distribution Plan

Effluent water from the holding pond at Bruns Feedlot, LLC is dewatered to application site 2. This system uses an 800 gpm pump and power unit and connects to the center pivot irrigation system on site 2 via above ground pipe from the holding pond to the pivot point. This system has no fresh water capabilities.



SHEET 1/2

Date	Drawn	Checked By	Project No.
7/13/17	D.D.A.	J.D.S.	17-119

BRUNS FEEDYARD
PROPOSED CATTLE FEEDLOT EXPANSION
N 1/2, SECTION 11, T-25-N, R-05-E
THURSTON COUNTY, NEBRASKA

ProAg Engineering, Inc.
77402 U.S. Highway 71, P.O. Box 181
Jackson, MN 56143
(507) 849-7200

T AVENUE

CONTRIBUTING DRAINAGE AREA = 402 ACRES, 25YR-24HR RUNOFF VOLUME (2.7") = 664,694 GALLONS

EXISTING OPEN CATTLE FEEDLOTS

DRAINAGE AREA 1A = 41.6 ACRES, 25YR-24HR RUNOFF VOLUME (3.8") = 5,442,370 GALLONS

EXISTING 12" RISER W/ 8" PIPE TO LIFT STATION

EXISTING LIFT STATION W/ 8" PIPE TO HOLDING POND

12 ROAD

OPOSED
AC DIRT
TTLE
EDLOT

YSICAL
GES ARE PROPOSED
POND OR SETTLING
Y WANTS TO BUILD
THIN ITS EXISTING
EA WHICH WILL
OFF FROM THIS AREA

PROFESSIONAL AGRICULTURAL ENGINEER
JUSTIN D. SPRAGUE
E-16245
STATE OF NEBRASKA

GRAPHIC SCALE
160 0 80 160
(IN FEET)
1 inch = 160 ft.

SHEET	2/2
Project No.	17-119
Checked By	J.D.S.
Date	7/13/17
Drawn	D.D.A.

BRUNS FEEDYARD
PROPOSED CATTLE FEEDLOT EXPANSION
N 1/2, SECTION 11, T-25-N, R-05-E
THURSTON COUNTY, NEBRASKA

ProAg Engineering, Inc.
77402 U.S. Highway 71, P.O. Box 181
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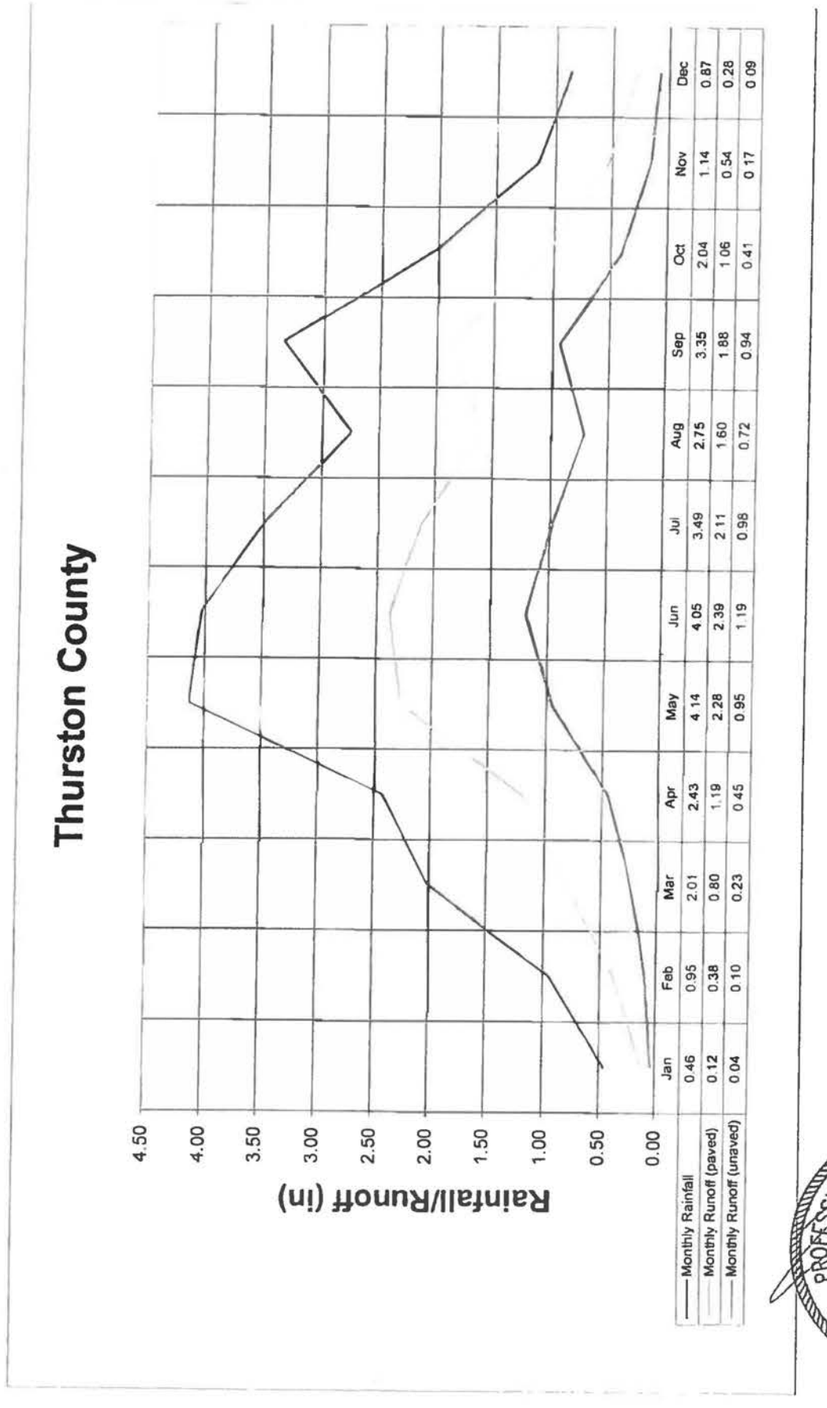


Precipitation, Evaporation, Runoff for Animal Waste Systems

Landowner: Bruns Feedyard
NRD:
Field Office:

Practice: Runoff Holding Pond
By: JDS Date: 05/22/17
Checked: Date:

County: Thurston
Design Storage Period From: Jan thru Dec

Storm Rainfall (Inches)	
10-yr Rainfall	4.4
25-yr Rainfall	5.0
100-yr Rainfall	

Storm Runoff (Inches)

	Unpaved	Paved	Cont. DA CN_1 = 74
10-yr Runoff	3.3	4.0	1.9
25-yr Runoff	3.9	4.6	2.4
100-yr Runoff			

CN_{30} = 48

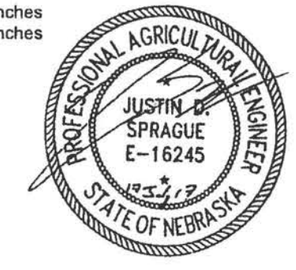
Monthly Rainfall / Runoff / Evaporation (Inches)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Monthly Rainfall	0.46	0.95	2.01	2.43	4.14	4.05	3.49	2.75	3.35	2.04	1.14	0.87	27.7
Primary Design Period	0.46	0.95	2.01	2.43	4.14	4.05	3.49	2.75	3.35	2.04	1.14	0.87	27.7
Secondary Design Period													
Monthly Evaporation	0.50	0.70	1.50	3.00	3.60	5.30	6.60	6.50	5.40	3.50	2.00	0.70	39.3
Primary Design Period	0.50	0.70	1.50	3.00	3.60	5.30	6.60	6.50	5.40	3.50	2.00		38.6
Secondary Design Period												0.70	0.7
Monthly Runoff (Paved)	0.12	0.38	0.80	1.19	2.28	2.39	2.11	1.60	1.88	1.06	0.54	0.28	14.6
Primary Design Period	0.12	0.38	0.80	1.19	2.28	2.39	2.11	1.60	1.88	1.06	0.54	0.28	14.6
Secondary Design Period													
Monthly Runoff (Unpaved)	0.04	0.10	0.23	0.45	0.95	1.19	0.98	0.72	0.94	0.41	0.17	0.09	6.3
Primary Design Period	0.04	0.10	0.23	0.45	0.95	1.19	0.98	0.72	0.94	0.41	0.17	0.09	6.3
Secondary Design Period													
Contributing DA				0.01	0.32	0.29	0.15	0.03	0.13				0.9
Primary Design Period				0.01	0.32	0.29	0.15	0.03	0.13				0.9
Secondary Design Period													

Summary

The NDEQ minimum runoff storage volume for open lots is the sum of runoffs from the 25-yr storm and the month of June.
The NDEQ minimum is: 5.1 inches of runoff for unpaved lots.

Rainfall		
Total rainfall during primary design period	27.7	inches
Total rainfall during secondary design period		inches
Evaporation		
Total Evap. during primary design period	38.6	inches
Total Evap. during secondary design period	0.7	inches
Runoff (Paved Lots)		
Total runoff from paved lots during primary design period	14.6	inches
Total runoff from paved lots during secondary design period		inches
Runoff (Unpaved Lots)		
Total runoff from unpaved lots during primary design period	6.3	inches
Total runoff from unpaved lots during secondary design period		inches
Runoff (Contributing Drainage Area)		
Total runoff from contributing DA during primary design Period	0.9	inches
Total ruoff from contributing DA during secondary design period		inches



I AVENUE

BENCHMARK IS THE CENTER OF I AVENUE AT THE 1/2 MILE MARKER, ELEV. 1447.0

EXISTING 36" CMP CULVERT

CONTRIBUTING DRAINAGE AREA = 10.2 ACRES

DRAINAGE AREA 1B = 5.8 ACRES

DRAINAGE AREA 1A = 41.5 ACRES

DRAINAGE AREA 1C = 4.9 ACRES

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING SETTLING BASIN 1C

PROPOSED 12" RISER W/ 8" PIPE TO CONVEY RUNOFF TO EXISTING SETTLING BASIN

EXISTING 36" CMP CULVERT

PROPOSED 12" RISER W/ 8" PIPE TO CONVEY RUNOFF TO EXISTING SETTLING BASIN

EXISTING 12" RISER W/ 8" PIPE TO HOLDING POND

PROPOSED FEED ALLEY EXTENSION

EXISTING SETTLING BASIN 1B

EXISTING 12" RISER W/ 8" PIPE TO HOLDING POND

PROPOSED 36" CMP CULVERT IN CLEAN WATER DITCH

198' 198' 198' 198' 198'

288' 288'

PROPOSED 1.3 AC DIRT CATTLE FEEDLOT

PROPOSED 1.3 AC DIRT CATTLE FEEDLOT

EXISTING OPEN CATTLE FEEDLOTS

EXISTING EARTHEN RUNOFF HOLDING POND
12' WIDE TOP OF DIKE ELEVATION 1421
FREEBOARD ELEVATION 1419.5
25YR-24HR "MUST PUMP" ELEVATION 1415.5
BOTTOM ELEVATION 1404.5
VOLUME @ ELEV. 1419.5 = 13,716,584 GAL
VOLUME @ ELEV. 1415.5= 7,042,728 GAL

PROFESSIONAL AGRICULTURAL ENGINEER
JUSTIN D. SPRAGUE
E-16245
STATE OF NEBRASKA

IMPORTANT NOTE: NO PHYSICAL CONSTRUCTION OR CHANGES ARE PROPOSED TO THE RUNOFF HOLDING POND OR SETTLING BASINS. FEEDYARD SIMPLY WANTS TO BUILD PROPOSED DIRT LOTS WITHIN ITS EXISTING CONTAINED DRAINAGE AREA WHICH WILL SLIGHTLY INCREASE RUNOFF FROM THIS AREA (SEE DESIGN REPORT).

GRAPHIC SCALE
160 0 80 160
(IN FEET)
1 inch = 160 ft.

SHEET 1/2

Project No.	17-119
Checked By	J.D.S.
Date	4/23/18
Drawn	D.D.A.

BRUNS FEEDYARD
PROPOSED CATTLE FEEDLOT EXPANSION
N 1/2, SECTION 11, T-25-N, R-05-E
THURSTON COUNTY, NEBRASKA

ProAg Engineering, Inc.
77402 U.S. Highway 71, P.O. Box 181
Jackson, MN 56143
(507) 849-7200

I AVENUE

EXISTING OPEN CATTLE FEEDLOTS

CONTRIBUTING DRAINAGE AREA = 10.2 ACRES

EXISTING OPEN CATTLE FEEDLOTS

DRAINAGE AREA 1A = 41.5 ACRES

EXISTING OPEN CATTLE FEEDLOTS

EXISTING SETTLING BASIN 1A

EXISTING 12" RISER W/ 8" PIPE TO LIFT STATION

EXISTING OPEN CATTLE FEEDLOTS

EXISTING LIFT STATION W/ 8" PIPE TO HOLDING POND

198' 198' 198' 198'

ROPOSED AC DIRT TTLE EEDLOT

EXISTING OPEN CATTLE FEEDLOTS

12 ROAD

EXISTING OPEN CATTLE FEEDLOTS

GRAPHIC SCALE

160 0 80 160

(IN FEET)

1 inch = 160 ft.

PROFESSIONAL AGRICULTURAL ENGINEER
JUSTIN D. SPRAGUE
E-16245
STATE OF NEBRASKA

SHEET 2/2

Project No.	17-119
Checked By	J.D.S.
Date	4/23/18
Drawn	D.D.A.

BRUNS FEEDYARD
PROPOSED CATTLE FEEDLOT EXPANSION
N 1/2, SECTION 11, T-25-N, R-05-E
THURSTON COUNTY, NEBRASKA

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(507) 849-7200

SHEET 1/2

Project No.	17-119
Checked By	J.D.S.
Date	4/23/18
Drawn	D.D.A.

I AVENUE

BENCHMARK IS THE CENTER OF J AVENUE AT THE 1/2 MILE MARKER, ELEV. 1447.0

CONTRIBUTING DRAINAGE AREA = 10.2 ACRES

DRAINAGE AREA 1A = 41.5 ACRES

DRAINAGE AREA 1B = 5.8 ACRES

DRAINAGE AREA 1C = 4.9 ACRES

EXISTING 36" CMP CULVERT

EXISTING OPEN CATTLE FEEDLOTS

EXISTING SETTLING BASIN 1C

EXISTING 12" RISER W/ 8" PIPE TO HOLDING POND

EXISTING SETTLING BASIN 1B

EXISTING 12" RISER W/ 8" PIPE TO HOLDING POND

PROPOSED 12" RISER W/ 8" PIPE TO CONVEY RUNOFF TO EXISTING SETTLING BASIN

PROPOSED FEED ALLEY EXTENSION

PROPOSED 36" CMP CULVERT IN CLEAN WATER DITCH

198' 198' 198' 198' 198'

288' 288'

PROPOSED 1.3 AC DIRT CATTLE FEEDLOT

PROPOSED 1.3 AC DIRT CATTLE FEEDLOT

EXISTING EARTHEN RUNOFF HOLDING POND
12' WIDE TOP OF DIKE ELEVATION 1421
FREEBOARD ELEVATION 1419.5
25YR-24HR "MUST PUMP" ELEVATION 1415.5
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VOLUME @ ELEV. 1419.5 = 13,716,584 GAL
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PROFESSIONAL AGRICULTURAL ENGINEER
JUSTIN D. SPRAGUE E-16245
STATE OF NEBRASKA
7-24-18

IMPORTANT NOTE: NO PHYSICAL CONSTRUCTION OR CHANGES ARE PROPOSED TO THE RUNOFF HOLDING POND OR SETTLING BASINS. FEEDYARD SIMPLY WANTS TO BUILD PROPOSED DIRT LOTS WITHIN ITS EXISTING CONTAINED DRAINAGE AREA WHICH WILL SLIGHTLY INCREASE RUNOFF FROM THIS AREA (SEE DESIGN REPORT).

GRAPHIC SCALE
160 0 80 160
(IN FEET)
1 inch = 160 ft.

BRUNS FEEDYARD
PROPOSED CATTLE FEEDLOT EXPANSION
N 1/2, SECTION 11, T-25-N, R-05-E
THURSTON COUNTY, NEBRASKA

ProAg Engineering, Inc.
77402 U.S. Highway 71, P.O. Box 181
Jackson, MN 56143
(507) 849-7200

I AVENUE

CONTRIBUTING DRAINAGE AREA = 10.2 ACRES

DRAINAGE AREA 1A = 41.5 ACRES

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING OPEN CATTLE FEEDLOTS

EXISTING SETTLING BASIN 1A

EXISTING 12" RISER W/ 8" PIPE TO LIFT STATION

EXISTING LIFT STATION W/ 8" PIPE TO HOLDING POND

12 ROAD

198' 198' 198' 198'

ROPOSED
AC DIRT
ATTLE
EEDLOT

GRAPHIC SCALE

160 0 80 160

(IN FEET)
1 inch = 160 ft.

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STATE OF NEBRASKA

SHEET 2/2

Project No.	17-119
Checked By	J.D.S.
Date	4/23/18
Drawn	D.D.A.

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