



Pete Ricketts, Governor

September 29, 2020

RECEIVED

OCT 09 2020

LANCASTER COUNTY
CLERK

Dan Nolte
Lancaster County Board
555 S. 10th St.
Lincoln, NE 68508

RE: Prairieland Dairy, LLC Concentrated Animal Feeding Operation
NDEE ID: 73762
Program ID: LWC 2-100
Subject: **Notice of Application for Major Modification Received**
NE 1/4, Section 29 & SE 1/4, Section 20, Township 07N, Range 08E
Lancaster County
Prepared By: Nutrient Advisors

Dear Mr. Nolte:

Enclosed is a copy of the application for a Construction and Operating Permit for the above referenced concentrated animal feeding operation, received by the Nebraska Department of Environment and Energy (Department), in accordance with Title 130, *Livestock Waste Control Regulations*.

The Lancaster County Board has thirty (30) days to submit comments to the Department about any factors or conditions existing at the site that should be considered when making a decision on the application.

Please keep the enclosed copy of the application for your records. If the application is approved, the Department will send you a copy of the Construction and Operating Permit for your files.

If you have any questions, please contact me at (402) 471-6687.

Sincerely,

A handwritten signature in black ink, appearing to read "Kevin Franzluebbbers".

Kevin Franzluebbbers
Program Specialist
Agriculture Section
Water Permits Division

Enclosure

CHECK #015775
RECEIVED \$400.00

COPY



**NUTRIENT
ADVISORS**

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OCT 09 2020

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LANCASTER COUNTY
CLERK

SEP 24 2020

September 23, 2020

Mr. Cay Ewoldt
Nebraska Department of Environment & Energy
P.O. Box 98922
Lincoln, NE 68509-8922

NE Dept of Environment and Energy
By: _____ DEE #171 _____

RE: Prairieland Dairy, LLC
NDEEID: 73762
Subject: Modified Construction & Operating and NPDES Permit Application

Dear Mr. Ewoldt:

Enclosed is an original and five copies of the Modified Construction & Operating Permit & NPDES application for Prairieland Dairy, LLC. Also enclosed is a check for \$400.00 for the application fees.

If you have any questions, please call our office.

Sincerely,

Joe Guenther

Nutrient Advisors

Enclosures



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



2020093600

CHECK #015775
RECEIVED \$400.00

COPY

PRAIRIELAND DAIRY, LLC

RECEIVED

NDEEID# - 73762
NPDES# - NE0139467

SEP 24 2020

NE Dept of Environment and Energy
By: _____ DEE #171 _____

NUTRIENT MANAGEMENT PLAN



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OCT 09 2020

LANCASTER COUNTY
CLERK



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

2020093600

Prairieland Dairy, LLC

Introduction

- Prairieland Dairy, LLC is located approximately 1 mile north and 3.5 miles east of Firth, NE in Lancaster County. It is an existing dairy with a current permitted capacity of 1,360 head.
- Prairieland Dairy, LLC would like to propose an expansion which would occur in three phases:
 - Phase I is a solo phase of getting the permitted capacity to 2,000 head
 - Phase II will add extensions to the width of the current freestall barns. This new row of freestalls will allow for 500 more head of dairy cattle for a total of 2,500 head.
 - Phase III will add a 600 head freestall barn located just west of the existing parlor. This additional barn would add 600 head for a total of 3,100 head.
 - Phase IV will add a new freestall barn and a new parlor. This last phase will add 400 head of dairy cattle to bring the total permitted capacity to 3,500 head.
- Prairieland Dairy, LLC will construct a new holding pond for the Gold building. This new holding pond will collect and store industry liquids in the Gold building. The existing 2 dairy ponds will continue to store all the dairy liquids.
- Prairieland Dairy, LLC will co-mingle dairy waste with industry waste at times. Thus, Prairieland Dairy, LLC will be applying for an industrial permit.

Prairieland Dairy, LLC

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NOTE: "Applicant" refers to the legal name of an individual, a corporation, a limited liability company, partnership, or government entity to whom the permit will be issued, if approved. If applicant is an individual, completion of a U.S. Citizenship Attestation form may be required, except when already on file with the Department. The Applicant is responsible for compliance with all local laws, and for obtaining applicable local, county, and other permits. The Certification below must be signed by the applicant or an authorized representative, as defined below.

CERTIFICATION

I certify that, to the best of my knowledge and belief, I have the authority under the laws of the State of Nebraska to sign this application. I also 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 significant penalties exist for submitting false information, including the possibilities of a fine and imprisonment for knowing violations.

Justin Ohlde

Printed or Typed Name of Applicant or Authorized Representative

Joe

Signature of Applicant or Authorized Representative

7-19-20

Date of Signature

"Authorized Representative" means, for:
A Corporation: a principal executive officer in charge of a principal business function and of at least the level of vice president; or
A Limited Liability Company: a manager or principal executive officer; or
A Partnership: a general partner; or
A Sole Proprietorship: the proprietor; or
A Municipal, state or other public entity: a principal executive officer or ranking elected official

TECHNICAL ADVISOR INFORMATION

NAME OF CONSULTANT OR ADVISOR Joe Guenther TITLE OR CERTIFICATION: Advisor

NAME OF COMPANY Nutrient Advisors

STREET ADDRESS 449 E Deere St. CITY/STATE/ZIP West Point, NE 68788

CONSULTANT PHONE NO.: (402) 372 2236 ()
(Work) (Other: Cell, Home, Fax, etc.)

Email: info@nutrientadvisors.com

I certify that the design of the livestock waste control facility meets the minimum requirements as outlined in Title 130, "Livestock Waste Control Regulations," of the Nebraska Department of Environmental Quality.

Joseph Guenther

Signature of Technical Advisor or Professional Engineer

7-21-2020

Date of Signature

---Seal of Professional Engineer---
(if required)

---For DEQ Office Use Only---

TITLE 130 - FORM B
Attachment

Name of Animal Feeding Operation (AFO)

PrairieLand Dairy, LLC

LIVESTOCK (Indicate one-time capacity of entire operation, including any livestock previously exempted from permitting)

Species (Cattle, Dairy, Swine, etc.)	Average Weight (in lbs.)	Indicate Head Numbers Below			
		Existing	Proposed (+ or -)	Previously Exempted	New Total
Dairy Cows (Proposed)	1400	1,360	+640		2,000
Dairy Cows (Phase 2)	1400	2,000	+500		2,500
Dairy Cows (Phase 4)	1400	2,500	+700		3,200
Dairy Cows (Phase 6)	1400	3,200	+300		3,500

TITLE 130 - FORM C

APPLICANT DISCLOSURE

Reserved for NDEQ Use only
 IIS # _____

This Applicant Disclosure is required from all applicants for construction and operating permits, major modifications, transfer requests, National Pollutant Discharge Elimination System (NPDES) individual permits, or requests for coverage under a NPDES General Permit. If additional space is needed for any section, please print, "See Attached," in that section and attach the required information on a separate sheet of paper.

LEGAL NAME OF APPLICANT: PrairieLand Dairy, LLC
 (Legal name of permittee, i.e.: Legal name of sole proprietor, partnership, limited liability company, corporation, or government entity)

NAME OF ANIMAL FEEDING OPERATION (AFO): (May be different than Applicant Name given above.)
PrairieLand Dairy, LLC

AFO LOCATION See Attachment Qtr. , N, E or W Lancaster County
Qtr. Qtr. Section Township Range

TYPE OF BUSINESS (check one): Sole Proprietor Partnership Limited Liability Company
 Corporation Government Entity

SECTION I – Owner or Authorized Representative Information

in the space provided below, disclose the name, title, address, phone number and email address (email optional) of the applicant, partners, owners, members, authorized representative(s), and all corporate officers, directors, and stockholders.

Name	Title or Association with Operation	Address & Phone No. (Email Optional)
SEE ATTACHED		
	Street Address: _____ City/State/Zip: _____ Phone No.: _____ Email: _____	_____ _____ _____ _____
	Street Address: _____ City/State/Zip: _____ Phone No.: _____ Email: _____	_____ _____ _____ _____
	Street Address: _____ City/State/Zip: _____ Phone No.: _____ Email: _____	_____ _____ _____ _____

SECTION II – Participation in Other AFOs

In the space below, list the location of all animal feeding operations in Nebraska and other states wholly or partially owned or operated in the past 5 years by the applicant or individual(s) listed in Section I.

Name	Name of Operation	Legal Location of Operation <small>(Qtr, Section, Township, Range, County, State)</small>
Justin Ohlde	Ohlde Dairy, LP	NW1/4, S24-T4S-R3E Washington County, KS
Justin Ohlde	Carter Creek Cattle, LLC	NE1/4, S24-T4S-R3E Washington County, KS
Wil-mar-sen Dairy, LLP	Wil-mar-sen Dairy, LLP	NE1/4, SE1/4, S13-T3N-R6E Gage County, NE

SECTION III – Livestock Waste Discharges

In the space below, list any livestock waste discharges within the past five years that were not in compliance with permit conditions from any operation in Nebraska wholly or partially owned or operated by the applicant or individuals listed in Section I.

Name of Operation	Location & Legal Description of Operation	Date(s) of Discharge
None		

SECTION IV – Previous Violations of Environmental Laws

In the space below, list all criminal convictions for a violation of §81-1506 of the Nebraska Environmental Protection Act or all felony criminal convictions for violation of the environmental laws of any jurisdiction by any of the individuals listed in Section I. Include the name of the individual, name of the operation, date(s) of violation, and describe the violation. If additional space is needed, please attach a separate sheet of paper.

None

CERTIFICATION

As authorized representative for the animal feeding operation described above, I hereby certify the following:

- A. Neither I, nor any of the persons named in Section I, have:
- 1) Allowed three or more livestock waste discharges to Waters of the State within the past five years that were not in compliance with permit conditions from any operation in Nebraska wholly or partially owned or operated by the applicant and individuals listed in Section I;
 - 2) A criminal conviction for violation of §81-1506 of the Nebraska Environmental Protection Act, or a felony criminal conviction for violation of environmental laws in any jurisdiction.
- B. That to the best of my knowledge and belief, I have the authority under the laws of the State of Nebraska to sign this applicant disclosure.
- C. Under penalty of law, that the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that significant penalties exist for submitting false information, including the possibilities of a fine and imprisonment for knowing violations. I have completely and accurately disclosed all information required by this form.
- D. I understand any misrepresentation or withholding of information may result in rejection of the application or revocation of a permit once issued. I also understand that any misrepresentation on this form may result in civil or criminal penalties provided for by law.

Justin Ohlde

Printed or Typed Name of Authorized Representative

Box

Signature of Authorized Representative

2-19-20

Date of Signature

"Authorized Representative" means, for:

A Corporation: a principal executive officer in charge of a principal business function and of at least the level of vice president; or

A Limited Liability Company: a manager or principal executive officer; or

A Partnership: a general partner; or

A Sole Proprietorship: the proprietor; or

A Municipal, state or other public entity: a principal executive officer or ranking elected official

NOTE: Applicant is responsible for compliance with all local laws and for obtaining applicable local, county, and other permits.

TITLE 130 - FORM C
Attachment

Name of Animal Feeding Operation (AFO)

Prairieland Dairy, LLC

AFO Location:

_____	,	SE4	,	20		7		N	8	<input checked="" type="checkbox"/>	E	or	<input type="checkbox"/>	W	Lancaster	County
Qtr.		Qtr.		Section		Township		Range								
_____	,	Pt. NE4	,	29		7		N	8	<input checked="" type="checkbox"/>	E	or	<input type="checkbox"/>	W	Lancaster	County
Qtr.		Qtr.		Section		Township		Range								
_____	,	_____	,	_____		_____		N	_____	<input type="checkbox"/>	E	or	<input type="checkbox"/>	W	_____	County
Qtr.		Qtr.		Section		Township		Range								
_____	,	_____	,	_____		_____		N	_____	<input type="checkbox"/>	E	or	<input type="checkbox"/>	W	_____	County
Qtr.		Qtr.		Section		Township		Range								

TITLE 130 - FORM C

Section I Attachment

Owner or Authorized Representative Information

Name	Title or Association with Operation	Address & Phone No. (Email Optional)
Justin Ohlde	Manager	
		Street Address: 1814 9th Rd City/State/Zip: Linn, KS 66953 Phone No.: 785-770-2387 Email:
Obbink Farms	Owner	
Cliff Obbink - President Dave Obbink - VP		Street Address: 27605 S. 134th Street City/State/Zip: Firth, NE 68358 Phone No.: Email:
Wil-mar-sen Dairy, LLP	Owner	
		Street Address: 30285 S. 23rd Road City/State/Zip: Beatrice, NE 68310 Phone No.: Email:
L.A.H. Eickhoff Farms Inc.	Owner	
Alfred Eickhoff - President Harvey Eickhoff - VP		Street Address: 71570 650 Ave. City/State/Zip: Falls City, NE 68355 Phone No.: Email:
	Owner	
		Street Address: City/State/Zip: Phone No.: Email:

United States Citizenship Attestation Form

For the purpose of complying with Neb. Rev. Stat. §§ 4-108 through 4-114, I attest as follows:

<input checked="" type="checkbox"/>	I am a citizen of the United States.
— OR —	
<input type="checkbox"/>	I am a qualified alien under the federal Immigration and Nationality Act, my immigration status and alien number are as follows: _____, and I agree to provide a copy of my USCIS documentation upon request.

I hereby attest that my response and the information provided on this form and any related application for public benefits are true, complete, and accurate and I understand that this information may be used to verify my lawful presence in the United States.

PRINT NAME	Justin Ohlde _____ <small>(first, middle, last)</small>
SIGNATURE	 _____
DATE	2-19-2020 _____

Section 1

Narrative

Narrative 1-1

Prairieland Dairy, LLC

Nutrient Management Plan

001 Operation & Maintenance Plan

001.01 Facility Description & Operation

Prairieland Dairy, LLC is a dairy operation utilizing freestall barns to house dairy cows. Prairieland Dairy, LLC cover approximately 84 acres in Lancaster County. The facility has a maximum one-time capacity of 3,500 head of dairy cattle weighing an average of 1,400 pounds. The manure will primarily be applied to cropland by solid manure spreader, slurry injection and through a center pivot system. Manure generated in pens or sediment cleaned from the basin(s) and holding pond(s) may be stockpiled on application sites throughout the growing season, and applied after crop removal. Prairieland Dairy, LLC has 4,047 acres available for manure application.

Prairieland Dairy, LLC is also a food waste processing operation. They take in waste from outside parties and compost it on their composting pad. All manure from Prairieland Dairy dairy cow side will be sent to the industrial building and separated and further processed in the building.

Prairieland Dairy, LLC will utilize the synergistic relationship between the dairy and the waste processing operation. Manure generated at the dairy may be composted on the composting pad. If the manure is composted on the composting pad, all the proper composting rules will be followed. The compost may be transferred to others throughout the year. If the dairy waste is not composted and land applied in its "raw" form it will only go on application sites and will follow all industrial guidelines. All waste being received in the industrial building will be composted or land applied as a liquid. Generated liquid manure from the dairy and the industrial building will be land applied on applications sites and following industrial guidelines.

001.02 Manure Estimates

It is estimated that the operation will produce approximately 9,609 tons of solid cattle manure, 16 million gallons of slurry and 8 million gallons of effluent water annually. These are estimates, and will vary depending on annual stocking rates and weather conditions.

Cattle manure production was determined using book values from the American Society of Agricultural & Biological Engineering's Manure Production & Characteristics Standard D384.2 (Table 1.b-Section 3). Tables and production calculations can be found in Section 6

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

001.03 Best Management Practices

Prairieland Dairy, 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 Prairieland Dairy, 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. Prairieland Dairy, LLC may apply manure fertilizer primarily with a 13 ton Knight Side Slinger and drag hose. Other equipment is available for use if necessary. Prairieland Dairy, LLC owns their own equipment and may also contract additional custom services for the application of manure. Prairieland Dairy, 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 applied in a manner that minimizes potential for 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 Prairieland Dairy, LLC. If Prairieland Dairy, LLC is hired for custom application on these acres, a Manure Agreement will be signed (Section 6). Prairieland Dairy, 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 Prairieland Dairy, 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 NDEE within 24 hours of the event. A written report will be submitted to NDEE within five days of the event. Justin Ohlde can be contacted at 785-770-2387 and/or Lancaster County dispatch at 402-441-6500.

001.03F LWCF Maintenance

Prairieland Dairy, 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. Backfill around the underground pit(s) will ensure that any storm runoff will drain away from the structure.

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. NDEE 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 Chemical Management Plan

Refer to the Chemical Management Plan in Section 3.

001.03J 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 run off does not affect waters of the state. See Livestock Mortality Management Plan in Section 3.

001.03K Odor Control Plan

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

001.03K1 Livestock Production Area

In the confined feeding operation, floors, equipment and livestock will be kept as clean and dry as possible. Manure will not be allowed to build up on floors and drainage area over deep pit(s). Water spills/leaks will be repaired promptly. In open lots, pens will be scraped periodically, not allowing manure to buildup. Pens will be kept as clean and dry as possible to avoid anaerobic decomposition or organic material.

001.03K2 Livestock Waste Control Facility

The holding pond(s) will be managed properly with respect to dewatering. The holding pond(s) is large enough to consistently hold all runoff, store production, store excess runoff and apply in a timely manner to cropland. The holding pond(s) 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. Critical levels will be monitored and maintained to the best of their ability. Basin(s) will be cleaned periodically.

001.03K3 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 a freestall barn dairy. The forms of manure are solids separated from the freestall barns, solids scraped from the pens, sediment cleaned from the basin(s), slurry from the freestall barns and effluent water from the holding pond(s). 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 known surface water within the boundaries of the field, as well as the location and extent of any known 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 ac (unless the field is less than 50 ac). 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 ac (unless the field is less than 50 ac). 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

Prairieland Dairy, 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(s); levels in the deep pit(s) will be checked with a measuring stick or tape measure, 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 NDEE 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 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 NDEE;
- 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 phosphorus content of 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.

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 double cropped corn silage-triticale rotation (see Five Year Field Plans, Section 6). Fields may also have a rotation that includes alfalfa, corn, 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 2018 Nebraska Agricultural Overview (Section 6).

002.10A2 Yield Goals

Realistic yield goals have been determined using a weighted average of Lancaster, Gage, and Johnson County average yields +10%. Actual production records may also be used in determining realistic yield goals. The yields used in these calculations are 221 bu/ac for irrigated corn and 175 bu/ac for dryland corn; 71 bu/ac for irrigated soybeans and 56 bu/ac for dryland soybeans. Average alfalfa yields are 4.4 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, gallons or acre-inches) to give an amount of manure to apply.

Example (irrigated corn-soybean rotation, field plan H): 265 (total crop N needed lb/ac) – 30 (soil credits) – 45 (previous crop soybeans) – 0 (no previous manure) – 11.3 (fresh irrigation water) = 178 lb/ac of nitrogen required. If the manure sample has 8.24 lb of N per ton available the first year, then $178 \div 8.24 = 21.6$ 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 volatilization of ammonium nitrogen for slurry is 5%, leaving 95% of the ammonium nitrogen available to the crop. The volatilization 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. Slurry applications will have 35% of the organic nitrogen 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 volatilization 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 (irrigated corn-soybean rotation, field plan H): the amount of phosphorus used per bushel of corn is 0.33 lb and 0.77 lb for soybeans. For a 221 bu corn yield goal, the phosphorus quantity is 73 lb/yr. For a 71 bu soybean yield goal, the phosphorus quantity is 54 lb/yr. In a five year rotation the crop will use 327 lb of phosphorus. Based on the manure analysis, the pounds of phosphorus per ton are divided into the total phosphorus used by the crop; $327 \text{ lb of P} \div 36.45 \text{ lb of P in manure} = 8.97 \text{ tons of manure per acre}$ 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

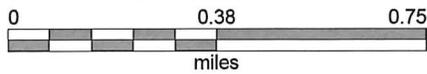
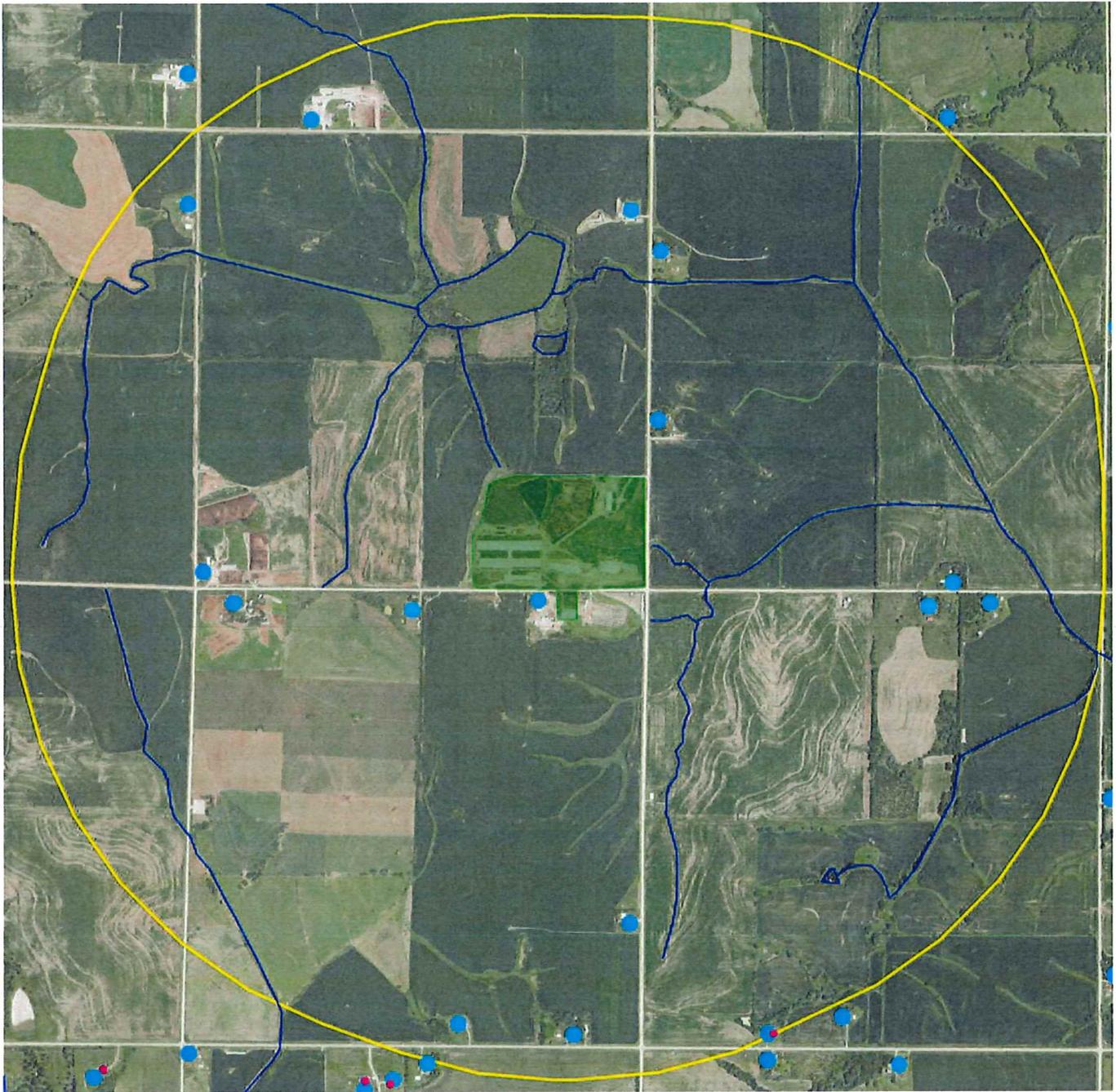
When manure nutrients applied plus the other nitrogen credits added together do not supply the crop with the necessary nutrients, nitrogen and phosphorus may be supplemented with commercial fertilization. If nutrient deficiencies are suspected, in season soil sampling or plant tissue tests may be used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

Section 2

Manure & Waste Water Handling & Storage

Operational Site Map (1 mile radius)	2-1
Operational Topography Map (1 mile radius)	2-2
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Engineering Drawings showing site, dairy buildings, holding pond, and construction details	2-60

Prairieland Dairy, LLC



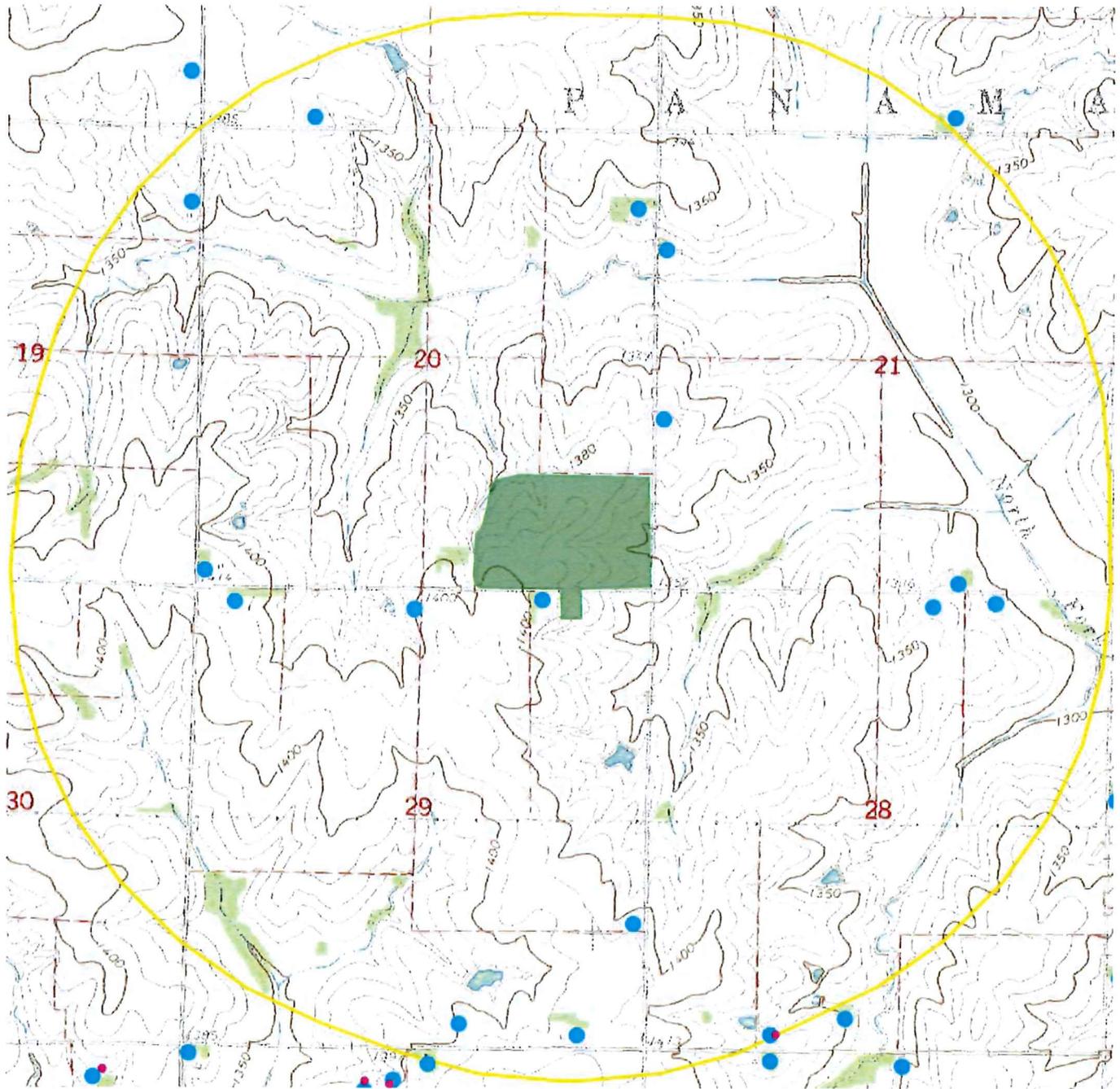
-  1 mile Boundary
-  Business
-  Facility
-  Homestead
-  Stream
-  Domestic Wells

1 mile Boundary Site Map

County: Lancaster
Township: Panama
Legal: S20&29-T7N-R8E



Prairieland Dairy, LLC



- 1 mile Boundary
- Business
- Facility
- Homestead
- Stream
- Domestic Wells

1 mile Topography Map

County: Lancaster
Township: Panama
Legal: S20&29-T7N-R8E



Processed by State of Nebraska Department of Natural Resources Data(Bank) 7/30/2019 4:46:21 PM
Subsection: SESE Section: 20 Township: 7 Range: 8E
Footage: 59 feet from the South section line and 1099 feet from the East section line.
Latitude: 40° 33' 10.11" Longitude: -96° 32' 36.66"



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: 7/30/2019
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

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, 1969, 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.

3 Records Found

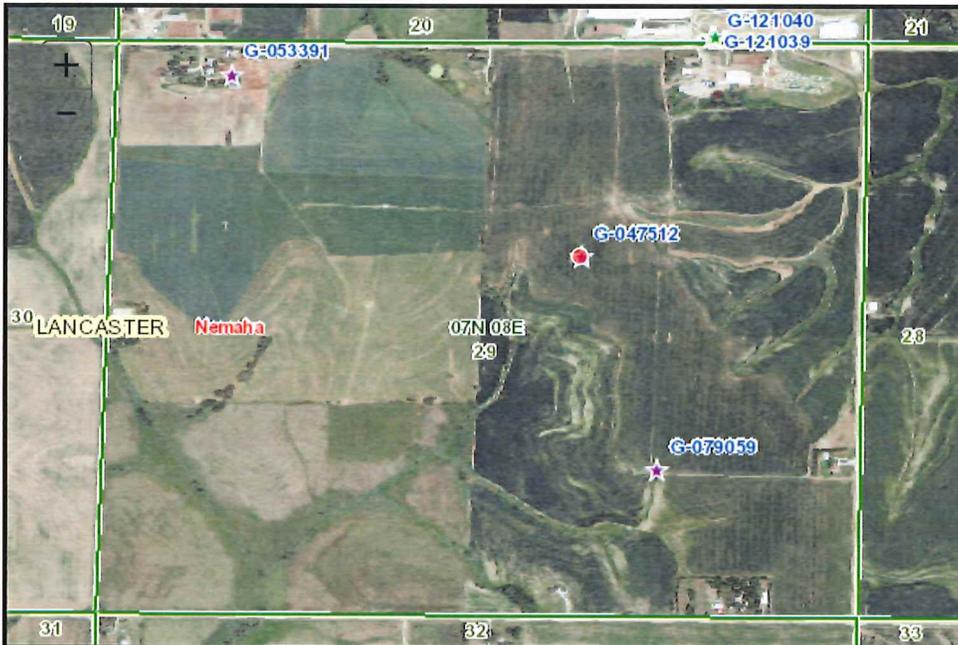
Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-047388 WellID: 54827 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 20 NWNW 1310N 1310W Map It	9/29/1975 10/31/1975 ---	130 800 gpm 85 ft 115 ft PRO	9 in --- 257 ft	Norma Kroese OwnerID: 17139 PO Box 585 Fremont NE 68026
G-121039 WellID: 149233 View Details View Logs View Scans	S A	Lancaster Nemaha 7N 8E 20 SESE 60S 1100E Map It	9/18/1999 4/18/2003 ---	--- 45 gpm 146 ft 170 ft PRO	2 in 165 ft 277 ft	PrairieLand Dairy LLC OwnerID: 72318 13000 Pella Road Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-121040 WellID: 149234 View Details View Logs View Scans	S A	Lancaster Nemaha 7N 8E 20 SESE 60S 1075E Map It	10/5/1999 4/18/2003 ---	--- 45 gpm 145 ft 170 ft PRO	16.5 in 2 ft 277 ft	Prairieland Dairy LLC OwnerID: 72318 13000 Pella Road Firth NE 68358
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

Processed by State of Nebraska Department of Natural Resources Data(Bank) 7/30/2019 4:50:58 PM
Subsection: SWNE Section: 29 Township: 7 Range: 8E
Footage: 1959 feet from the North section line and 1982 feet from the East section line.
Latitude: 40° 32' 50.19" Longitude: -96° 32' 48.37"



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: 7/30/2019
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

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, 1969, 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.

3 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-047512 WellID: 54953 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 29 SWNE Map It	10/24/1975 11/10/1975 ---	200 800 gpm 149 ft 166 ft PRO	9 in --- 305 ft	Wilbur Obbink OwnerID: 34226 RR 1 Firth NE 68358
G-053391 WellID: 60954 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 29 NWNW 300N 800W Map It	11/19/1976 12/10/1976 ---	140 800 gpm 122 ft 136 ft PRO	8 in --- 277 ft	Ivan Walvoord OwnerID: 44921 RR Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-079059 WellID: 87721 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 29 NWSE 1350S 1420E Map It	8/16/1993 9/24/1993 ---	120 800 gpm 166 ft 186 ft PRO	8 in --- 304 ft	Obbink Dairy OwnerID: 50621 27605 South 134th Street Firth NE 68358
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

**PRAIRIE LAND DAIRY
PROPOSED DAIRY EXPANSION
LANCASTER COUNTY, NEBRASKA**

ProAg Job No. 19-048

October 2019

ProAg Engineering, Inc.

Nicholaus J. Rowe, P.E.
77402 U.S. Highway 71
P.O. Box 181
Jackson, MN 56143
507-849-7200 – Office
507-841-3269 – Cell
nic@proageng.com



ProAg Engineering, Inc.

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Jackson, MN 56143
507-849-7200
nic@proageng.com

18 October 2019

Nebraska DEE
PO Box 98922
1200 N Street, Suite 400
Lincoln, Nebraska 68509-8922

RE: Prairie Land Dairy
Proposed Dairy Expansion
Lancaster County, Nebraska
ProAg Project No. 19-048

On behalf of Justin Ohlde and the Prairie Land Dairy, this information is being provided in support of the new construction and operating permit. Enclosed please find the original and five (5) copies of the following:

1. Site Maps
2. Design Report with Calculations
3. Stage Storage Tables
4. Construction Inspection and Quality Assurance Plan
5. Technical Specifications
6. Engineering Drawings showing site, dairy buildings, holding ponds, and construction details

The site is located three miles east and one mile north of Firth in the SE 1/4, Section 20, T-07-N, R-08-W, Lancaster County.

The Prairie Land Dairy is an existing dairy operation currently consisting of two freestall barns, one bedded confinement barn, an open dirt lot, milking parlor with holding area, a sand settling lane, and two existing holding ponds. Also included on the site is a composting yard and a waste recovery and recycling building referred to as the Gold Building. The operation is now proposing the following six phases of construction:

- Phase 1: Compost Area runoff control structures
- Phase 2: Freestall Building Additions to existing barns
- Phase 3: Gold Building liquid waste storage pond
- Phase 4: West Freestall Barn constructed and open lot closed
- Phase 5: New Parlor and Holding Area
- Phase 6: East Freestall Barn constructed

All of the manure from the dairy freestall barns will be flushed to the sand lane and then to the existing holding ponds. All of the livestock waste control facility structures comply with the design standards of NDEE Title 130. The livestock operation will not receive any waste streams from the compost yard or the Gold Building. The industrial permit and its associated structures will not be addressed in this report other than to provide a comprehensive view of the site.

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 712-563-2168.

Nebraska DEE
18 October 2019
Page 2

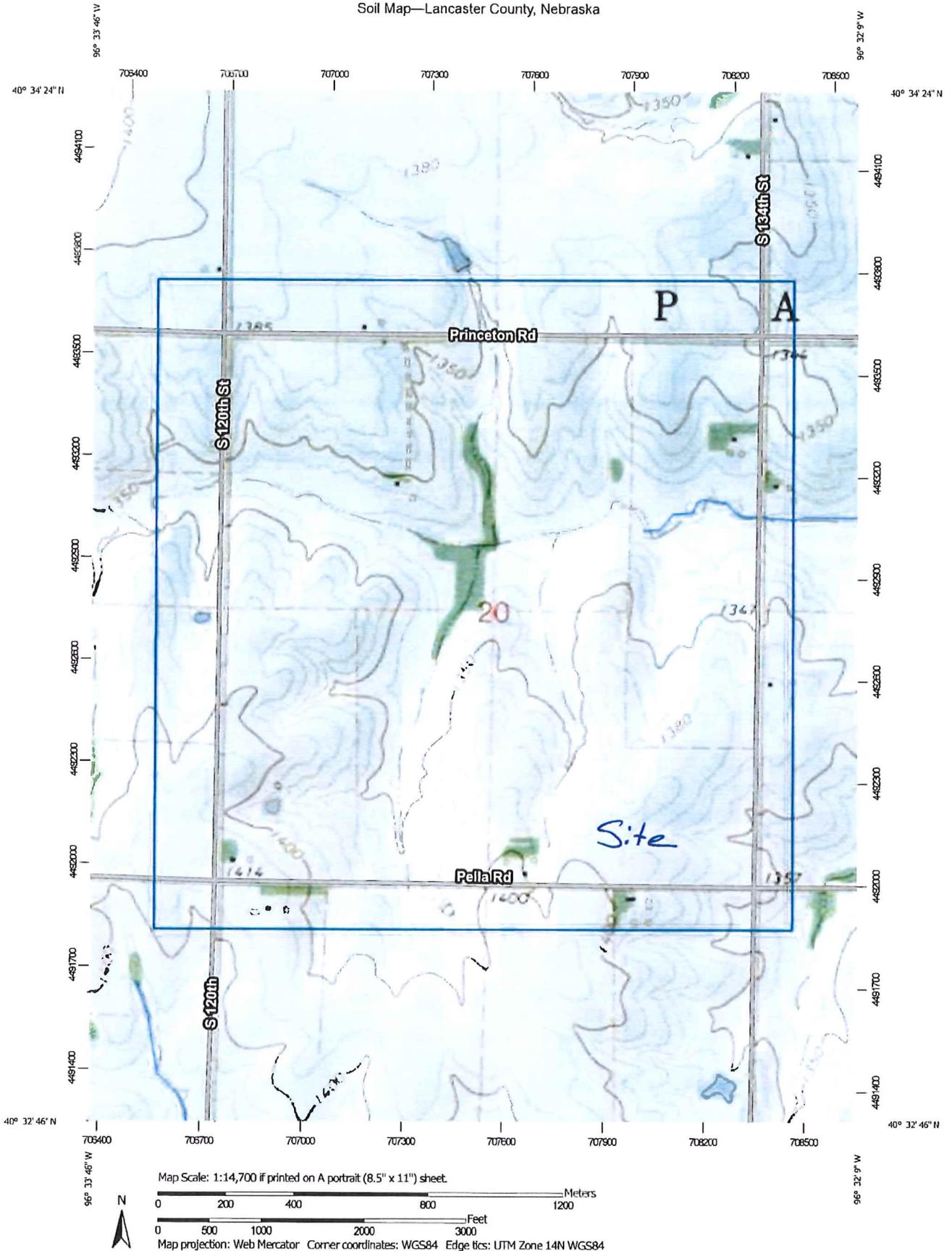
Respectfully submitted,



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

cc: Justin Ohlde, owner
Joe Guenther, Nutrient Advisors

Soil Map—Lancaster County, Nebraska

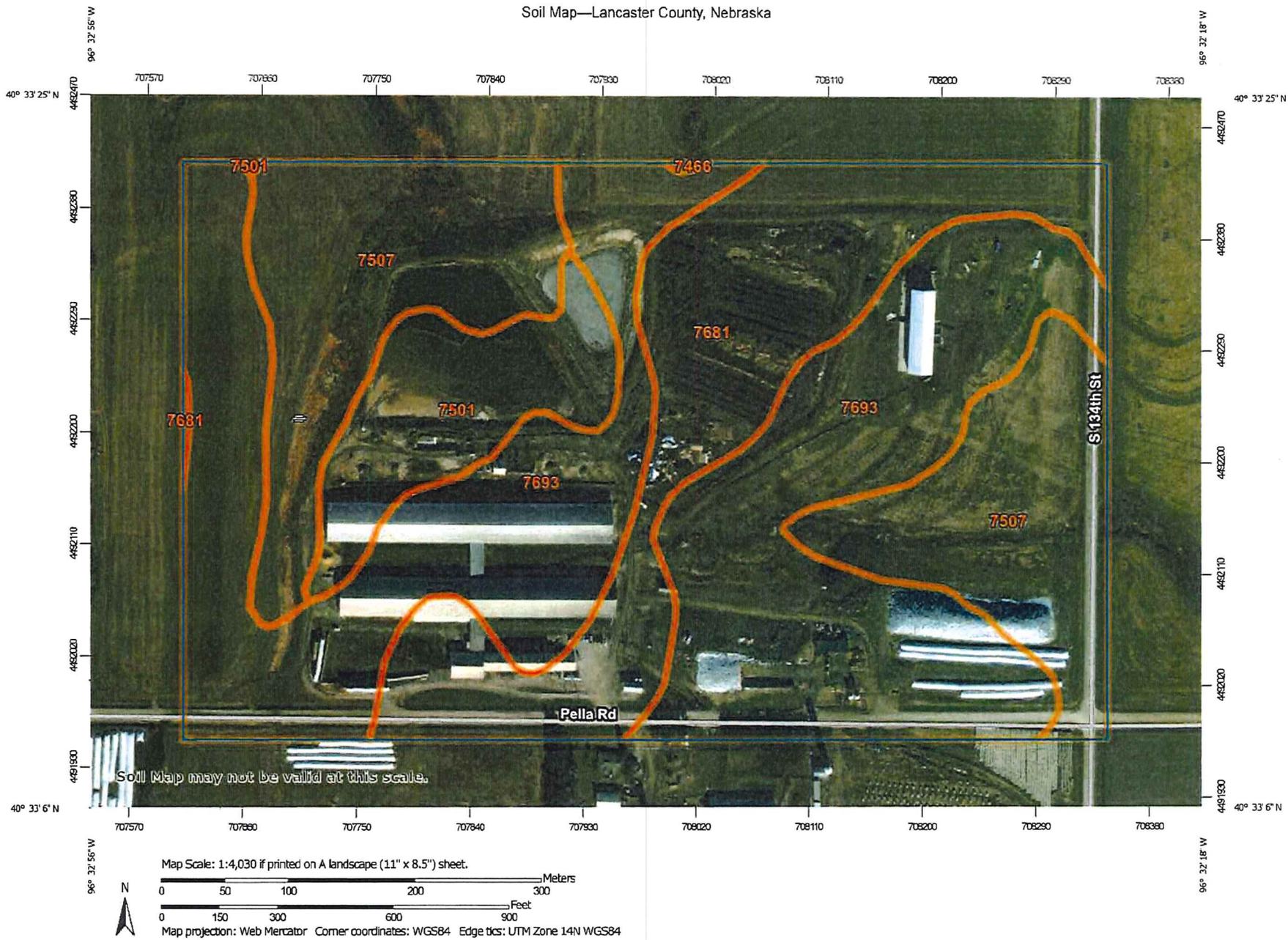


Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/24/2019
Page 1 of 3

Soil Map—Lancaster County, Nebraska



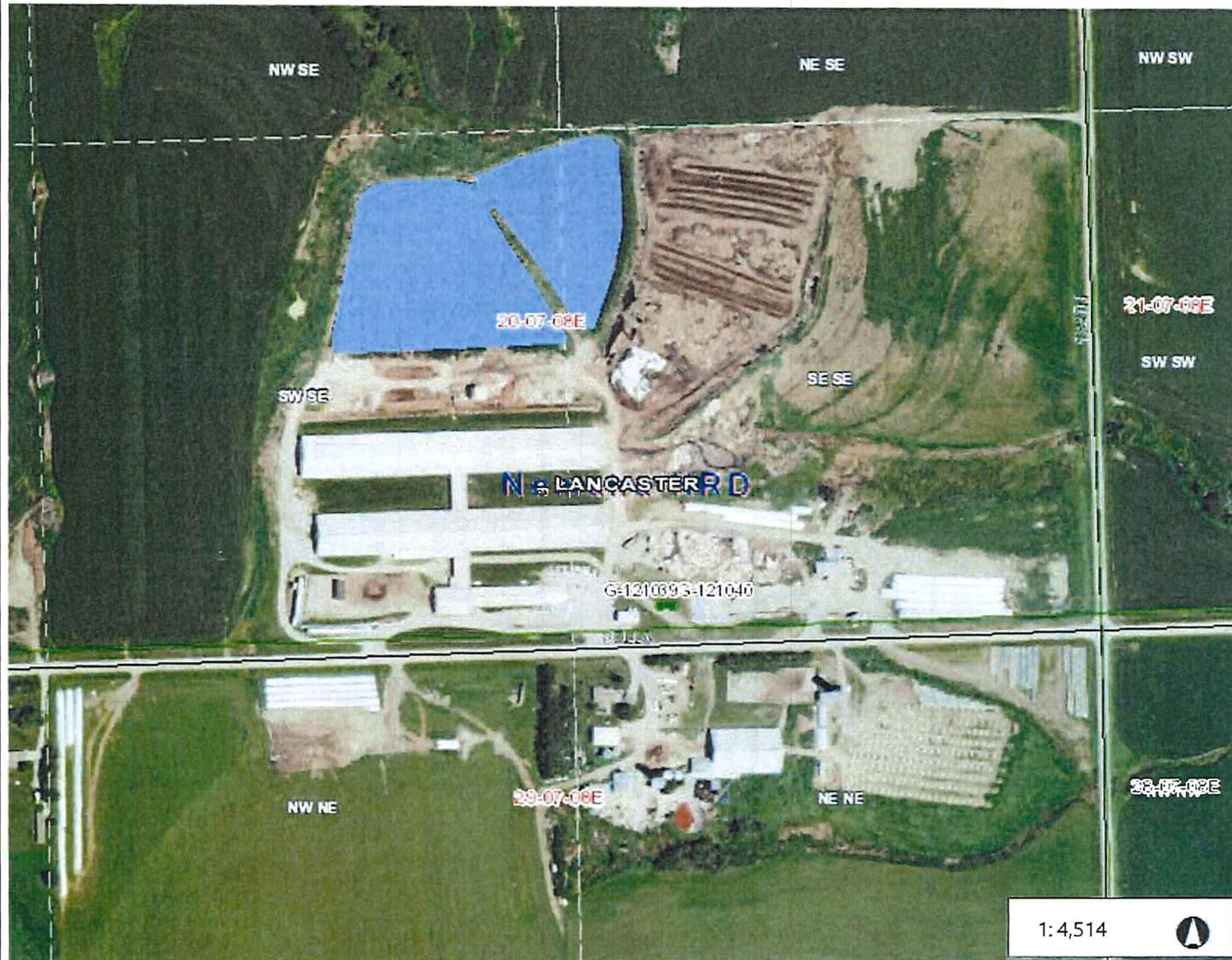
2-13

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres In AOI	Percent of AOI
7466	Otoe silty clay, 6 to 11 percent slopes, eroded	0.0	0.1%
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	6.9	8.2%
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	20.8	24.6%
7681	Wymore silty clay loam, 1 to 3 percent slopes	17.0	20.1%
7693	Wymore silty clay loam, 2 to 6 percent slopes	39.8	47.1%
Totals for Area of Interest		84.6	100.0%

Legend

- County Boundary
- Well Data**
- Aquaculture
- Commercial/Industrial
- Domestic
- Pit for Irrigation
- Ground Heat Exch-Closed Loop
- Heat Pump-Open Loop
- Irrigation
- Injection
- Observation
- Other
- Monitoring
- Recovery
- Stock
- Geothermal
- Dewatering
- NRD Boundary
- Section Boundary
- City Point
- Road
- Sub-Sections
- Major Lakes
- Rivers
- Major Streams
- Waterbodies
- Streams



2-15

752.3 0 376.17 752.3 Feet

NAD_1983_StatePlane_Nebraska_FIPS_2600_Feet

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WATER WELL REGISTRATION

FOR DEPARTMENT USE ONLY

Registration Date 4-18-2003 Sequence No. 149233 Registration No. 9-121039
Owner Code No. 63213 Receipt No. R12962 Timaha NRD

1. Well Owner PrairieLand Dairy L.L.C. Telephone Number (402) 791-2223
Address 13000 Pello Rd.
City Firth State NE Zip Code 68358

2. Drilling Firm Blue Valley Drilling (did not install pump) Telephone Number (402) 613-3465
Address 14734 US Highway 77 Contractor's License No. 39022
City Pickrell State NE Zip Code 68422

3. Permit Number(s) /

4. Purpose of well (indicate one):
 Dewatering (over 90 days) Domestic Ground Heat Exchanger
 Ground Water Source Heat Pump Industrial Injection Irrigation Livestock
 Monitoring Observation Public Water Supply (with spacing (46 A)(4)) Public Water Supply (with spacing (46 A)(4))
 Recovery Aquaculture Other _____
(indicate one)

5. Replacement and abandoned well information.
A. Is this well a replacement well? Yes No
B. Registration number of abandoned well: _____
If not registered, date of construction completion: _____, 19____
C. Replacement well is _____ feet from abandoned well.
D. Abandoned well last operated _____, 19____
E. Original well pump column size: _____ inches.
F. Completion of original well abandonment on _____, 19____
G. Location of water use of abandoned well: _____

6. A. Well location: SE 1/4 of the SE 1/4 of Section 20, Township 7 North, Range 8 East ~~West~~ Lancaster County.
B. The well is 60 feet from the (~~North~~ or South) section line and 1100 feet from the (~~East~~/~~West~~) section line.
(circle one) (circle one)
C. Street address or block, lot and subdivisions, if applicable: _____
D. Location of water use, if applicable (give legal descriptions): SE 1/4 - SE 1/4 20-7-8
E. If for irrigation, the land to be irrigated is _____ acres.
F. Well reference letter(s), if applicable: _____

7. Pump Information.
Is pump installed at this time: Yes No
If yes, complete items A through F.
If no, complete items A and D with estimated information for those wells in which pump will be installed.
A. Actual pumping rate, if applicable: 45 gallons per minute. Measured or Estimated
B. Pump column diameter: 2 inches. C. Length of pump column: 165' feet.
D. Pumping equipment installed: (month) 2 (day) 29 ~~19~~ 2003 E. Brand/Type: Coldwell 5"
F. Pump installed by: Contractor Owner Pump Installer License No. 29307

G-121039

8. Well Construction Information.

- A. Total well depth: 277 feet. B. Static water level: 146 feet.
- C. Pumping water level: 170 feet Estimated or Measured (at what gallons per minute rate 10)
- D. Well Construction began: (month) 9 / (day) 18 / 1999 E. Well Construction completed: (month) 9 / (day) 18 / 1999
- F. Bore hole diameter: 11 inches.
- G. Plain Casing: Diameter 6 ID 6 1/2 OD inches. Type of material: PVC
 Wall thickness: .316 inch(es). Joints: Welded ~~Glued~~ ~~Not Recommended~~
 Length(s) and placement(s) depth from 0 ft. to 257 ft. from _____ ft. to _____ ft.
- H. Screen: 6 ID 6 1/2 OD in.; Type of material PVC
 Screen openings (slot size): .025 Trade name: Saw slot
 Length(s) and placement(s) depth from 257 ft. to 277 ft. from _____ ft. to _____ ft. Guides at _____ ft.
- I. Gravel pack interval(s) from 120 ft. to 277 ft. from _____ ft. to _____ ft. Grade size: Road grave
- J. Grouted/Sealed from 6 ft. to 10 ft., with Bentonite (type)
 from _____ ft. to _____ ft., with _____ (type)
- K. Drilling method: Straight rotary L. Drilling fluid: Water
- M. Well development technique (total time and method): 2 hours - Air
- N. Will chemicals, fertilizer or antifreeze be injected or utilized in the system? Yes No
 If yes, what will be used: _____

9. Geologic Materials Logged

DEPTH IN FEET FROM TO	DESCRIPTION	DEPTH IN FEET FROM TO	DESCRIPTION
<u>0</u> <u>21</u>	<u>Clay - browns, tan & orange</u>	<u>153</u> <u>175</u>	<u>Sand - fine gray</u>
<u>21</u> <u>34</u>	<u>Clay - yellow - limestone</u>	<u>175</u> <u>191</u>	<u>Sand - fine to medium fine gray</u>
<u>34</u> <u>66</u>	<u>Clay - brown & tan - rocks</u>	<u>191</u> <u>219</u>	<u>Sand - fine gray</u>
<u>66</u> <u>91</u>	<u>Clay - yellow & brown</u>	<u>219</u> <u>242</u>	<u>Sand - fine to medium fine gray - some medium</u>
<u>91</u> <u>101</u>	<u>Clay - gray & brownish gray</u>	<u>242</u> <u>253</u>	<u>Sand - fine to medium gray</u>
<u>101</u> <u>114</u>	<u>Clay - blue/gray - rocks - sandy layers</u>	<u>253</u> <u>262</u>	<u>Sand - fine to medium fine gray</u>
<u>114</u> <u>122</u>	<u>Clay - blue/gray & brownish gray</u>	<u>262</u> <u>271</u>	<u>Sand - fine to coarse gray</u>
<u>122</u> <u>133</u>	<u>Clay - sandy blue/gray - traces sand</u>	<u>271</u> <u>282</u>	<u>Sand - fine to medium fine gray</u>
<u>133</u> <u>140</u>	<u>Sand - fine to medium brown</u>		
<u>140</u> <u>153</u>	<u>Clay - gray</u>		

(Additional sheets may be submitted)

10. I am familiar with the information submitted on this registration, and to the best of my knowledge it is true.

Kevin Stinch
Water Well Contractor's Signature

9-22-99
Date

Cliff O'Neil
Water Well Owner's Signature

3-2-00
Date

STATE OF NEBRASKA
DEPARTMENT OF WATER RESOURCES
WATER WELL REGISTRATION

FOR DEPARTMENT USE ONLY

Registration Date 4-18-2003 Sequence No. _____ Registration No. 9-121040
Owner Code No. _____ Receipt No. R12962 Demaha NRD

1. Well Owner PrairieLand Dairy, L.L.C. Telephone Number (402) 791-2228
Address 13000 Pella Rd.
City Firth State NE Zip Code 68358 +

2. Drilling Firm Blue Valley Drilling (did not install pump) Telephone Number (402) 673-3465
Address 14734 US Highway 77 Contractor's License No. 39022
City Pickrell State NE Zip Code 68422 +

3. Permit Number(s) _____

4. Purpose of well (indicate one): _____ Dewatering (over 90 days) _____ Domestic _____ Ground Heat Exchanger
_____ Ground Water Source Heat Pump _____ Industrial _____ Injection _____ Irrigation _____ X Livestock
_____ Monitoring _____ Observation _____ Public Water Supply (with spacing (46-618)) _____ Public Water Supply (without spacing)
_____ Recovery _____ Aquaculture _____ Other _____
(indicate use)

5. Replacement and abandoned well information.

A. Is this well a replacement well? Yes _____ X No _____ B. Registration number of abandoned well: _____
If not registered, date of construction completion: _____, 19____
C. Replacement well is _____ feet from abandoned well. D. Abandoned well last operated _____, 19____
E. Original well pump column size: _____ inches. F. Completion of original well abandonment on _____, 19____
G. Location of water use of abandoned well: _____

6. A. Well location: SE 1/4 of the SE 1/4 of Section 20, Township 7 North, Range 8 East/West, Lancaster County.
B. The well is 60 feet from the (North or South) section line and 1075 feet from the (East/West) section line.
(circle one) (circle one)
C. Street address or block, lot and subdivisions, if applicable: _____
D. Location of water use, if applicable (give legal descriptions): SE 1/4 - SE 1/4 20-7-8
E. If for irrigation, the land to be irrigated is _____ acres.
F. Well reference letter(s), if applicable: _____

7. Pump Information.

Is pump installed at this time: Yes _____ X No _____

If yes, complete items A through F.

If no, complete items A and D with estimated information for those wells in which pump will be installed.

A. Actual pumping rate, if applicable: 45 gallons per minute. Measured or Estimated
B. Pump column diameter: 2" inches. C. Length of pump column: 168 feet.
D. Pumping equipment installed: (smooth) 2 (day) 29 19 E. Brand/Type: Gold's SIP
F. Pump installed by: Contractor Owner Pump Installer License No. 29307

G-121040

8. Well Construction Information.

- A. Total well depth: 277 feet. B. Static water level: 145 feet.
- C. Pumping water level: 170 feet Estimated or Measured (at what gallons per minute rate 30)
- D. Well Construction began: (month) 10 / (day) 5 /19 99 . E. Well Construction completed: (month) 10 / (day) 5 /19 99 .
- F. Bore hole diameter: 11 inches.
- G. Plain Casing: Diameter 6 ID 6 1/2 OD inches. Type of material: PVC
 Wall thickness: .316 inch(es). Joints: Welded/Threaded/Flanged
 Length(s) and placement(s) depth from 0 ft. to 257 ft. from _____ ft. to _____ ft.
- H. Screen: 6 ID 6 1/2 OD in.; Type of material PVC
 Screen openings (slot size): .020 Trade name: Saw slot
 Length(s) and placement(s) depth from 257 ft. to 277 ft. from _____ ft. to _____ ft. Guides at _____ ft.
- I. Gravel pack interval(s) from 180 ft. to 277 ft. from _____ ft. to _____ ft. Grade size: road gravel
- J. Grouted/Sealed from 6 ft. to 10 ft., with Bentonite (type)
 from 95 ft. to 100 ft., with Bentonite (type)
- K. Drilling method: Straight rotary L. Drilling fluid: Water
- M. Well development technique (total time and method): 1 hour - Air
- N. Will chemicals, fertilizer or antifreeze be injected or utilized in the system? Yes No
 If yes, what will be used: _____

9. Geologic Materials Logged

DEPTH IN FEET		DESCRIPTION	DEPTH IN FEET		DESCRIPTION
FROM	TO		FROM	TO	
<u>0</u>	<u>21</u>	<u>Clay - brown & orange</u>	<u>252</u>	<u>257</u>	<u>Sand - fine to medium fine gray</u>
<u>21</u>	<u>82</u>	<u>Clay - yellow, tan & brown - limestone</u>	<u>257</u>	<u>271</u>	<u>Sand - fine to coarse gray</u>
<u>82</u>	<u>93</u>	<u>Clay - sandy brown & tan - sand layers</u>	<u>271</u>	<u>282</u>	<u>Sand - fine to medium gray</u>
<u>93</u>	<u>120</u>	<u>Clay - gray & brownish gray</u>			
<u>120</u>	<u>132</u>	<u>Clay - sandy blue/gray - rocks - traces sand</u>			
<u>132</u>	<u>139</u>	<u>Sand - fine to medium fine brown</u>			
<u>139</u>	<u>152</u>	<u>Clay - gray</u>			
<u>152</u>	<u>212</u>	<u>Sand - fine to very fine gray</u>			
<u>212</u>	<u>243</u>	<u>Sand - fine to medium fine gray</u>			
<u>243</u>	<u>252</u>	<u>Sand - fine to medium gray</u>			

(Additional sheets may be submitted)

10. I am familiar with the information submitted on this registration, and to the best of my knowledge it is true.

Roger Shuch 10-6-99
Water Well Contractor's Signature Date

Clifford Kirk 3-2-00
Water Well Owner's Signature Date

Return to Search Page
Nebraska Department of Natural Resources
 Database Through: 7/17/2019
 Processed: 7/17/2019 1:15:13 PM

REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

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, 1969, 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.

3 Records Found

Registration#	Use	County Name	Completion Date	Acres Irrigated	Pump	Owner's
Well ID	Status	NRD Name	Filing Date	Gallons/Minute	Column	Name
Permit Number		Well Location	Decommission Date	Static Level	Diameter	Owner's ID
		Footage	Times Replaced	Pumping Level Series	Pump Depth	Address
		Latitude Longitude	Online Registration ID (NOLID)		Well Depth	
G-047388	I	Lancaster	9/29/1975	130	9 in	Norma
WellID: 54827	A	Nemaha	10/31/1975	800 gpm	---	Kroese
View Details		7N 8E 20		85 ft	257 ft	OwnerID:
View Logs		NWNW		115 ft		17139
View Scans		1310N	---	PRO		PO Box 585
		1310W				Fremont NE
		Map It				68026

Registration#	County Name	NRD Name	Completion Date	Acres Irrigated	Pump Column	Owner's Name
Well ID	Well Name	Filing Date	Decommission Date	Gallons/Minute	Diameter	Owner's ID
Permit Number	Use Status	Location Footage	Times Replaced	Static Level	Pump Depth	Address
		Latitude Longitude	Online Registration ID (NOLID)	Pumping Level Series	Well Depth	
G-121039	S	Lancaster	9/18/1999	---	2 in	PrairieLand Dairy LLC
WellID:	A	Nemaha	4/18/2003	45 gpm	165 ft	OwnerID:
149233		7N 8E 20		146 ft	277 ft	72318
View Details		SESE		170 ft		13000 Pella
View Logs		60S 1100E	---	PRO		Road
View Scans		Map It				Firth NE
						68358
G-121040	S	Lancaster	10/5/1999	---	16.5 in	PrairieLand Dairy LLC
WellID:	A	Nemaha	4/18/2003	45 gpm	2 ft	OwnerID:
149234		7N 8E 20		145 ft	277 ft	72318
View Details		SESE		170 ft		13000 Pella
View Logs		60S	---	PRO		Road
View Scans		1075E				Firth NE
		Map It				68358

Next

- 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.
- Data copy of requested contacts.

Legend and Notes

National Flood Hazard Layer FIRMette



40°33'27.64"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

<p>SPECIAL FLOOD HAZARD AREAS</p>	<p> Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i></p> <p> With BFE or Depth <i>Zones AE, AO, AH, VE, AR</i></p> <p> Regulatory Floodway</p>
<p>OTHER AREAS OF FLOOD HAZARD</p>	<p> 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone C</i></p> <p> Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i></p> <p> Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i></p> <p> Area with Flood Risk due to Levee <i>Zone C</i></p>
<p>OTHER AREAS</p>	<p> NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i></p> <p> Effective LOMRs</p> <p> Area of Undetermined Flood Hazard <i>Zone D</i></p>
<p>GENERAL STRUCTURES</p>	<p> Channel, Culvert, or Storm Sewer</p> <p> Levee, Dike, or Floodwall</p>
<p>OTHER FEATURES</p>	<p> 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation</p> <p> 17.5 Water Surface Elevation</p> <p> Coastal Transect</p> <p> Base Flood Elevation Line (BFE)</p> <p> Limit of Study</p> <p> Jurisdiction Boundary</p> <p> Coastal Transect Baseline</p> <p> Profile Baseline</p> <p> Hydrographic Feature</p>
<p>MAP PANELS</p>	<p> Digital Data Available</p> <p> No Digital Data Available</p> <p> Unmapped</p>

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/24/2019 at 5:58:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



DESIGN REPORT
PRAIRIE LAND DAIRY
PROPOSED DAIRY EXPANSION
LANCASTER COUNTY, NEBRASKA
ProAg Project No. 19-048

short OR

INTRODUCTION

The Prairie Land Dairy is an existing dairy operation that is now proposing to expand. The animal feeding operation currently consists of two freestall barns, one dry-bedded confinement barn, an open dirt lot, a milking parlor with holding area, a sand settling lane, two earthen solids settling basins, and two earthen holding ponds. The dry-bedded confinement barn located on the south side of Pella Road is considered exempt and is not included in this report. The site also includes a composting yard and a waste recovery and recycling building, referred to as the Gold Building. The compost operation and the Gold Building are not part of the animal feeding operation. Any information included with this report regarding these operations is intended only to provide a comprehensive understanding of the site and is not intended as part of the permit application. The site is proposing six phases of site improvements. The phases included in the dairy's permit application are shown in bold:

- Phase 1: Compost Area runoff control structures
- **Phase 2: Freestall Building Additions to existing barns**
- Phase 3: Gold Building liquid waste storage pond
- **Phase 4: West Freestall Barn constructed and open lot closed**
- **Phase 5: New Parlor and Holding Area**
- **Phase 6: East Freestall Barn constructed**

The site is located three miles east and one mile north of Firth in the SE ¼, Section 20, T-07-N, R-08-W, Lancaster County, Nebraska.

DESIGN BASIS

All of the manure from the dairy freestall confinement barns will be flushed to the sand lane and then to the existing runoff holding ponds. No changes are proposed to the existing holding ponds. The stage storage tables with updated critical levels for each phase are included with the engineering drawings.

The livestock operations will not receive any waste streams from the Gold Building or the compost yard.

The site will have one distinct drainage area. Drainage Area 1 will consist of the sand lane, sand stacking pad, a small contributing area between the north freestall barn and Holding Pond 1A. The existing open lot will be included in the drainage area until it is discontinued in Phase 4.

Very few solids will enter the holding pond system, which will allow for easier pumpout of the ponds. The wastewater is suitable for flushing the freestall barns and for land applying with irrigation equipment on standing crops.

The existing staff gauges in the runoff holding ponds will be updated with the new critical levels at each phase of the construction. The markings will include "Freeboard," "Must-Pump," and "Winter Drawdown" elevations. If the liquid level in the runoff holding pond rises above the "Must-Pump" elevation, the pond will be pumped out every day that conditions allow until the liquid level is lowered to the required elevation. Prior to each winter season, the holding ponds will be pumped out until, at a minimum, the "Winter Drawdown" level is reached. The ponds will maintain a minimum level at all times in order to provide the flush water for the barns. The holding ponds' capacity is greater than the minimum required storage volume, which allows for extras operating storage, prevents pumping out the pond after every significant rainfall, and conserves waste water for ideal irrigation timing.

EXISTING EARTHEN RUNOFF HOLDING POND

The existing earthen holding ponds were designed in accordance with NDEE Title 130 requirements. The structures currently receive waste streams from the solids settling basins, the sand land overflow, and the compost yard. The runoff from the compost yard will be diverted to a runoff control structure in Phase 1 that is considered separate from the CAFO. The total available storage volume in the existing holding ponds below the required freeboard is 28,363,135 gallons.

ANIMAL NUMBERS

The existing animal types, numbers, and animal units are as follows

Confinement Dairy: Lactating Cow	1,200 head
Confinement Dairy: Dry Cow	160 head
Open Lot Dairy: Dry Cow	50 head
<hr/>	
TOTAL = 1,410 head	

Phase 2 proposed animal types, numbers, and animal units are as follows

Confinement Dairy: Lactating Cow	1,680 head
Confinement Dairy: Dry Cow	320 head
Open Lot Dairy: Dry Cow	50 head
<hr/>	
TOTAL = 2,050 head	

Phase 4 proposed animal types, numbers, and animal units are as follows

Confinement Dairy: Lactating Cow	2,310 head
Confinement Dairy: Dry Cow	440 head
Open Lot Dairy: Dry Cow	0 head
<hr/>	
TOTAL = 2,750 head	

Phase 6 proposed animal types, numbers, and animal units are as follows

Confinement Dairy: Lactating Cow	2,940 head
Confinement Dairy: Dry Cow	560 head
Open Lot Dairy: Dry Cow	0 head
<hr/>	
TOTAL = 3,500 head	

MANURE GENERATION RATES

The values listed in ASABE D384.2 Manure Production and Characteristics, Table 1.b-Section 3 are used for the following manure generation rates:

- Dairy: Lactating Cow = 2.4 ft³/d-hd
- Dairy: Dry Cow = 1.3 ft³/d-hd

RINSE WATER USAGE RATES

The dairy will use an estimated 12 gallons (1.6 ft³) per day per milking cow of fresh water to rinse equipment. All of the rinse water will be sent to the holding ponds.

- Dairy: Lactating Cow = 1.6 ft³/d-hd

BEDDING USAGE RATES

The dairy will use an estimated 50-pounds (0.5 ft³) of sand bedding each day for every cow. The gently sloped concrete sand lane will remove approximately 90% of this sand from the waste stream, and the remaining sand and liquid manure will drain into the holding ponds. The sand bedding removed in the sand lane process will be placed on the adjacent sand stacking pad in order to dry before it is placed back in the stalls for bedding.

- Dairy: Cow = 0.5 ft³/d-hd

FLUSH WATER USAGE RATES

The dairy will use wastewater from the earthen holding ponds to flush the barns to the 24" waste flume pipe and run the sand lane. Each flush releases approximately 75,000 gallons per barn. The storage structures are sized to hold 1,500,000 gallons of wastewater at all times in order to provide flush water for the flume and sand lane.

25-YEAR, 24-HOUR PRECIPITATION EVENT

The total volume of runoff and direct precipitation resulting from the 25-year, 24-hour storm event will remain available in the holding ponds at all times. The open lot area will be included until the lot is discontinued in Phase 4.

- 25-year, 24-hour precipitation event = 5.5 inches
- Runoff depth from sand lane and roof area (CN 98) = 5.3 inches
- Runoff depth from contributing area (CN 86) = 3.9 inches
- Runoff depth from open lot area = 4.3 inches

MONTH OF JUNE PRECIPITATION

The net runoff volume and direct precipitation during the month of June is included in the minimum design requirement and "Winter Drawdown" level. The open lot area will be included until the lot is discontinued at the completion Phase 4.

- June net direct precipitation volume = Precipitation < Evaporation, no credit taken
- Runoff depth from sand lane and roof area (CN 98) = 2.67 inches
- Runoff depth from open lot area (CN 90) = 0.97 inches
- Runoff depth from contributing area (CN 86) = 0.79 inches

WASTE STORAGE VOLUME REQUIRED

Phase 2

- 25-year, 24-hour Volume TOTAL = 218,744 ft³

Direct Precipitation on Ponds	362,616 ft ² x 5.5 in. = 166,199 ft ³
Roof and Sand Lane Runoff	16,492 ft ² x 5.3 in. = 7,284 ft ³
Contributing Area Runoff	100,306 ft ² x 3.9 in. = 32,599 ft ³
Open Lot Area Runoff	35,335 ft ² x 4.3 in. = 12,662 ft ³

- Minimum Required Storage Volume TOTAL = 1,534,352 ft³

Liquid Manure	800,640 ft ³
Lactating Cows	1,680 hd x 2.4 ft ³ /d-hd x 180 days = 725,760 ft ³
Dry Cows	320 hd x 1.3 ft ³ /d-hd x 180 days = 74,880 ft ³
Rinse Water	483,840 ft ³
Lactating Cows	1,680 hd x 1.6 ft ³ /d-hd x 180 days = 483,840 ft ³
Bedding	18,000 ft ³
Cows	2,000 hd x 0.5 ft ³ /d-hd x 180 days x 10% = 18,000 ft ³
25-yr, 24-hr Volume	218,744 ft ³
June Volume	13,128 ft ³
Direct Precipitation on Ponds	362,616 ft ² x 0.0 in. = 0 ft ³
Roof and Sand Lane Runoff	16,492 ft ² x 2.67 in. = 3,669 ft ³
Contributing Area Runoff	100,306 ft ² x 0.79 in. = 6,603 ft ³
Open Lot Area Runoff	35,335 ft ² x 0.97 in. = 2,856 ft ³

- Runoff Holding Pond Critical Levels (if pumping from Pond 1A only)
 - Total storage volume below freeboard elevation (1381.5) = 3,791,863 ft³
 - Volume below **MUST PUMP** elevation (1380.6 in Pond 1A, 1381.0 in Pond 1B) = 3,572,355 ft³
 - Volume below **WINTER DRAWDOWN** elevation (1372.0 in Pond 1A, 1381.0 in Pond 1B) = 2,210,879 ft³

- Runoff Holding Pond Critical Levels (if pumping both ponds)
 - Total storage volume below freeboard elevation (1381.5) = 3,791,863 ft³
 - Volume below **MUST PUMP** elevation (1380.6) = 3,526,344 ft³
 - Volume below **WINTER DRAWDOWN** elevation (1375.0) = 2,155,527 ft³

Phase 4

- 25-year, 24-hour Volume TOTAL = 206,082 ft³

Direct Precipitation on Ponds	362,616 ft ² x 5.5 in. = 166,199 ft ³
Roof and Sand Lane Runoff	16,492 ft ² x 5.3 in. = 7,284 ft ³

Contributing Area Runoff $100,306 \text{ ft}^2 \times 3.9 \text{ in.} = 32,599 \text{ ft}^3$

- Minimum Required Storage Volume TOTAL = 2,007,264 ft³

Liquid Manure		1,100,880 ft ³
Lactating Cows	2,310 hd x 2.4 ft ³ /d-hd x 180 days =	997,920 ft ³
Dry Cows	440 hd x 1.3 ft ³ /d-hd x 180 days =	102,960 ft ³
Rinse Water		665,280 ft ³
Lactating Cows	2,310 hd x 1.6 ft ³ /d-hd x 180 days =	665,280 ft ³
Bedding		24,750 ft ³
Cows	2,750 hd x 0.5 ft ³ /d-hd x 180 days x 10% =	24,750 ft ³
25-yr, 24-hr Volume		206,082 ft ³
June Volume		10,272 ft ³
Direct Precipitation on Ponds	362,616 ft ² x 0.0 in. =	0 ft ³
Roof and Sand Lane Runoff	16,492 ft ² x 2.67 in. =	3,669 ft ³
Contributing Area Runoff	100,306 ft ² x 0.79 in. =	6,603 ft ³
- Runoff Holding Pond Critical Levels (if pumping from Pond 1A only)
 - Total storage volume below freeboard elevation (1381.5) = 3,791,863 ft³
 - Volume below **MUST PUMP** elevation (1380.6 in Pond 1A, 1381.0 in Pond 1B) = 3,572,355 ft³
 - Volume below **WINTER DRAWDOWN** elevation (1368.5 in Pond 1A, 1381.0 in Pond 1B) = 1,756,129 ft³
- Runoff Holding Pond Critical Levels (if pumping both ponds)
 - Total storage volume below freeboard elevation (1381.5) = 3,791,863 ft³
 - Volume below **MUST PUMP** elevation (1380.6) = 3,526,344 ft³
 - Volume below **WINTER DRAWDOWN** elevation (1373.0) = 1,724,985 ft³

Phase 6

- 25-year, 24-hour Volume TOTAL = 206,082 ft³

Direct Precipitation on Ponds	362,616 ft ² x 5.5 in. =	166,199 ft ³
Roof and Sand Lane Runoff	16,492 ft ² x 5.3 in. =	7,284 ft ³
Contributing Area Runoff	100,306 ft ² x 3.9 in. =	32,599 ft ³
- Minimum Required Storage Volume TOTAL = 2,495,694 ft³

Liquid Manure		1,401,120 ft ³
Lactating Cows	2,940 hd x 2.4 ft ³ /d-hd x 180 days =	1,270,080 ft ³
Dry Cows	560 hd x 1.3 ft ³ /d-hd x 180 days =	131,040 ft ³
Rinse Water		846,720 ft ³
Lactating Cows	2,940 hd x 1.6 ft ³ /d-hd x 180 days =	846,720 ft ³
Bedding		31,500 ft ³
Cows	3,500 hd x 0.5 ft ³ /d-hd x 180 days x 10% =	31,500 ft ³
25-yr, 24-hr Volume		206,082 ft ³
June Volume		10,272 ft ³
Direct Precipitation on Ponds	362,616 ft ² x 0.0 in. =	0 ft ³
Roof and Sand Lane Runoff	16,492 ft ² x 2.67 in. =	3,669 ft ³
Contributing Area Runoff	100,306 ft ² x 0.79 in. =	6,603 ft ³
- Runoff Holding Pond Critical Levels (if pumping from Pond 1A only)
 - Total storage volume below freeboard elevation (1381.5) = 3,791,863 ft³
 - Volume below **MUST PUMP** elevation (1380.6 in Pond 1A, 1381.0 in Pond 1B) = 3,572,355 ft³
 - Volume below **WINTER DRAWDOWN** elevation (1364.0 in Pond 1A, 1381.0 in Pond 1B) = 1,252,088 ft³
- Runoff Holding Pond Critical Levels (if pumping both ponds)
 - Total storage volume below freeboard elevation (1381.5) = 3,791,863 ft³

Volume below **MUST PUMP** elevation (1380.6) = 3,526,344 ft³

Volume below **WINTER DRAWDOWN** elevation (1370.5) = 1,231,460 ft³

WATER SUPPLY

The site obtains all of its water from two existing wells located on site. The well logs are included with this report. The existing wells are expected to meet the water demand at the end of all proposed expansion.

FLOOD PLAIN

The FEMA flood hazard map for Lancaster County shows the nearest flood hazard located approximately one-half mile north of the site around the North Fork Big Nemaha river. The flood zone appears to extend to approximate USGS elevation 1330. The proposed freestall barns and additions are planned to match the existing barns; all elevations are above USGS elevation 1390. Based on the difference in elevation and the distance to the mapped flood hazard, it appears the proposed construction will be located above the 100-year flood plain.

GEOLOGY

The proposed barns and barn additions are located primarily in the Pawnee soil series. The Pawnee soil series consists of very deep, moderately well drained soils that formed in till. The slopes across the exiting ground ranges from 2-6%.

GROUNDWATER

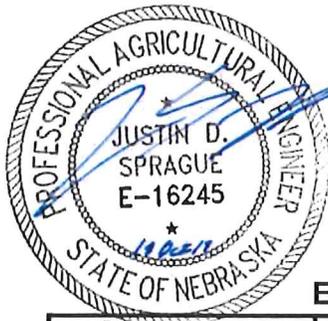
The available registered groundwater wells near the site show a static water level at approximately 145-feet below grade. All proposed CAFO construction will be above groundwater level.

STORM WATER

The proposed site expansion will not disturb more than one acre in any phase. If the phases happen concurrently, the operation will obtain an NPDES Storm Water Discharge Permit. All storm water on the site will drain to the north through a grassed waterway until it reaches the unnamed tributary to the North Fort Big Nemaha river. A combination of earthen berms, silt fence, and bale checks will be installed as needed for erosion protection.



and BR

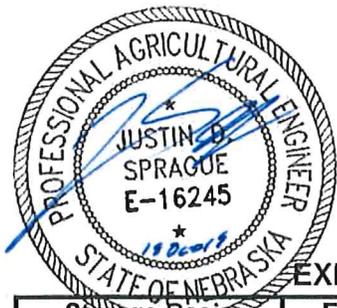


PRAIRIE LAND DAIRY DRAINAGE AREA 1

STAGE STORAGE TABLE EXISTING EARTHEN RUNOFF HOLDING POND #1A

Storage Basin Liquid Elev. (USGS)	Elev. (ft)	Depth of Liquid (ft)	Storage Volume (CF)	Storage Volume (gal)	Notes*
1383.0	496.0	20.7	2,899,564	21,688,739	Top of Dike Elevation
1382.5	495.5	20.2	2,811,059	21,026,721	
1382.0	495.0	19.7	2,715,711	20,313,518	
1381.5	494.5	19.2	2,621,781	19,610,922	Freeboard Elevation
1381.0	494.0	18.7	2,529,252	18,918,805	12" Crossover Line
1380.6	493.6	18.3	2,449,366	18,321,258	*Must Pump*
1380.0	493.0	17.7	2,348,324	17,565,464	
1379.5	492.5	17.2	2,259,899	16,904,045	
1379.0	492.0	16.7	2,172,816	16,252,664	
1378.5	491.5	16.2	2,087,064	15,611,239	
1378.0	491.0	15.7	2,002,631	14,979,680	
1377.5	490.5	15.2	1,919,506	14,357,905	
1377.0	490.0	14.7	1,837,676	13,745,816	
1376.5	489.5	14.2	1,757,129	13,143,325	
1376.0	489.0	13.7	1,677,854	12,550,348	
1375.5	488.5	13.2	1,599,836	11,966,773	
1375.0	488.0	12.7	1,523,063	11,392,511	
1374.5	487.5	12.2	1,447,522	10,827,465	
1374.0	487.0	11.7	1,373,201	10,271,543	
1373.5	486.5	11.2	1,300,088	9,724,658	
1373.0	486.0	10.7	1,228,173	9,186,734	
1372.7	485.7	10.4	1,181,392	8,836,812	
1372.0	485.0	9.7	1,087,890	8,137,417	Winter Drawdown Ph. 2
1371.5	484.5	9.2	1,019,501	7,625,867	
1371.0	484.0	8.7	952,268	7,122,965	
1370.5	483.5	8.2	886,183	6,628,649	
1370.0	483.0	7.7	821,236	6,142,845	
1369.5	482.5	7.2	757,419	5,665,494	
1369.0	482.0	6.7	694,723	5,196,528	
1368.5	481.5	6.2	633,140	4,735,887	Winter Drawdown Ph. 4
1368.0	481.0	5.7	572,661	4,283,504	
1367.5	480.5	5.2	513,282	3,839,349	
1367.0	480.0	4.7	454,995	3,403,363	
1366.5	479.5	4.2	397,793	2,975,492	
1366.0	479.0	3.7	341,670	2,555,692	
1365.5	478.5	3.2	286,618	2,143,903	
1365.0	478.0	2.7	232,638	1,740,132	
1364.5	477.5	2.2	179,954	1,346,056	
1364.0	477.0	1.7	129,099	965,661	Winter Drawdown Ph. 6
1363.5	476.5	1.2	81,052	606,269	Sludge
1363.0	476.0	0.7	39,207	293,268	
1362.3	475.3	0	0	0	Bottom

*Critical levels figured by pumping out of Pond 1A only.



PRAIRIE LAND DAIRY DRAINAGE AREA 1

STAGE STORAGE TABLE EXISTING EARTHEN RUNOFF HOLDING POND #1B

Storage Basin Liquid Elev. (USGS)	Elev. (ft)	Depth of Liquid (ft)	Storage Volume (CF)	Storage Volume (gal)	Notes*
1383.0	496.0	20.0	1,318,163	9,859,859	Top of Dike Elevation
1382.5	495.5	19.5	1,267,624	9,481,828	
1382.0	495.0	19.0	1,218,281	9,112,742	
1381.5	494.5	18.5	1,170,082	8,752,213	Freeboard Elevation
1381.0	494.0	18.0	1,122,989	8,399,958	12" Crossover Line / MP / WD
1380.5	493.5	17.5	1,076,978	8,055,795	
1380.0	493.0	17.0	1,031,989	7,719,278	
1379.5	492.5	16.5	987,955	7,389,903	
1379.0	492.0	16.0	944,857	7,067,530	
1378.5	491.5	15.5	902,683	6,752,069	
1378.0	491.0	15.0	861,424	6,443,452	
1377.5	490.5	14.5	821,068	6,141,589	
1377.0	490.0	14.0	781,604	5,846,398	
1376.5	489.5	13.5	743,021	5,557,797	
1376.0	489.0	13.0	705,310	5,275,719	
1375.5	488.5	12.5	668,461	5,000,088	
1375.0	488.0	12.0	632,464	4,730,831	
1374.5	487.5	11.5	597,311	4,467,886	
1374.0	487.0	11.0	562,990	4,211,165	
1373.5	486.5	10.5	529,494	3,960,615	
1373.0	486.0	10.0	496,812	3,716,154	
1372.5	485.5	9.5	464,934	3,477,706	
1372.0	485.0	9.0	433,851	3,245,205	
1371.5	484.5	8.5	403,553	3,018,576	
1371.0	484.0	8.0	374,032	2,797,759	
1370.5	483.5	7.5	345,277	2,582,672	
1370.0	483.0	7.0	317,281	2,373,262	
1369.5	482.5	6.5	290,032	2,169,439	
1369.0	482.0	6.0	263,523	1,971,152	
1368.5	481.5	5.5	237,743	1,778,318	
1368.0	481.0	5.0	212,685	1,590,884	
1367.5	480.5	4.5	188,339	1,408,776	
1367.0	480.0	4.0	164,696	1,231,926	
1366.5	479.5	3.5	141,749	1,060,283	
1366.0	479.0	3.0	119,490	893,785	
1365.5	478.5	2.5	97,913	732,389	
1365.0	478.0	2.0	77,010	576,035	
1364.5	477.5	1.5	56,774	424,670	
1364.0	477.0	1.0	37,199	278,249	Sludge
1363.5	476.5	0.5	18,276	136,704	
1363.0	476.0	0.0	0	0	Bottom

*Critical levels figured by pumping out of Pond 1A only.

**PRAIRIE LAND DAIRY
DRAINAGE AREA 1
STAGE STORAGE TABLE**

EXISTING EARTHEN RUNOFF HOLDING PONDS 1A & 1B

Storage Basin Liquid Elev. (USGS)	Elev. (ft)	Depth of Liquid (ft)	Pond 1A Volume (CF)	Pond 1B Volume (CF)	Total Storage Volume (CF)	Total Storage Volume (gal)	Notes*
1383.0	496.0	20.7	2,899,564	1,318,163	4,217,727	31,548,598	Top of Dike Elevation
1382.5	495.5	20.2	2,811,059	1,267,624	4,078,683	30,508,549	
1382.0	495.0	19.7	2,715,711	1,218,281	3,933,992	29,426,260	
1381.5	494.5	19.2	2,621,781	1,170,082	3,791,863	28,363,135	Freeboard Elevation
1381.0	494.0	18.7	2,529,252	1,122,989	3,652,241	27,318,763	12" Crossover Line
1380.6	493.6	18.3	2,449,366	1,076,978	3,526,344	26,377,053	*Must Pump*
1380.0	493.0	17.7	2,348,324	1,031,989	3,380,313	25,284,741	
1379.5	492.5	17.2	2,259,899	987,955	3,247,854	24,293,948	
1379.0	492.0	16.7	2,172,816	944,857	3,117,673	23,320,194	
1378.5	491.5	16.2	2,087,064	902,683	2,989,747	22,363,308	
1378.0	491.0	15.7	2,002,631	861,424	2,864,055	21,423,131	
1377.5	490.5	15.2	1,919,506	821,068	2,740,574	20,499,494	
1377.0	490.0	14.7	1,837,676	781,604	2,619,280	19,592,214	
1376.5	489.5	14.2	1,757,129	743,021	2,500,150	18,701,122	
1376.0	489.0	13.7	1,677,854	705,310	2,383,164	17,826,067	
1375.5	488.5	13.2	1,599,836	668,461	2,268,297	16,966,862	
1375.0	488.0	12.7	1,523,063	632,464	2,155,527	16,123,342	Winter Drawdown Ph. 2
1374.5	487.5	12.2	1,447,522	597,311	2,044,833	15,295,351	
1374.0	487.0	11.7	1,373,201	562,990	1,936,191	14,482,709	
1373.5	486.5	11.2	1,300,088	529,494	1,829,582	13,685,273	
1373.0	486.0	10.7	1,228,173	496,812	1,724,985	12,902,888	Winter Drawdown Ph. 4
1372.7	485.7	10.4	1,181,392	464,934	1,646,326	12,314,518	
1372.0	485.0	9.7	1,087,890	433,851	1,521,741	11,382,623	
1371.5	484.5	9.2	1,019,501	403,553	1,423,054	10,644,444	
1371.0	484.0	8.7	952,268	374,032	1,326,300	9,920,724	
1370.5	483.5	8.2	886,183	345,277	1,231,460	9,211,321	Winter Drawdown Ph. 6
1370.0	483.0	7.7	821,236	317,281	1,138,517	8,516,107	
1369.5	482.5	7.2	757,419	290,032	1,047,451	7,834,933	
1369.0	482.0	6.7	694,723	263,523	958,246	7,167,680	
1368.5	481.5	6.2	633,140	237,743	870,883	6,514,205	
1368.0	481.0	5.7	572,661	212,685	785,346	5,874,388	
1367.5	480.5	5.2	513,282	188,339	701,621	5,248,125	
1367.0	480.0	4.7	454,995	164,696	619,691	4,635,289	
1366.5	479.5	4.2	397,793	141,749	539,542	4,035,774	
1366.0	479.0	3.7	341,670	119,490	461,160	3,449,477	
1365.5	478.5	3.2	286,618	97,913	384,531	2,876,292	
1365.0	478.0	2.7	232,638	77,010	309,648	2,316,167	
1364.5	477.5	2.2	179,954	56,774	236,728	1,770,725	
1364.0	477.0	1.7	129,099	37,199	166,298	1,243,909	
1363.5	476.5	1.2	81,052	18,276	99,328	742,973	Sludge
1363.0	476.0	0.7	39,207	0	39,207	293,268	
1362.3	475.3	0	0	0	0	0	Bottom



*Critical levels figured by pumping out of BOTH Pond 1A and Pond 1B.

Construction Inspection & Quality Assurance Plan

PRAIRIE LAND DAIRY PROPOSED DAIRY EXPANSION ProAg Project No. 19-048

This Construction Inspection & Quality Assurance plan outlines the responsibilities of the parties involved in the construction of the freestall barn additions and new freestall barn construction; a description of roles for various construction items; and a timeline of notifications. These parties include the Owner, Contractor, Construction Inspector, and the Engineer.

Roles and Responsibilities

Owner: The owner is responsible for obtaining the contractor of his choice to install components of the proposed design. The owner is responsible for payment to the contractor for his services. It will be the owner's responsibility to require the contractor to install the structures according to the plans and specifications.

Contractor: The contractor will install the components of the design as shown on the plans and specifications.

Inspector: The engineer will provide the construction inspector for the project. The inspector is responsible to assure the structures are being installed according to the plans and specifications. The construction inspector will serve as the representative of the engineer. The inspector will not direct or be expected to direct the operations of the contractor. The inspector may provide suggestions to the contractor if asked but the contractor is under no obligation to implement these suggestions. If the inspector determines the plans and specifications are not being followed, he/she will notify the designing engineer. The inspectors are both certified ACI Concrete Field Testing Technicians – Grade 1 along with A.A.S. degrees in Civil Engineering Technology.

Engineer: Under no circumstances will major modifications be made without first notifying the designing engineer. If modifications are necessary, the designing engineer will consult with NE DEQ before approving the modification. If deficiencies in construction are brought to the attention of the designing engineer, he/she will contact the owner and inform them of the deficiencies. If the structures are not constructed according to the plans and specifications, the designing engineer will not certify the construction to NE DEQ.

Items of Construction

- **Pre-Construction Meeting-** A meeting will be held between the contractor, landowner, inspector, suppliers, engineer, and NRCS field office personnel (if applicable) prior to any construction taking place. Discussions will include review of the drawings and specifications, work schedules, safety issues, inspection requirements, NE DEQ certification, and other items pertaining to construction and quality control of this project.
- **Surveying-** The engineer will provide the required construction staking and layout prior to construction if requested by the owner or contractor. The contractor will be provided all bench mark information so they can do any grade checks required if engineering personnel are not on site. Elevation tolerances for earthwork and grading will be within 0.1 feet, and location to be within 10 feet in any direction.

- **Excavation-** The construction inspector will approve all excavation prior to placing any earthfill or beginning any formwork. The inspector will not be required to be on site during the excavation operations, but approval will be required before any of excavation can be backfilled.
- **Earthfill-** Earthfill will require periodic inspection by the inspector for moisture content and compaction methods.
- **Pipe Trench Excavations and Backfill-** Earthen backfill in the delivery pipe trenches will require periodic inspection to ensure the envelope of the pipe backfill meets specifications. Trench excavation will require periodic inspection to ensure excavation is to the neat lines as shown on drawings. The inspector will approve the grade and placement of the pipe and associated appurtenances before any blinding of backfill over the pipe is performed.
- **Formwork-** All formwork will be inspected by the inspector to ensure it will be adequate before any concrete is placed.
- **Concrete-** The concrete mix will conform to specifications. If a commercial mix is used, the concrete supplier will provide the engineer with a mix design along with test documentation to show it meets the specification. Continuous visual inspection with slump tests taken and test specimens cast will be performed by the inspector for all pours greater than 100 yards.

Batch tickets (if applicable) will be collected and provided to the engineer for review of the correct quantities by the engineer as shown for the mix design.

The contractor will have adequate personnel and standby equipment on hand during pouring to ensure the concrete is placed in a timely, efficient, and workmanlike manner. Tremies will utilized where needed to prevent excessive fall of the concrete while it is being placed.

- **Stripping of formwork-** All formwork will be stripped from the concrete in the time allotted by the construction specifications. Any honeycombs or defects will be repaired before certification of completion can be issued. Such repairs will be in accordance with the construction specifications for concrete.

All exposed concrete surfaces will be cured in a matter stated in the construction specifications.

- **Record keeping-** The inspector will keep an on-going written record of construction activities and his observations. He will use the inspection form or a bound notebook for documenting construction activities, progress, discrepancies, certification of materials, test results, photo log, etc.

A report will be prepared upon completion of construction which will summarize the inspection elements of the project, any deficiencies that occurred, and any deviations from the drawings and specifications and the reasons thereof. A copy of this report will be attached to the certification of completion.

Timeline and Notifications

Work under these specifications is subject to NE DEQ inspection and review.

- BEFORE STARTING CONSTRUCTION, Owner shall:
 1. Consult the NE DEQ for required submittals, notifications and approvals.
 2. Arrange for pre-construction meeting with engineer, owner, and contractors.
 3. Notify engineer, 3 days before starting construction.
 4. Notify permitting agency 3 days before starting construction.
- DURING CONSTRUCTION, Concrete Contractor shall:
 1. Notify Engineer, minimum 8 hrs before each concrete pour.
 2. Review batch tickets before pouring concrete.
- BEFORE POURING CONCRETE FLOORS; the following must be completed:
 1. Contractor give Engineer advance notice, minimum 8 hrs before each concrete pour.
 2. Inspector observes subgrade and floor slab thickness (full 5" thick).
 3. Inspector observes grade and placement of reinforcing steel. Steel shall be supported on chairs and tied.
 4. Perimeter tile shall be laid at least 12 inches from pit wall and covered with pearock or ¼" – ½" crushed rock.

Placement of the perimeter tile and rock cover shall be done by the Concrete Contractor. Tile and rock provided by Owner.

- BEFORE POURING CONCRETE WALLS; the following must be completed:
 1. Contractor give Engineer advance notice, minimum 8 hrs before each concrete pour.
 2. Inspector observes forms, reinforcing steel, waterstop, and tile.
 3. Tile system shall be working with (temporary or permanent) automatic sump pump or day light outlet.
- BEFORE BACKFILLING; Items 1 thru 4 must be complete, then Owner notify Engineer and allow 3 work days for inspection.
 1. Concrete contractor shall have patched all cracks and honeycomb.
 2. Permanent tile sump pump or inspection port set in-place, (braced if necessary) and ready for backfilling.
 3. All organic debris shall be removed from the overdig area.
 4. Engineer must inspect items 1 thru 3 and approve before backfilling.
- UPON COMPLETION, Owner shall notify Engineer when all of these items are done.
 1. Backfilling and finish grading completed.
 2. Safety signs installed.
 3. Engineer completes inspection and closes out the project.

TECHNICAL SPECIFICATIONS
PRAIRIE LAND DAIRY
PROPOSED DAIRY EXPANSION
SE¹/₄, SECTION 20, T-07-N, R-08-W
LANCASTER COUNTY, NEBRASKA

ProAg Job No. 19-048

October 2019



ENGINEER:

ProAg Engineering, Inc.

P.O. Box 181

Jackson, MN 56143

Phone: 507-849-7200

Fax: 507-849-7203

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STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

SECTION 200

I. GENERAL

A. Construction Sequence and Best Management Practices (BMP's)

1. The construction site shall be planted to grass (or cover crop) prior to commencement of construction. See Grass Seeding Guidelines.
2. Areas not to be disturbed during construction shall be staked and marked. Considerable rain water and sediment can be trapped on areas planted to grass and not compacted by construction traffic.
3. Install silt fence as shown on the site plan or according to Engineer.
4. All drive entrances shall be protected with rock. Install road culvert(s) as per highway department specifications.
5. Build a berm to prevent field water from entering the construction site. Make berm 18-24" high with 3:1 side slopes. Use loose top soil from the disturbed area. A berm is an alternative to using silt fence. The loose soil will absorb a lot of water. Construct the berm on the contour with no channel on the up-hill side of the berm.
6. Temporary stockpiles shall have silt fence or other effective sediment controls and cannot be placed in stormwater conveyances, ditches or grass waterways.
7. Dewatering of site shall be done in a manner that does not cause nuisance conditions or discharge onto down-slope property. Rain in excavations shall not be allowed to flow direct into open tile, unless the tile inlet has silt fence or other protection or the perimeter tile is installed and covered with pea rock or crushed rock.
8. After backfilling and final grading is done, those areas shall be planted to grass. Slopes steeper than 4:1 shall be mulched. All seeding and mulching operations shall commence within 1 week after completion of each portion of the construction or as soon as soil conditions permit. See Grass Seeding Guidelines.
9. After berms are removed and backfill around barns is re-graded (the following spring) those areas shall be re-seeded to grass.
10. Final stabilization is achieved when soils have been stabilized by a uniform perennial vegetative cover over at least 70% of the pervious area, and all drainage ditches and grass waterways have been stabilized, then the silt fence may be removed.
11. The Owner shall keep the plans and records on file for a minimum of six (6) years.

B. Maintenance of BMP's

1. Owner shall inspect all BMP's weekly and within 24 hours after each rain event of 1/2" or more in 24 hours.
2. Silt shall be removed from behind silt fences within 24 hours of when the depth reaches 1/3 the height of the fence.
3. Mud and crushed rock are tracked onto public roads, it shall be removed within 24 hours.
4. If sediment escapes the site, off-site accumulations must be removed in a manner and frequency sufficient to minimize off-site impacts.

C. Assignment of Responsibilities for Execution of the SWPPP

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

SECTION 200

1. Owner shall be responsible for execution, inspection, record keeping and up-dating The SWPPP as required.
2. Owner shall inspect all BMP's weekly and within 24 hours after each rain event of 1/2" or more in 24 hours and supervise proper maintenance of erosion and sediment control practices.
3. Earthwork Contractor shall be responsible for implement, manage and maintain both temporary and permanent erosion and sediment control BMP's (except seeding) until final grading has been completed on site.
4. Owner shall be responsible for seedbed preparation, planting and mulching operations prescribed by the SWPPP.
5. Changes to the SWPPP shall be approved and recorded by Owner prior to implementation.

D. Grass Seeding Guidelines

1. All in-place topsoil shall be salvaged to the maximum extent possible. It is ideal to place 6 inches of top soil in areas to be seeded. Harrowing before and packing with roller after planting will help germination, make the ground smoother and easier to mow.
2. Seeding mixture and rates are recommendations based on NDOR specs. Fertilizer is important for quick growth. Mixtures can be mowed.
 - a. Temporary seeding: Fertilizer 10-10-20 at 200 lbs/acre. Oats at 100 lbs/ac for spring/summer seeding of areas that will be left undisturbed for 21 days or more.
 - b. Winter wheat at 100 lbs/ac for fall seeding of areas that will be disturbed again in the spring, such as backfill around barns.

Turf and agricultural grasses: Fertilizer 20-10-20 at 350 lbs/acre.

General Roadside mix.

Brome grass, smooth	9.8 lbs/ac	14.0%
Bluegrass, Kentucky "Certified Park"	20.3	29.0
Bluegrass, Canada	9.8	14.0
Switch grass	2.1	3.0
Wheat-grass, slender	2.8	4.0
Rye-grass, perennial	14.7	21.0
Timothy	2.1	3.0
Redtop	2.1	3.0
Alfalfa, creeping	4.2	6.0
White clover	2.1	3.0
Total	70 lb/ac	

Agricultural Roadside mix.

Alfalfa, creeping	15 lb/ac	30.0%
Brome grass, smooth	10	20.0
Redtop	3	6.0
Rye-grass, perennial	15	30.0
Switch grass	2	4.0
Timothy	2	4.0
Wheat-grass, slender	3	6.0
Total	50 lb/ac	

EROSION PROTECTION

SECTION 210

I. GENERAL

A. SCOPE

1. This section covers the requirements, materials, installation and maintenance of erosion control features.
2. Furnish, install and maintain all erosion control improvements as shown, specified or required by governing agencies.
3. Perform work in accordance with best present day installation and construction practices.

B. APPROVALS AND PERMITS

1. Owner/Engineer shall obtain the following erosion control permits as required.
 - a. NPDES Storm Water Discharge General Permit administered by NE DEQ.
2. Contractor shall be responsible for applying for, paying all fees and obtaining any other erosion control permits including but not limited to:
 - a. Local silt screen or erosion control ordinance.
 - b. General building permits.
 - c. Any additional permits required.
3. Contractor shall notify Engineer and/or governing agency when erosion control measures are in place prior to commencing any land disturbing activities.

II. PRODUCTS

- A. Silt Screen: Synthetic Monofilament Woven material, 36 inches tall meeting DNOR SSHC Section 809.
- B. Fence Post: Steel "T" posts with lugs to prevent vertical slipping. Length to be minimum six feet.
- C. Jute Mesh: Non-toxic, single jute, plain weave meeting NDOR SSHC Section 811.
- D. Wood Excelsior Mat: Interlocking wood fiber or straw with plastic netting on one side. Matting shall meet NDOR SSHC Section 811.
- E. Manufactured Surface Intake Covers: Fabric covers with rigid frame as manufactured by Silt Saver, Inc. or equal.
- F. Compost: Controlled production compost consisting of yard trimmings, sewage sludge, animal manure or food processing residue. Compost shall meet the following AASHTO specifications:
 1. Carbon to Nitrogen Ratio – minimum 30:1
 2. Organic Matter – 30-60%

EROSION PROTECTION

SECTION 210

3. Moisture Content – 40% Target
4. Particle Size – 1/4" -- 5/8" for turf area, 1 1/4" for mulch
5. pH – 5.0 – 8.5
6. Soluble Salts – maximum 4 mmhos/cm
7. Heavy Metals – as regulated by US EPA, Class A 40 CFR 503.13, Tables 1 & 3

Compost facility shall comply with U.S. Composting Councils Seal of Testing Assurance (STA) Program.

III. EXECUTION

A. Prior to any site disturbing activities all required silt fence, compost fences, temporary detention ponds and hay bale silt checks shall be installed and approved.

B. A copy of an approved permit from all governing agencies shall be kept on site or with the responsible individual.

C. Installation:

1. Silt fence shall be installed in accordance with NDOR SSHC Section 809. Location of silt fence shall be according to approved plans.
2. Compost erosion control measures shall be installed in accordance with current installation practices.
3. Jute Mesh or Wood Excelsior Mat shall be installed according to NDOR SSHC Section 811.
4. After installation of storm intakes, field drains or culverts, adequate erosion and sediment control shall be installed in accordance with the standard details shown in the specification or on the drawing.

D. Monitoring:

1. The Contractor shall designate an individual, including name, title, address and phone number, to be responsible for the following duties throughout the duration of the project.

a. Initial installation of the erosion control measures.

b. Site inspections on a weekly basis and after rains greater than 1/4" to assess the effectiveness of existing erosion control measures and to direct installation of additional erosion control measures in response to problems noted during said inspections. The designated individual will keep a log of the inspections and any corrective measures taken. No inspections are required while the ground is frozen or there is snow cover. Inspection will resume when the snow begins to melt. Inspections will continue until adequate ground cover is established to control erosion.

EROSION PROTECTION

SECTION 210

2. Maintenance:

a. Silt fences, intake protection devices and straw bales shall be kept in proper working condition until all land disturbing activities are complete, all turf re-establishment is complete and final inspections are performed.

3. Removal:

a. Contractor shall be responsible for complete removal of silt fence, posts, or any non-biodegradable items used for installation of erosion control measures after Owner, Engineer or governing agency indicates they are no longer needed.

SEEDING & FERTILIZING

SECTION 230

I. GENERAL

A. SCOPE

1. Work involves seeding and fertilizing all disturbed grass areas as shown on drawings.
2. All work shall conform to NDOR SSHC Section 800.

II. PRODUCTS

A. MATERIALS

1. Urban Seed Mixture: Application Rate: 4 lbs/1000 S.F.

Kentucky Bluegrass	70%
Perennial Ryegrass	10%
Creeping Red Fescue	20%

Rural Seed Mixture:

Fescue, Kentucky 31 or Fawn	25 lbs/acre
Ryegrass (perennial)	15 lbs/acre
Sideoats Grama (Butte or Trakway)	5 lbs. Pure Live Seed (PLS) per acre
Switchgrass (Neb. 28, Blackwell, Pathfinder or Cave-in Rock)	3 lbs. PLS/acre
Birdsfoot Trefoil (Empire)	5 lbs/acre

Native Seed Mixture:

Temporary Cover or Nurse Crop Seed Mixture: NDOR SSHC Section 803. Seed mixture shall be based on time of year nurse crop is to be planted.

- B. Fertilizer: Urban and Rural Areas (13-13-13) or equivalent.
Application Rate: 750 lbs. per acre.

Mulch: NDOR SSHC Section 805. No mulching is required unless specifically noted on plans or bid item. Any areas to be mulched shall be at a rate of 3000 lbs/acre

- C. Silt Fencing: NDOR SSHC Section 809, Trevira, Spunbound Fabric Type 1114 or equal.
- D. Furnish seed analysis labels meeting NDOR SSHC Section 803 for all seed mixtures.

III. EXECUTION

A. INSTALLATION

1. Prepare seeding bed as per NDOR SSHC Section 803.
2. Apply fertilizer at the rate specified in NDOR SSHC Section 804.
3. Furnish and spread seed at the rate called for in depending on mixture specified.

SEEDING & FERTILIZING

SECTION 230

4. Normal seeding periods shall be March 1 through May 31 and August 10 through September 30. Deviation from these seeding periods will be considered by the Engineer upon written request from the Contractor.
5. Seed all disturbed areas with rural seed mixture except residential type lawns shall be urban mixture.
6. Mulch all seeded areas in accordance with NDOR SSHC Section 805.
7. Install silt fencing as shown on the drawings or as directed by the Engineer.
8. Contractor shall fence or rope off areas seeded which may be disturbed during turf establishment.
9. Contractor shall be responsible for keeping soil moist during germination and watering lawns a minimum weekly for 45 days.
10. Contractor shall regrade and reseed disturbed or unestablished turf areas.

END OF SECTION

EXCAVATION & BORROW

SECTION 300

I. GENERAL

A. SCOPE

1. All excavation to be performed shall be considered as Unclassified Excavation and shall consist of either topsoil stripping, site grading, pond excavation or building excavation.
2. Includes all required excavation, stockpiling, placement, compaction and fine grading.

B. EXISTING UTILITIES

1. Cooperate with Owner and utility companies for maintaining service.
2. Repair damage to existing utilities as directed by utility company.

II. PRODUCTS

A. FILL MATERIALS

1. Suitable clay material from grading and excavation operations on the site may be used upon approval from the Engineer.
2. Pit run gravel as approved by Engineer.
3. Do not use black earth or topsoil as fill in dikes or under proposed paving, structures or pads.

III. EXECUTION

A. EXCAVATION

1. All areas to be excavated or filled shall have vegetation removed prior to excavating.
2. Excavation consists of removal and disposal of materials encountered when establishing required grade elevations.
3. Topsoil shall be stockpiled separate from other materials to be used later for earth slope finishing.
4. Stockpiling of stripped topsoil shall be as shown on the drawings or within the site limits as directed by the Engineer.
5. Any wood, piping, rubble or deleterious materials encountered during excavation shall be disposed of by the Contractor.
6. "Topsoil Removal":
 - a. Strip topsoil as directed below unless shown on plans otherwise or as directed by Engineer.
 - b. *Buildings*: Strip top six (6) inches of topsoil and vegetation beneath building structures.

EXCAVATION & BORROW

SECTION 300

c. *Roadways/Parking Area*: Strip top six (6) inches to remove vegetation.

d. *Areas to have Grade Lowered*: Strip top six (6) inches to remove vegetation

7. If the grade is inadvertently cut below proposed subgrade elevation, provide acceptable clay or granular material from the site for fill, free of rock or gravel larger than 2 inches in diameter, debris, waste, frozen materials, vegetable and other deleterious matter.
8. Cast-In-Place Concrete Structures: Excavate to firm subgrade and place granular base. Remove unsuitable material and replace with stabilization rock.

B. FILL

1. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil, obstructions and deleterious materials from ground surface prior to placement of fills. Disk surfaces (minimum 8" deep) so that fill material will bond with existing surface.
2. Place fill in layers not more than 8 inches in loose depth. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact as described in Paragraph 3.3 below.
3. Do not place fill on surfaces that are muddy, frozen or contain frost.
4. Additional fill required in roadways or building pads shall be suitable clay obtained from on site or borrow source.
5. Top 6" of final grade shall be replaced topsoil in areas where seeding is shown or specified.

C. COMPACTION

1. All disked materials and fill materials shall be placed in lifts not exceeding 6 inches and compacted to a minimum of 95% of the maximum density as determined by the Standard Proctor Test. Material shall be placed when it exhibits a moisture content at or above the optimum content as determined by the Standard Proctor Test. Compaction shall be achieved by using a standard sheepsfoot roller with a minimum of 4 passes per lift so that the roller walks out of each lift. Engineer will conduct soil density tests of two tests per foot of fill per acre. Contractor to assist Engineer with tests by leveling grades, etc.
2. Moisture Control:
 - a. Material shall be compacted at or above the optimum moisture content.
 - b. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to specified density.
 - c. Soil that has been removed, because it is too wet to permit compaction, may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a satisfactory value, as determined by moisture density tests.
 - d. Add water uniformly to soil that is too dry to compact to specified density.
 - e. Contractor shall supply his own water. It may be obtained from the Owner if well is installed.

EXCAVATION & BORROW

SECTION 300

D. MAINTENANCE

1. Protection of Graded Areas: Protect newly graded areas from traffic and erosion and keep free of trash and debris.
2. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
3. Install erosion protection rock on inside corners of earthen basins as shown. Rock to be native fieldstone, crushed limestone or crushed concrete.

E. DISPOSAL OF EXCESS AND WASTE MATERIALS

1. Excess clay material shall be hauled to the pad areas. Excess clay remaining after final grading shall be placed on basin dike exterior.
2. Excess topsoil shall be left in designated stockpile area.

END OF SECTION

TRENCHING, BACKFILLING & COMPACTING

SECTION 320

I. GENERAL

A. SCOPE

1. This section covers the labor and materials relating to excavation, backfilling and compaction of backfill.
2. Contractor shall perform all necessary excavation, shoring, bracing, dewatering, bottom stabilization, utility protection, pipe bedding, initial backfill, trench backfill, compaction, grading and cleanup as required to install utilities and structures as shown on plans or specified herein.
3. Perform all work in accordance with best present day construction practices.

B. WORK BY OTHERS

1. Engineer shall perform all soil compaction testing. Contractor shall assist Engineer during testing and notify Engineer when new areas are being backfilled.
2. Reference to percent maximum density shall mean a soil density not less than the stated percent of maximum density for soil as determined by ASTM D698 "Moisture-Density Relations of Soils using 5.5 lb. Hammer and 12" Drop (Standard Proctor).

C. PROTECTION OF EXISTING UTILITIES

1. Contractor shall be responsible for making a locate call to have utility companies field locate existing utilities before the start of any excavation.
2. Contractor shall be responsible for verifying location and existence of all underground utilities. Omission from or inclusion of located utility items does not constitute non-existence or definite location. Secure and examine local utility records for available location data.
3. Take necessary precautions to protect existing utilities from damage due to any construction activity. Repair all damages to utility items at sole expense. Assess no cost to Owner, Engineer or auxiliary party for any damages.

D. JOB CONDITIONS

1. Contractor shall accept site in condition at time of construction. Notify Engineer or Owner immediately if site conditions are significantly different than during solicitation of construction bids. Surface water or groundwater level fluctuation shall not be considered change in site condition.
2. Contractor shall make provisions if working in wet or frozen conditions to prevent installation on frozen ground or backfilling with excessively wet or frozen material.

E. SAFETY

1. Nothing as indicated in these specifications or drawings shall relieve the Contractor from complying with appropriate safety regulations including OSHA Standards or state and local building codes.

TRENCHING, BACKFILLING & COMPACTING

SECTION 320

2. Pile excavated material suitable for backfill in an orderly manner sufficient distance back from edge of excavation to avoid rollbacks, slides or cave-ins.
3. Erect sheeting, shoring and bracing as necessary for protection of persons, improvements and excavations.

II. PRODUCTS

A. EXCAVATION CLASSIFICATION

1. Earth: All materials not classified as rock or rubble; includes clay, silt, sand, gravel, hardpan, disintegrated shale and rock debris, junk, brick, loose stones and boulders less than ½ cubic yard in volume.
2. Rock: Buried boulders larger than ½ cubic yard in volume or solid deposits so firmly cemented together that they cannot be removed with a ½ cubic yard rated backhoe.
3. Rubble: Buried concrete foundations, beams, walls and other materials which required continuous use of pneumatic tools or blasting.

B. TRENCH STABILIZING MATERIAL

1. 2" coarse, sharp, clean crushed stone. Material shall be crushed to 100% passing a 2" sieve, 10%-50% passing a ¾" sieve and less than 5% passing a No. 8 sieve or other material approved by the Engineer.

C. PIPE OR STRUCTURE BEDDING

1. Crushed stone or gravel meeting NDOR Class F Aggregate for coarse aggregate for concrete.

D. INITIAL BACKFILL

1. NDOR Class C Aggregate.

E. POROUS BACKFILL

1. NDOR SSHC Section 1033 (washed pea gravel)

F. GRANULAR BACKFILL

1. Pit run material subject to approval of Engineer.

G. CONTROLLED DENSITY FILL

1. High slump mixture of Portland Cement.

III. EXECUTION

A. INSPECTION

1. Verify that preceding work affecting work of this section has been satisfactorily completed.

TRENCHING, BACKFILLING & COMPACTING

SECTION 320

2. Correct conditions adversely affecting work of this section.
3. Verify that existing utilities are marked prior to excavation.
4. Perform any exploratory excavation as shown or specified.

B. EXCAVATION FOR STRUCTURES AND APPURTENANCES

1. Includes excavation for manholes and other appurtenances.
2. Strip suitable topsoil or granular surfacing materials for later replacement.
3. Excavate as required to firm, undisturbed soil. If excavation is carried below bottom of foundations as shown on plans, fill with 3,000 psi concrete or stabilizing material as directed by Engineer at no expense to Owner.
4. When unstable material is encountered which will not provide suitable foundation, fill with 3,000 psi concrete or stabilizing material specified hereinafter or as directed by Engineer. Extra work provisions shall apply.

C. TRENCH EXCAVATION

1. Excavate trenches by open cut method. Permission to tunnel under crosswalks, driveways or utility lines may be granted by Engineer or Owner.
2. Limit open trench to 300 lineal feet at any one time.
3. Keep width of trench as narrow as possible. See utility specification for the maximum trench width.
4. Keep sides of trench as nearly vertical as practicable within the limits of excavating safety and applicable codes. Maintain vertical walls of excavation below top of pipe.
5. Provide access to operable fire hydrants, driveways and accesses unless specifically noted otherwise.
6. When unstable material is encountered which may not provide a suitable foundation for pipe:
 - a. Notify Engineer immediately.
 - b. Engineer will investigate questionable material to determine its suitability for pipe foundation.
 - c. If material is considered unsuitable for foundations, Engineer will specify and authorize remedial measures in writing.
 - d. If removal of unsuitable material is authorized:
 1. Replace with trench stabilizing material.
 2. Authorized over-excavation and trench stabilizing material will be paid for as trench stabilizing material.

TRENCHING, BACKFILLING & COMPACTING

SECTION 320

3. Provide minimum of 4" of bedding material on top of stabilizing material to prevent point load. Bedding material shall be graded sufficiently coarse to prevent movement and loss of bedding into trench stabilizing material.

e. Authorized remedial measures not covered by contract unit prices will be paid for as Extra Work.

7. Excavate by hand:

a. Under and around utilities.

b. Where overhead clearance prevents use of machine.

c. Under trees and shrubs that are shown to remain.

D. ROCK AND RUBBLE EXCAVATION

1. Excavate to provide 2" of granular bedding for pipe, structures and appurtenances.

2. Use of explosives: Submit detailed plans outlining all proposed blasting operations, locations, methods and use of mats and other safety measures.

a. Obtain written approval from municipal authority and Engineer before using explosives.

b. Provide Special Hazard Insurance covering liability for all blasting operations. Cost is incidental to cost of rock excavation.

c. Use experienced demolition personnel.

3. Remove excavated rock or rubble not suitable for backfill to an acceptable disposal area. Disposal is incidental to cost of rock excavation.

4. Trench bottom carried below required elevations: Replace with pipe bedding material.

E. DEWATERING

1. Perform all work in the dry to satisfaction of Engineer.

2. Lay no pipe in, and pour no concrete on, excessively wet soil.

3. Prevent surface water from flowing into excavation. Remove water as it accumulates.

4. Divert stream flow away from areas of construction.

5. Contractor's method of managing water encountered during construction shall conform to all laws and permits in effect.

6. Contractor shall obtain approval from Engineer prior to any dewatering.

7. Do not pump water onto adjacent property without approval of Engineer and adjacent property owner. Do not use sanitary sewers for disposal of ground water.

TRENCHING, BACKFILLING & COMPACTING

SECTION 320

F. SHEETING, SHORING AND BRACING

1. Construct sheeting, shoring and bracing required to hold walls of excavation and to provide safety for workmen; to protect existing utilities or structures; or to permit construction in the dry.
2. Wood sheeting driven below level of pipe: Leave in place to a level 5' below finish grade.
3. Pull steel sheeting except where shown on plans.
4. When moveable trench shield is used below spring-line of pipe, it shall be lifted prior to any forward movement to avoid pipe displacement.

G. BEDDING

1. Place specified bedding after excavation or trench has been excavated to proper grade.
2. Place, compact and shape bedding material to uniformly support structure or full length of piping.
3. Provide bedding as shown on plans or specified in utility sections.

H. BACKFILL FOR STRUCTURES

1. Backfill after poured-in-place concrete or masonry has cured for 48 hours.
2. Backfill with material removed from excavation except where sand or granular backfill is specified. Use no debris, frozen earth, large clods, stones or other unsuitable material.
3. Backfill simultaneously on all sides of structure. Save structure from damage at all times.
4. Compact backfill at structures to density not less than specified for adjacent trench.

I. INITIAL PIPE BACKFILL

1. Place specified initial backfill after pipe has been placed, checked for grade and alignment and pipe bedding is fully supporting pipe.
2. Place initial backfill in maximum 8" lifts. Spread backfill uniformly and hand compact to 12" above pipe as specified.

J. TRENCH BACKFILL

1. Backfill with material removed from excavation except where sand or granular backfill is specified. Use no debris, frozen earth, large clods, stones or other unsuitable material.
2. Place backfill into the trench at an angle so that impact on installed pipe is minimized.
3. Install cushion of 4 feet of backfill above pipe envelope before using heavy compacting equipment.
 - a. Trenches where "granular" is shown on plans.
 1. Backfill with pit run up to bottom of specified surface restoration.

TRENCHING, BACKFILLING & COMPACTING

SECTION 320

2. Compact to 95% minimum standard proctor density under and within six feet of pavement; 90% minimum density in other areas.
 3. Hydraulic compaction permitted only upon approval by Engineer.
 4. Top 12 inches of backfill shall match soil equivalent to adjacent excavation.
 5. Refer to Paving Section for subbase requirements beneath pavements.
- b. Trenches where "Compacted Backfill" is shown on plans:
1. Backfill with suitable excavated material up to bottom of specified surface restoration.
 2. Dry or moisten if required; compact to 95% minimum standard proctor density under and within two feet of pavement; 90% minimum density in other areas. Engineer will conduct soil compaction tests as needed. Contractor shall rework all areas not meeting compaction specification.
 3. Top 12 inches of backfill shall match soil equivalent to adjacent excavation.
 4. Refer to paving section for subbase requirement beneath pavements.
 5. Maximum lift of compacted backfill shall be 12".
- c. "Ordinary Backfill":
1. Use unless otherwise shown on plans.
 2. Backfill trench with excavated material and compact to same density as adjoining soils.
 3. Top 12 inches of backfill equivalent to adjacent topsoil.
 4. Mound up or level off to original surface as directed by Engineer.
- d. Where select earth backfill is required to replace unsuitable excavated material, Extra Work provisions shall apply.
3. If settlement above compacted or sand backfill occurs within period of guarantee and bond, refill, compact, level off and resurface.
 4. If new pipe is installed below existing utilities (i.e. water, sewer, gas, electric, etc.) then Contractor shall backfill beneath utility to satisfaction of utility owner.

END OF SECTION

UTILITY CONFLICT REPAIRS

SECTION 330

I. GENERAL

A. SCOPE

1. This section covers the requirements for materials to furnish and install all pipe, fittings, structures and accessories required for moving existing utility mains and services out of the way of new storm, sanitary sewer, water main or other construction to be installed as specified or shown on the plans.
2. Before installation of new facilities, verify sizes, measurements, type and location of existing piping and appurtenances at points of connection to existing system.
3. Make necessary field measurements to determine piping laying lengths; work pipe into place without forcing or springing.
4. Do work in accordance with best present-day installation and construction practices.

II. PRODUCTS

A. MATERIALS

1. Ductile Iron Pipe (water main):
 - a. AWWA C151, Class 52, unless specified otherwise
2. PVC C900 or C909 (water main or sanitary sewer main)
3. PVC SCH40 (sanitary sewer service lines):
 - a. ASTM D2665
 - b. Joints and Fittings, solvent weld
4. Copper Pipe (water service lines): ASTM B88, Type K, annealed
5. Fittings: AWWA C153 compact, restrained, mechanical joint for water main.
6. Repair Sleeves: Clow Band-Seal or approved equal meeting ASTM C-594
7. Coupling: "Dresser" style coupling with gaskets to suit pipe encountered.
8. Concrete: Class B Mix or solid concrete block as directed by the Engineer.
9. Field Tile:
 1. PVC Plastic, ASTM C900, Class 150. Use Fernco rubber adapters as necessary.
 2. HDPE, Heavy Duty, perforated with connecting bands.

III. EXECUTION

A. PIPE INSTALLATION

UTILITY CONFLICT REPAIRS

SECTION 330

1. Ductile Iron Pipe: AWWA C600
 2. PVC C900 or C909: ASTM D2321
 3. PVC SCH 40 Pipe: ASTM D2774
 4. Minimum depth to top of water line pipe: 6.0 feet or as directed by the Engineer.
 5. The width of the trench shall be ample to permit the pipe to be laid and joined properly but should be no more than 12 inches on either side of the pipe.
 6. Lay pipe in the dry and thoroughly compacted backfill.
 7. Clean pipe interior of foreign material before lowering into trench; keep clean at all times by securely closing open ends of pipe and fittings with watertight plug to prevent ingress of foreign material at all times when pipe jointing operation is not in progress. If water is in the trench, the seal shall remain in place until the trench is pumped dry.
 8. Place in trench in sound, undamaged conditions. Do not injure pipe coating or lining. Do not use end hooks to install or move pipe.
 9. Cut pipe in neat and workmanlike manner without damage to pipe; mechanical pipe cutters subject to approval of Engineer; bevel cut ends of push-on type pipe.
 10. Before installation, visually inspect for cracks or defects; damaged or unsound pipe will be rejected.
 11. Deflect pipe joints, as shown on plans, in accordance with pipe manufacturer's recommendations.
 12. Plug or cap and block all pipe ends or fittings left for future connections.
 13. Uncover existing mains a sufficient time ahead of pipe laying operations to determine fittings required to make connections; make connections between existing and new water mains with specials and fittings as required.
- B. WATER MAIN AND SERVICE LOWERING OR RAISING WITH ELBOWS OR PIPE EXTENSIONS**
1. Locate valves and shut off line.
 2. Cut and install necessary elbows, pipe restrained fitting and thrust blocks.
 3. Provide a minimum of two inch clearance between water line and storm sewers.
 4. Refer to water main or sanitary sewer specifications for clearances.
 5. Maintain uniform, thoroughly compacted trench bottom to support piping.
 6. Secure pipe and return pressure to the line and inspect all joints for leaks before completion of backfilling and compaction.
 7. Backfill with granular material if directed by the Engineer.
 8. Use 45° elbows on mains 4" and larger.

UTILITY CONFLICT REPAIRS

SECTION 330

C. SEWER SERVICE LINE RECONSTRUCTION

1. Where sewer service lines cannot be supported across the proposed storm sewer trench, the lines may be temporarily removed and reconstructed. Keep length to be replaced to a minimum.
2. Prevent service lines from being plugged during construction.
3. Backfill and compact sewer trench to maximum density under all sewer services. Use granular material if directed by the Engineer.
4. Cut pipe and place watertight repair sleeve on firm, undisturbed soil. Contractor may use PVC or DIP across sewer trench.
5. Backfill and compact granular material around sewer repair to 24" above pipe with hand tamper.
6. Complete backfilling and compaction as directed by the Engineer.
7. Reference sewer repair location and depth for future location.

END OF SECTION

CAST-IN-PLACE CONCRETE

SECTION 400

I. GENERAL

A. SCOPE

This section covers the requirements for cast-in-place reinforced concrete on the project including form work and reinforcing.

B. WORK BY OTHERS

1. The Engineer may conduct additional testing of concrete during placement in addition to tests required by Contractor.
2. Contractor is responsible construction staking for location and elevation. Contractor shall coordinate any staking requirements with Engineer.

C. REFERENCES

1. Comply with the latest published edition of the American Concrete Institute (ACI) and American Society of Testing and Materials (ASTM) standards and codes:
 - a. ACI 318-05/ACI 318R, "Building Code Requirements for Reinforced Concrete and Commentary"
 - b. ACI 350/350R-01, "Code Requirements for Environments for Environmental Engineering Concrete and Commentary."
 - c. ACI 350R-01, "Environmental Engineering Concrete Structures"
 - d. ACI 347R-04, "Guide to Formwork for Concrete"
 - e. ASTM A615 – Deformed Billet Steel Bars for Concrete Reinforcement
 - f. ASTM C94 – Ready-Mixed Concrete
 - g. ASTM C150 – Portland Cement
 - h. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete
 - i. ASTM C260 – Air-Entraining Admixtures

II. PRODUCTS

A. MATERIALS

1. Formwork:
 - a. Exposed Surfaces: Metal, smooth fiberglass, hardboard, premium grade plywood or architectural forms as specified.
 - b. Concealed Surfaces: Plywood or No. 2 lumber.
 - c. Columns: Metal, fiberglass or cardboard (SONOTUBE or equal).

CAST-IN-PLACE CONCRETE

SECTION 400

- d. Insulated: Lite form or equal.
 - e. Form Release Agent: Non-staining mineral oil to prevent bonding to concrete and not affect bonding of curing and sealing agents
 - f. Form Ties: Plastic snap cone ties with neoprene waterproof washer at center.
2. Reinforcement:
- a. DeFormed Bars: ASTM A615 Grade 60. Deformations to meet ASTM A305,
 - b. Welded Wire Fabric: ASTM A185
 - c. Bar Supports: Plastic tipped non corrosive manufactured support.
3. Ready-Mixed Concrete: Class C, NDOR SSHC Section 600.
- a. Compressive Strength: 3500 psi minimum at 28 days for footing and slabs, 4000 psi for walls and roof.
 - b. Portland Cement: ASTM C150 Type I or II.
 - c. Admixtures: Only when specified or authorized by Engineer
 - d. Fine Aggregate: NDOR SSHC Section 1033
 - e. Coarse Aggregate: NDOR SSHC Section 1033
 - f. Water to Cement Ratio = .5 by weight
 - g. Air Content: 6.5% target value; range 5.5% to 7.5%
 - h. Fly Ash, maximum 20% of cementitious material. Silica Fume, maximum 20% of cementitious material. The combination of fly ash and silica fume shall not exceed 35% of total cementitious materials. Fly ash and silica fume will increase resistance to sulfates and reduce permeability. CAUTION: fly ash slows curing, especially in cold water and shall not be used after October 15th without permission from the Engineer.
 - i. To minimize shrinkage cracks in floors, minimize the amount of cement-water paste and maximize the amount of large aggregate. Contractor may order water reducing or other admixtures, except calcium chloride shall not be used.
 - j. Curing Material: Liquid membrane, non staining. Sonneborn Kure and Seal or equal.
 - k. Expansion Joint Fillers: NDOR SSHC Section 612. Sonneborn Sonolastic SL1 or equal.
 - l. Waterstop: Ribbed PVC or Bentonite Roll.

B. SUBMITTALS

1. Contractor shall submit proposed ready mix design along with test results to Engineer prior to placement of any ready mix concrete.
2. Submit two (2) copies of reinforcing steel shop drawings to Engineer for review.

CAST-IN-PLACE CONCRETE

SECTION 400

III. EXECUTION

A. INSPECTION

1. Verify that earthwork is completed to correct line and grade.
2. Check that subgrade is smooth, compacted and free of frost or excessive moisture before each concrete pour. Also inspect forms, waterstop, placement and grade of reinforcing steel.
3. Do not commence work until conditions are satisfactory.

B. WEATHER LIMITATIONS

1. Do not place concrete during rain, sleet or snow or on excessively wet subgrade.
2. Exposed concrete surfaces shall be kept continuously wet for at least 24 hours or until a curing compound is applied.
3. Allowable concrete temperatures:
 - a. Cold Weather: Minimum air temperature 40°F and rising
 - b. Hot Weather: Maximum concrete temperature 90°F

C. INSTALLATION

1. Formwork:

- a. Install formwork to tolerances specified in ACI 301 Section 4.3.
- b. Contractor shall coordinate tolerances allowed with subsequent construction requirements.
- c. All formwork shall be adequately supported to prevent displacement and free of gaps or holes to prevent loss of mix.
- d. Forms shall have form release agent applied prior to placement of reinforcing steel.
- e. Formwork removal:
 1. Minimum of 24 hours at 50°F for footings or slab edges.
 2. Minimum of 48 hours at 50°F for walls. No backfill allowed for seven days.
 3. Minimum of fourteen days at 50°F for self supported floors or beams.

2. Reinforcing:

- a. All reinforcing shall be free of mud, rust, oil and grease prior to placement.
- b. Field bending cold is allowed on reinforcing bars #5 and smaller. Heating and bending is not allowed.

CAST-IN-PLACE CONCRETE

SECTION 400

- c. All reinforcing shall have 3" minimum cover when placed against earth. All other locations 2" minimum.
 - d. Refer to drawings for splice lengths.
 - e. No reinforcing shall be cut for any opening unless approved by Engineer.
 - f. All reinforcing shall be supported off forms, earth and tied adequately to prevent displacement during construction.
 - g. Notify Engineer when reinforcing is installed. Contractor shall obtain Engineer's approval prior to placing concrete or covering up steel with formwork.
3. Cast-in-Place Concrete:
- a. Verify forms are installed to line and grade and are secure.
 - b. Prior to placement of concrete, the forms and subgrade shall be free of wood chips sawdust, debris, standing water, ice, snow, extraneous oil, mortar and other harmful substances or coatings. Placement of concrete on mud, dried earth, un-compacted fill or frozen subgrade will not be permitted.
 - c. Moisten subgrade, forms or existing concrete prior to placement.
 - d. Install $\frac{3}{4}$ " chamfer strips at corners of all exposed concrete.
 - e. Place concrete in position without separation of concrete materials. Dropping of concrete more than five feet is prohibited.
 - f. Place concrete continuously so that each pour unit will be monolithic in construction and will terminate at expansion, contraction or construction joint. permit not more than 30 minutes between depositing adjacent batches.
 - g. Consolidate concrete with mechanical vibrators operating at not less than 3500 vibrations per minute.
 - h. Finishing:
 - 1. Exposed floors shall be floated and power trowelled or broom finished for non skid surface.
 - 2. Concrete to receive additional concrete shall have rough or raked finish.
 - 3. Concrete to be concealed shall have float finish.
 - 4. Exposed walls shall have burrs removed, surfaces cleaned and all honeycomb and form tie holes filled with non shrink grout. If grout rub finish is shown on plans then entire surface shall be wetted and non shrink grout mixture rubbed on entire surface.
 - 5. Use edger on all slabs.
 - 6. Coordinate all surface finishes with Engineer.

CAST-IN-PLACE CONCRETE

SECTION 400

j. Curing:

1. Exposed slabs shall have liquid membrane curing and sealing agent applied in accordance with manufacturer's recommendation.
2. Walls shall be cured with liquid membrane curing agent.
3. Burlap continuously wetted for seven days is an acceptable curing method for all concrete.

k. Backfilling: See Material Specification for Cast-in-Place Concrete

l. All concrete shall be protected at Contractor's expense. Owner shall incur no expense for concrete repairs caused by the Contractor's operations.

m. Tolerances: Elevation of floor slabs, top of walls, slab ledges, beam pockets and top of columns $\pm 1/4"$. Horizontal length and width of top of wall, location of beam pockets and columns $\pm 1/2"$. Straightness of top of wall $\pm 1/4"$. Anchor bolt spacing $\pm 1"$, centered in stem wall $\pm 1/2"$. Thickness of floor slab shall not be less than 5 inches at any point.

D. TESTING

1. Contractor shall submit ready mix design and test results to Engineer prior to any concrete placement.
2. Engineer will conduct all on site testing of concrete during placement.
3. Failure of any ready mix concrete to achieve specified air content or to exceed specified slump shall be cause to reject ready mix.
4. Engineer will cast compression test specimens, three each, for every major pour. Cylinders will be cast and stored at project site. Contractor shall furnish secure location for test cylinders. Engineer will transport cylinders to testing lab where one cylinder will be broke in seven days, one cylinder broke in 28 days and one cylinder held in reserve for 90 days. Engineer shall notify testing lab if third cylinder needs to be tested.
5. If Contractor desires placed concrete to have forms removed early, traffic applied, backfill placed or loads applied prematurely Contractor shall conduct additional testing at his expense (cylinders, beams, time-temperature curves, etc.) and furnish results to Engineer for consideration.
6. All lab test results shall be on proper forms and distributed to Contractor, Engineer and Owner.
7. Engineer may request core samples be taken for any concrete of questionable strength or quality. All such concrete found to be defective shall be removed and replaced by Contractor.

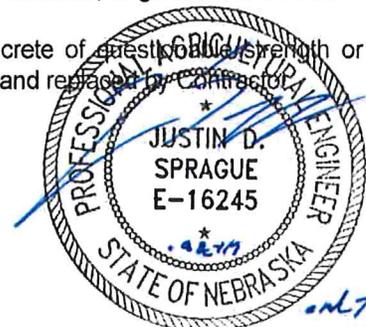
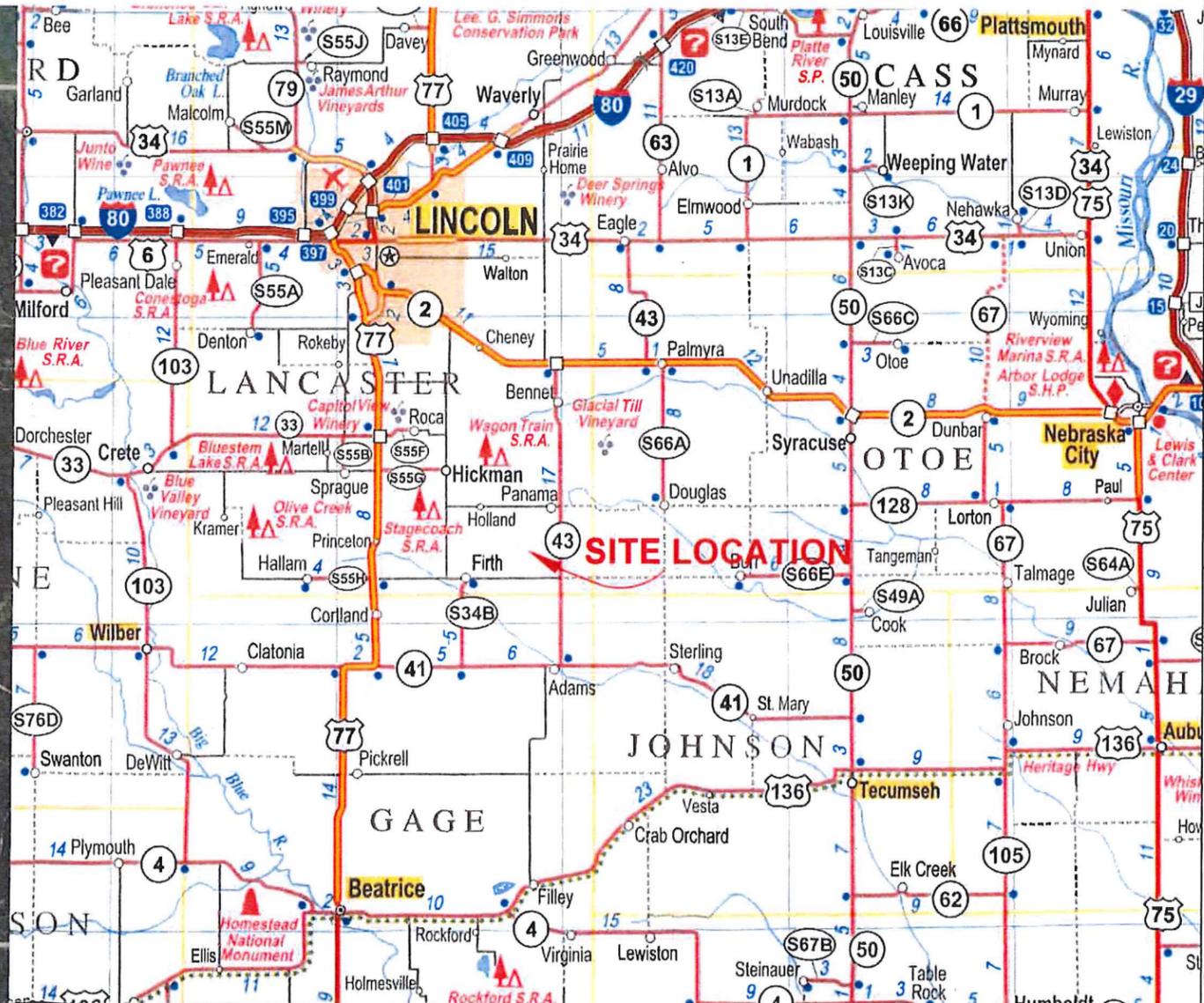


TABLE OF CONTENTS

- SHEET 1- AERIAL MAP
ROAD MAP
- SHEET 2- SITE PLAN DRAINAGE AREAS
- SHEET 3- SITE PLAN-DAIRY BARN
- SHEET 4- BARN DETAILS
- SHEET 5- MATERIAL SPECIFICATIONS
CONSTRUCTION JOINT DETAILS



SHEET	1/5
Project No.	19-048
Checked By	J.D.S.
Date	10/14/19
Drawn	D.D.A.



PRAIRIE LAND DAIRY
PROPOSED DAIRY EXPANSION
SE 1/4, SECTION 20, T-7-N, R-08-E
LANCASTER COUNTY, NEBRASKA

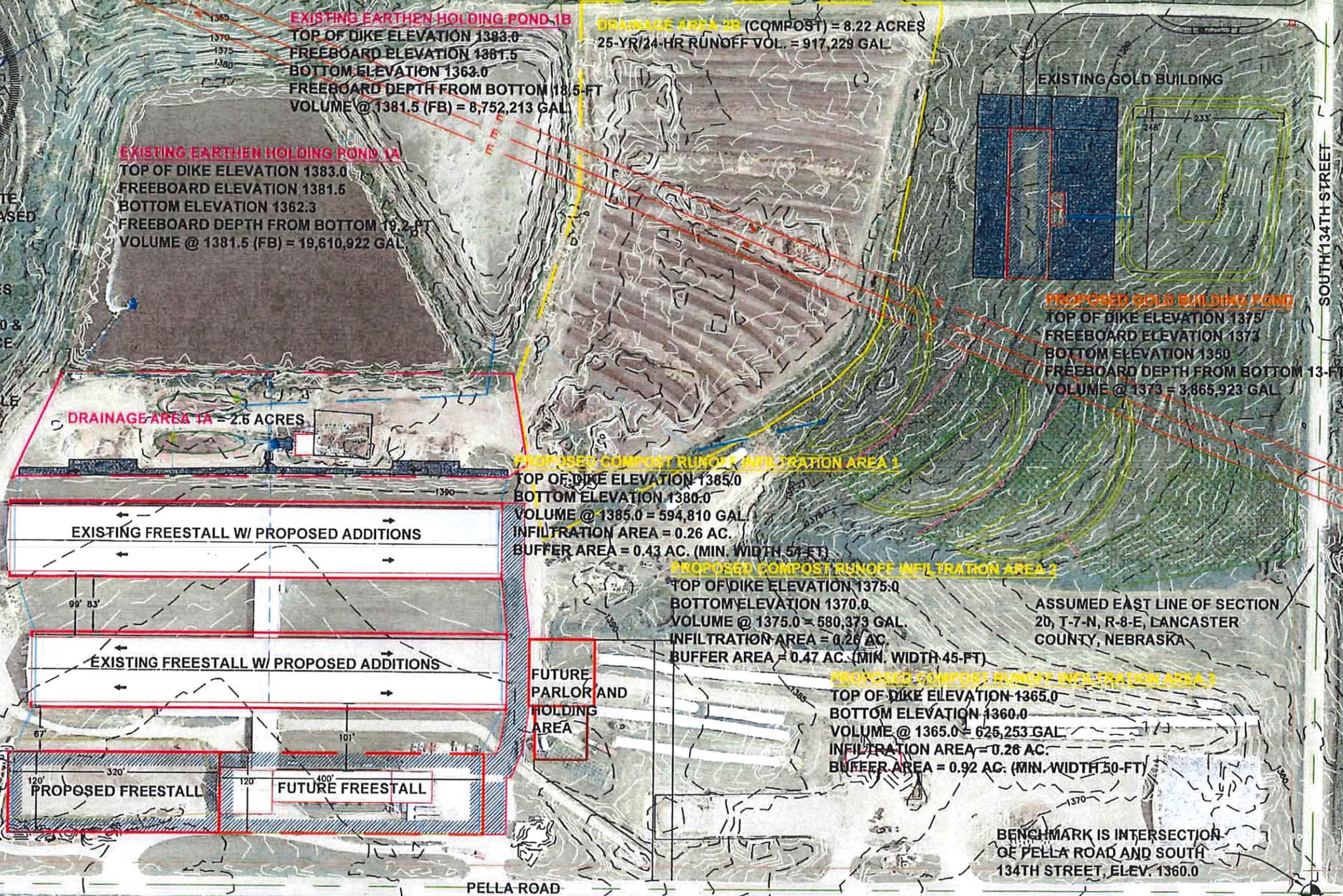
ProAg Engineering, Inc.
77402 Highway 71, P.O. Box 181
Jackson, MN 56143
(507) 849-7200



ELEVATIONS ARE APPROXIMATE USGS ELEVATIONS AND ARE BASED ON USGS QUAD MAP ROAD INTERSECTION ELEVATIONS.

THE PROPOSED STRUCTURES COMPLY WITH THE DESIGN STANDARDS OF NDEC TITLE 130 & NRCS CONSERVATION PRACTICE STANDARDS.

CONTRACTOR IS RESPONSIBLE FOR CALLING NEBRASKA ONE CALL (1-800-331-5888) AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION WORK.



EXISTING EARTHEN HOLDING POND 1B
 TOP OF DIKE ELEVATION 1383.0
 FREEBOARD ELEVATION 1381.5
 BOTTOM ELEVATION 1363.0
 FREEBOARD DEPTH FROM BOTTOM 18.5-FT
 VOLUME @ 1381.5 (FB) = 8,752,213 GAL

DRAINAGE AREA 2B (COMPOST) = 8.22 ACRES
 25-YR/24-HR RUNOFF VOL. = 917,229 GAL

EXISTING EARTHEN HOLDING POND 1A
 TOP OF DIKE ELEVATION 1383.0
 FREEBOARD ELEVATION 1381.5
 BOTTOM ELEVATION 1362.3
 FREEBOARD DEPTH FROM BOTTOM 19.2-FT
 VOLUME @ 1381.5 (FB) = 19,610,922 GAL

DRAINAGE AREA 1A = 2.6 ACRES

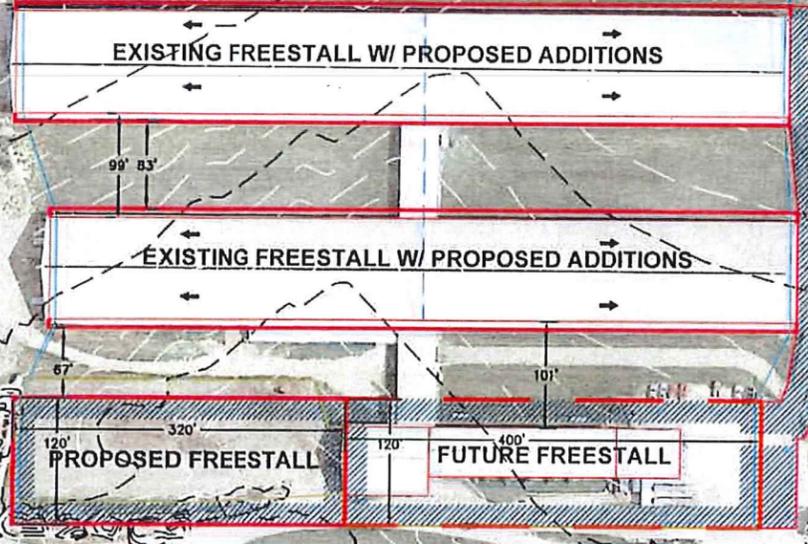
PROPOSED COMPOST RUNOFF INFILTRATION AREA 1
 TOP OF DIKE ELEVATION 1385.0
 BOTTOM ELEVATION 1380.0
 VOLUME @ 1385.0 = 594,810 GAL
 INFILTRATION AREA = 0.26 AC.
 BUFFER AREA = 0.43 AC. (MIN. WIDTH 57-FT)

PROPOSED COMPOST RUNOFF INFILTRATION AREA 2
 TOP OF DIKE ELEVATION 1375.0
 BOTTOM ELEVATION 1370.0
 VOLUME @ 1375.0 = 580,373 GAL
 INFILTRATION AREA = 0.26 AC.
 BUFFER AREA = 0.47 AC. (MIN. WIDTH 45-FT)

PROPOSED COMPOST RUNOFF INFILTRATION AREA 3
 TOP OF DIKE ELEVATION 1365.0
 BOTTOM ELEVATION 1360.0
 VOLUME @ 1365.0 = 625,253 GAL
 INFILTRATION AREA = 0.26 AC.
 BUFFER AREA = 0.92 AC. (MIN. WIDTH 50-FT)

ASSUMED EAST LINE OF SECTION 20, T-7-N, R-8-E, LANCASTER COUNTY, NEBRASKA

BENCHMARK IS INTERSECTION OF PELLA ROAD AND SOUTH 134TH STREET, ELEV. 1360.0



PROPOSED GOLD BUILDING POND
 TOP OF DIKE ELEVATION 1375
 FREEBOARD ELEVATION 1373
 BOTTOM ELEVATION 1350
 FREEBOARD DEPTH FROM BOTTOM 13-FT
 VOLUME @ 1373 = 3,865,923 GAL

- PHASE 1: COMPOST RUNOFF CONTROL STRUCTURES
- PHASE 2: FREESTALL ADDITIONS (REVISED STAGE STORAGE)
- PHASE 3: GOLD BUILDING POND
- PHASE 4: WEST FREESTALL BARN (REVISED STAGE STORAGE)
- PHASE 5: NEW PARLOR AND HOLDING AREA
- PHASE 6: EAST FREESTALL BARN (REVISED STAGE STORAGE)

EXISTING BEDDED PACK CONFINEMENT BARN



(IN FEET)
 1 Inch = 170 ft

SHEET 2/5	
Date	10/14/19
Checked By	J.D.S.
Drawn	T.M.W.
Project No.	19-048
PRAIRIE LAND DAIRY PROPOSED DAIRY EXPANSION SE 1/4, SECTION 20, T-7-N, R-08-E LANCASTER COUNTY, NEBRASKA	
ProAg Engineering, Inc. 77402 Highway 71, P.O. Box 181 Jackson, MN 56143 (507) 849-7200	

GRAPHIC SCALE



(IN FEET)
1 inch = 100 ft



EXISTING EARTHEN HOLDING POND 1A
TOP OF DIKE ELEVATION 1383.0
FREEBOARD ELEVATION 1381.5
BOTTOM ELEVATION 1362.3
FREEBOARD DEPTH FROM BOTTOM 19.2-FT
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FREEBOARD ELEVATION 1381.5
BOTTOM ELEVATION 1363.0
FREEBOARD DEPTH FROM BOTTOM 18.5-FT
VOLUME @ 1381.5 (FB) = 8,752,213 GAL

FLOATING PUMP STATION
TWO PUMPS FOR LAND
APPLICATION & RECYCLE

GRIDRAIN LEVEL
CONTROL STRUCTURES

8" GRAVITY
OUTLET FROM
BASIN

18" EMERGENCY
OVERFLOW PIPE
FROM SAND LANE

12" AND 4" GRAVITY
OUTLETS FROM BASIN

PROPOSED CONTAINED DRAINAGE
AREA 1A = 2.6 ACRES

10" OVERFLOW PIPE
BETWEEN BASINS

SETTLING
BASIN B

8" OUTLET PIPE FROM
SEPARATOR TO SETTLING BASINS

EXISTING MECHANICAL SEPARATOR

8" EMERGENCY OVERFLOW
PIPE FROM SAND LANE

SETTLING
BASIN A

EXISTING CONCRETE
STACKING PAD

PUMP STATION WITH 4" TRANSFER LINE
FROM SAND LANE TO SEPARATOR

PROPOSED 8" WIDE ADDITION TO NORTH SIDE OF EXISTING FREESTALL BARN

EXISTING FREESTALL BARN
745'x98', SLOPES 2%

PROPOSED 8" WIDE ADDITION TO SOUTH SIDE OF EXISTING FREESTALL BARN

24" FLUSH
FLUME

99' 83'

4" RECYCLE LINE

EXISTING 24"
FLUSH FLUME

PROPOSED 8" WIDE ADDITION TO NORTH SIDE OF EXISTING FREESTALL BARN

EXISTING FREESTALL BARN
720'x97', SLOPES 2%

HOLDING
AREA
100'x100'

8" PIPE & RISER
CPP TO FLUSH
FLUME

PROPOSED 8" WIDE ADDITION TO SOUTH SIDE OF EXISTING FREESTALL BARN

EXISTING OPEN FEEDLOT AREA = 0.8 ACRES TO BE
EMPTIED, CLEANED OUT, AND DISCONTINUED IN PHASE 4

ROTARY
PARLOR
80'x80'

PROPOSED 320'x100' FREESTALL BARN

FUTURE 320'x100' FREESTALL BARN

EXISTING OFFICE

TRAILER
LOADOUT

PROPOSED 24" FLUSH FLUME
& 8" FLUSH LINE EXTENSION

EXISTING HOLDING AREA

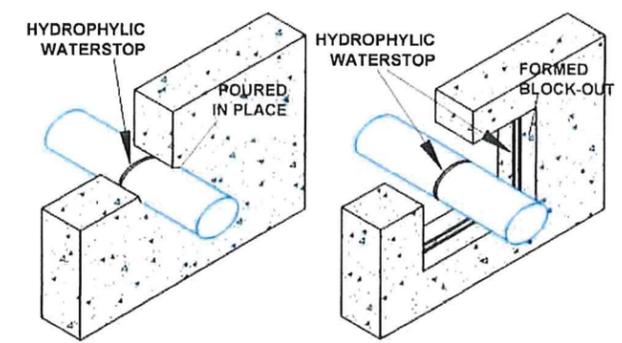
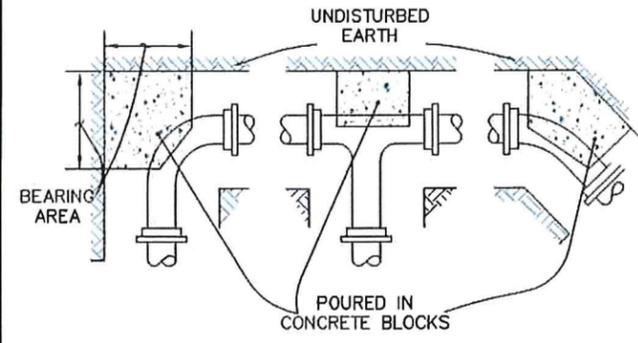
EXISTING MILKING
PARLOR, 100'x47'

PROPOSED 24" FLUSH FLUME
& 8" FLUSH LINE EXTENSION

PELLA ROAD

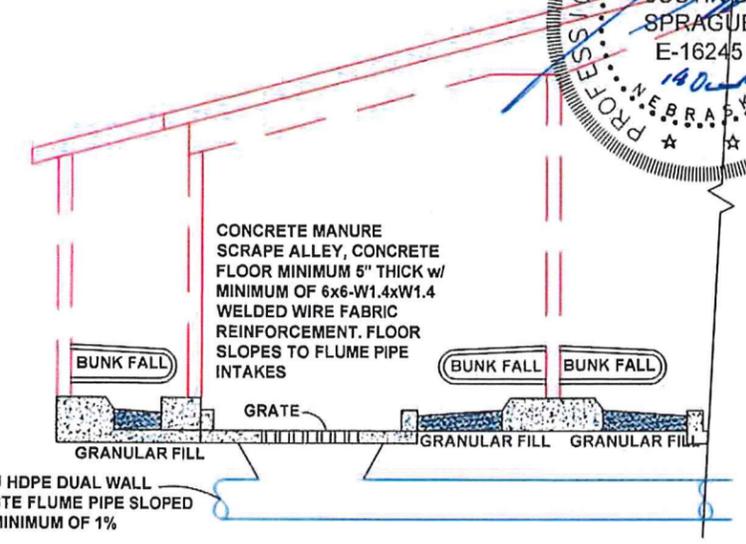
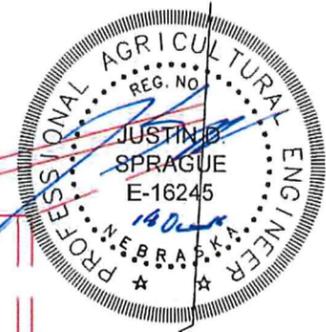
ASSUMED SOUTH LINE OF
SECTION 20, T-7-N, R-8-E,
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PELLA ROAD AND SOUTH 134TH STREET
TO THE EAST, ELEV. 1360.0

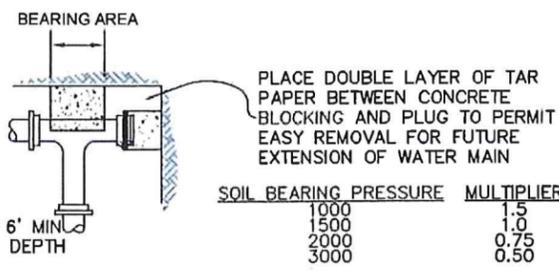


LIQUID TIGHT PIPE PENETRATIONS
(NOT TO SCALE)

- CONSTRUCTION NOTES**
1. THESE JOINT DRAWINGS ARE TO BE ADAPTED TO A SPECIFIC STRUCTURE OR SYSTEM.
 2. WATERSTOP DIMENSIONS SHALL BE BASED ON MANUFACTURER'S REQUIREMENTS FOR MINIMUM COVER.
 3. THE WATERSTOP SHALL BE APPLIED TO EVEN SURFACES, FREE OF DIRT, OIL, OR LAITANCE.
 4. THE WATERSTOP MUST BE BONDED TO THE CONCRETE AND/OR PIPE PRIOR TO PLACEMENT OF ADJOINING CONCRETE.
 5. THE MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE FOLLOWED FOR WATERSTOP SPlicing AND ADDITIONAL INSTALLATION REQUIREMENTS.



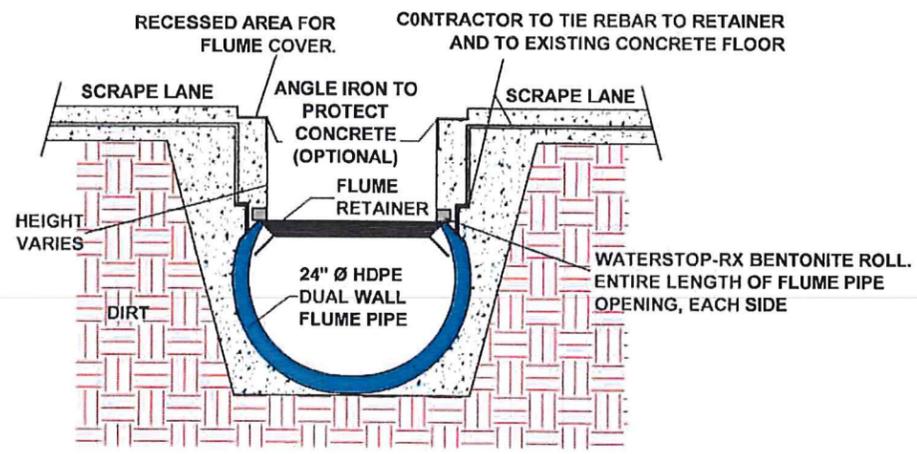
FREESTALL ADDITION PROFILE
(NOT TO SCALE)



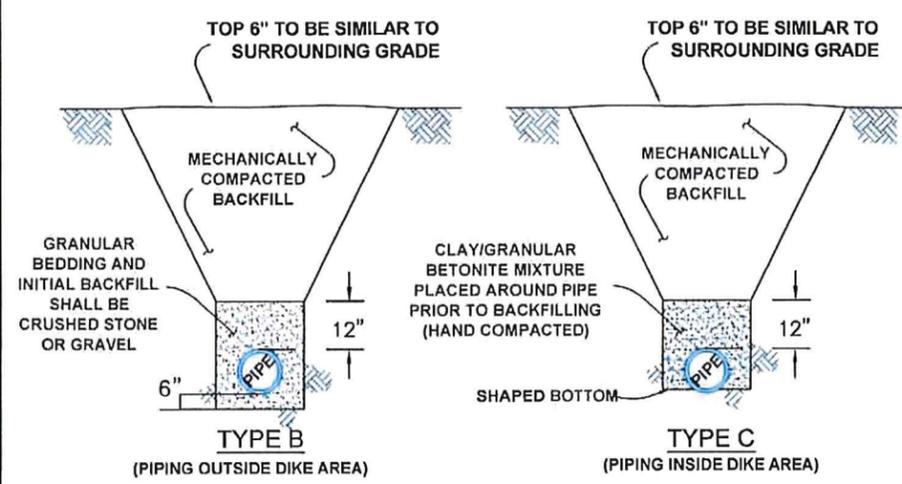
SOIL BEARING PRESSURE	MULTIPLIER
1000	1.5
1500	1.0
2000	0.75
3000	0.50

FITTING SIZES	BEARING AREA OF BLOCKS IN SQ. FT.					MIN. T (INCHES)
	TEE & END	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	
3"	1.0	1.33	0.67	0.4	0.25	4"
4"	1.67	2.4	1.1	0.67	0.4	6"
6"	3.75	5.4	2.5	1.5	0.8	8"
8"	6.7	9.5	5.2	2.7	1.33	12"
10"	10.5	15.0	7.0	4.1	2.0	16"
12"	15.1	21.6	10.1	5.9	2.9	18"

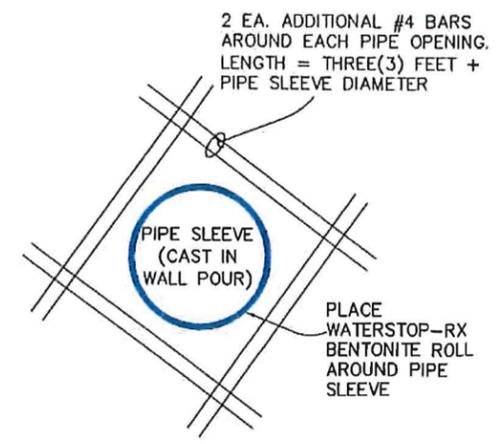
THRUST BLOCK DETAILS
(NOT TO SCALE)



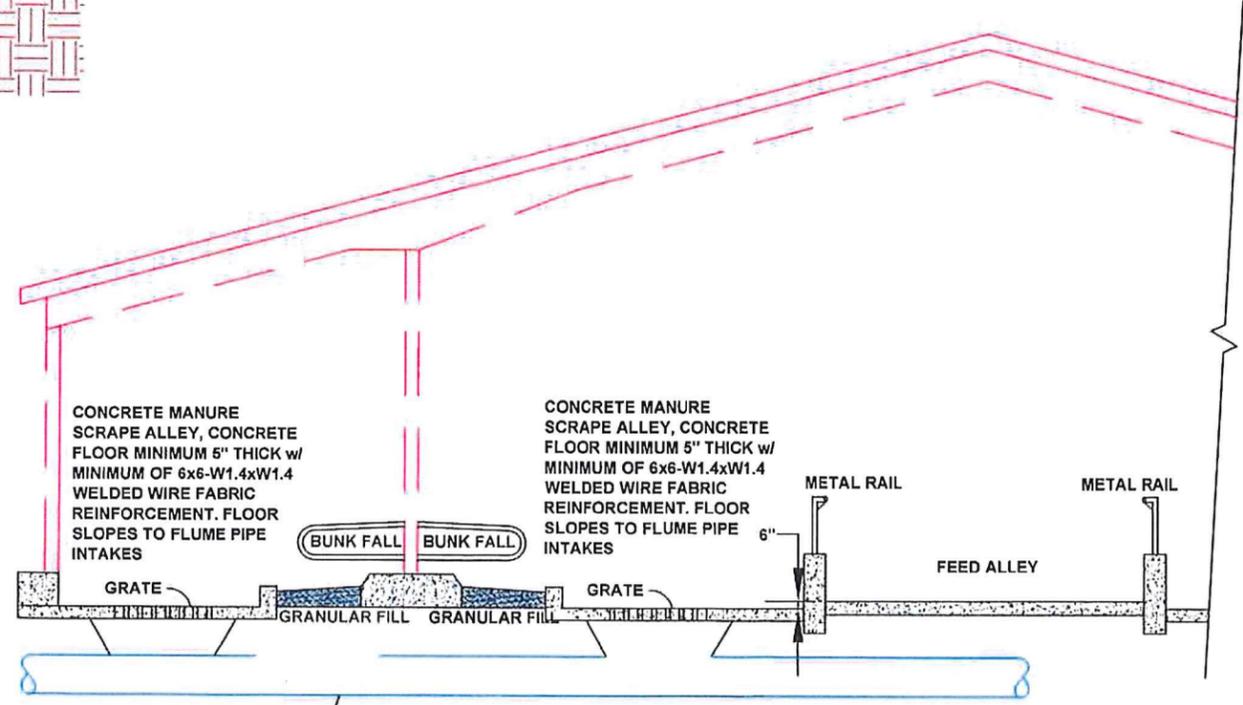
FLUME PIPE RETAINER
(NOT TO SCALE)



BEDDING/BACKFILL REQUIREMENTS
(NOT TO SCALE)



PIPE OPENING DETAIL
(NOT TO SCALE)



FREESTALL BARN SECTION
(NOT TO SCALE)

PRAIRIE LAND DAIRY
PROPOSED DAIRY EXPANSION
SE 1/4, SECTION 20, T-07-N, R-08-E
LANCASTER COUNTY, IOWA

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

Date 10/14/19
Drawn D.D.A.
Checked By J.D.S.
Project No. 19-048

MATERIAL SPECIFICATION FOR CAST-IN-PLACE CONCRETE
(SPECIFICATIONS APPLY TO ALL CONCRETE CONSTRUCTION ON SITE)

A. GENERAL

- 1.) NOTES AND DETAILS ON THE STRUCTURAL DRAWINGS TAKE PRECEDENCE OVER THESE STRUCTURAL NOTES.
- 2.) THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS PRIOR TO STARTING WORK. THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCIES.
- 3.) IN NO CASE SHALL DIMENSIONS BE SCALED FROM PLANS, SECTIONS, OR DETAILS ON THE STRUCTURAL DRAWINGS.
- 4.) DESIGN CHANGES MUST BE APPROVED IN WRITING BY BOTH THE OWNER AND ENGINEER BEFORE PROCEEDING WITH THE WORK. SOME DESIGN CHANGES MAY ALSO REQUIRE NEBRASKA DEQ APPROVAL.
- 5.) ANCHOR BOLTS SHALL BE SET AS SPECIFIED BY BUILDING CONTRACTOR.
- 6.) ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE REQUIREMENTS OF THE FOLLOWING CODES:
 - a. UNIFORM BUILDING CODE (UBC)
 - b. NEBRASKA STATE BUILDING CODE
 - c. AMERICAN CONCRETE INSTITUTE (ACI)
 - d. CONCRETE REINFORCING STEEL INSTITUTE (CRSI) MANUAL OF STANDARD PRACTICE

B. SUBGRADE

1. EXISTING DISTURBED SUBGRADE SHALL BE RECOMPACTED TO 95% OF STANDARD PROCTOR DENSITY.
2. ALL FILL UNDER FOOTINGS AND SLAB SHALL BE COMPACTED TO A DRY DENSITY OF AT LEAST 95% OF MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T-180.
3. SAND FILL AS REQUIRED FOR LEVELING SUBGRADES SHALL BE PROVIDED AT ALL SLAB ON GRADE AREAS.

C. REINFORCED CONCRETE

- 1.) ALL CONCRETE AND REINFORCING WORK SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE'S "STANDARD BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", (ACI 318)
- 3.) CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF $f'c=4000$ PSI FLOOR, 4000 PSI WALLS
- 4.) WATER CEMENT RATIO SHALL BE 0.45 MAXIMUM
- 5.) CEMENT SHALL CONFORM TO ASTM C150, TYPE 1 OR TYPE 2.
- 6.) COARSE AGGREGATE SHALL BE MAXIMUM 3/4".
- 7.) NEW CONCRETE SLABS TO BE INSTALLED OVER A LEVELED SAND OR GRANULAR BASE.
- 7.) READY-MIX CONCRETE SHALL BE MIXED & DELIVERED IN ACCORDANCE WITH ASTM C94.
- 8.) SLUMP SHALL BE MAXIMUM OF 5"
- 9.) AIR CONTENT SHALL BE 6% + OR - 1%
- 10.) CONCRETE TO BE CURED WITH SONOBORN CURE AND SEAL OR EQUAL.
- 11.) ADMIXTURES MAY BE USED WITH PRIOR APPROVAL OF THE ENGINEER FOR THE PURPOSE OF INCREASING THE WORKABILITY BUT NOT TO REDUCE THE SPECIFIED MINIMUM CEMENT CONTENT. CALCIUM CHLORIDE SHALL NOT BE USED.
- 12.) FLOORS SHALL BE MIN. 5" THICK. WITH #4, GRADE 60 REBAR @ 18" O.C.E.W. IN FLOOR.
- 13.) REINFORCING STEEL SHALL BE PLACED IN THE CENTER OF CONCRETE PLACEMENT UNLESS NOTED OTHERWISE. STEEL MUST BE SUPPORTED WITH APPROPRIATE CHAIRS OR CONCRETE BLOCKS.
- 14.) WATERSTOP TO BE RIBBED PVC OR BENTONITE ROLL, AT CONTRACTOR'S DISCRETION. MAKE PVC WATERSTOP SPLICES WITH SPLICING IRON.

D. STEEL

- 1.) F'Y = GRADE 60 (60,000 PSI) DEFORMED STEEL.
- 2.) REINFORCING SHALL BE CONTINUOUS AND LAP A MINIMUM OF 40 BAR DIAMETER UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL BE LAPPED A MINIMUM OF EIGHT INCHES.
- 3.) MINIMUM BENDING RADIUS SHALL BE 6 BAR DIAMETERS.
MINIMUM BEND AROUND CORNERS FOR #4 BARS - 24", FOR #5 BARS - 30".
- 5.) ALL CONCRETE IS REINFORCED UNLESS SPECIFICALLY CALLED OUT AS "NOT REINFORCED." REINFORCE ALL CONCRETE NOT OTHERWISE SHOWN WITH THE SAME STEEL AS IN SIMILAR SECTIONS OR AREAS.
- 6.) THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR FOR REINFORCEMENT UNLESS OTHERWISE NOTED:

WHERE CAST AGAINST EARTH	3 INCHES
WALLS AND SLABS (EXPOSED TO EARTH OR WEATHER).....	2 INCHES
OTHER.....	2 INCHES

E. COLD WEATHER CONCRETING

- 1.) WHEN, FOR MORE THAN 3 CONSECUTIVE DAYS, THE MEAN DAILY TEMPERATURE DROPS BELOW 40°F, THE CONTRACTOR SHALL PLACE AND PROTECT THE CONCRETE IN ACCORDANCE WITH ACI 306.

F. HOT WEATHER CONCRETING

- 1.) WHEN IT IS LIKELY THAT TEMPERATURE BETWEEN 75°F AND 100°F WILL BE APPROACHED OR EXCEEDED; THAT LOW RELATIVE HUMIDITY IS PRESENT; OR WIND VELOCITY WILL EXCEED 10 MPH, THE CONTRACTOR SHALL PLACE & PROTECT THE CONCRETE IN ACCORDANCE WITH CHAPTERS 4 & 5 OF ACI 305.

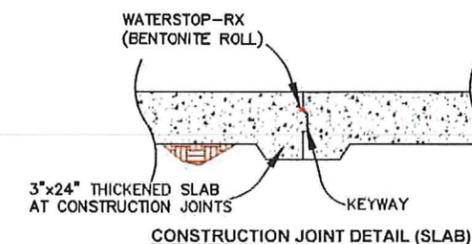
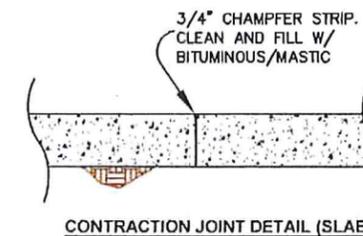
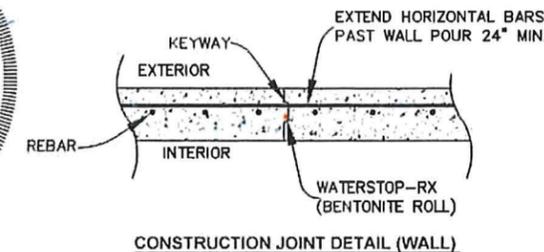
G. ADDITIONAL CONCRETE NOTES (UNLESS NOTED OTHERWISE ON PLANS)

- 1.) ANY SLAB ON GRADE WHICH WILL HAVE A VERTICAL WALL ON TOP SHALL HAVE #4 18"x24" "L" BARS IN SLAB EXTENDING INTO WALL @ 12" O.C. UNLESS OTHERWISE NOTED.
- 2.) ANY SLAB ON GRADE WHICH WILL HAVE A VERTICAL WALL ON TOP SHALL HAVE A KEYWAY AND WATERSTOP AT THE SLAB/WALL INTERFACE.
- 3.) ALL WALLS SHALL BE A MINIMUM 6" THICK W/ #4 BARS @ 12" O.C.E.W. UNLESS OTHERWISE NOTED.
- 4.) ALL WALLS SHALL HAVE MINIMUM #4 BARS 24"x24" CORNER BARS 2 12" O.C. HORIZONTAL UNLESS NOTED OTHERWISE.
- 5.) 10" WALLS SHALL HAVE TWO MATS OF REINFORCEMENT UNLESS NOTED OTHERWISE.
- 6.) ALL EXPOSED CONCRETE SHALL HAVE ENTRAINED AIR ADMIXTURE.

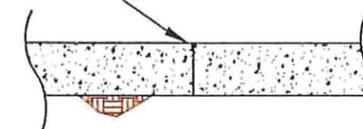


CONSTRUCTION JOINTS

(NOT TO SCALE)



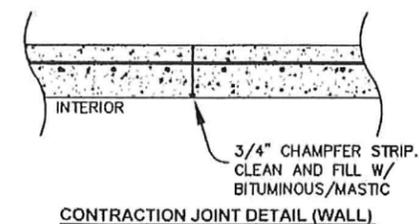
ROUTER OUT CRACK WITH "CRACK CHASER"
CONCRETE SAW. BLOW OUT CRACK WITH COMPRESSED AIR. FILL WITH BITUMINOUS SEALANT.



NOTE: INSPECT FOR RANDOM CRACKS NO EARLIER THAN 28 DAYS AFTER FLOOR CONSTRUCTION

RANDOM CRACK REPAIR FOR CONCRETE PIT FLOOR
(NOT TO SCALE)

*REINFORCING CONTINUOUS THROUGH ALL JOINTS



SHEET 5/5

Project No. 19-048

Checked By J.D.S.

Date 10/14/19
Drawn D.D.A.

PRAIRIE LAND DAIRY
PROPOSED DAIRY EXPANSION
SE 1/4, SECTION 20, T-07-N, R-08-E
LANCASTER COUNTY, IOWA

ProAg Engineering, Inc.
77402 HIGHWAY 71, P.O. BOX 181
JACKSON, MN 56143
(507) 849-7200

Section 3

Facility Safety & Security

Livestock Mortality Management Plan	3-1
Chemical Management Plan.....	3-2
Facility Component Map	3-3

Livestock Mortality Management Plan - Supplement

Name of Operation & Address (please print)

Prairieland Dairy, LLC

13000 Pella Road

Firth NE 68358

City State Zip Code

Phone No. 402-791-2238

IIS No. 73762 (if known)

For NDEQ use

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 (tarp): yes no
- o Storage area controlled by berms or diversion: yes no
- o If controlled by other means or practices please

describe: The temporary mortality management area will be graded away from surface water as needed.

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.

**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)

Prairieland Dairy, LLC

13000 Pella Road

Firth	NE	68358
<i>City/Town</i>	<i>State</i>	<i>Zip Code</i>

Phone No. 402-791-2238

IIS No. 73762 (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 component map.

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

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) See component map.

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.

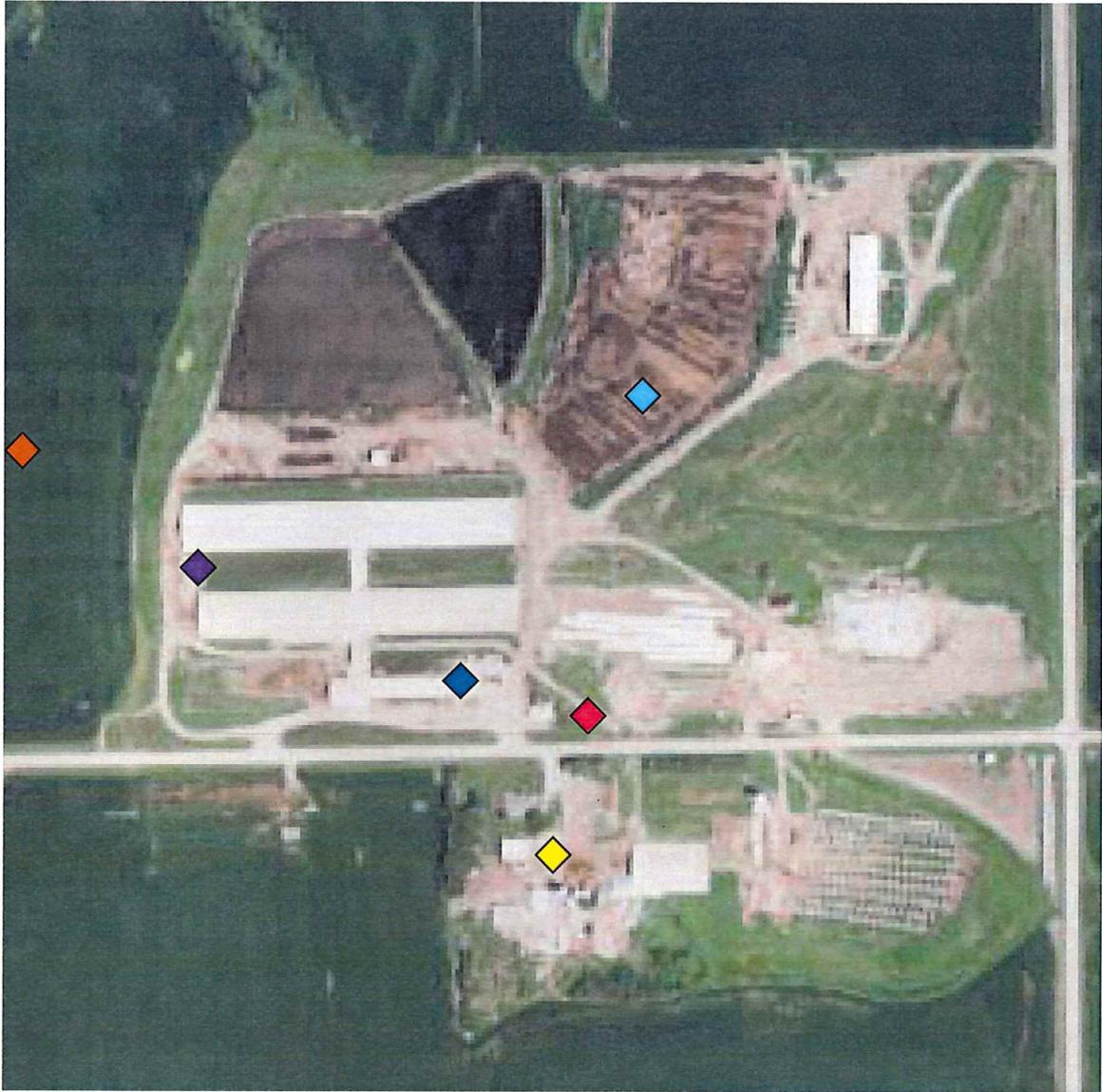
**Printed or typed name of Authorized representative*

**Signature of Authorized Representative* Date: _____

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

Prairieland Dairy, LLC

Facility Component Map



◆ Temporary Mortality Site

◆ Burial Site

◆ Chemical Storage Site

◆ Fuel Storage

◆ Stockpile or Compost Site

◆ Water Source

Section 4

Crop Yield Data

USDA NASS Lancaster County Yield Data	4-1
USDA NASS Gage County Yield Data	4-2
USDA NASS Johnson County Yield Data.....	4-3
USDA NASS Weighted Average County Yield Data.....	4-4



United States Department of Agriculture
National Agricultural Statistics Service

Year	Period	Geo Level	State	County	Data Item	Domain	Value
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	215.8
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	201.5
2016	YEAR	COUNTY	NEBRASKA	LANCASTER	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	201.0
2015	YEAR	COUNTY	NEBRASKA	LANCASTER	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	199.1
2014	YEAR	COUNTY	NEBRASKA	LANCASTER	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	191.4
County Average							202
County Average +10%							222
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	182.0
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	175.4
2016	YEAR	COUNTY	NEBRASKA	LANCASTER	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	159.8
2015	YEAR	COUNTY	NEBRASKA	LANCASTER	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	153.7
2014	YEAR	COUNTY	NEBRASKA	LANCASTER	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	152.5
County Average							165
County Average +10%							181
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	63.3
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	66.6
2016	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	66.1
2015	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	65.2
2014	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	63.0
County Average							65
County Average +10%							71
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	53.5
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	53.2
2016	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	56.5
2015	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	53.9
2014	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	49.1
County Average							53
County Average +10%							59
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.30
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.05
2016	YEAR	COUNTY	NEBRASKA	LANCASTER	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	3.00
2015	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.40
2014	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.55
County Average							4.1
County Average +10%							4.5

USDA United States Department of Agriculture
National Agricultural Statistics Service

Year	Period	Geo Level	State	County	Data Item	Domain	Value
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	214.9
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	202.5
2016	YEAR	COUNTY	NEBRASKA	GAGE	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	178.4
2015	YEAR	COUNTY	NEBRASKA	GAGE	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	184.6
2014	YEAR	COUNTY	NEBRASKA	GAGE	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	204.4
County Average							197
County Average +10%							217
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	154.8
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	142.3
2016	YEAR	COUNTY	NEBRASKA	GAGE	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	125.2
2015	YEAR	COUNTY	NEBRASKA	GAGE	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	142.4
2014	YEAR	COUNTY	NEBRASKA	GAGE	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	158.7
County Average							145
County Average +10%							159
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	65.1
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	64.1
2016	YEAR	COUNTY	NEBRASKA	GAGE	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	64.6
2015	YEAR	COUNTY	NEBRASKA	GAGE	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	60.4
2014	YEAR	COUNTY	NEBRASKA	GAGE	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	61.3
County Average							63
County Average +10%							69
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	47.9
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	45.9
2016	YEAR	COUNTY	NEBRASKA	GAGE	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	50.4
2015	YEAR	COUNTY	NEBRASKA	GAGE	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	43.2
2014	YEAR	COUNTY	NEBRASKA	GAGE	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	44.4
County Average							46
County Average +10%							51
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.05
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	3.60
2016	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	3.90
2015	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.00
2014	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.00
County Average							3.9
County Average +10%							4.3



United States Department of Agriculture
National Agricultural Statistics Service

Year	Period	Geo Level	State	County	Data Item	Domain	Value
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	214.9
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	202.5
2016	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	197.2
2015	YEAR	COUNTY	NEBRASKA	JOHNSON	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	188.6
2014	YEAR	COUNTY	NEBRASKA	JOHNSON	CORN, GRAIN, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	201.1
County Average							201
County Average +10%							221
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	154.8
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	142.3
2016	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	131.6
2015	YEAR	COUNTY	NEBRASKA	JOHNSON	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	136.2
2014	YEAR	COUNTY	NEBRASKA	JOHNSON	CORN, GRAIN, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	148.4
County Average							143
County Average +10%							157
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	65.1
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	64.1
2016	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	63.6
2015	YEAR	COUNTY	NEBRASKA	JOHNSON	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	59.3
2014	YEAR	COUNTY	NEBRASKA	JOHNSON	SOYBEANS, IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	56.0
County Average							62
County Average +10%							68
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	47.9
2017	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	45.9
2016	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	53.4
2015	YEAR	COUNTY	NEBRASKA	JOHNSON	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	43.0
2014	YEAR	COUNTY	NEBRASKA	JOHNSON	SOYBEANS, NON-IRRIGATED - YIELD, MEASURED IN BU / ACRE	TOTAL	43.2
County Average							47
County Average +10%							51
2018	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.05
2017	YEAR	COUNTY	NEBRASKA	JOHNSON	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	2.50
2016	YEAR	COUNTY	NEBRASKA	JOHNSON	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	3.35
2015	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.00
2014	YEAR	COUNTY	NEBRASKA	OTHER (COMBINED) COUNTIES	HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE	TOTAL	4.00
County Average							3.6
County Average +10%							3.9

Weighted Average for Prairieland Dairy, LLC

Lancaster	
County 1 Yields	
Crop	Yield
Irrigated Corn	222
Non Irrigated Corn	181
Irrigated Soybeans	71
Non Irrigated Soybeans	59
Alfalfa	4.5
County 1 Acres	
	2,655
Weight Factor	
	0.69

Gage	
County 2 Yields	
Crop	Yield
Irrigated Corn	217
Non Irrigated Corn	159
Irrigated Soybeans	69
Non Irrigated Soybeans	51
Alfalfa	4.3
County 2 Acres	
	956
Weight Factor	
	0.25

Johnson	
County 3 Yields	
Crop	Yield
Irrigated Corn	221
Non Irrigated Corn	157
Irrigated Soybeans	68
Non Irrigated Soybeans	51
Alfalfa	3.9
County 3 Acres	
	218
Weight Factor	
	0.06

Weighted Average	
Crop	Yield
Irrigated Corn	221
Non Irrigated Corn	174
Irrigated Soybeans	71
Non Irrigated Soybeans	56
Alfalfa	4.4

Total Acres: 3,829



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

Section 5

Site Information

Application Site Summary.....	5-1
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Prairieland Dairy, LLC

Application Site Summary

Total Acres: 3829.11								
Application Site # / Name	Useable Acres	Land Use	Dominate Soil Slope ^A	Legal Description	Land Owner	Application Agreement	Shared Manure Application Site	
Site 1 West of Dairy	48.34	Dryland Crop	Pawnee clay loam 6 to 11 percent slopes, eroded	Pt. W1/2 SE1/4 S20-T7N-R8E	Prairieland Dairy, LLC 13000 Pella Rd Firth, NE 68358	Owned	Yes	
Site 2 South Field North	127.40	Irrigated Crop	Wymore silty clay loam, 2 to 6 percent slopes	NE1/4 S29-T7N-R8E	Clifford P Obbink 811 Country VW Firth, NE 68358	Yes	Yes	
Site 3 South Field South	135.20	Irrigated Crop	Wymore silty clay loam, 2 to 6 percent slopes	SE1/4 S29-T7N-R8E	See Attachment	Yes	Yes	
Site 4	383.00	Dryland Crop	Otoe silty clay loam 6 to 11 percent slopes, eroded	Pt. S19-T6N-R8E	Vinson & Harriet VanEngen 11814 E State Highway 41 Adams, NE 68301	Yes	Yes	
Site 5	153.10	Irrigated Crop	Wymore silty clay loam, 2 to 6 percent slopes	SW1/4 S33-T7N-R8E	Steven R & Dena K DeBoer 12350 Princeton Rd Firth, NE 68358	Yes	Yes	
Site 6	365.30	Irrigated Crop	Wymore silty clay loam, 2 to 6 percent slopes	S1/2 & S1/2 NW1/4 S17-T7N-R8E	DeBoer Farms, Inc. c/o Steven R DeBoer 12700 Princeton Rd Firth, NE 68358	Yes	Yes	
Site 7 Firth South	118.70	Dryland Crop	Kennebec silt loam occasionally flooded	SE1/4 S35-T7N-R7E	Larry K Schweitzer 2529 SW 12 St Lincoln, NE 68522	Yes	Yes	
Site 10	72.23	Dryland Crop	Pawnee clay loam 6 to 11 percent slopes, eroded	E1/2 SW1/4 S20-T7N-R8E	Nicholas J & Jennifer Heetderks 14171 Firth Rd Firth, NE 68358	Yes	Yes	
Site 11	144.50	Dryland Crop	Wymore silty clay loam, 2 to 6 percent slopes	SE1/4 S24-T7N-R7E	Ivan W Walvoord Unified Credit Trust & Jerry & Jamie Prange Attn: Union Bank - Gessert PO Box 82535 Lincoln, NE 68501	Yes	Yes	
Site 12	62.84	Dryland Crop	Wymore silty clay loam, 2 to 6 percent slopes	E1/2 NW1/4 S22-T7N-R8E	Ivan W Walvoord Unified Credit Trust Attn: Union Bank - Gessert PO Box 82535 Lincoln, NE 68501	Yes	Yes	

PrairieLand Dairy, LLC

Application Site Summary

Total Acres: 3829.11								
Application Site # / Name	Useable Acres	Land Use	Dominant Soil Slope ^A	Legal Description	Land Owner	Application Agreement	Shared Manure Application Site	
Site 13	173.80	Irrigated Crop	Wymore silty clay loam, 2 to 6 percent slopes	NW1/4 & N1/2 SW1/4 S29-T7N-R8E	Ivan W Walvoord Unified Credit Trust & Tim & Keri Pritschau Attn: Union Bank - Gessert PO Box 82535 Lincoln, NE 68501	12421 Pella Rd Firth, NE 68358	Yes	Yes
Site 14	129.80	Irrigated Crop	Pawnee clay loam 6 to 11 percent slopes, eroded	Pt. NW1/4 S20-T7N-R8E	PrairieLand Dairy, LLC 13000 Pella Rd Firth, NE 68358		Owned	Yes
Site 15 East Pivot	145.20	Irrigated Crop	Pawnee clay loam 6 to 11 percent slopes, eroded	SW1/4 S21-T7N-R8E	David B & Chrystal J Obbink 12800 Firth Rd Firth, NE 68358		Yes	Yes
Site 16	135.30	Irrigated Crop	Pawnee clay loam 6 to 11 percent slopes, eroded	NE1/4 S33-T7N-R8E	Nicholas J & Jennifer Heetderks 14171 Firth Rd Firth, NE 68358		Yes	Yes
Site 17	106.20	Dryland Crop	Nodaway silt loam occasionally flooded	S1/2 SW1/4 & S1/2 N1/2 SW1/4 S29-T7N-R8E	Ivan W Walvoord Unified Credit Trust Attn: Union Bank - Gessert PO Box 82535 Lincoln, NE 68501		Yes	Yes
Site 18	140.80	Irrigated Crop	Kennebec silt loam occasionally flooded	NW1/4 S21-T7N-R8E	Janet L Kroese 809 Country View Ln Firth, NE 68358		Yes	Yes
Site 19	156.40	Irrigated Crop	Wymore silty clay loam, 3 to 6 percent slopes, eroded	NW1/4 & W1/2 NE1/4 S36-T7N-R8E	Cathy Heetderks 28180 S 176th Rd Adams, NE 68301		Yes	Yes
Site 20	228.20	Irrigated Crop	Wymore silty clay loam, 2 to 6 percent slopes	NW1/4 & W1/2 NE1/4 S20-T5N-R6E	Cathy Heetderks 28180 S 176th Rd Adams, NE 68301		Yes	Yes
Site 21	217.50	Irrigated Crop	Wymore silty clay loam, 2 to 6 percent slopes	S1/2 NE1/4 & SE1/4 S21-T5N-R9E	Garry Heetderks 28180 S 176th Rd Adams, NE 68301		Yes	Yes
Site 22	127.60	Dryland Crop	Pawnee clay loam 6 to 11 percent slopes, eroded	NE1/4 S19-T7N-R8E	Larry Edgar 25205 S 120th St Firth, NE 68358		Yes	Yes

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Prairieland Dairy, LLC

Application Site Summary

Total Acres: 3829.11								
Application Site # / Name	Useable Acres	Land Use	Dominant Soil Slope ^A	Legal Description	Land Owner	Application Agreement	Shared Manure Application Site	
Site 23	61.54	Dryland Crop	Kennebec silt loam occasionally flooded	W1/2 SW1/4 S35-T7N-R7E	Larry & Linda Deboer 608 Abraham St Firth, NE 68358	Yes	Yes	
Site 25	137.80	Irrigated Crop	Crete silt loams 0 to 1 percent slopes	NE1/4 SW1/4 & N1/2 SE1/4 & Pt. SE1/4 SE1/4 S22-T7N-R7E	Larry & Linda Deboer 608 Abraham St Firth, NE 68358	Yes	Yes	
Site 26	130.30	Dryland Crop	Wymore silty clay loam 0 to 2 percent slopes	SE1/4 S35-T7N-R6E	Larry & Linda Deboer 608 Abraham St Firth, NE 68358	Yes	Yes	
Site 28	81.93	Dryland Crop	Wymore silty clay loam 0 to 2 percent slopes	E1/2 NW1/4 S5-T5N-R7E	Vinson & Harriet VanEngen 11814 E State Highway 41 Adams, NE 68301	Yes	Yes	
Site 29	33.59	Dryland Crop	Cortland-Malmo complex 6 to 11 percent slopes, eroded	SW1/4 SE1/4 S17-T6N-R8E	Vinson & Harriet VanEngen 11814 E State Highway 41 Adams, NE 68301	Yes	Yes	
Site 30	65.94	Dryland Crop	Wymore silty clay loam, 2 to 6 percent slopes	Pt. E1/2 NE1/4 S24-T6N-R7E	Vinson VanEngen 11814 E State Highway 41 Adams, NE 68301	Yes	Yes	
Site 31	72.24	Dryland Crop	Wymore silty clay loam, 2 to 6 percent slopes	N1/2 SW1/4 S35-T6N-R8E	Vinson & Harriet VanEngen 11814 E State Highway 41 Adams, NE 68301	Yes	Yes	
Site 32	34.45	Dryland Crop	Malmo, eroded-Pawnee complex 6 to 11 percent slopes	NE1/4 NW1/4 S25-T6N-R7E	Vinson & Harriet VanEngen 11814 E State Highway 41 Adams, NE 68301	Yes	Yes	
Site 33	39.91	Dryland Crop	Kennebec silt loam occasionally flooded	Pt. W1/2 SE1/4 S27-T7N-R8E	Ivan Walvoord Unified Credit Trust Attn: Union Bank - Gessert PO Box 82535 Lincoln, NE 68501	Yes	Yes	

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Prairieland Dairy, LLC

Application Site Summary Attachment

Land Owner			
Site 3 South Field South	Clifford Obbink 811 Country VW Firth, NE 68358	Obbink Farms, Inc. 811 Country View Ln Firth, NE 68358	David & Chrystal Obbink 12800 Firth Rd Firth, NE 68358

Prairieland Dairy, 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 West of Dairy	Low Risk 1.8	Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 2 South Field North	Medium Risk 3.7	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 3 South Field South	Medium Risk 3.0	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Well Tile Inlets	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 4	Low Risk 1.1	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Streams	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 5	Medium Risk 4.3	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Streams Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 6	Low Risk 1.8	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway	Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 7 Firth South	Medium Risk 2.7	Silt Loam=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 10	Medium Risk 4.9	Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 11	Medium Risk 4.7	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Streams Tile Inlet	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 12	Medium Risk 3.3	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage

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Prairieland Dairy, 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 13	Medium Risk 3.7	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Streams	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 14	Low Risk 1.1	Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway & Terrace	Streams Well Tile Inlet	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 15 East Pivot	Low Risk 0.7	Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Tile Inlet Terraces	Streams Well Tile Inlet	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 16	Low Risk 1.1	Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway & Terrace	Streams	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 17	Medium Risk 4.0	Silt Loam=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Streams	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 18	Medium Risk 3.8	Silt Loam=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Streams Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 19	Medium Risk 4.2	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 20	Medium Risk 3.0	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway	Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 21	Medium Risk 4.4	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 22	Low Risk 1.5	Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway & Terrace	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage

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Prairieland Dairy, 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 23	Medium 4.5	Silt Loam=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Well Stream	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 25	Medium Risk 2.3	Silt Loam=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	Well	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 26	Medium Risk 2.9	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 28	Medium Risk 2.6	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 29	Medium Risk 4.2	Complex=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 30	Medium Risk 4.9	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 31	Medium Risk 3.3	Silty Clay Loam=Fine Texture Fine Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 32	Low Risk 1.6	Complex=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	Grass Waterway & Terrace	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage
Site 33	1.2	Silt Loam=Medium Texture Medium Texture and Fall or Spring Application = Low Nitrogen Leaching Potential	None	None	Soil Sampling Manure Sampling Conservation Tillage	Soil Sampling Manure Sampling Conservation Tillage

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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

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Gage County, Nebraska

Map Unit: 3820—Butler silt loam, 0 to 1 percent slopes

Component: Butler (92%)

The Butler component makes up 92 percent of the map unit. Slopes are 0 to 1 percent. This component is on swales on broad interstream divides on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during March, April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 2w. Irrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Fillmore (5%)

Generated brief soil descriptions are created for major soil components. The Fillmore soil is a minor component.

Component: Wymore (3%)

Generated brief soil descriptions are created for major soil components. The Wymore soil is a minor component.

Map Unit: 7050—Kennebec silt loam, occasionally flooded

Component: Kennebec (85%)

The Kennebec component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 42 inches during February, March, April, May. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY070NE Loamy Terrace ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Component: Muscotah (5%)

Generated brief soil descriptions are created for major soil components. The Muscotah soil is a minor component.

Component: Reading (3%)

Generated brief soil descriptions are created for major soil components. The Reading soil is a minor component.

Component: Wabash (3%)

Generated brief soil descriptions are created for major soil components. The Wabash soil is a minor component.

Component: Olmitz (2%)

Generated brief soil descriptions are created for major soil components. The Olmitz soil is a minor component.

Component: Colo (2%)

Generated brief soil descriptions are created for major soil components. The Colo soil is a minor component.

Map Unit: 7231—Judson silt loam, 2 to 6 percent slopes

Component: Judson (92%)

The Judson component makes up 92 percent of the map unit. Slopes are 2 to 6 percent. This component is on hillslopes on uplands. The parent material consists of fine-silty colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY070NE Loamy Terrace ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Nodaway, occasionally flooded (7%)

Generated brief soil descriptions are created for major soil components. The Nodaway, occasionally flooded soil is a minor component.

Component: Colo, occasionally flooded (1%)

Generated brief soil descriptions are created for major soil components. The Colo, occasionally flooded soil is a minor component.

Map Unit: 7258—Deroiin silty clay loam, 6 to 11 percent slopes, eroded

Component: Deroiin, eroded (90%)

The Derooin, eroded component makes up 90 percent of the map unit. Slopes are 5 to 11 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Malmo, eroded (10%)

Generated brief soil descriptions are created for major soil components. The Malmo, eroded soil is a minor component.

Map Unit: 7344—Malmo, eroded-Pawnee complex, 6 to 11 percent slopes

Component: Malmo, eroded (60%)

The Malmo, eroded component makes up 60 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Pawnee, eroded (30%)

The Pawnee, eroded component makes up 30 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 14 inches during March, April, May. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Otoe, eroded (10%)

Generated brief soil descriptions are created for major soil components. The Otoe, eroded soil is a minor component.

Map Unit: 7349—Malmo clay loam, 2 to 6 percent slopes, eroded

Component: Malmo, Eroded (85%)

The Malmo, Eroded component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on hillslopes on uplands. The parent material consists of weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Component: Morrill (10%)

Generated brief soil descriptions are created for major soil components. The Morrill soil is a minor component.

Component: Wymore (5%)

Generated brief soil descriptions are created for major soil components. The Wymore soil is a minor component.

Map Unit: 7411—Cortland-Malmo complex, 6 to 11 percent slopes, eroded

Component: Cortland, Eroded (55%)

The Cortland, Eroded component makes up 55 percent of the map unit. Slopes are 6 to 12 percent. This component is on hillslopes on uplands. The parent material consists of outwash and/or loamy till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Malmo, Eroded (25%)

The Malmo, Eroded component makes up 25 percent of the map unit. Slopes are 6 to 12 percent. This component is on hillslopes on uplands. The parent material consists of weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Component: Otoe, Eroded (20%)

Generated brief soil descriptions are created for major soil components. The Otoe, Eroded soil is a minor component.

Map Unit: 7464—Otoe silty clay loam, 6 to 11 percent slopes, eroded

Component: Otoe, eroded (85%)

The Otoe, eroded component makes up 85 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Malmo, eroded (10%)

Generated brief soil descriptions are created for major soil components. The Malmo, eroded soil is a minor component.

Component: Wymore, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Wymore, eroded soil is a minor component.

Map Unit: 7689—Wymore silty clay loam, 0 to 2 percent slopes

Component: Wymore (90%)

The Wymore component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 2s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Aksarben (4%)

Generated brief soil descriptions are created for major soil components. The Aksarben soil is a minor component.

Component: Butler (4%)

Generated brief soil descriptions are created for major soil components. The Butler soil is a minor component.

Component: Fillmore, frequently ponded (2%)

Generated brief soil descriptions are created for major soil components. The Fillmore, frequently ponded soil is a minor component.

Map Unit: 7693—Wymore silty clay loam, 2 to 6 percent slopes

Component: Wymore (85%)

The Wymore component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Malmo (5%)

Generated brief soil descriptions are created for major soil components. The Malmo soil is a minor component.

Component: Otoe (5%)

Generated brief soil descriptions are created for major soil components. The Otoe soil is a minor component.

Map Unit: 7750—Nodaway silt loam, occasionally flooded

Component: Nodaway, occasionally flooded (90%)

The Nodaway, occasionally flooded component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps on valleys. The parent material consists of fine-silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during July. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 2w. Irrigated land capability classification is 2w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Judson (5%)

Generated brief soil descriptions are created for major soil components. The Judson soil is a minor component.

Component: Zook, occasionally flooded (3%)

Generated brief soil descriptions are created for major soil components. The Zook, occasionally flooded soil is a minor component.

Component: Colo, occasionally flooded (2%)

Generated brief soil descriptions are created for major soil components. The Colo, occasionally flooded soil is a minor component.

Map Unit: 7868—Nodaway silt loam, channeled, occasionally flooded

Component: Nodaway, channeled, occasionally flooded (85%)

The Nodaway, channeled, occasionally flooded component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on drainageways on flood plains on valleys. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 6w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Nodaway, occasionally flooded (10%)

Generated brief soil descriptions are created for major soil components. The Nodaway, occasionally flooded soil is a minor component.

Component: Judson (3%)

Generated brief soil descriptions are created for major soil components. The Judson soil is a minor component.

Component: Kezan, occasionally flooded (2%)

Generated brief soil descriptions are created for major soil components. The Kezan, occasionally flooded soil is a minor component.

Johnson County, Nebraska

Map Unit: 7231—Judson silt loam, 2 to 6 percent slopes

Component: Judson (92%)

The Judson component makes up 92 percent of the map unit. Slopes are 2 to 6 percent. This component is on hillslopes on uplands. The parent material consists of fine-silty colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY070NE Loamy Terrace ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Nodaway, occasionally flooded (7%)

Generated brief soil descriptions are created for major soil components. The Nodaway, occasionally flooded soil is a minor component.

Component: Colo, occasionally flooded (1%)

Generated brief soil descriptions are created for major soil components. The Colo, occasionally flooded soil is a minor component.

Map Unit: 7350—Malmo clay, 3 to 11 percent slopes, eroded

Component: Malmo, Eroded (100%)

The Malmo, Eroded component makes up 100 percent of the map unit. Slopes are 3 to 9 percent. This component is on hillslopes on uplands. The parent material consists of weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Map Unit: 7418—Morrill clay loam, 6 to 11 percent slopes

Component: Morrill (85%)

The Morrill component makes up 85 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Mayberry (5%)

Generated brief soil descriptions are created for major soil components. The Mayberry soil is a minor component.

Component: Filley (5%)

Generated brief soil descriptions are created for major soil components. The Filley soil is a minor component.

Component: Burchard (5%)

Generated brief soil descriptions are created for major soil components. The Burchard soil is a minor component.

Map Unit: 7501—Pawnee clay loam, 4 to 8 percent slopes, eroded

Component: Pawnee, eroded (85%)

The Pawnee, eroded component makes up 85 percent of the map unit. Slopes are 4 to 8 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 14 inches during March, April, May. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Morrill, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Morrill, eroded soil is a minor component.

Component: Shelby, eroded (4%)

Generated brief soil descriptions are created for major soil components. The Shelby, eroded soil is a minor component.

Component: Grundy, eroded (3%)

Generated brief soil descriptions are created for major soil components. The Grundy, eroded soil is a minor component.

Component: Wymore, eroded (2%)

Generated brief soil descriptions are created for major soil components. The Wymore, eroded soil is a minor component.

Component: Typic epiaquoll (1%)

Generated brief soil descriptions are created for major soil components. The Typic epiaquoll soil is a minor component.

Map Unit: 7669—Mayberry clay loam, 3 to 11 percent slopes

Component: Mayberry (100%)

The Mayberry component makes up 100 percent of the map unit. Slopes are 3 to 9 percent. This component is on hillslopes on uplands. The parent material consists of reworked weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: 7689—Wymore silty clay loam, 0 to 2 percent slopes

Component: Wymore (90%)

The Wymore component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 2s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Butler (4%)

Generated brief soil descriptions are created for major soil components. The Butler soil is a minor component.

Component: Aksarben (4%)

Generated brief soil descriptions are created for major soil components. The Aksarben soil is a minor component.

Component: Fillmore, frequently ponded (2%)

Generated brief soil descriptions are created for major soil components. The Fillmore, frequently ponded soil is a minor component.

Map Unit: 7693—Wymore silty clay loam, 2 to 6 percent slopes

Component: Wymore (85%)

The Wymore component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Malmo (5%)

Generated brief soil descriptions are created for major soil components. The Malmo soil is a minor component.

Component: Otoe (5%)

Generated brief soil descriptions are created for major soil components. The Otoe soil is a minor component.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Map Unit: 7750—Nodaway silt loam, occasionally flooded

Component: Nodaway, occasionally flooded (90%)

The Nodaway, occasionally flooded component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps on valleys. The parent material consists of fine-silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during July. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 2w. Irrigated land capability classification is 2w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Judson (5%)

Generated brief soil descriptions are created for major soil components. The Judson soil is a minor component.

Component: Zook, occasionally flooded (3%)

Generated brief soil descriptions are created for major soil components. The Zook, occasionally flooded soil is a minor component.

Component: Colo, occasionally flooded (2%)

Generated brief soil descriptions are created for major soil components. The Colo, occasionally flooded soil is a minor component.

Lancaster County, Nebraska

Map Unit: 3820—Butler silt loam, 0 to 1 percent slopes

Component: Butler (95%)

The Butler component makes up 95 percent of the map unit. Slopes are 0 to 1 percent. This component is on divides on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during March, April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 2w. Irrigated land capability classification is 2w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

Component: Fillmore (5%)

Generated brief soil descriptions are created for major soil components. The Fillmore soil is a minor component.

Map Unit: 3824—Crete silt loam, 0 to 1 percent slopes

Component: Crete (90%)

The Crete component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on interfluves on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R075XY057NE Clayey Plains ecological site. Nonirrigated land capability classification is 2s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Hastings (4%)

Generated brief soil descriptions are created for major soil components. The Hastings soil is a minor component.

Component: Butler (3%)

Generated brief soil descriptions are created for major soil components. The Butler soil is a minor component.

Component: Fillmore, frequently ponded (2%)

Generated brief soil descriptions are created for major soil components. The Fillmore, frequently ponded soil is a minor component.

Component: Olbut, occasionally ponded (1%)

Generated brief soil descriptions are created for major soil components. The Olbut, occasionally ponded soil is a minor component.

Map Unit: 3952—Fillmore silt loam, frequently ponded

Component: Fillmore (99%)

The Fillmore component makes up 99 percent of the map unit. Slopes are 0 to 1 percent. This component is on playas on stream terraces on valleys. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 12 inches during March, April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R075XY049NE Closed Upland Depression ecological site. Nonirrigated land capability classification is 4w. Irrigated land capability classification is 4w. This soil meets hydric criteria.

Component: Ponded soils (1%)

Generated brief soil descriptions are created for major soil components. The Ponded soils soil is a minor component.

Map Unit: 7050—Kennebec silt loam, occasionally flooded

Component: Kennebec (85%)

The Kennebec component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains on river valleys. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 42 inches during February, March, April, May. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY070NE Loamy Terrace ecological site. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Component: Muscotah (5%)

Generated brief soil descriptions are created for major soil components. The Muscotah soil is a minor component.

Component: Reading (3%)

Generated brief soil descriptions are created for major soil components. The Reading soil is a minor component.

Component: Wabash (3%)

Generated brief soil descriptions are created for major soil components. The Wabash soil is a minor component.

Component: Olmitz (2%)

Generated brief soil descriptions are created for major soil components. The Olmitz soil is a minor component.

Component: Colo (2%)

Generated brief soil descriptions are created for major soil components. The Colo soil is a minor component.

Map Unit: 7211—Burchard-Nodaway complex, 2 to 30 percent slopes

Component: Burchard (45%)

The Burchard component makes up 45 percent of the map unit. Slopes are 15 to 30 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 12 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Nodaway, frequently flooded (40%)

The Nodaway, frequently flooded component makes up 40 percent of the map unit. Slopes are 0 to 2 percent. This component is on drainageways on uplands. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 54 inches during April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 6w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Steinauer (5%)

Generated brief soil descriptions are created for major soil components. The Steinauer soil is a minor component.

Component: Colo, frequently flooded (5%)

Generated brief soil descriptions are created for major soil components. The Colo, frequently flooded soil is a minor component.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Map Unit: 7227—Burchard clay loam, 6 to 11 percent slopes

Component: Burchard (85%)

The Burchard component makes up 85 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 12 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Morrill (5%)

Generated brief soil descriptions are created for major soil components. The Morrill soil is a minor component.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Steinauer (5%)

Generated brief soil descriptions are created for major soil components. The Steinauer soil is a minor component.

Map Unit: 7229—Burchard clay loam, 11 to 17 percent slopes

Component: Burchard (85%)

The Burchard component makes up 85 percent of the map unit. Slopes are 11 to 17 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 12 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Morrill (5%)

Generated brief soil descriptions are created for major soil components. The Morrill soil is a minor component.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Steinauer (5%)

Generated brief soil descriptions are created for major soil components. The Steinauer soil is a minor component.

Map Unit: 7231—Judson silt loam, 2 to 6 percent slopes

Component: Judson (92%)

The Judson component makes up 92 percent of the map unit. Slopes are 2 to 6 percent. This component is on hillslopes on uplands. The parent material consists of fine-silty colluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY070NE Loamy Terrace ecological site. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Nodaway, occasionally flooded (7%)

Generated brief soil descriptions are created for major soil components. The Nodaway, occasionally flooded soil is a minor component.

Component: Colo, occasionally flooded (1%)

Generated brief soil descriptions are created for major soil components. The Colo, occasionally flooded soil is a minor component.

Map Unit: 7344—Malmo, eroded-Pawnee complex, 6 to 11 percent slopes

Component: Malmo, eroded (60%)

The Malmo, eroded component makes up 60 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Pawnee, eroded (30%)

The Pawnee, eroded component makes up 30 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 14 inches during March, April, May. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Otoe, eroded (10%)

Generated brief soil descriptions are created for major soil components. The Otoe, eroded soil is a minor component.

Map Unit: 7411—Cortland-Malmo complex, 6 to 11 percent slopes, eroded

Component: Cortland, Eroded (55%)

The Cortland, Eroded component makes up 55 percent of the map unit. Slopes are 6 to 12 percent. This component is on hillslopes on uplands. The parent material consists of outwash and/or loamy till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Malmo, Eroded (25%)

The Malmo, Eroded component makes up 25 percent of the map unit. Slopes are 6 to 12 percent. This component is on hillslopes on uplands. The parent material consists of weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Component: Otoe, Eroded (20%)

Generated brief soil descriptions are created for major soil components. The Otoe, Eroded soil is a minor component.

Map Unit: 7422—Morrill clay loam, 6 to 11 percent slopes, eroded

Component: Morrill, eroded (85%)

The Morrill, eroded component makes up 85 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Mayberry, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Mayberry, eroded soil is a minor component.

Component: Filley, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Filley, eroded soil is a minor component.

Component: Steinauer, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Steinauer, eroded soil is a minor component.

Map Unit: 7466—Otoe silty clay, 6 to 11 percent slopes, eroded

Component: Otoe, Eroded (100%)

The Otoe, Eroded component makes up 100 percent of the map unit. Slopes are 5 to 9 percent. This component is on hillslopes on uplands. The parent material consists of loess over till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: 7501—Pawnee clay loam, 4 to 8 percent slopes, eroded

Component: Pawnee, eroded (85%)

The Pawnee, eroded component makes up 85 percent of the map unit. Slopes are 4 to 8 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 14 inches during March, April, May. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Morrill, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Morrill, eroded soil is a minor component.

Component: Shelby, eroded (4%)

Generated brief soil descriptions are created for major soil components. The Shelby, eroded soil is a minor component.

Component: Grundy, eroded (3%)

Generated brief soil descriptions are created for major soil components. The Grundy, eroded soil is a minor component.

Component: Wymore, eroded (2%)

Generated brief soil descriptions are created for major soil components. The Wymore, eroded soil is a minor component.

Component: Typic epiaquoll (1%)

Generated brief soil descriptions are created for major soil components. The Typic epiaquoll soil is a minor component.

Map Unit: 7507—Pawnee clay loam, 6 to 11 percent slopes, eroded

Component: Pawnee, eroded (85%)

The Pawnee, eroded component makes up 85 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 14 inches during March, April, May. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Steinauer, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Steinauer, eroded soil is a minor component.

Component: Burchard, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Burchard, eroded soil is a minor component.

Component: Wymore, eroded (5%)

Generated brief soil descriptions are created for major soil components. The Wymore, eroded soil is a minor component.

Map Unit: 7585—Shelby clay loam, 7 to 12 percent slopes

Component: Shelby (85%)

The Shelby component makes up 85 percent of the map unit. Slopes are 7 to 12 percent. This component is on hillslopes on uplands. The parent material consists of till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY075NE Loamy Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Martin (5%)

Generated brief soil descriptions are created for major soil components. The Martin soil is a minor component.

Component: Morrill (5%)

Generated brief soil descriptions are created for major soil components. The Morrill soil is a minor component.

Component: Pawnee (4%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Aquolls (1%)

Generated brief soil descriptions are created for major soil components. The Aquolls soil is a minor component.

Map Unit: 7614—Steinauer clay loam, 6 to 11 percent slopes, eroded

Component: Steinauer, eroded (90%)

The Steinauer, eroded component makes up 90 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of calcareous till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the R106XY076NE Limy Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 17 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Burchard, eroded (10%)

Generated brief soil descriptions are created for major soil components. The Burchard, eroded soil is a minor component.

Map Unit: 7616—Steinauer loam, 6 to 11 percent slopes

Component: Steinauer (85%)

The Steinauer component makes up 85 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of calcareous till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY076NE Limy Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 17 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Burchard (10%)

Generated brief soil descriptions are created for major soil components. The Burchard soil is a minor component.

Component: Dickinson (5%)

Generated brief soil descriptions are created for major soil components. The Dickinson soil is a minor component.

Map Unit: 7617—Steinauer loam, 11 to 30 percent slopes

Component: Steinauer (85%)

The Steinauer component makes up 85 percent of the map unit. Slopes are 11 to 30 percent. This component is on hillslopes on uplands. The parent material consists of calcareous till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY076NE Limy Upland ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 17 percent. There are no saline horizons within 30 inches of the soil surface.

Component: Malcolm (5%)

Generated brief soil descriptions are created for major soil components. The Malcolm soil is a minor component.

Component: Dickinson (5%)

Generated brief soil descriptions are created for major soil components. The Dickinson soil is a minor component.

Component: Shelby (5%)

Generated brief soil descriptions are created for major soil components. The Shelby soil is a minor component.

Map Unit: 7666—Mayberry silty clay loam, 3 to 6 percent slopes, eroded

Component: Mayberry (100%)

The Mayberry component makes up 100 percent of the map unit. Slopes are 2 to 7 percent. This component is on hillslopes on uplands. The parent material consists of reworked weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: 7668—Mayberry silty clay loam, 6 to 11 percent slopes, eroded

Component: Mayberry (100%)

The Mayberry component makes up 100 percent of the map unit. Slopes are 7 to 11 percent. This component is on hillslopes on uplands. The parent material consists of reworked weathered till. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April, May, June. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: 7680—Wymore silty clay loam, 0 to 1 percent slopes

Component: Wymore (98%)

The Wymore component makes up 98 percent of the map unit. Slopes are 0 to 1 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 2s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Butler (2%)

Generated brief soil descriptions are created for major soil components. The Butler soil is a minor component.

Map Unit: 7681—Wymore silty clay loam, 1 to 3 percent slopes

Component: Wymore (90%)

The Wymore component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Baileyville (7%)

Generated brief soil descriptions are created for major soil components. The Baileyville soil is a minor component.

Component: Pawnee (2%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Benfield (1%)

Generated brief soil descriptions are created for major soil components. The Benfield soil is a minor component.

Map Unit: 7684—Wymore silty clay loam, 3 to 6 percent slopes, eroded

Component: Wymore, eroded (85%)

The Wymore, eroded component makes up 85 percent of the map unit. Slopes are 3 to 6 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 4e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Baileyville (5%)

Generated brief soil descriptions are created for major soil components. The Baileyville soil is a minor component.

Component: Irwin (4%)

Generated brief soil descriptions are created for major soil components. The Irwin soil is a minor component.

Component: Aquolls (1%)

Generated brief soil descriptions are created for major soil components. The Aquolls soil is a minor component.

Map Unit: 7689—Wymore silty clay loam, 0 to 2 percent slopes

Component: Wymore (90%)

The Wymore component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 2s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Butler (4%)

Generated brief soil descriptions are created for major soil components. The Butler soil is a minor component.

Component: Aksarben (4%)

Generated brief soil descriptions are created for major soil components. The Aksarben soil is a minor component.

Component: Fillmore, frequently ponded (2%)

Generated brief soil descriptions are created for major soil components. The Fillmore, frequently ponded soil is a minor component.

Map Unit: 7693—Wymore silty clay loam, 2 to 6 percent slopes

Component: Wymore (85%)

The Wymore component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 3e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Otoe (5%)

Generated brief soil descriptions are created for major soil components. The Otoe soil is a minor component.

Component: Malmo (5%)

Generated brief soil descriptions are created for major soil components. The Malmo soil is a minor component.

Map Unit: 7697—Wymore silty clay loam, 6 to 11 percent slopes

Component: Wymore (90%)

The Wymore component makes up 90 percent of the map unit. Slopes are 6 to 11 percent. This component is on hillslopes on uplands. The parent material consists of loess. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March, April. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY074NE Clayey Upland ecological site. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Pawnee (5%)

Generated brief soil descriptions are created for major soil components. The Pawnee soil is a minor component.

Component: Aksarben (5%)

Generated brief soil descriptions are created for major soil components. The Aksarben soil is a minor component.

Map Unit: 7750—Nodaway silt loam, occasionally flooded

Component: Nodaway, occasionally flooded (90%)

The Nodaway, occasionally flooded component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood-plain steps on valleys. The parent material consists of fine-silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during July. Organic matter content in the surface horizon is about 4 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 2w. Irrigated land capability classification is 2w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Judson (5%)

Generated brief soil descriptions are created for major soil components. The Judson soil is a minor component.

Component: Zook, occasionally flooded (3%)

Generated brief soil descriptions are created for major soil components. The Zook, occasionally flooded soil is a minor component.

Component: Colo, occasionally flooded (2%)

Generated brief soil descriptions are created for major soil components. The Colo, occasionally flooded soil is a minor component.

Map Unit: 7774—Colo-Nodaway silty clay loams, frequently flooded

Component: Colo, occasionally flooded (60%)

The Colo, occasionally flooded component makes up 60 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains on valleys. The parent material consists of fine-silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, June, July, November, December. Organic matter content in the surface horizon is about 6 percent. This component is in the R106XY032NE Subirrigated ecological site. Nonirrigated land capability classification is 3w. This soil meets hydric criteria.

Component: Nodaway, frequently flooded (40%)

The Nodaway, frequently flooded component makes up 40 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains on valleys. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 54 inches during April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Map Unit: 7867—Nodaway silt loam, channeled, frequently flooded

Component: Nodaway, channeled, frequently flooded (95%)

The Nodaway, channeled, frequently flooded component makes up 95 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains on valleys. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is moderate. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 54 inches during April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 6w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Colo, occasionally flooded (4%)

Generated brief soil descriptions are created for major soil components. The Colo, occasionally flooded soil is a minor component.

Component: Poned soils (1%)

Generated brief soil descriptions are created for major soil components. The Poned soils soil is a minor component.

Map Unit: 7868—Nodaway silt loam, channeled, occasionally flooded

Component: Nodaway, channeled, occasionally flooded (85%)

The Nodaway, channeled, occasionally flooded component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on drainageways on flood plains on valleys. The parent material consists of silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during April, May, June, July. Organic matter content in the surface horizon is about 3 percent. This component is in the R106XY068NE Loamy Floodplain ecological site. Nonirrigated land capability classification is 6w. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Nodaway, occasionally flooded (10%)

Generated brief soil descriptions are created for major soil components. The Nodaway, occasionally flooded soil is a minor component.

Component: Judson (3%)

Generated brief soil descriptions are created for major soil components. The Judson soil is a minor component.

Component: Kezan, occasionally flooded (2%)

Generated brief soil descriptions are created for major soil components. The Kezan, occasionally flooded soil is a minor component.

Map Unit: 9999—Water

Component: Water (100%)

Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

Data Source Information

Soil Survey Area: Gage County, Nebraska
Survey Area Data: Version 23, Jun 8, 2020

Soil Survey Area: Johnson County, Nebraska
Survey Area Data: Version 21, Jun 9, 2020

Soil Survey Area: Lancaster County, Nebraska
Survey Area Data: Version 25, Jun 9, 2020

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (K_{sat}), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (K_{sat}) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (K_{sat}) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (K_w and K_f) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and K_{sat}. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor K_w indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor K_f indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

Report—Physical Soil Properties

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Physical Soil Properties—Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
3820—Butler silt loam, 0 to 1 percent slopes														
Butler	0-10	2-10- 12	-66-	18-24- 27	1.10-1.20 -1.40	4.23-9.00-14.11	0.22-0.23-0. 24	3.0- 4.5- 5.9	2.0- 3.0- 4.0	.43	.43	3	6	48
	10-12	2-10- 12	-70-	18-20- 27	1.20-1.40 -1.60	4.23-9.00-14.11	0.22-0.23-0. 24	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.55	.55			
	12-34	2- 5- 12	-45-	45-50- 55	1.25-1.40 -1.45	0.07-0.25-0.42	0.11-0.12-0. 13	9.0-10.5-11.9	1.0- 1.5- 2.0	.28	.28			
	34-43	2- 8- 10	-55-	32-38- 45	1.25-1.40 -1.45	0.42-0.96-1.41	0.14-0.17-0. 20	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.37	.37			
	43-60	2- 8- 10	-62-	20-30- 35	1.25-1.35 -1.45	1.41-2.82-4.23	0.18-0.20-0. 22	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.49	.49			
7050—Kennebec silt loam, occasionally flooded														
Kennebec	0-8	0- 7- 15	60-68- 75	20-25- 32	1.25-1.40 -1.45	1.41-1.80-4.23	0.23-0.25-0. 27	2.0- 3.5- 5.9	2.0- 3.0- 4.0	.37	.37	5	6	48
	8-41	0- 6- 15	60-70- 75	20-24- 32	1.25-1.35 -1.45	1.41-2.70-4.23	0.23-0.25-0. 27	2.0- 3.5- 5.9	2.0- 2.5- 3.0	.43	.43			
	41-54	0- 4- 10	60-68- 75	20-28- 32	1.25-1.35 -1.45	1.41-2.70-4.23	0.22-0.24-0. 26	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.43	.43			
	54-79	0- 4- 10	60-67- 75	20-29- 32	1.35-1.40 -1.45	1.41-2.70-4.23	0.21-0.23-0. 25	3.0- 4.5- 5.9	0.5- 1.0- 2.0	.49	.49			

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Physical Soil Properties--Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7231—Judson silt loam, 2 to 6 percent slopes														
Judson	0-6	2- 4- 8	65-70- 72	24-26- 27	1.20-1.33 -1.40	1.41-2.70-4.23	0.10-0.17-0.25	3.3- 3.8- 4.1	2.0- 3.5- 5.0	.37	.37	5	6	48
	6-22	2- 4- 8	63-68- 70	27-28- 30	1.30-1.36 -1.50	1.41-2.70-4.23	0.16-0.18-0.22	3.5- 4.3- 4.8	2.0- 3.0- 5.0	.43	.43			
	22-28	2- 4- 8	61-66- 70	27-30- 32	1.22-1.33 -1.50	1.41-2.70-4.23	0.15-0.17-0.22	3.9- 4.7- 5.2	1.2- 2.5- 4.0	.37	.37			
	28-35	2- 4- 8	59-65- 70	27-31- 35	1.20-1.38 -1.50	1.41-2.70-4.23	0.13-0.16-0.21	3.9- 4.9- 5.8	1.0- 1.3- 2.0	.43	.43			
	35-52	3- 8- 12	55-60- 65	27-32- 34	1.35-1.40 -1.50	1.41-2.70-4.23	0.10-0.15-0.21	3.4- 5.0- 5.6	0.5- 1.0- 1.5	.43	.43			
	52-79	2-10- 15	55-62- 69	27-28- 32	1.25-1.40 -1.55	1.41-2.70-4.23	0.11-0.18-0.23	3.3- 4.0- 5.0	0.2- 0.4- 0.8	.49	.49			
7258—Deroin silty clay loam, 6 to 11 percent slopes, eroded														
Deroin, eroded	0-7	5- 7- 20	-59-	27-34- 40	1.20-1.30 -1.40	1.41-2.82-4.23	0.21-0.22-0.23	3.0- 4.5- 5.9	1.0- 2.0- 3.0	.32	.32	5	6	48
	7-40	5- 7- 30	-59-	27-34- 35	1.35-1.40 -1.45	1.41-2.82-4.23	0.17-0.19-0.20	3.0- 4.5- 5.9	0.0- 0.5- 1.0	.43	.43			
	40-80	10-12- 45	-58-	24-30- 32	1.30-1.40 -1.50	1.41-2.82-4.23	0.16-0.18-0.20	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7344--Malmo, eroded-Pawnee complex, 6 to 11 percent slopes														
Malmo, eroded	0-6	20-23- 25	35-39- 49	30-38- 40	1.35-1.40 -1.45	0.42-0.91-1.41	0.17-0.18-0.19	3.8- 6.6- 7.4	1.5- 3.0- 5.0	.24	.24	5	4	86
	6-22	14-23- 25	34-38- 45	35-39- 42	1.35-1.40 -1.45	0.01-0.22-0.42	0.10-0.12-0.14	5.4- 6.6- 7.6	0.5- 0.7- 1.0	.37	.37			
	22-43	15-23- 26	33-39- 45	35-38- 41	1.35-1.40 -1.45	0.01-0.22-0.42	0.10-0.12-0.14	5.3- 6.4- 7.3	0.3- 0.6- 0.8	.37	.37			
	43-54	25-32- 35	33-36- 41	24-32- 40	1.45-1.55 -1.65	0.42-0.91-1.41	0.09-0.15-0.17	2.6- 4.2- 7.0	0.3- 0.5- 0.7	.37	.37			
	54-79	27-38- 45	34-38- 45	20-24- 39	1.50-1.60 -1.70	0.42-0.91-1.41	0.09-0.18-0.19	1.9- 2.7- 6.9	0.1- 0.3- 0.5	.43	.43			
Pawnee, eroded	0-6	20-23- 33	28-42- 50	30-35- 39	1.20-1.40 -1.60	1.41-2.70-4.23	0.15-0.18-0.20	3.7- 5.9- 7.2	1.5- 2.0- 3.0	.32	.32	5	6	48
	6-9	20-23- 33	28-42- 50	30-35- 39	1.20-1.40 -1.60	1.41-2.70-4.23	0.15-0.18-0.20	3.7- 5.9- 7.2	1.5- 2.0- 3.0	.32	.32			
	9-11	20-23- 32	23-33- 40	40-44- 48	1.35-1.45 -1.55	0.01-0.22-0.42	0.10-0.12-0.15	6.0- 7.9- 9.4	0.5- 1.0- 1.2	.28	.28			
	11-33	22-26- 32	25-34- 42	36-40- 44	1.45-1.55 -1.65	0.01-0.22-0.42	0.10-0.12-0.15	5.3- 6.9- 8.2	0.3- 0.5- 0.8	.32	.32			
	33-43	23-28- 33	23-34- 45	32-38- 44	1.45-1.55 -1.65	0.42-0.91-1.41	0.12-0.13-0.15	3.5- 6.3- 8.1	0.0- 0.3- 0.5	.32	.32			
	43-79	26-31- 34	26-35- 45	28-34- 40	1.55-1.60 -1.70	0.42-0.91-1.41	0.12-0.14-0.16	2.8- 4.3- 6.8	0.0- 0.0- 0.3	.32	.32			

5-47

Physical Soil Properties--Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7349--Malmo clay loam, 2 to 6 percent slopes, eroded														
Malmo, eroded	0-6	20-30- 45	-32-	35-38- 40	1.35-1.40 -1.45	0.42-0.96-1.41	0.17-0.18-0.19	6.0- 7.5- 8.9	1.0- 2.0- 3.0	.24	.24	4	4	86
	6-43	20-24- 50	-30-	35-46- 50	1.30-1.40 -1.50	0.07-0.25-0.42	0.10-0.12-0.14	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.28	.28			
	43-54	20-34- 45	-32-	20-34- 45	1.40-1.50 -1.60	0.42-0.96-1.41	0.09-0.15-0.17	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.32	.32			
	54-80	20-39- 50	-37-	20-24- 45	1.45-1.55 -1.65	0.42-0.96-1.41	0.09-0.18-0.19	3.0- 4.5- 5.9	0.1- 0.3- 0.5	.43	.43			

548

Physical Soil Properties--Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7411— Cortland-Malmo complex, 6 to 11 percent slopes, eroded														
Cortland, eroded	0-6	26-42- 52	-38-	15-20- 27	1.30-1.50 -1.65	4.23-9.00-14.11	0.16-0.17-0.19	0.0- 1.5- 2.9	1.0- 1.5- 2.0	.32	.32	3	6	48
	6-28	20-36- 75	-39-	18-25- 35	1.40-1.50 -1.60	1.41-2.82-14.10	0.15-0.17-0.19	3.0- 4.5- 6.0	0.5- 0.8- 1.0	.37	.37			
	28-36	30-66- 90	-19-	2-15- 35	1.50-1.60 -1.70	1.41-28.00-42.3 3	0.08-0.12-0.18	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.24	.24			
	36-80	30-80- 90	-15-	2- 5- 30	1.55-1.65 -1.75	1.41-92.00-141.15	0.05-0.10-0.16	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.24	.24			
Malmo, eroded	0-6	20-30- 45	-32-	35-38- 40	1.35-1.40 -1.45	0.42-0.96-1.41	0.17-0.18-0.19	6.0- 7.5- 8.9	1.0- 2.0- 3.0	.24	.24	4	4	86
	6-43	20-24- 50	-30-	35-46- 50	1.30-1.40 -1.50	0.07-0.25-0.42	0.10-0.12-0.14	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.28	.28			
	43-54	20-34- 45	-32-	20-34- 45	1.40-1.50 -1.60	0.42-0.96-1.41	0.09-0.15-0.17	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.32	.32			
	54-80	20-39- 50	-37-	20-24- 45	1.45-1.55 -1.65	0.42-0.96-1.41	0.09-0.18-0.19	3.0- 4.5- 5.9	0.1- 0.3- 0.5	.43	.43			

5-49

Physical Soil Properties--Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7464--Otoe silty clay loam, 6 to 11 percent slopes, eroded														
Otoe, eroded	0-6	1- 5- 7	53-57- 62	36-38- 40	1.20-1.26 -1.30	0.42-0.91-1.41	0.18-0.19-0.20	6.6- 7.2- 8.7	2.1- 3.0- 3.4	.32	.32	5	4	86
	6-18	1- 2- 5	50-53- 59	40-45- 49	1.30-1.40 -1.50	0.42-0.91-1.41	0.11-0.13-0.16	6.9- 9.0-10.2	0.5- 1.4- 2.0	.32	.32			
	18-32	1- 3- 7	53-57- 60	36-40- 46	1.30-1.36 -1.50	0.42-0.91-1.41	0.11-0.13-0.16	6.4- 7.5- 9.2	0.5- 0.8- 1.0	.37	.37			
	32-40	1- 5- 7	53-57- 60	34-38- 40	1.30-1.36 -1.50	0.42-0.91-1.41	0.11-0.13-0.16	5.0- 7.0- 7.6	0.5- 0.8- 1.0	.37	.37			
	40-57	6- 9- 15	50-57- 59	28-34- 35	1.20-1.29 -1.40	0.42-0.91-1.41	0.16-0.18-0.20	3.8- 5.0- 6.2	0.3- 0.6- 0.7	.43	.43			
	57-79	20-26- 28	38-40- 45	28-34- 35	1.20-1.30 -1.40	0.42-0.91-1.41	0.14-0.16-0.18	3.8- 4.9- 6.1	0.2- 0.3- 0.5	.32	.32			

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Physical Soil Properties--Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7689--Wymore silty clay loam, 0 to 2 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-11	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	11-18	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.7-10.5	0.5- 1.0- 1.5	.32	.32			
	18-45	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	45-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			

5-51

Physical Soil Properties—Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7693—Wymore silty clay loam, 2 to 6 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-10	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	10-14	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.8-10.5	0.5- 1.2- 1.5	.32	.32			
	14-41	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	41-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			
7750—Nodaway silt loam, occasionally flooded														
Nodaway, occasionally flooded	0-7	1- 7- 10	63-68- 73	18-25- 27	1.25-1.30 -1.35	1.41-2.70-4.23	0.20-0.22-0.23	1.9- 3.8- 4.1	2.0- 3.5- 6.0	.32	.32	5	6	48
	7-12	2-11- 15	59-64- 71	22-25- 27	1.25-1.30 -1.35	1.41-2.70-4.23	0.20-0.22-0.23	2.7- 3.6- 4.6	0.5- 0.7- 0.8	.49	.49			
	12-26	1- 7- 12	64-70- 75	18-23- 27	1.29-1.33 -1.40	1.41-2.70-4.23	0.15-0.18-0.19	1.9- 3.0- 4.0	1.2- 1.6- 2.2	.49	.49			
	26-79	1- 3- 7	67-71- 75	19-26- 27	1.23-1.28 -1.35	1.41-2.70-4.23	0.15-0.18-0.19	2.0- 3.8- 4.0	1.5- 2.0- 2.6	.43	.43			

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Physical Soil Properties--Gage County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7868— Nodaway silt loam, channeled, occasionally flooded														
Nodaway, channeled, occasionally flooded	0-7	2- 7- 10	-69-	18-24- 27	1.25-1.30 -1.35	4.23-9.20-14.11	0.20-0.22-0.23	0.0- 1.5- 2.9	2.0- 2.5- 3.0	.37	.37	5	6	48
	7-80	2- 7- 10	-69-	18-24- 35	1.25-1.30 -1.35	4.23-9.20-14.11	0.20-0.22-0.23	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.49	.49			

5-53

Physical Soil Properties--Johnson County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7231—Judson silt loam, 2 to 6 percent slopes														
Judson	0-6	2- 4- 8	65-70- 72	24-26- 27	1.20-1.33 -1.40	1.41-2.70-4.23	0.10-0.17-0.25	3.3- 3.8- 4.1	2.0- 3.5- 5.0	.37	.37	5	6	48
	6-22	2- 4- 8	63-68- 70	27-28- 30	1.30-1.36 -1.50	1.41-2.70-4.23	0.16-0.18-0.22	3.5- 4.3- 4.8	2.0- 3.0- 5.0	.43	.43			
	22-28	2- 4- 8	61-66- 70	27-30- 32	1.22-1.33 -1.50	1.41-2.70-4.23	0.15-0.17-0.22	3.9- 4.7- 5.2	1.2- 2.5- 4.0	.37	.37			
	28-35	2- 4- 8	59-65- 70	27-31- 35	1.20-1.38 -1.50	1.41-2.70-4.23	0.13-0.16-0.21	3.9- 4.9- 5.8	1.0- 1.3- 2.0	.43	.43			
	35-52	3- 8- 12	55-60- 65	27-32- 34	1.35-1.40 -1.50	1.41-2.70-4.23	0.10-0.15-0.21	3.4- 5.0- 5.6	0.5- 1.0- 1.5	.43	.43			
	52-79	2-10- 15	55-62- 69	27-28- 32	1.25-1.40 -1.55	1.41-2.70-4.23	0.11-0.18-0.23	3.3- 4.0- 5.0	0.2- 0.4- 0.8	.49	.49			
7350—Malmo clay, 3 to 11 percent slopes, eroded														
Malmo, eroded	0-6	20-30- 45	-26-	35-44- 48	1.35-1.40 -1.45	0.42-0.96-1.41	0.10-0.12-0.14	6.0- 7.5- 8.9	1.0- 2.0- 3.0	.24	.24	4	4	86
	6-43	20-24- 50	-30-	35-46- 50	1.35-1.40 -1.45	0.07-0.25-0.42	0.10-0.12-0.14	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.28	.28			
	43-54	20-34- 45	-32-	20-34- 45	1.35-1.40 -1.45	0.42-0.96-1.41	0.09-0.15-0.17	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.32	.32			
	54-80	20-39- 50	-37-	20-24- 45	1.45-1.55 -1.65	0.42-0.96-1.41	0.09-0.18-0.19	3.0- 4.5- 5.9	0.1- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Johnson County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7418—Morrill clay loam, 6 to 11 percent slopes														
Morrill	0-6	20-33- 45	25-40- 53	27-27- 32	1.35-1.39 -1.50	1.41-2.70-4.23	0.14-0.14-0.15	3.3- 4.0- 5.2	1.0- 2.0- 3.0	.24	.24	5	6	48
	6-12	20-32- 40	26-40- 53	18-28- 34	1.35-1.36 -1.60	1.41-2.70-4.23	0.12-0.15-0.17	1.6- 4.2- 5.7	1.0- 2.0- 3.0	.28	.28			
	12-28	30-38- 50	16-30- 47	20-32- 34	1.40-1.45 -1.60	1.41-2.70-4.23	0.09-0.13-0.17	1.5- 4.9- 5.5	0.5- 0.8- 1.0	.24	.24			
	28-63	35-37- 50	22-36- 45	20-27- 32	1.50-1.55 -1.65	1.41-2.70-4.23	0.11-0.13-0.15	1.5- 3.0- 5.0	0.5- 0.8- 1.0	.17	.32			
	63-73	30-53- 65	3-25- 50	18-22- 32	1.60-1.65 -1.70	4.23-9.00-14.11	0.08-0.13-0.14	1.5- 2.6- 5.0	0.3- 0.5- 0.8	.24	.24			
	73-79	50-65- 80	0-16- 42	7-19- 30	1.60-1.67 -1.70	14.11-28.00-42.30	0.10-0.11-0.12	0.5- 1.9- 4.5	0.0- 0.3- 0.5	.20	.20			

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Physical Soil Properties--Johnson County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7501—Pawnee clay loam, 4 to 8 percent slopes, eroded														
Pawnee, eroded	0-6	20-23- 33	31-46- 50	28-31- 39	1.20-1.33 -1.50	1.41-2.70-4.23	0.15-0.18-0.20	3.6- 4.4- 7.5	1.5- 2.0- 3.0	.37	.37	5	6	48
	6-9	20-23- 33	31-44- 50	28-33- 39	1.20-1.35 -1.50	1.41-2.70-4.23	0.15-0.18-0.20	3.6- 4.7- 7.5	1.5- 2.0- 3.0	.37	.37			
	9-12	20-23- 32	23-33- 40	40-44- 48	1.35-1.45 -1.55	0.01-0.22-0.42	0.10-0.12-0.15	6.3- 8.3- 9.8	0.5- 1.0- 1.2	.28	.28			
	12-41	22-26- 32	25-34- 42	36-40- 44	1.45-1.55 -1.65	0.01-0.22-0.42	0.10-0.12-0.15	5.4- 7.2- 8.7	0.3- 0.5- 0.8	.32	.32			
	41-51	23-28- 33	23-34- 45	32-38- 44	1.45-1.55 -1.65	0.42-0.91-1.41	0.12-0.13-0.15	3.8- 6.6- 8.6	0.0- 0.3- 0.5	.32	.32			
	51-79	26-31- 34	26-35- 45	28-34- 40	1.55-1.60 -1.70	0.42-0.91-1.41	0.12-0.14-0.16	3.1- 4.6- 7.1	0.0- 0.0- 0.3	.32	.32			
7669—Mayberry clay loam, 3 to 11 percent slopes														
Mayberry	0-16	-34-	-32-	27-34- 40	1.35-1.40 -1.45	1.41-2.82-4.23	0.17-0.20-0.23	3.0- 4.5- 5.9	1.0- 2.0- 3.0	.24	.24	5	6	48
	16-56	-26-	-29-	40-45- 50	1.35-1.40 -1.45	0.42-0.96-1.41	0.10-0.11-0.11	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.24	.24			
	56-60	-56-	-13-	18-32- 45	1.45-1.55 -1.65	0.42-0.96-1.41	0.09-0.13-0.16	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.20	.20			

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Physical Soil Properties--Johnson County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7689--Wymore silty clay loam, 0 to 2 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-11	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	11-18	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.7-10.5	0.5- 1.0- 1.5	.32	.32			
	18-45	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	45-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			

5-57

Physical Soil Properties--Johnson County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7693—Wymore silty clay loam, 2 to 6 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-10	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	10-14	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.8-10.5	0.5- 1.2- 1.5	.32	.32			
	14-41	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	41-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			
7750—Nodaway silt loam, occasionally flooded														
Nodaway, occasionally flooded	0-7	1- 7- 10	63-68- 73	18-25- 27	1.25-1.30 -1.35	1.41-2.70-4.23	0.20-0.22-0.23	1.9- 3.8- 4.1	2.0- 3.5- 6.0	.32	.32	5	6	48
	7-12	2-11- 15	59-64- 71	22-25- 27	1.25-1.30 -1.35	1.41-2.70-4.23	0.20-0.22-0.23	2.7- 3.6- 4.6	0.5- 0.7- 0.8	.49	.49			
	12-26	1- 7- 12	64-70- 75	18-23- 27	1.29-1.33 -1.40	1.41-2.70-4.23	0.15-0.18-0.19	1.9- 3.0- 4.0	1.2- 1.6- 2.2	.49	.49			
	26-79	1- 3- 7	67-71- 75	19-26- 27	1.23-1.28 -1.35	1.41-2.70-4.23	0.15-0.18-0.19	2.0- 3.8- 4.0	1.5- 2.0- 2.6	.43	.43			

5-58

Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
3820—Butler silt loam, 0 to 1 percent slopes														
Butler	0-12	-25-	-53-	18-23- 27	1.20-1.30 -1.40	4.23-9.00-14.11	0.22-0.23-0.24	0.0- 1.5- 2.9	2.0- 3.0- 4.0	.37	.37	3	6	48
	12-34	-22-	-28-	45-50- 55	1.10-1.15 -1.20	0.07-0.25-0.42	0.10-0.12-0.16	7.0-10.0-14.0	1.0- 1.5- 2.0	.24	.24			
	34-60	- 7-	-54-	32-39- 45	1.10-1.20 -1.30	0.42-0.96-1.41	0.14-0.17-0.20	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.37	.37			
3824—Crete silt loam, 0 to 1 percent slopes														
Crete	0-6	4- 7- 10	64-69- 75	20-24- 26	1.27-1.37 -1.47	4.23-9.00-14.11	0.20-0.22-0.23	0.0- 2.9- 2.9	2.0- 3.0- 4.0	.37	.37	5	6	48
	6-15	3- 5- 7	52-59- 65	32-36- 42	1.28-1.38 -1.48	1.41-2.70-4.23	0.17-0.19-0.20	3.0- 4.0- 5.9	1.5- 2.5- 3.0	.37	.37			
	15-25	2- 4- 6	42-49- 56	42-47- 52	1.28-1.33 -1.38	0.42-0.91-1.41	0.12-0.14-0.16	9.0-11.0-13.0	1.0- 1.5- 2.0	.32	.32			
	25-33	2- 4- 6	48-54- 60	38-42- 46	1.30-1.38 -1.46	0.42-0.91-1.41	0.12-0.14-0.16	6.0- 8.9- 8.9	0.5- 0.8- 1.0	.37	.37			
	33-40	3- 5- 8	56-63- 70	27-32- 37	1.28-1.34 -1.40	1.41-2.70-4.23	0.18-0.19-0.20	3.0- 5.9- 5.9	0.3- 0.5- 0.7	.43	.43			
	40-79	3- 6- 9	60-67- 74	23-27- 31	1.26-1.33 -1.40	4.23-9.00-14.11	0.18-0.19-0.20	3.0- 4.0- 5.9	0.1- 0.3- 0.5	.49	.49			

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Physical Soil Properties—Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
3952—Fillmore silt loam, frequently ponded														
Fillmore	0-16	-25-	-53-	18-23- 27	1.30-1.35 -1.40	4.23-9.00-14.11	0.21-0.23-0.24	0.0- 1.5- 2.9	2.0- 3.0- 4.0	.37	.37	3	6	48
	16-48	- 5-	-45-	45-50- 55	1.10-1.20 -1.30	0.07-0.25-0.42	0.10-0.12-0.16	7.0-10.0-14.0	1.0- 1.5- 2.0	.28	.28			
	48-60	- 7-	-51-	35-43- 50	1.20-1.30 -1.40	0.07-0.25-1.41	0.18-0.19-0.20	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.37	.37			
7050—Kennebec silt loam, occasionally flooded														
Kennebec	0-8	0- 7- 15	60-68- 75	20-25- 32	1.25-1.40 -1.45	1.41-1.80-4.23	0.23-0.25-0.27	2.0- 3.5- 5.9	2.0- 3.0- 4.0	.37	.37	5	6	48
	8-41	0- 6- 15	60-70- 75	20-24- 32	1.25-1.35 -1.45	1.41-2.70-4.23	0.23-0.25-0.27	2.0- 3.5- 5.9	2.0- 2.5- 3.0	.43	.43			
	41-54	0- 4- 10	60-68- 75	20-28- 32	1.25-1.35 -1.45	1.41-2.70-4.23	0.22-0.24-0.26	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.43	.43			
	54-79	0- 4- 10	60-67- 75	20-29- 32	1.35-1.40 -1.45	1.41-2.70-4.23	0.21-0.23-0.25	3.0- 4.5- 5.9	0.5- 1.0- 2.0	.49	.49			

5-60

Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7211— Burchard-Nodaway complex, 2 to 30 percent slopes														
Burchard	0-6	26-37- 45	24-35- 46	27-28- 31	1.15-1.20 -1.40	1.41-4.20-4.23	0.14-0.16-0.18	3.3- 3.9- 4.6	2.0- 3.0- 4.0	.24	.24	5	6	48
	6-10	26-32- 43	26-38- 47	27-30- 35	1.20-1.30 -1.50	1.41-4.20-4.23	0.11-0.14-0.16	3.3- 4.2- 5.3	2.0- 2.5- 3.0	.32	.32			
	10-25	26-31- 44	22-35- 47	27-34- 35	1.30-1.40 -1.50	1.41-1.60-4.23	0.11-0.13-0.16	3.2- 4.8- 5.2	0.5- 0.8- 1.2	.32	.32			
	25-35	27-29- 44	24-37- 46	27-34- 35	1.30-1.40 -1.50	0.42-1.00-1.41	0.11-0.13-0.16	3.0- 4.6- 5.0	0.5- 0.8- 1.0	.37	.37			
	35-47	26-30- 43	22-35- 50	22-35- 35	1.50-1.60 -1.60	0.01-0.25-0.42	0.10-0.12-0.14	2.1- 4.7- 5.0	0.0- 0.5- 1.0	.32	.32			
	47-79	26-34- 50	15-35- 53	18-31- 35	1.50-1.60 -1.70	0.01-0.25-0.42	0.10-0.11-0.14	1.5- 3.8- 4.9	0.0- 0.1- 0.5	.37	.37			
Nodaway, frequently flooded	0-7	1- 9- 18	55-66- 77	22-25- 27	1.18-1.27 -1.36	4.23-9.00-14.11	0.20-0.22-0.23	2.8- 3.4- 5.3	1.8- 3.0- 6.0	.32	.32	5	6	48
	7-28	1- 7- 12	60-70- 80	18-23- 28	1.32-1.35 -1.38	4.23-9.00-14.11	0.18-0.19-0.22	1.9- 3.0- 3.9	1.2- 1.6- 2.2	.43	.43			
	28-51	1- 4- 6	64-70- 76	22-26- 30	1.35-1.36 -1.37	4.23-9.00-14.11	0.18-0.19-0.22	2.8- 3.5- 4.3	1.6- 1.9- 2.4	.43	.43			
	51-79	0- 3- 6	64-71- 80	18-26- 30	1.37-1.38 -1.38	4.23-9.00-14.11	0.18-0.19-0.22	1.9- 3.5- 4.3	1.5- 2.0- 2.6	.43	.43			

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Physical Soil Properties—Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7227— Burchard clay loam, 6 to 11 percent slopes														
Burchard	0-6	26-37- 45	24-35- 46	27-28- 31	1.15-1.20 -1.40	1.41-4.20-4.23	0.14-0.16-0.18	3.3- 3.9- 4.6	2.0- 3.0- 4.0	.24	.24	5	6	48
	6-12	26-32- 43	26-38- 47	27-30- 35	1.20-1.30 -1.50	1.41-4.20-4.23	0.11-0.14-0.16	3.3- 4.2- 5.4	2.0- 2.5- 4.0	.32	.32			
	12-25	26-31- 44	22-35- 47	27-34- 35	1.30-1.40 -1.50	1.41-1.60-4.23	0.11-0.13-0.16	3.2- 4.8- 5.2	0.5- 0.8- 1.2	.32	.32			
	25-35	27-29- 44	24-37- 46	27-34- 35	1.30-1.40 -1.50	0.42-1.00-1.41	0.11-0.13-0.16	3.0- 4.6- 5.0	0.5- 0.8- 1.0	.37	.37			
	35-47	26-30- 43	22-35- 50	22-35- 35	1.50-1.60 -1.60	0.01-0.25-0.42	0.10-0.12-0.14	2.1- 4.7- 5.0	0.0- 0.5- 1.0	.32	.32			
	47-79	26-34- 50	15-35- 53	18-31- 35	1.50-1.60 -1.70	0.01-0.25-0.42	0.10-0.11-0.14	1.5- 3.8- 4.9	0.0- 0.1- 0.5	.37	.37			

5-62

Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7229— Burchard clay loam, 11 to 17 percent slopes														
Burchard	0-6	26-37- 45	24-35- 46	27-28- 31	1.15-1.20 -1.40	1.41-4.20-4.23	0.14-0.16-0.18	3.3- 3.9- 4.6	2.0- 3.0- 4.0	.24	.24	5	6	48
	6-11	26-32- 43	26-38- 47	27-30- 35	1.20-1.30 -1.50	1.41-4.20-4.23	0.11-0.14-0.16	3.3- 4.2- 5.4	2.0- 2.5- 4.0	.32	.32			
	11-25	26-31- 44	22-35- 47	27-34- 35	1.30-1.40 -1.50	1.41-1.60-4.23	0.11-0.13-0.16	3.2- 4.8- 5.2	0.5- 0.8- 1.2	.32	.32			
	25-35	27-29- 44	24-37- 46	27-34- 35	1.30-1.40 -1.50	0.42-1.00-1.41	0.11-0.13-0.16	3.0- 4.6- 5.0	0.5- 0.8- 1.0	.37	.37			
	35-47	26-30- 43	22-35- 50	22-35- 35	1.50-1.60 -1.60	0.01-0.25-0.42	0.10-0.12-0.14	2.1- 4.7- 5.0	0.0- 0.5- 1.0	.32	.32			
	47-79	26-34- 50	15-35- 53	18-31- 35	1.50-1.60 -1.70	0.01-0.25-0.42	0.10-0.11-0.14	1.5- 3.8- 4.9	0.0- 0.1- 0.5	.37	.37			

5-63

Physical Soil Properties—Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7231—Judson silt loam, 2 to 6 percent slopes														
Judson	0-6	2- 4- 8	65-70- 72	24-26- 27	1.20-1.33 -1.40	1.41-2.70-4.23	0.10-0.17-0.25	3.3- 3.8- 4.1	2.0- 3.5- 5.0	.37	.37	5	6	48
	6-22	2- 4- 8	63-68- 70	27-28- 30	1.30-1.36 -1.50	1.41-2.70-4.23	0.16-0.18-0.22	3.5- 4.3- 4.8	2.0- 3.0- 5.0	.43	.43			
	22-28	2- 4- 8	61-66- 70	27-30- 32	1.22-1.33 -1.50	1.41-2.70-4.23	0.15-0.17-0.22	3.9- 4.7- 5.2	1.2- 2.5- 4.0	.37	.37			
	28-35	2- 4- 8	59-65- 70	27-31- 35	1.20-1.38 -1.50	1.41-2.70-4.23	0.13-0.16-0.21	3.9- 4.9- 5.8	1.0- 1.3- 2.0	.43	.43			
	35-52	3- 8- 12	55-60- 65	27-32- 34	1.35-1.40 -1.50	1.41-2.70-4.23	0.10-0.15-0.21	3.4- 5.0- 5.6	0.5- 1.0- 1.5	.43	.43			
	52-79	2-10- 15	55-62- 69	27-28- 32	1.25-1.40 -1.55	1.41-2.70-4.23	0.11-0.18-0.23	3.3- 4.0- 5.0	0.2- 0.4- 0.8	.49	.49			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7344—Malmo, eroded-Pawnee complex, 6 to 11 percent slopes														
Malmo, eroded	0-6	20-23- 25	35-39- 49	30-38- 40	1.35-1.40 -1.45	0.42-0.91-1.41	0.17-0.18-0.19	3.8- 6.6- 7.4	1.5- 3.0- 5.0	.24	.24	5	4	86
	6-22	14-23- 25	34-38- 45	35-39- 42	1.35-1.40 -1.45	0.01-0.22-0.42	0.10-0.12-0.14	5.4- 6.6- 7.6	0.5- 0.7- 1.0	.37	.37			
	22-43	15-23- 26	33-39- 45	35-38- 41	1.35-1.40 -1.45	0.01-0.22-0.42	0.10-0.12-0.14	5.3- 6.4- 7.3	0.3- 0.6- 0.8	.37	.37			
	43-54	25-32- 35	33-36- 41	24-32- 40	1.45-1.55 -1.65	0.42-0.91-1.41	0.09-0.15-0.17	2.6- 4.2- 7.0	0.3- 0.5- 0.7	.37	.37			
	54-79	27-38- 45	34-38- 45	20-24- 39	1.50-1.60 -1.70	0.42-0.91-1.41	0.09-0.18-0.19	1.9- 2.7- 6.9	0.1- 0.3- 0.5	.43	.43			
Pawnee, eroded	0-6	20-23- 33	28-42- 50	30-35- 39	1.20-1.40 -1.60	1.41-2.70-4.23	0.15-0.18-0.20	3.7- 5.9- 7.2	1.5- 2.0- 3.0	.32	.32	5	6	48
	6-9	20-23- 33	28-42- 50	30-35- 39	1.20-1.40 -1.60	1.41-2.70-4.23	0.15-0.18-0.20	3.7- 5.9- 7.2	1.5- 2.0- 3.0	.32	.32			
	9-11	20-23- 32	23-33- 40	40-44- 48	1.35-1.45 -1.55	0.01-0.22-0.42	0.10-0.12-0.15	6.0- 7.9- 9.4	0.5- 1.0- 1.2	.28	.28			
	11-33	22-26- 32	25-34- 42	36-40- 44	1.45-1.55 -1.65	0.01-0.22-0.42	0.10-0.12-0.15	5.3- 6.9- 8.2	0.3- 0.5- 0.8	.32	.32			
	33-43	23-28- 33	23-34- 45	32-38- 44	1.45-1.55 -1.65	0.42-0.91-1.41	0.12-0.13-0.15	3.5- 6.3- 8.1	0.0- 0.3- 0.5	.32	.32			
	43-79	26-31- 34	26-35- 45	28-34- 40	1.55-1.60 -1.70	0.42-0.91-1.41	0.12-0.14-0.16	2.8- 4.3- 6.8	0.0- 0.0- 0.3	.32	.32			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7411— Cortland-Malmo complex, 6 to 11 percent slopes, eroded														
Cortland, eroded	0-6	26-42- 52	-38-	15-20- 27	1.30-1.50 -1.65	4.23-9.00-14.11	0.16-0.17-0.19	0.0- 1.5- 2.9	1.0- 1.5- 2.0	.32	.32	3	6	48
	6-28	20-36- 75	-39-	18-25- 35	1.40-1.50 -1.60	1.41-2.82-14.10	0.15-0.17-0.19	3.0- 4.5- 6.0	0.5- 0.8- 1.0	.37	.37			
	28-36	30-66- 90	-19-	2-15- 35	1.50-1.60 -1.70	1.41-28.00-42.3 3	0.08-0.12-0.18	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.24	.24			
	36-80	30-80- 90	-15-	2- 5- 30	1.55-1.65 -1.75	1.41-92.00-141.15	0.05-0.10-0.16	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.24	.24			
Malmo, eroded	0-6	20-30- 45	-32-	35-38- 40	1.35-1.40 -1.45	0.42-0.96-1.41	0.17-0.18-0.19	6.0- 7.5- 8.9	1.0- 2.0- 3.0	.24	.24	4	4	86
	6-43	20-24- 50	-30-	35-46- 50	1.30-1.40 -1.50	0.07-0.25-0.42	0.10-0.12-0.14	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.28	.28			
	43-54	20-34- 45	-32-	20-34- 45	1.40-1.50 -1.60	0.42-0.96-1.41	0.09-0.15-0.17	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.32	.32			
	54-80	20-39- 50	-37-	20-24- 45	1.45-1.55 -1.65	0.42-0.96-1.41	0.09-0.18-0.19	3.0- 4.5- 5.9	0.1- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7422—Morrill clay loam, 6 to 11 percent slopes, eroded														
Morrill, eroded	0-6	20-33- 45	25-40- 53	27-27- 32	1.35-1.39 -1.50	1.41-2.70-4.23	0.14-0.14-0.15	3.3- 4.0- 5.2	1.0- 2.0- 3.0	.24	.24	5	6	48
	6-10	20-32- 40	26-40- 53	18-28- 34	1.35-1.36 -1.60	1.41-2.70-4.23	0.12-0.15-0.17	1.6- 4.2- 5.7	1.0- 2.0- 3.0	.28	.28			
	10-28	30-38- 50	16-30- 47	20-32- 34	1.40-1.45 -1.60	1.41-2.70-4.23	0.09-0.13-0.17	1.5- 4.9- 5.5	0.5- 0.8- 1.0	.24	.24			
	28-63	35-37- 50	22-36- 45	20-27- 32	1.50-1.55 -1.65	1.41-2.70-4.23	0.11-0.13-0.15	1.5- 3.0- 5.0	0.5- 0.8- 1.0	.17	.32			
	63-73	30-53- 65	3-25- 50	18-22- 32	1.60-1.65 -1.70	4.23-9.00-14.11	0.08-0.13-0.14	1.5- 2.6- 5.0	0.3- 0.5- 0.8	.24	.24			
	73-79	50-65- 80	0-16- 42	7-19- 30	1.60-1.67 -1.70	14.11-28.00-42.30	0.10-0.11-0.12	0.5- 1.9- 4.5	0.0- 0.3- 0.5	.20	.20			
7466—Otoe silty clay, 6 to 11 percent slopes, eroded														
Otoe, eroded	0-6	1- 5- 6	-57-	30-38- 40	1.30-1.40 -1.50	0.42-0.96-1.41	0.18-0.19-0.20	3.0- 4.5- 6.0	2.0- 3.0- 4.0	.28	.28	5	4	86
	6-32	1- 5- 6	-50-	35-45- 55	1.30-1.40 -1.50	0.42-0.96-1.41	0.11-0.13-0.16	6.0- 7.5- 9.0	0.5- 0.8- 1.0	.32	.32			
	32-57	1- 5- 6	-61-	27-34- 40	1.30-1.40 -1.50	0.42-0.96-1.41	0.16-0.18-0.20	3.0- 4.5- 6.0	0.0- 0.3- 0.5	.43	.43			
	57-80	10-18- 45	-48-	27-34- 40	1.30-1.40 -1.50	0.42-0.96-1.41	0.14-0.16-0.18	3.0- 4.5- 6.0	0.0- 0.3- 0.5	.43	.43			

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Physical Soil Properties—Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7501—Pawnee clay loam, 4 to 8 percent slopes, eroded														
Pawnee, eroded	0-6	20-23- 33	31-46- 50	28-31- 39	1.20-1.33 -1.50	1.41-2.70-4.23	0.15-0.18-0.20	3.6- 4.4- 7.5	1.5- 2.0- 3.0	.37	.37	5	6	48
	6-9	20-23- 33	31-44- 50	28-33- 39	1.20-1.35 -1.50	1.41-2.70-4.23	0.15-0.18-0.20	3.6- 4.7- 7.5	1.5- 2.0- 3.0	.37	.37			
	9-12	20-23- 32	23-33- 40	40-44- 48	1.35-1.45 -1.55	0.01-0.22-0.42	0.10-0.12-0.15	6.3- 8.3- 9.8	0.5- 1.0- 1.2	.28	.28			
	12-41	22-26- 32	25-34- 42	36-40- 44	1.45-1.55 -1.65	0.01-0.22-0.42	0.10-0.12-0.15	5.4- 7.2- 8.7	0.3- 0.5- 0.8	.32	.32			
	41-51	23-28- 33	23-34- 45	32-38- 44	1.45-1.55 -1.65	0.42-0.91-1.41	0.12-0.13-0.15	3.8- 6.6- 8.6	0.0- 0.3- 0.5	.32	.32			
	51-79	26-31- 34	26-35- 45	28-34- 40	1.55-1.60 -1.70	0.42-0.91-1.41	0.12-0.14-0.16	3.1- 4.6- 7.1	0.0- 0.0- 0.3	.32	.32			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7507—Pawnee clay loam, 6 to 11 percent slopes, eroded														
Pawnee, eroded	0-6	20-23- 33	28-42- 50	30-35- 39	1.20-1.40 -1.60	1.41-2.70-4.23	0.15-0.18-0.20	3.7- 5.9- 7.2	1.5- 2.0- 3.0	.32	.32	5	6	48
	6-9	20-23- 33	28-42- 50	30-35- 39	1.20-1.40 -1.60	1.41-2.70-4.23	0.15-0.18-0.20	3.7- 5.9- 7.2	1.5- 2.0- 3.0	.32	.32			
	9-11	20-23- 32	23-33- 40	40-44- 48	1.35-1.45 -1.55	0.01-0.22-0.42	0.10-0.12-0.15	6.0- 7.9- 9.4	0.5- 1.0- 1.2	.28	.28			
	11-33	22-26- 32	25-34- 42	36-40- 44	1.45-1.55 -1.65	0.01-0.22-0.42	0.10-0.12-0.15	5.3- 6.9- 8.2	0.3- 0.5- 0.8	.32	.32			
	33-43	23-28- 33	23-34- 45	32-38- 44	1.45-1.55 -1.65	0.42-0.91-1.41	0.12-0.13-0.15	3.5- 6.3- 8.1	0.0- 0.3- 0.5	.32	.32			
	43-79	26-31- 34	26-35- 45	28-34- 40	1.55-1.60 -1.70	0.42-0.91-1.41	0.12-0.14-0.16	2.8- 4.3- 6.8	0.0- 0.0- 0.3	.32	.32			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7585—Shelby clay loam, 7 to 12 percent slopes														
Shelby	0-6	25-37- 45	25-34- 45	27-29- 34	1.40-1.45 -1.50	1.41-2.70-4.23	0.13-0.17-0.18	3.3- 3.9- 5.1	2.0- 3.0- 4.0	.24	.24	5	6	48
	6-10	25-37- 45	25-33- 45	27-30- 33	1.40-1.45 -1.50	1.41-2.70-4.23	0.13-0.16-0.18	3.3- 4.1- 4.9	2.0- 2.5- 4.0	.28	.28			
	10-13	25-36- 45	25-31- 40	30-33- 35	1.45-1.50 -1.55	1.41-2.70-4.23	0.11-0.14-0.16	3.7- 4.5- 5.1	0.8- 1.0- 2.0	.28	.28			
	13-37	25-36- 45	25-31- 40	30-33- 35	1.45-1.50 -1.55	1.41-2.70-4.23	0.11-0.14-0.16	3.7- 4.5- 5.1	0.4- 0.6- 0.8	.28	.28			
	37-50	30-43- 45	25-27- 40	27-30- 32	1.50-1.60 -1.70	1.41-2.70-4.23	0.11-0.13-0.16	3.1- 3.9- 4.5	0.2- 0.4- 0.8	.28	.28			
	50-79	30-45- 45	25-26- 40	27-29- 32	1.60-1.65 -1.70	1.41-2.70-4.23	0.10-0.12-0.15	3.0- 3.6- 4.4	0.1- 0.2- 0.5	.28	.28			
7614—Steinauer clay loam, 6 to 11 percent slopes, eroded														
Steinauer, eroded	0-5	31-41- 44	23-31- 40	27-28- 33	1.30-1.40 -1.50	1.41-2.70-4.23	0.19-0.21-0.22	3.3- 3.7- 5.3	0.5- 2.0- 2.5	.20	.20	5	4L	86
	5-15	30-35- 43	27-37- 43	27-28- 34	1.30-1.40 -1.50	1.41-2.70-4.23	0.17-0.18-0.19	3.2- 3.6- 5.3	0.4- 0.5- 0.8	.32	.32			
	15-57	20-37- 52	15-37- 53	12-26- 35	1.30-1.48 -1.65	1.41-2.70-4.23	0.16-0.18-0.19	0.7- 2.9- 5.1	0.2- 0.3- 0.5	.37	.37			
	57-79	20-42- 52	15-35- 53	13-23- 34	1.30-1.48 -1.65	1.41-2.70-4.23	0.16-0.18-0.19	0.8- 2.0- 4.8	0.0- 0.3- 0.5	.37	.37			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7616— Steinauer loam, 6 to 11 percent slopes														
Steinauer	0-6	31-41- 44	30-34- 43	24-25- 27	1.40-1.45 -1.50	1.41-2.70-4.23	0.19-0.21-0.22	2.9- 3.1- 4.0	2.8- 3.5- 4.5	.20	.20	5	4L	86
	6-15	30-35- 43	27-37- 43	27-28- 34	1.30-1.40 -1.50	1.41-2.70-4.23	0.17-0.18-0.19	3.2- 3.6- 5.3	0.4- 0.5- 0.8	.32	.32			
	15-57	20-37- 52	15-37- 53	12-26- 35	1.30-1.48 -1.65	1.41-2.70-4.23	0.16-0.18-0.19	0.7- 2.9- 5.1	0.2- 0.3- 0.5	.37	.37			
	57-79	20-42- 52	15-35- 53	13-23- 34	1.30-1.48 -1.65	1.41-2.70-4.23	0.16-0.18-0.19	0.8- 2.0- 4.8	0.0- 0.3- 0.5	.37	.37			
7617— Steinauer loam, 11 to 30 percent slopes														
Steinauer	0-5	31-41- 44	30-34- 43	24-25- 27	1.40-1.45 -1.50	1.41-2.70-4.23	0.19-0.21-0.22	3.1- 3.4- 4.6	2.8- 3.5- 4.5	.20	.20	5	4L	86
	5-15	30-35- 43	27-37- 43	27-28- 34	1.30-1.40 -1.50	1.41-2.70-4.23	0.17-0.18-0.19	3.2- 3.6- 5.3	0.4- 0.5- 0.8	.32	.32			
	15-57	20-37- 52	15-37- 53	12-26- 35	1.30-1.48 -1.65	1.41-2.70-4.23	0.16-0.18-0.19	0.7- 2.9- 5.1	0.2- 0.3- 0.5	.37	.37			
	57-79	20-42- 52	15-35- 53	13-23- 34	1.30-1.48 -1.65	1.41-2.70-4.23	0.16-0.18-0.19	0.8- 2.0- 4.8	0.0- 0.3- 0.5	.37	.37			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7666— Mayberry silty clay loam, 3 to 6 percent slopes, eroded														
Mayberry	0-12	-19-	-48-	27-34- 40	1.35-1.40 -1.45	1.41-2.82-4.23	0.17-0.22-0.23	3.0- 6.0- 7.0	2.0- 3.0- 4.0	.28	.28	5	6	48
	12-48	-26-	-29-	40-45- 50	1.35-1.40 -1.45	0.42-0.96-1.41	0.10-0.12-0.15	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.24	.24			
	48-60	-56-	-13-	18-32- 45	1.45-1.55 -1.65	0.42-0.96-1.41	0.09-0.13-0.16	0.0- 4.5- 9.0	0.0- 0.3- 0.5	.20	.20			
7668— Mayberry silty clay loam, 6 to 11 percent slopes, eroded														
Mayberry	0-12	-19-	-48-	27-34- 40	1.35-1.40 -1.45	1.41-2.82-4.23	0.17-0.22-0.23	3.0- 6.0- 7.0	2.0- 3.0- 4.0	.28	.28	5	6	48
	12-48	-26-	-29-	40-45- 50	1.35-1.40 -1.45	0.42-0.96-1.41	0.10-0.12-0.15	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.24	.24			
	48-60	-56-	-13-	18-32- 45	1.45-1.55 -1.65	0.42-0.96-1.41	0.09-0.13-0.16	0.0- 4.5- 9.0	0.0- 0.3- 0.5	.20	.20			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7680—Wymore silty clay loam, 0 to 1 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-11	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	11-18	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.8-10.5	0.5- 1.0- 1.5	.32	.32			
	18-45	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	45-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7681--Wymore silty clay loam, 1 to 3 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-11	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	11-18	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.8-10.5	0.5- 1.0- 1.5	.32	.32			
	18-45	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	45-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7684—Wymore silty clay loam, 3 to 6 percent slopes, eroded														
Wymore, eroded	0-6	1- 4- 6	55-58- 67	31-38- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	4	86
	6-11	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.7-10.5	0.5- 0.8- 1.5	.37	.37			
	11-40	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	40-51	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	51-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7689--Wymore silty clay loam, 0 to 2 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-11	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	11-18	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.7-10.5	0.5- 1.0- 1.5	.32	.32			
	18-45	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	45-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7693—Wymore silty clay loam, 2 to 6 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-10	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	10-14	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.8-10.5	0.5- 1.2- 1.5	.32	.32			
	14-41	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	41-53	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	53-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7697---Wymore silty clay loam, 6 to 11 percent slopes														
Wymore	0-6	1- 4- 6	55-61- 67	31-35- 39	1.20-1.30 -1.40	1.41-2.70-4.23	0.21-0.22-0.23	4.3- 6.2- 7.3	2.0- 3.0- 4.0	.32	.32	5	6	48
	6-10	1- 3- 5	53-59- 65	34-38- 42	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	4.9- 6.9- 8.0	1.5- 2.5- 3.5	.37	.37			
	10-16	1- 2- 4	46-52- 57	42-46- 52	1.30-1.40 -1.50	0.01-0.22-0.42	0.12-0.14-0.16	7.6- 8.7-10.5	0.5- 0.8- 1.5	.37	.37			
	16-43	1- 2- 4	52-59- 64	35-39- 45	1.30-1.40 -1.50	0.42-0.91-1.41	0.16-0.17-0.18	5.8- 6.9- 8.5	0.3- 0.5- 0.8	.37	.37			
	43-55	1- 2- 4	56-62- 67	32-36- 40	1.25-1.35 -1.45	1.41-2.70-4.23	0.16-0.17-0.18	4.1- 6.1- 7.1	0.0- 0.3- 0.5	.43	.43			
	55-79	1- 2- 5	58-65- 71	28-33- 38	1.25-1.35 -1.45	1.41-2.70-4.23	0.18-0.19-0.20	3.3- 4.5- 6.6	0.0- 0.3- 0.5	.43	.43			
7750---Nodaway silt loam, occasionally flooded														
Nodaway, occasionally flooded	0-7	1- 7- 10	63-68- 73	18-25- 27	1.25-1.30 -1.35	1.41-2.70-4.23	0.20-0.22-0.23	1.9- 3.8- 4.1	2.0- 3.5- 6.0	.32	.32	5	6	48
	7-12	2-11- 15	59-64- 71	22-25- 27	1.25-1.30 -1.35	1.41-2.70-4.23	0.20-0.22-0.23	2.7- 3.6- 4.6	0.5- 0.7- 0.8	.49	.49			
	12-26	1- 7- 12	64-70- 75	18-23- 27	1.29-1.33 -1.40	1.41-2.70-4.23	0.15-0.18-0.19	1.9- 3.0- 4.0	1.2- 1.6- 2.2	.49	.49			
	26-79	1- 3- 7	67-71- 75	19-26- 27	1.23-1.28 -1.35	1.41-2.70-4.23	0.15-0.18-0.19	2.0- 3.8- 4.0	1.5- 2.0- 2.6	.43	.43			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/In	Pct	Pct					
7774—Colo-Nodaway silty clay loams, frequently flooded														
Colo, occasionally flooded	0-12	- 7-	-62-	27-32- 36	1.28-1.30 -1.32	1.41-2.82-4.23	0.21-0.22-0.23	3.0- 4.5- 5.9	5.0- 6.0- 7.0	.32	.32	5	6	48
	12-36	- 7-	-61-	30-33- 35	1.25-1.30 -1.35	1.41-2.82-4.23	0.18-0.19-0.20	3.0- 4.5- 5.9	3.0- 3.5- 4.0	.32	.32			
	36-60	- 7-	-63-	25-30- 35	1.35-1.40 -1.45	1.41-2.82-4.23	0.18-0.19-0.20	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.43	.43			
Nodaway, frequently flooded	0-7	- 7-	-64-	27-29- 30	1.25-1.30 -1.35	4.23-9.20-14.11	0.20-0.22-0.23	3.0- 4.5- 5.9	2.0- 2.5- 3.0	.37	.37	5	6	48
	7-60	-10-	-68-	18-23- 28	1.25-1.30 -1.35	4.23-9.20-14.11	0.18-0.19-0.20	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.49	.49			
7867—Nodaway silt loam, channeled, frequently flooded														
Nodaway, channeled, frequently flooded	0-4	-10-	-68-	18-23- 27	1.25-1.30 -1.35	4.23-9.20-14.11	0.20-0.22-0.23	0.0- 1.5- 2.9	2.0- 3.0- 4.0	.32	.32	5	6	48
	4-60	- 9-	-67-	18-24- 30	1.25-1.30 -1.35	4.23-9.20-14.11	0.18-0.19-0.20	0.0- 3.0- 5.9	0.5- 0.8- 1.0	.49	.49			

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Physical Soil Properties--Lancaster County, Nebraska														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
7868— Nodaway silt loam, channeled, occasionally flooded														
Nodaway, channeled, occasionally flooded	0-7	2- 7- 10	-69-	18-24- 27	1.25-1.30 -1.35	4.23-9.20-14.11	0.20-0.22-0.23	0.0- 1.5- 2.9	2.0- 2.5- 3.0	.37	.37	5	6	48
	7-80	2- 7- 10	-69-	18-24- 35	1.25-1.30 -1.35	4.23-9.20-14.11	0.20-0.22-0.23	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.49	.49			
9999—Water														
Water	—	—	—	—	—	—	—	—	—					

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Data Source Information

Soil Survey Area: Gage County, Nebraska
 Survey Area Data: Version 23, Jun 8, 2020

Soil Survey Area: Johnson County, Nebraska
 Survey Area Data: Version 21, Jun 9, 2020

Soil Survey Area: Lancaster County, Nebraska
 Survey Area Data: Version 25, Jun 9, 2020

Chemical Soil Properties

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Report—Chemical Soil Properties

Chemical Soil Properties—Gage County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
3820—Butler silt loam, 0 to 1 percent slopes								
Butler	0-10	18-27	—	5.1-6.5	0	0	0	0
	10-12	18-27	—	5.1-6.5	0	0	0	0
	12-34	30-40	—	5.6-7.8	0	0	0	0
	34-43	20-35	—	6.6-8.4	0-5	0	0	0
	43-60	20-35	—	6.6-8.4	0-5	0	0	0
7050—Kennebec silt loam, occasionally flooded								
Kennebec	0-8	17-25	—	5.0-7.3	0	0	0	0
	8-41	17-25	—	5.0-7.3	0	0	0	0
	41-54	17-24	—	6.0-7.3	0	0	0	0
	54-79	16-24	—	6.0-7.3	0	0	0	0
7231—Judson silt loam, 2 to 6 percent slopes								
Judson	0-6	20-23	—	5.6-7.3	0	0	0.0-2.0	0
	6-22	21-26	—	5.6-7.3	0	0	0.0-2.0	0
	22-28	22-27	—	5.6-7.3	0	0	0.0-2.0	0
	28-35	22-28	—	5.6-7.3	0	0	0.0-2.0	0
	35-52	20-27	—	6.1-7.8	0	0	0.0-2.0	0
	52-79	19-25	—	6.1-7.8	0	0	0.0-2.0	0

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Chemical Soil Properties—Gage County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7258—Deroin silty clay loam, 6 to 11 percent slopes, eroded								
Deroin, eroded	0-7	20-35	—	5.6-6.5	0	0	0	0
	7-40	15-25	—	6.1-7.8	0-5	0	0	0
	40-80	10-20	—	6.1-7.8	0-5	0	0	0
7344—Malmo, eroded-Pawnee complex, 6 to 11 percent slopes								
Malmo, eroded	0-6	24-32	—	5.6-6.5	0	0	0.0-2.0	0
	6-22	26-31	—	6.1-7.8	0-5	0	0.0-2.0	0
	22-43	26-31	—	6.1-7.8	0-5	0	0.0-2.0	0
	43-54	19-30	—	7.4-8.4	1-10	0	0.0-2.0	0
	54-79	15-29	—	7.4-8.4	1-10	0	0.0-2.0	0
Pawnee, eroded	0-6	24-31	—	5.1-6.0	0	0	0.0-2.0	0
	6-9	24-31	—	5.1-6.0	0	0	0.0-2.0	0
	9-11	29-35	—	6.1-7.8	0	0	0.0-2.0	0
	11-33	26-32	—	7.4-8.4	0-1	0	0.0-2.0	0
	33-43	22-32	—	7.9-8.4	0-2	0	0.0-2.0	0
	43-79	19-28	—	7.9-8.4	0-12	0	0.0-2.0	0
7349—Malmo clay loam, 2 to 6 percent slopes, eroded								
Malmo, eroded	0-6	25-31	—	5.6-6.5	0	0	0	0
	6-43	30-36	—	6.1-7.8	0-5	0	0	0
	43-54	13-33	—	7.4-8.4	1-10	0	0	0
	54-80	13-33	—	7.4-8.4	1-10	0	0	0

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Chemical Soil Properties—Gage County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7411—Cortland-Malmo complex, 6 to 11 percent slopes, eroded								
Cortland, eroded	0-6	10-30	—	4.5-6.0	0	0	0	0
	6-28	10-30	—	5.1-6.5	0	0	0	0
	28-36	1.0-25	—	5.6-7.3	0	0	0	0
	36-80	1.0-25	—	5.6-7.3	0	0	0	0
Malmo, eroded	0-6	25-31	—	5.6-6.5	0	0	0	0
	6-43	30-36	—	6.1-7.8	0-5	0	0	0
	43-54	13-33	—	7.4-8.4	1-10	0	0	0
	54-80	13-33	—	7.4-8.4	1-10	0	0	0
7464—Otoe silty clay loam, 6 to 11 percent slopes, eroded								
Otoe, eroded	0-6	28-33	—	5.6-7.3	0	0	0.0-2.0	0
	6-18	28-37	—	5.6-7.3	0	0	0.0-2.0	0
	18-32	27-34	—	5.6-7.3	0	0	0.0-2.0	0
	32-40	26-30	—	5.6-7.3	0	0	0.0-2.0	0
	40-57	21-27	—	6.6-7.3	0	0	0.0-2.0	0
	57-79	21-26	—	6.6-7.3	0	0	0.0-2.0	0

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Chemical Soil Properties--Gage County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7689--Wymore silty clay loam, 0 to 2 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-11	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	11-18	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	18-45	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	45-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7693--Wymore silty clay loam, 2 to 6 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-10	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	10-14	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	14-41	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	41-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7750--Nodaway silt loam, occasionally flooded								
Nodaway, occasionally flooded	0-7	16-23	—	6.1-7.3	0	0	0.0-2.0	0
	7-12	18-24	—	6.1-7.3	0	0	0.0-2.0	0
	12-26	15-22	—	6.1-7.3	0	0	0.0-2.0	0
	26-79	16-23	—	6.1-7.3	0	0	0.0-2.0	0

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Chemical Soil Properties--Gage County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7868--Nodaway silt loam, channeled, occasionally flooded								
Nodaway, channeled, occasionally flooded	0-7	20-25	—	6.1-7.3	0	0	0.0-2.0	0
	7-80	20-25	—	6.1-7.3	0	0	0.0-2.0	0

Chemical Soil Properties--Johnson County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7231--Judson silt loam, 2 to 6 percent slopes								
Judson	0-6	20-23	—	5.6-7.3	0	0	0.0-2.0	0
	6-22	21-26	—	5.6-7.3	0	0	0.0-2.0	0
	22-28	22-27	—	5.6-7.3	0	0	0.0-2.0	0
	28-35	22-28	—	5.6-7.3	0	0	0.0-2.0	0
	35-52	20-27	—	6.1-7.8	0	0	0.0-2.0	0
	52-79	19-25	—	6.1-7.8	0	0	0.0-2.0	0
7350--Malmo clay, 3 to 11 percent slopes, eroded								
Malmo, eroded	0-6	25-31	—	5.6-6.5	0	0	0	0
	6-43	30-36	—	6.1-7.8	0-5	0	0	0
	43-54	13-33	—	7.4-8.4	1-10	0	0	0
	54-80	13-33	—	7.4-8.4	1-10	0	0	0

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Chemical Soil Properties--Johnson County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7418--Morrill clay loam, 6 to 11 percent slopes								
Morrill	0-6	22-27	—	5.6-6.5	0	0	0.0-2.0	0
	6-12	15-28	—	5.6-6.5	0	0	0.0-2.0	0
	12-28	16-27	—	5.6-7.3	0	0	0.0-2.0	0
	28-63	16-25	—	5.6-7.3	0	0	0.0-2.0	0
	63-73	14-25	—	5.6-7.3	0	0	0.0-2.0	0
	73-79	5.5-23	—	5.6-7.3	0	0	0.0-2.0	0
7501--Pawnee clay loam, 4 to 8 percent slopes, eroded								
Pawnee, eroded	0-6	22-31	—	5.1-6.0	0	0	0.0-2.0	0
	6-9	22-31	—	5.1-6.0	0	0	0.0-2.0	0
	9-12	29-35	—	6.1-7.8	0	0	0.0-2.0	0
	12-41	26-32	—	7.4-8.4	0-1	0	0.0-2.0	0
	41-51	22-32	—	7.9-8.4	0-2	0	0.0-2.0	0
	51-79	19-28	—	7.9-8.4	0-12	0	0.0-2.0	0
7669--Mayberry clay loam, 3 to 11 percent slopes								
Mayberry	0-16	15-35	—	5.6-6.5	0	0	0	0
	16-56	25-40	—	5.6-7.8	0	0	0	0
	56-60	10-30	—	6.1-8.4	0-5	0	0	0

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Chemical Soil Properties—Johnson County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7689—Wymore silty clay loam, 0 to 2 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-11	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	11-18	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	18-45	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	45-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7693—Wymore silty clay loam, 2 to 6 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-10	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	10-14	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	14-41	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	41-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7750—Nodaway silt loam, occasionally flooded								
Nodaway, occasionally flooded	0-7	16-23	—	6.1-7.3	0	0	0.0-2.0	0
	7-12	18-24	—	6.1-7.3	0	0	0.0-2.0	0
	12-26	15-22	—	6.1-7.3	0	0	0.0-2.0	0
	26-79	16-23	—	6.1-7.3	0	0	0.0-2.0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
3820--Butler silt loam, 0 to 1 percent slopes								
Butler	0-12	18-27	—	5.1-6.5	0	0	0	0
	12-34	30-40	—	5.6-7.8	0	0	0	0
	34-60	20-35	—	6.6-8.4	0-5	0	0	0
3824--Crete silt loam, 0 to 1 percent slopes								
Crete	0-6	17-23	—	5.1-6.0	0	0	0.0-2.0	0
	6-15	21-33	—	5.6-6.5	0	0	0.0-2.0	0
	15-25	30-36	—	6.1-7.3	0	0	0.0-2.0	0
	25-33	28-34	—	6.6-7.8	0	0	0.0-2.0	0
	33-40	25-31	—	6.6-8.4	1-5	0	0.0-2.0	0
	40-79	23-29	—	7.4-8.4	0-3	0	0.0-2.0	0
3952--Fillmore silt loam, frequently ponded								
Fillmore	0-16	15-22	—	5.1-6.5	0	0	0	0
	16-48	32-40	—	5.6-7.8	0	0	0	0
	48-60	22-30	—	6.6-8.4	0-5	0	0	0
7050--Kennebec silt loam, occasionally flooded								
Kennebec	0-8	17-25	—	5.0-7.3	0	0	0	0
	8-41	17-25	—	5.0-7.3	0	0	0	0
	41-54	17-24	—	6.0-7.3	0	0	0	0
	54-79	16-24	—	6.0-7.3	0	0	0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7211--Burchard-Nodaway complex, 2 to 30 percent slopes								
Burchard	0-6	22-26	—	6.6-7.3	0	0	0.0-2.0	0
	6-10	22-29	—	6.6-7.3	0	0	0.0-2.0	0
	10-25	21-28	—	6.6-7.8	0-10	0	0.0-2.0	0
	25-35	21-26	—	7.4-8.4	5-13	0	0.0-2.0	0
	35-47	16-26	—	7.4-8.4	8-14	0	0.0-2.0	0
	47-79	13-25	—	7.4-8.4	8-14	0	0.0-2.0	0
Nodaway, frequently flooded	0-7	19-29	—	6.1-7.3	0	0	0.0-2.0	0
	7-28	15-23	—	6.1-7.3	0	0	0.0-2.0	0
	28-51	18-25	—	6.1-7.3	0	0	0.0-2.0	0
	51-79	15-25	—	6.1-7.3	0	0	0.0-2.0	0
7227--Burchard clay loam, 6 to 11 percent slopes								
Burchard	0-6	22-26	—	6.6-7.3	0	0	0.0-2.0	0
	6-12	22-29	—	6.6-7.3	0	0	0.0-2.0	0
	12-25	21-28	—	6.6-7.8	0-10	0	0.0-2.0	0
	25-35	21-26	—	7.4-8.4	5-13	0	0.0-2.0	0
	35-47	16-26	—	7.4-8.4	8-14	0	0.0-2.0	0
	47-79	13-25	—	7.4-8.4	8-14	0	0.0-2.0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7229—Burchard clay loam, 11 to 17 percent slopes								
Burchard	0-6	22-26	—	6.6-7.3	0	0	0.0-2.0	0
	6-11	22-29	—	6.6-7.3	0	0	0.0-2.0	0
	11-25	21-28	—	6.6-7.8	0-10	0	0.0-2.0	0
	25-35	21-26	—	7.4-8.4	5-13	0	0.0-2.0	0
	35-47	16-26	—	7.4-8.4	8-14	0	0.0-2.0	0
	47-79	13-25	—	7.4-8.4	8-14	0	0.0-2.0	0
7231—Judson silt loam, 2 to 6 percent slopes								
Judson	0-6	20-23	—	5.6-7.3	0	0	0.0-2.0	0
	6-22	21-26	—	5.6-7.3	0	0	0.0-2.0	0
	22-28	22-27	—	5.6-7.3	0	0	0.0-2.0	0
	28-35	22-28	—	5.6-7.3	0	0	0.0-2.0	0
	35-52	20-27	—	6.1-7.8	0	0	0.0-2.0	0
	52-79	19-25	—	6.1-7.8	0	0	0.0-2.0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7344—Malmo, eroded-Pawnee complex, 6 to 11 percent slopes								
Malmo, eroded	0-6	24-32	—	5.6-6.5	0	0	0.0-2.0	0
	6-22	26-31	—	6.1-7.8	0-5	0	0.0-2.0	0
	22-43	26-31	—	6.1-7.8	0-5	0	0.0-2.0	0
	43-54	19-30	—	7.4-8.4	1-10	0	0.0-2.0	0
	54-79	15-29	—	7.4-8.4	1-10	0	0.0-2.0	0
Pawnee, eroded								
	0-6	24-31	—	5.1-6.0	0	0	0.0-2.0	0
	6-9	24-31	—	5.1-6.0	0	0	0.0-2.0	0
	9-11	29-35	—	6.1-7.8	0	0	0.0-2.0	0
	11-33	26-32	—	7.4-8.4	0-1	0	0.0-2.0	0
	33-43	22-32	—	7.9-8.4	0-2	0	0.0-2.0	0
	43-79	19-28	—	7.9-8.4	0-12	0	0.0-2.0	0
7411—Cortland-Malmo complex, 6 to 11 percent slopes, eroded								
Cortland, eroded	0-6	10-30	—	4.5-6.0	0	0	0	0
	6-28	10-30	—	5.1-6.5	0	0	0	0
	28-36	1.0-25	—	5.6-7.3	0	0	0	0
	36-80	1.0-25	—	5.6-7.3	0	0	0	0
Malmo, eroded								
	0-6	25-31	—	5.6-6.5	0	0	0	0
	6-43	30-36	—	6.1-7.8	0-5	0	0	0
	43-54	13-33	—	7.4-8.4	1-10	0	0	0
	54-80	13-33	—	7.4-8.4	1-10	0	0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7422—Morrill clay loam, 6 to 11 percent slopes, eroded								
Morrill, eroded	0-6	22-27	—	5.6-6.5	0	0	0.0-2.0	0
	6-10	15-28	—	5.6-6.5	0	0	0.0-2.0	0
	10-28	16-27	—	5.6-7.3	0	0	0.0-2.0	0
	28-63	16-25	—	5.6-7.3	0	0	0.0-2.0	0
	63-73	14-25	—	5.6-7.3	0	0	0.0-2.0	0
	73-79	5.5-23	—	5.6-7.3	0	0	0.0-2.0	0
7466—Otoe silty clay, 6 to 11 percent slopes, eroded								
Otoe, eroded	0-6	23-32	—	5.1-6.5	0	0	0	0
	6-32	30-46	—	5.6-7.3	0	0	0	0
	32-57	18-29	—	6.6-7.8	0	0	0	0
	57-80	16-33	—	6.6-7.8	0	0	0	0
7501—Pawnee clay loam, 4 to 8 percent slopes, eroded								
Pawnee, eroded	0-6	22-31	—	5.1-6.0	0	0	0.0-2.0	0
	6-9	22-31	—	5.1-6.0	0	0	0.0-2.0	0
	9-12	29-35	—	6.1-7.8	0	0	0.0-2.0	0
	12-41	26-32	—	7.4-8.4	0-1	0	0.0-2.0	0
	41-51	22-32	—	7.9-8.4	0-2	0	0.0-2.0	0
	51-79	19-28	—	7.9-8.4	0-12	0	0.0-2.0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7507—Pawnee clay loam, 6 to 11 percent slopes, eroded								
Pawnee, eroded	0-6	24-31	—	5.1-6.0	0	0	0.0-2.0	0
	6-9	24-31	—	5.1-6.0	0	0	0.0-2.0	0
	9-11	29-35	—	6.1-7.8	0	0	0.0-2.0	0
	11-33	26-32	—	7.4-8.4	0-1	0	0.0-2.0	0
	33-43	22-32	—	7.9-8.4	0-2	0	0.0-2.0	0
	43-79	19-28	—	7.9-8.4	0-12	0	0.0-2.0	0
7585—Shelby clay loam, 7 to 12 percent slopes								
Shelby	0-6	22-28	—	5.1-7.3	0	0	0.0-2.0	0
	6-10	22-28	—	5.1-7.3	0	0	0.0-2.0	0
	10-13	23-28	—	5.1-7.3	0	0	0.0-2.0	0
	13-37	23-27	—	5.1-7.3	0	0	0.0-2.0	0
	37-50	20-25	—	6.6-8.4	0-5	0	0.0-2.0	0
	50-79	20-25	—	6.6-8.4	0-10	0	0.0-2.0	0
7614—Steinauer clay loam, 6 to 11 percent slopes, eroded								
Steinauer, eroded	0-5	21-26	—	7.4-8.4	2-8	0	0.0-2.0	0
	5-15	21-25	—	7.9-8.4	14-19	0	0.0-2.0	0
	15-57	9.1-23	—	7.9-8.4	5-15	0	0.0-2.0	0
	57-79	8.9-23	—	7.9-8.4	5-15	0	0.0-2.0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7616—Steinauer loam, 6 to 11 percent slopes								
Steinauer	0-6	20-22	—	7.4-8.4	2-8	0	0.0-2.0	0
	6-15	21-25	—	7.9-8.4	14-19	0	0.0-2.0	0
	15-57	9.1-23	—	7.9-8.4	5-15	0	0.0-2.0	0
	57-79	8.9-23	—	7.9-8.4	5-15	0	0.0-2.0	0
7617—Steinauer loam, 11 to 30 percent slopes								
Steinauer	0-5	23-27	—	7.4-8.4	2-8	0	0.0-2.0	0
	5-15	21-25	—	7.9-8.4	14-19	0	0.0-2.0	0
	15-57	9.1-23	—	7.9-8.4	5-15	0	0.0-2.0	0
	57-79	8.9-23	—	7.9-8.4	5-15	0	0.0-2.0	0
7666—Mayberry silty clay loam, 3 to 6 percent slopes, eroded								
Mayberry	0-12	15-35	—	5.6-6.5	0	0	0	0
	12-48	25-40	—	5.6-7.3	0	0	0	0
	48-60	10-30	—	6.1-7.8	0	0	0	0
7668—Mayberry silty clay loam, 6 to 11 percent slopes, eroded								
Mayberry	0-12	15-35	—	5.6-6.5	0	0	0	0
	12-48	25-40	—	5.6-7.3	0	0	0	0
	48-60	10-30	—	6.1-7.8	0	0	0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7680—Wymore silty clay loam, 0 to 1 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-11	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	11-18	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	18-45	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	45-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7681—Wymore silty clay loam, 1 to 3 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-11	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	11-18	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	18-45	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	45-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7684—Wymore silty clay loam, 3 to 6 percent slopes, eroded								
Wymore, eroded	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-11	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	11-40	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	40-51	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	51-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0

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Chemical Soil Properties--Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7689--Wymore silty clay loam, 0 to 2 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-11	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	11-18	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	18-45	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	45-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7693--Wymore silty clay loam, 2 to 6 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-10	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	10-14	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	14-41	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	41-53	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	53-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0
7697--Wymore silty clay loam, 6 to 11 percent slopes								
Wymore	0-6	25-31	—	5.6-6.5	0	0	0.0-2.0	0
	6-10	27-33	—	5.6-6.5	0	0	0.0-2.0	0
	10-16	31-38	—	5.6-7.3	0	0	0.0-2.0	0
	16-43	26-33	—	6.1-7.3	0-2	0	0.0-2.0	0
	43-55	22-29	—	6.6-7.8	0-2	0	0.0-2.0	0
	55-79	19-28	—	6.6-7.8	0-2	0	0.0-2.0	0

5-97

Chemical Soil Properties—Lancaster County, Nebraska								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
7750—Nodaway silt loam, occasionally flooded								
Nodaway, occasionally flooded	0-7	16-23	—	6.1-7.3	0	0	0.0-2.0	0
	7-12	18-24	—	6.1-7.3	0	0	0.0-2.0	0
	12-26	15-22	—	6.1-7.3	0	0	0.0-2.0	0
	26-79	16-23	—	6.1-7.3	0	0	0.0-2.0	0
7774—Colo-Nodaway silty clay loams, frequently flooded								
Colo, occasionally flooded	0-12	36-41	—	5.6-7.3	0	0	0	0
	12-36	36-41	—	5.6-7.3	0	0	0	0
	36-60	30-36	—	6.1-7.3	0	0	0	0
Nodaway, frequently flooded	0-7	20-25	—	6.1-7.3	0	0	0.0-2.0	0
	7-60	20-25	—	6.1-7.3	0	0	0.0-2.0	0
7867—Nodaway silt loam, channeled, frequently flooded								
Nodaway, channeled, frequently flooded	0-4	15-30	—	6.1-7.3	0	0	0.0-2.0	0
	4-60	10-25	—	6.1-7.3	0	0	0.0-2.0	0
7868—Nodaway silt loam, channeled, occasionally flooded								
Nodaway, channeled, occasionally flooded	0-7	20-25	—	6.1-7.3	0	0	0.0-2.0	0
	7-80	20-25	—	6.1-7.3	0	0	0.0-2.0	0
9999—Water								
Water	—	—	—	—	—	—	—	—

5-98

Data Source Information

Soil Survey Area: Gage County, Nebraska
Survey Area Data: Version 23, Jun 8, 2020

Soil Survey Area: Johnson County, Nebraska
Survey Area Data: Version 21, Jun 9, 2020

Soil Survey Area: Lancaster County, Nebraska
Survey Area Data: Version 25, Jun 9, 2020

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Return to Search Page
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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Due to possibility of a well being in more than one series, an individual well might be listed more than once.

1 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-141078 WellID: 178295 View Details View Logs View Scans	D A	Gage Lower Big Blue 5N 7E 5 NENE 843N 197E Map It	2/11/2006 8/7/2006 115470180611194	--- 30 gpm 55 ft 65 ft PRO	1 in 130 ft 130 ft	Bonnie Mae Bartlett OwnerID: 104735 9129 South 54th Road Cortland NE 68331
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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11 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-121094 WellID: 148328 N57 View Details View Logs View Scans	C I	Gage Nemaha 6N 8E 17 SWNE Map It 40°29' 18.390" -96°32' 54.810"	3/14/2003 4/22/2003 105094903011003	-- -- 36 ft -- PRO	-- -- 103 ft	E Energy Adams LLC OwnerID: 84311 510 Main Street PO Box 49 Adams NE 68301
G-142405 WellID: 171497 N137 View Details View Logs View Scans	C A	Gage Nemaha 6N 8E 17 SENW 2454N 1699W Map It 40°29' 15.000" -96°33' 8.200"	9/19/2006 11/13/2006 11631780677963	-- 276 gpm 45 ft 68.6 ft PRO	4 in 80 ft 99 ft	E Energy Adams LLC OwnerID: 84311 510 Main Street PO Box 49 Adams NE 68301
G-142406 WellID: 171498 N138 View Details View Logs View Scans	C A	Gage Nemaha 6N 8E 17 NESW 2372S 2054W Map It 40°29' 10.600" -96°33' 2.600"	9/20/2006 11/13/2006 116318906729198	-- 300 gpm 29 ft 65 ft PRO	4 in 80 ft 98 ft	E Energy Adams LLC OwnerID: 84311 510 Main Street PO Box 49 Adams NE 68301
G-139537 WellID: 176022 View Details View Logs View Scans	L X	Gage Nemaha 6N 8E 17 NESW 2339S 2060W Map It 40°29' 10.300" -96°33' 1.100"	3/16/2006 4/12/2006 7/1/2006 11351045073761	-- -- 33 ft -- PRO	-- -- 97 ft	E Energy Adams LLC OwnerID: 84311 510 Main Street PO Box 49 Adams NE 68301

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-139539 WellID: 176024 View Details View Logs View Scans	L X	Gage Nemaha 6N 8E 17 SENW 2503N 1637W Map It 40°29' 14.600" -96°33' 8.100"	3/16/2006 4/12/2006 7/1/2006 114476942628883	-- -- 29 ft -- PRO	-- -- 100 ft	E Energy Adams LLC OwnerID: 84311 510 Main Street PO Box 49 Adams NE 68301
G-141650 WellID: 179087 View Details View Logs View Scans	D I	Gage Nemaha 6N 8E 17 NWSE 1421S 1788E Map It 40°29' 1.700" -96°32' 44.500"	8/2/2006 9/12/2006 115798920389	-- -- 30 ft 41 ft PRO	-- -- 112 ft	E Energy Adams LLC OwnerID: 84311 510 Main Street PO Box 49 Adams NE 68301
G-145468 WellID: 181563 N289 View Details View Logs View Scans	C A	Gage Nemaha 6N 8E 17 NESW Map It 40°29' 2.110" -96°33' 0.420"	1/23/2007 7/20/2007 11848529514511	-- 300 gpm 29 ft 68 ft PRO	6 in 89 ft 106 ft	E Energy Adams LLC OwnerID: 84311 510 Main Street PO Box 49 Adams NE 68301
G-173892 WellID: 234713 View Details View Logs View Scans	Q A	Gage Nemaha 6N 8E 17 NWNW 7N 69W Map It 40°29' 38.700" -96°33' 28.300"	7/17/2014 9/26/2014 14115945677031	-- -- -- -- PRO	-- -- 93 ft	Leroy Wallman OwnerID: 85070 3180 South 120 Road Adams NE 68301
G-175833 WellID: 237430 View Details View Logs View Scans	D A	Gage Nemaha 6N 8E 17 SENE 2352N 266E Map It 40°29' 17.000" -96°32' 25.000"	1/30/2015 4/6/2015 142739732023161	-- 12 gpm 28 ft 50 ft PRO	1 in 80 ft 95 ft	Gary Kroese OwnerID: 131028 3042 South 148th Adams NE 68301
WellID: 237460 View Details View Logs View Scans	D U	Gage Nemaha 6N 8E 17 SENE Map It 40°29' 20.000" -96°32' 24.000"	3/11/2015 --	-- -- -- -- PRO	-- -- 39 ft	Gary Kroese OwnerID: 131028 3042 South 148th Adams NE 68301
WellID: 237461 View Details View Logs View Scans	D U	Gage Nemaha 6N 8E 17 SENE Map It 40°29' 17.000" -96°32' 23.000"	3/16/2015 --	-- -- -- -- PRO	-- -- 37 ft	Gary Kroese OwnerID: 131028 3042 South 148th Adams NE 68301

Next

Data copy of requested wells.

Data copy of Geo Logs for requested wells.

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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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Note:
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Due to possibility of a well being in more than one series, an individual well might be listed more than once.

3 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-023539 WellID: 29979 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 17 SESW 1120S 1500W Map It	8/12/1964 12/23/1964 --	240 1000 gpm 96 ft 105 ft PRO	6 in -- 280 ft	DeBoer Farms Inc OwnerID: 84864 12350 Princeton Rd Firth NE 68358
G-031117 WellID: 38047 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 17 SWSE 1000S 1400E Map It	5/28/1967 3/21/1969 --	160 750 gpm 84 ft 100 ft PRO	6 in -- 269 ft	DeBoer Farms Inc OwnerID: 84864 12350 Princeton Rd Firth NE 68358
G-052970 WellID: 60528 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 17 NESW Map It 40°34' 27.400" -96°33' 12.100"	11/18/1976 11/22/1976 --	160 800 gpm 120 ft 169 ft PRO	8 in -- 303 ft	DeBoer Farms Inc OwnerID: 84864 12350 Princeton Rd Firth NE 68358

Next

- 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.
- Data copy of requested contacts.

Legend and Notes

S19-T6N-R8E

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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0 Records Found

Registration#	Use	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

Return to Search Page
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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3 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-041028 WellID: 48281 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 19 SWSW 600S 20W Map It	2/2/1974 5/13/1974 ---	120 1200 gpm 137 ft 154 ft PRO	8 in --- 325 ft	Golden Link Inc OwnerID: 62470 12000 Pella Rd Firth NE 68358
G-048498 WellID: 55962 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 19 SESE 600S 65E Map It	12/28/1975 1/21/1976 ---	160 800 gpm 136 ft 150 ft PRO	9 in --- 333 ft	Golden Link Inc OwnerID: 62470 12000 Pella Rd Firth NE 68358
G-096648 WellID: 113257 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 8E 19 NWNW 296N 1252W Map It	5/9/1998 6/19/1998 ---	--- 22 gpm 113 ft 160 ft PRO	4 in 3 ft 261 ft	Gary D Reese OwnerID: 60874 6201 South 57th Lincoln NE 68516
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

Return to Search Page
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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5 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-037298 WellID: 44446 View Details View Logs View Scans	I A	Gage Lower Big Blue 5N 6E 20 NW Map It	6/2/1972 7/28/1972 ---	210 600 gpm 163 ft 218 ft PRO	7 in --- 239 ft	Cathy L Heetderks OwnerID: 39787 28180 South 176th Road Adams NE 68301
G-052982 WellID: 60542 View Details View Logs View Scans	I A	Gage Lower Big Blue 5N 6E 20 SWNW Map It	11/11/1976 11/23/1976 ---	217 850 gpm 175 ft 184 ft PRO	8 in --- 258 ft	Cathy L Heetderks OwnerID: 39787 28180 South 176th Road Adams NE 68301
G-057279 WellID: 64947 View Details View Logs View Scans	I A	Gage Lower Big Blue 5N 6E 20 NESE Map It	6/30/1977 7/19/1977 ---	140 800 gpm 180 ft 204 ft PRO	8 in --- 249 ft	General Agricultural Services LLC OwnerID: 20418 PO Box 489 Beatrice NE 68310
G-106990 WellID: 124698 LBB-0079 View Details View Logs View Scans	I A	Gage Lower Big Blue 5N 6E 20 SWSW 1300S 1300W Map It	3/28/2000 9/7/2000 ---	160 1200 gpm 160 ft 186 ft PRO	8 in 220 ft 247 ft	General Agricultural Services LLC OwnerID: 20418 PO Box 489 Beatrice NE 68310

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
WellID: 227854 View Details View Logs View Scans	D U	Gage Lower Big Blue 5N 6E 20 NESE Map It 40°22' 58.860" -96°45' 43.320"	3/27/2013 ---	--- --- --- --- PRO	--- --- 315 ft	Loren D Huls OwnerID: 24505 2226 W Pickrell Pickrell NE 68422
Next						

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.

Data copy of requested contacts.

Legend and Notes

Return to Search Page
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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3 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-047388 WellID: 54827 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 20 NWNW 1310N 1310W Map It	9/29/1975 10/31/1975 ---	130 800 gpm 85 ft 115 ft PRO	9 in --- 257 ft	Norma Kroese OwnerID: 17139 PO Box 585 Fremont NE 68026
G-121039 WellID: 149233 View Details View Logs View Scans	S A	Lancaster Nemaha 7N 8E 20 SESE 60S 1100E Map It	9/18/1999 4/18/2003 ---	--- 45 gpm 146 ft 170 ft PRO	2 in 165 ft 277 ft	PrairieLand Dairy LLC OwnerID: 72318 13000 Pella Road Firth NE 68358
G-121040 WellID: 149234 View Details View Logs View Scans	S A	Lancaster Nemaha 7N 8E 20 SESE 60S 1075E Map It	10/5/1999 4/18/2003 ---	--- 45 gpm 145 ft 170 ft PRO	16.5 in 2 ft 277 ft	PrairieLand Dairy LLC OwnerID: 72318 13000 Pella Road Firth NE 68358
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

Return to Search Page
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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2 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-056467 WellID: 64102 View Details View Logs View Scans	I A	Johnson Nemaha 5N 9E 21 SW Map It	5/27/1977 6/1/1977 --	139 800 gpm 187 ft 208 ft PRO	8 in --- 390 ft	Harold Fritz OwnerID: 19975 Adams NE 68301
G-062947 WellID: 70828 View Details View Logs View Scans	I A	Johnson Nemaha 5N 9E 21 SE Map It	12/20/1979 1/3/1980 --	130 900 gpm 187 ft 209 ft PRO	8 in --- 387 ft	Garry J Heetderks OwnerID: 87442 28180 South 176th Road Adams NE 68301
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

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2 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-047389 WellID: 54828 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 21 NWNW 1310N 1310W Map It	9/25/1975 10/31/1975 ---	130 800 gpm 60 ft 90 ft PRO	9 in -- 214 ft	Janet Larae Kroese OwnerID: 28151 804 Country View Drive PO Box 252 Firth NE 68358
G-047390 WellID: 54829 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 21 NWSW 1330S 1330W Map It	9/23/1975 10/31/1975 ---	130 800 gpm 96 ft 106 ft PRO	9 in -- 273 ft	David B & Chrystal J Obbink OwnerID: 35239 12800 Firth Rd Firth NE 68358

Next

- 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.
- Data copy of requested contacts.

Legend and Notes

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

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12 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-048850 WellID: 56317 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 7E 22 NWSE Map It 40°33' 29.010" -96°36' 59.290"	4/5/1970 3/2/1976 ---	135 2000 gpm 30 ft 45 ft PRO	8 in --- 315 ft	Linda R DeBoer Trustee OwnerID: 97877 608 Abraham St Firth NE 68358
G-088700 WellID: 100721 View Details View Logs View Scans	D A	Lancaster Lower Platte South 7N 7E 22 SENE 2260N 405E Map It	6/21/1996 7/19/1996 ---	--- 18 gpm 110 ft 150 ft PRO	1 in 200 ft 262 ft	Ray Werner OwnerID: 55885 116 Brentwood Hickman NE 68372
G-090729 WellID: 106083 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 22 SWSW 800S 300W Map It	1/18/1997 2/25/1997 ---	--- 50 gpm 105 ft 150 ft PRO	1 in 160 ft 313 ft	Clifford E Moormeier OwnerID: 57173 26200 South 54th Firth NE 68358
G-148345 WellID: 186898 N313 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 7E 22 NE 1320N 1345E Map It	9/4/2007 2/13/2008 119790787014093	67 1200 gpm 115 ft 128 ft PRO	8 in 180 ft 319 ft	Darrell TeSelle OwnerID: 94795 7900 Pella Road Firth NE 68358
G-150179 WellID: 193822 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 22 SENE Map It 40°33' 36.000" -96°36' 38.900"	6/4/2008 8/22/2008 121934660024156	--- --- --- --- PRO	--- --- 85 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-150180 WellID: 193823 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 22 NESE Map It 40°33' 35.900" -96°36' 39.000"	6/4/2008 8/22/2008 12193473006615	--- --- --- --- PRO	-- --- 135 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450
G-150181 WellID: 193824 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 22 NESE Map It 40°33' 35.800" -96°36' 39.100"	6/5/2008 8/22/2008 121934818025861	--- --- --- --- PRO	-- --- 218 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450
G-150182 WellID: 193825 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 22 NESE Map It 40°33' 35.800" -96°36' 39.200"	6/9/2008 8/22/2008 12193486668144	--- --- --- --- PRO	-- --- 320 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450
G-150785 WellID: 194744 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 22 NWSE 2133S 1601E Map It 40°33' 31.000" -96°36' 58.100"	4/11/2008 10/10/2008 ---	-- 20 gpm 120 ft 125 ft PRO	1.25 in 180 ft 272 ft	Larry Laux OwnerID: 100717 25805 S 82nd Firth NE 68358
G-160971 WellID: 214035 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 22 NWSW 1742S 699W Map It 40°33' 27.000" -96°37' 36.600"	7/5/2011 11/18/2011 ---	--- 20 gpm 87 ft 95 ft PRO	1.25 in 160 ft 252 ft	Ken Weber OwnerID: 118436 3330 Saltillo Rd Roca NE 68430
G-174579 WellID: 235602 View Details View Logs View Scans	S A	Lancaster Nemaha 7N 7E 22 NENE 535N 938E Map It 40°33' 56.750" -96°36' 49.930"	10/1/2014 11/24/2014 ---	--- 20 gpm 84 ft 90 ft PRO	1.25 in 140 ft 250 ft	Gary Kubicek OwnerID: 128844 7855 Princeton Rd Firth NE 68358
G-187882 WellID: 258106 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 22 SWSW Map It 40°33' 16.650" -96°37' 39.390"	6/11/2019 8/14/2019 ---	-- 20 gpm 72 ft 80 ft PRO	1.25 in 140 ft 237 ft	Ben Weber OwnerID: 143263 117 Wagon Train Ave Hickman NE 68372

Next

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.

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Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

Note:

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3 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-130159 WellID: 162415 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 8E 22 NESE 1683S 1063E Map It 40°33' 25.400" -96°30' 18.900"	9/29/2004 10/7/2004 10970681062132	--- 20 gpm 180 ft 155 ft PRO	1.25 in 12 ft 200 ft	Aaron & Kenda Fink OwnerID: 78877 300 North Coddington Avenue Lincoln NE 68528
G-130160 WellID: 162416 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 8E 22 NESE 2303S 833E Map It 40°33' 31.500" -96°30' 15.900"	9/28/2004 10/7/2004 109706928112812	--- 20 gpm 141 ft 155 ft PRO	1.25 in 180 ft 214 ft	Scott & Julie Hudson OwnerID: 78878 3430 Cascade Circle Lincoln NE 68504
G-159308 WellID: 204344 N403 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 22 SWSW Map It 40°33' 21.400" -96°30' 57.000"	4/11/2011 5/27/2011 130644219514402	120 1200 gpm 93 ft 116 ft PRO	8 in 160 ft 245 ft	Harlan Doeschot OwnerID: 17226 15100 Pella Road Adams NE 68301
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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11 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-139506 WellID: 174939 View Details View Logs View Scans	D I	Gage Nemaha 6N 7E 24 NWNE 673N 2159E Map It 40°28' 40.700" -96°34' 46.400"	1/29/2003 4/10/2006 11444211094626	--- --- 58 ft 80 ft PRO	--- --- 103 ft	Roy Mulder OwnerID: 83689 6005 East Gage Road Firth NE 68358
G-140271 WellID: 176955 View Details View Logs View Scans	D A	Gage Nemaha 6N 7E 24 NWNE 561N 1411E Map It 40°28' 42.000" -96°34' 36.700"	5/16/2006 6/12/2006 11498648039369	--- 15 gpm 58 ft 65 ft PRO	1 in 80 ft 95 ft	Roy Mulder OwnerID: 83689 6005 East Gage Road Firth NE 68358
G-141037 WellID: 178100 View Details View Logs View Scans	D A	Gage Nemaha 6N 7E 24 NENE 617N 791E Map It 40°28' 41.600" -96°34' 28.700"	7/17/2006 8/3/2006 11543590535505	--- 30 gpm 58 ft 71 ft PRO	2 in 100 ft 111 ft	Roy Mulder OwnerID: 83689 6005 East Gage Road Firth NE 68358
G-142206 WellID: 180010 View Details View Logs View Scans	D A	Gage Nemaha 6N 7E 24 SWNE 1539N 2320E Map It 40°28' 32.100" -96°34' 48.400"	10/2/2006 10/25/2006 116170425513998	--- 15 gpm 41 ft 50 ft PRO	1 in 50 ft 89 ft	Todd Britson OwnerID: 90335 4650 South 103rd Lane Adams NE 68301

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-147688 WellID: 189721 View Details View Logs View Scans	D I	Gage Nemaha 6N 7E 24 NWNE 735N 2054E Map It 40°28' 40.100" -96°34' 45.000"	10/19/2004 12/28/2007 119878184325732	--- --- 63 ft 75 ft PRO	--- --- 121 ft	Leon Mennenga OwnerID: 96766 PO Box 394 Tilden NE 68781
G-150758 WellID: 194719 View Details View Logs View Scans	D A	Gage Nemaha 6N 7E 24 NWNE 554N 2431E Map It 40°28' 41.800" -96°34' 49.900"	8/9/2008 10/9/2008 ---	--- 15 gpm 61 ft 61 ft PRO	1 in 80 ft 94 ft	Bruce & Algene Andrews OwnerID: 100699 PO Box 121 Beatrice NE 68310
G-152154 WellID: 197405 View Details View Logs View Scans	D I	Gage Nemaha 6N 7E 24 NWNE 997N 2526E Map It 40°28' 37.400" -96°34' 51.100"	1/20/2009 2/10/2009 ---	--- --- 57 ft 79 ft PRO	--- --- 95 ft	Adam M & Chelsea J Schaaf OwnerID: 101973 4550 103rd Ln Adams NE 68301
G-153693 WellID: 200118 View Details View Logs View Scans	D A	Gage Nemaha 6N 7E 24 SWNE 1667N 2513E Map It 40°28' 30.800" -96°34' 50.900"	6/4/2009 8/19/2009 ---	--- 15 gpm 39 ft 45 ft PRO	1.25 in 65 ft 84 ft	Jerry Orcutt OwnerID: 114198 PO Box 726 Kemah TX 77565
G-158508 WellID: 209453 View Details View Logs View Scans	D A	Gage Nemaha 6N 7E 24 SESE 282S 144E Map It 40°27' 58.000" -96°34' 20.100"	12/17/2010 2/17/2011 ---	--- 10 gpm 17 ft 25 ft PRO	1 in 40 ft 61 ft	Buhr Trucking OwnerID: 116561 Box 974 Adams NE 68301
G-159248 WellID: 210862 View Details View Logs View Scans	D A	Gage Nemaha 6N 7E 24 NWNE 666N 1644E Map It 40°28' 40.900" -96°34' 39.700"	3/29/2011 5/23/2011 13060227947031	--- 15 gpm 60 ft 60 ft PRO	1 in 90 ft 100 ft	Tom Renniger OwnerID: 117047 PO Box 556 Mullen NE 69152
G-181723 WellID: 246877 View Details View Logs View Scans	D I	Gage Nemaha 6N 7E 24 NWNE 584N 2461E Map It 40°28' 41.500" -96°34' 50.300"	7/28/2016 1/19/2017 ---	--- --- 59 ft --- PRO	--- --- 104 ft	Bruce & Algene Andrews OwnerID: 100699 PO Box 121 Beatrice NE 68310

Next

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.
Data copy of requested contacts.

Legend and Notes

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

Note:

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

2 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-051647 WellID: 59184 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 7E 24 SENE Map It 40°33' 49.400" -96°34' 28.800"	7/5/1976 8/27/1976 --	94 1300 gpm 135 ft 157 ft PRO	8 in -- 338 ft	Dean Lefferdink OwnerID: 29202 Hickman NE 68372
G-159311 WellID: 209860 N426 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 7E 24 SESW Map It 40°33' 22.500" -96°35' 11.000"	3/30/2011 5/27/2011 130644393617895	160 1200 gpm 114 ft 129 ft PRO	8 in 170 ft 320 ft	SJD Farms LLC OwnerID: 116675 PO Box 85506 Lincoln NE 68501
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

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Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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1 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
WellID: 234242 View Details View Logs View Scans	S U	Gage Nemaha 6N 7E 25 SESE Map It 40°27' 5.000" -96°34' 32.000"	7/3/2014 ---	--- --- --- --- PRO	-- -- 64 ft	Larry Agena OwnerID: 128193 1225 Main Adams NE 68301

Next

- 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.
- Data copy of requested contacts.

Legend and Notes

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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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1 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-101997 WellID: 120017 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 8E 27 NENW 120N 1600W Map It	2/10/1997 9/13/1999 --	-- 40 gpm 76 ft 100 ft PRO	1 in 90 ft 152 ft	Ronald Essink OwnerID: 40313 RR 1 Adams NE 68301
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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4 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-047512 WellID: 54953 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 29 SWNE Map It	10/24/1975 11/10/1975 ---	200 800 gpm 149 ft 166 ft PRO	9 in --- 305 ft	Wilbur Obbink OwnerID: 34226 RR 1 Firth NE 68358
G-053391 WellID: 60954 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 29 NWNW 300N 800W Map It	11/19/1976 12/10/1976 ---	140 800 gpm 122 ft 136 ft PRO	8 in --- 277 ft	Ivan Walvoord OwnerID: 44921 RR Firth NE 68358
G-079059 WellID: 87721 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 29 NWSE 1350S 1420E Map It	8/16/1993 9/24/1993 ---	120 800 gpm 166 ft 186 ft PRO	8 in --- 304 ft	Obbink Dairy OwnerID: 50621 27605 South 134th Street Firth NE 68358
G-188887 WellID: 259573 View Details View Logs View Scans	L A	Lancaster Nemaha 7N 8E 29 SESE 59S 1240E Map It 40°32' 18.100" -96°32' 39.300"	8/1/2019 1/2/2020 157799914425677	--- --- 169.8 ft --- PRO	--- --- 336 ft	Carlos Monzon OwnerID: 144113 13160 Firth Rd Firth NE 68358
Next						

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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Note:

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3 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-133441 WellID: 167463 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 8E 33 SESE 279S 1053E Map It 40°31' 27.900" -96°31' 28.700"	11/9/2004 5/2/2005 --	--- 10 gpm 143 ft 155 ft PRO	1.25 in 200 ft 288 ft	Randy Leber OwnerID: 81418 4025 J Street Lincoln NE 68510
G-150726 WellID: 192855 N341 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 33 NWSW 1350S 1300W Map It	10/2/2008 10/8/2008 12234102917399	130 1000 gpm 157 ft 174 ft PRO	8 in 220 ft 300 ft	Steven R DeBoer OwnerID: 99381 12350 Princeton Road Firth NE 68358
G-162691 WellID: 213957 N449 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 33 SWNE Map It 40°32' 4.000" -96°31' 32.600"	11/22/2011 5/14/2012 13364068453168	140 1200 gpm 122 ft 134 ft PRO	8 in 180 ft 315 ft	Nick Heetderks OwnerID: 118403 14171 Firth Road Firth NE 68358
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

S35-T6N-R8E

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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0 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

Return to Search Page
Nebraska Department of Natural Resources
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

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1 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-167298 WellID: 224833 N514 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 6E 35 SWNE 1358N 2569E Map It 40°32' 2.100" -96°42' 48.800"	5/14/2013 5/29/2013 1369755175918	130 800 gpm 164 ft 240 ft PRO	8 in 280 ft 350 ft	David Schwaninger OwnerID: 25479 28500 SW 14th Martell NE 68404
Next						

- 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.
- Data copy of requested contacts.

Legend and Notes

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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
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98 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-048851 WellID: 56318 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 7E 35 NWSW 1234S 43W Map It 40°31' 38.070" -96°36' 35.780"	9/15/1968 3/2/1976 ---	60 2000 gpm 20 ft 30 ft PRO	8 in --- 150 ft	Linda R DeBoer Trustee OwnerID: 97877 608 Abraham St Firth NE 68358
G-078852 WellID: 87515 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 780N 965W Map It	8/1/1990 9/8/1993 11/10/2010 ---	--- --- 6 ft --- PRO	--- --- 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078853 WellID: 87516 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 855N 790W Map It	8/1/1990 9/8/1993 11/10/2010 ---	--- --- 26 ft --- PRO	--- --- 60 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078854 WellID: 87517 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 870N 800W Map It	8/1/1990 9/8/1993 11/10/2010 ---	--- --- 7 ft --- PRO	--- --- 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-078855 WellID: 87518 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 905N 590W Map It	8/1/1990 9/8/1993 11/10/2010 --- ---	--- --- 7 ft --- PRO	--- --- 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078856 WellID: 87519 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 955N 970W Map It	8/1/1990 9/8/1993 11/10/2010 ---	--- --- 12 ft --- PRO	--- --- 35 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078857 WellID: 87520 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 980N 820W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 6 ft --- PRO	--- --- 40 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078858 WellID: 87521 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1050N 600W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 8 ft --- PRO	--- --- 38 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078859 WellID: 87522 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1080N 900W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 4 ft --- PRO	--- --- 40 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078860 WellID: 87523 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1130N 690W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- --- --- PRO	--- --- 38 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078861 WellID: 87524 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1130N 692W Map It	6/1/1992 9/8/1993 11/10/2010 ---	--- --- --- --- PRO	--- --- 34 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078862 WellID: 87525 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1190N 630W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 7 ft --- PRO	--- --- 38 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-078863 WellID: 87526 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1220N 690W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 6 ft --- PRO	-- --- 47 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078864 WellID: 87527 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1220N 800W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 4 ft --- PRO	-- --- 37 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078865 WellID: 87528 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1247N 750W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 4 ft --- PRO	-- --- 48 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078866 WellID: 87529 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWNW 1255N 900W Map It	7/1/1988 9/8/1993 11/12/2010 ---	--- --- 5 ft --- PRO	-- --- 49 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078867 WellID: 87530 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1330N 570W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 6 ft --- PRO	-- --- --- ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078868 WellID: 87531 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1425N 750W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- --- --- PRO	-- --- 48 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078869 WellID: 87532 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1430N 620W Map It	7/1/1988 9/8/1993 11/10/2010 ---	--- --- 3 ft --- PRO	-- --- 45 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-078870 WellID: 87533 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1455N 670W Map It	6/1/1992 9/8/1993 11/10/2010 ---	--- --- --- --- PRO	-- --- 34 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-078871 WellID: 87534 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1530N 730W Map It	8/1/1990 9/8/1993 11/10/2010 ---	--- --- 25 ft --- PRO	--- --- 68 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-080380 WellID: 89036 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2140N 510W Map It	1/12/1994 2/14/1994 ---	--- --- 7 ft --- PRO	--- --- 21 ft	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080381 WellID: 89037 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2140N 715W Map It	1/14/1994 2/14/1994 ---	--- --- 3 ft --- PRO	--- --- 21 ft	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080382 WellID: 89038 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2180N 530W Map It	1/12/1994 2/14/1994 ---	--- --- 7 ft --- PRO	--- --- 21 ft	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080383 WellID: 89039 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2285N 530W Map It	1/12/1994 2/14/1994 ---	--- --- 10 ft --- PRO	--- --- 21 ft	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080384 WellID: 89040 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2395N 505W Map It	1/12/1994 2/14/1994 ---	--- --- --- --- PRO	--- --- 21 ft	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080385 WellID: 89041 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2415N 690W Map It	1/14/1994 2/14/1994 ---	--- --- 12 ft --- PRO	--- --- 21 ft	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080386 WellID: 89042 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2440N 840W Map It	1/17/1994 2/14/1994 ---	--- --- 10 ft --- PRO	--- --- 20 ft	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-080387 WellID: 89043 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2450N 560W Map It	1/12/1994 2/14/1994 --- ---	--- --- 15 ft --- PRO	--- --- 20 ft ---	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080388 WellID: 89044 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2455N 780W Map It	1/17/1994 2/14/1994 --- ---	--- --- 12 ft --- PRO	--- --- 20 ft ---	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080389 WellID: 89045 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2520N 810W Map It	1/17/1994 2/14/1994 --- ---	--- --- 15 ft --- PRO	--- --- 20 ft ---	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080390 WellID: 89046 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2590N 310W Map It	1/17/1994 2/14/1994 --- ---	--- --- 13 ft --- PRO	--- --- 20 ft ---	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080391 WellID: 89047 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2630N 710W Map It	1/17/1994 2/14/1994 --- ---	--- --- 14 ft --- PRO	--- --- 20 ft ---	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-080392 WellID: 89048 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWNW 2635N 980W Map It	1/13/1994 2/14/1994 --- ---	--- --- 21 ft --- PRO	--- --- 21 ft ---	Ron Preston OwnerID: 51076 Box 278 Firth NE 68358
G-085708A WellID: 97070 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 3770S 510W Map It	4/4/1995 9/28/1995 11/10/2010 ---	--- --- 96 ft --- PRO	--- --- 18 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708B WellID: 97080 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 3820S 370W Map It	4/4/1995 9/28/1995 11/10/2010 ---	--- --- 95 ft --- PRO	--- --- 18 ft ---	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-085708C WellID: 97081 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 3820S 390W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 92 ft --- PRO	-- --- 8 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708D WellID: 97082 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 3880S 390W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 94 ft --- PRO	-- --- 18 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708E WellID: 97084 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 3995S 480W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 93 ft --- PRO	-- --- 18 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708F WellID: 97085 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 3900S 550W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 95 ft --- PRO	-- --- 18 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708G WellID: 97086 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWSW 3855N 550W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 95 ft --- PRO	-- --- 18 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708H WellID: 97087 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWSW 4015N 490W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 4 ft --- PRO	-- --- 18 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708I WellID: 97088 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWSW 3920N 610W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 12 ft --- PRO	-- --- 19 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-085708J WellID: 97089 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 NWSW 3877N 680W Map It	4/4/1995 9/28/1995 11/10/2010 --- ---	--- --- 13 ft --- PRO	-- --- 19 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-086070A WellID: 97465 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 2425N 1000W Map It	1/17/1994 11/22/1995 11/10/2010 ---	--- --- 24 ft --- PRO	--- --- 50 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070B WellID: 97466 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2050N 760W Map It	7/25/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 24 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070C WellID: 97467 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2065N 750W Map It	7/25/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 25 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070D WellID: 97468 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2078N 730W Map It	7/26/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 25 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070E WellID: 97469 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2088N 713W Map It	7/26/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 26 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070F WellID: 97470 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2098N 697W Map It	7/26/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 26 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070G WellID: 97471 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2102N 687W Map It	7/26/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 20 ft 28 ft PRO	4 in 3 ft 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070H WellID: 97472 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2112N 669W Map It	8/1/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 21 ft 28 ft PRO	4 in 3 ft 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-086070I WellID: 97473 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2145N 633W Map It	7/27/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 23 ft 28 ft PRO	4 in 3 ft 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070J WellID: 97474 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2162N 620W Map It	8/1/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 24 ft 28 ft PRO	4 in 3 ft 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070K WellID: 97475 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2176N 607W Map It	7/26/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 24 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070L WellID: 97476 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2192N 695W Map It	7/29/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 23 ft 28 ft PRO	4 in 3 ft 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070M WellID: 97477 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2208N 661W Map It	7/28/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 25 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070N WellID: 97478 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2163N 639W Map It	7/26/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 25 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070O WellID: 97479 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2180N 650W Map It	7/27/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 28 ft 30 ft PRO	4 in 3 ft 32 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070P WellID: 97480 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2195N 662W Map It	7/27/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 27 ft 30 ft PRO	4 in 3 ft 32 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-086070Q WellID: 97481 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2210N 654W Map It	7/27/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 25 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070R WellID: 97482 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2226N 685W Map It	8/2/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 29 ft 32 ft PRO	4 in 3 ft 34 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070S WellID: 97483 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2012N 726W Map It	8/4/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 23 ft 27 ft PRO	4 in 3 ft 29 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070T WellID: 97484 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2023N 711W Map It	8/3/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 26 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070U WellID: 97485 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2034N 694W Map It	8/2/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 26 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070V WellID: 97486 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2058N 662W Map It	8/4/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 24 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070W WellID: 97487 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2068N 645W Map It	7/29/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 20 ft 28 ft PRO	4 in 3 ft 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070X WellID: 97488 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2080N 629W Map It	8/1/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 21 ft 28 ft PRO	4 in 3 ft 30 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-086070Y WellID: 97489 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2083N 600W Map It	8/2/1994 11/22/1995 11/10/2010 ---	--- 1 gpm 26 ft 29 ft PRO	4 in 3 ft 31 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070Z WellID: 97490 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2012N 672W Map It	8/5/1994 11/22/1995 11/10/2010 ---	--- 1 gpm --- 23 ft PRO	4 in 3 ft 25 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-086070AA WellID: 97491 View Details View Logs View Scans	R X	Lancaster Nemaha 7N 7E 35 SWNW 2043N 644W Map It	8/5/1994 11/22/1995 11/10/2010 ---	--- 1 gpm --- 20 ft PRO	4 in 3 ft 21 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-098523 WellID: 114522 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 NESE 2520S 110E Map It	9/22/1997 11/18/1998 ---	--- 10 gpm 95 ft 100 ft PRO	1 in 140 ft 226 ft	Dan James OwnerID: 61287 29275 South 96th Firth NE 68358
G-098409 WellID: 114528 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 NENE 825N 330E Map It	11/11/1997 11/9/1998 ---	--- 10 gpm 97 ft 100 ft PRO	1 in 240 ft 255 ft	Bradley D Walburn OwnerID: 61293 423 Village View Hickman NE 68372
G-098351 WellID: 115228 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 SENE 2590N 1073E Map It	11/4/1998 ---	--- 20 gpm 99 ft 105 ft PRO	1 in 140 ft 271 ft	Brad Sass OwnerID: 61610 9300 East 2 Street Firth NE 68358
G-101683 WellID: 118590 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 SENE 1436N 446E Map It	6/26/1998 8/17/1999 ---	--- 15 gpm 82 ft 90 ft PRO	1 in 120 ft 245 ft	Todd M & Crystal L Bowman OwnerID: 32333 28701 South 96 Firth NE 68358
G-102213 WellID: 120546 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 SENE 2140N 800E Map It	7/21/1999 10/5/1999 ---	--- 15 gpm 79 ft 130 ft PRO	4 in 165 ft 239 ft	Keith Oden OwnerID: 13242 6900 Hickman Road RR 1 Box 301 Hickman NE 68372

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-103829 WellID: 123192 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 NENE 300N 400E Map It	1/11/2000 2/3/2000 ---	--- 22 gpm 101 ft 120 ft PRO	1.25 in 160 ft 240 ft	Greg Derks OwnerID: 64492 9441 Firth Road Firth NE 68358
G-103849 WellID: 123224 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 NESE 2480S 500E Map It	1/26/2000 2/4/2000 ---	--- 10 gpm 118 ft 180 ft PRO	1.25 in 125 ft 263 ft	Thomas C Allen OwnerID: 64507 5211 South 80 Street Lincoln NE 68516
G-104857 WellID: 124765 View Details View Logs View Scans	D I	Lancaster Nemaha 7N 7E 35 NENE 800N 250E Map It	12/31/1999 3/30/2000 ---	--- --- 104 ft 120 ft PRO	-- --- 240 ft	Curt Helgenberger OwnerID: 65113 705 East 4th Street Hickman NE 68372
G-126887A WellID: 158286 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 NENW 500N 1550W Map It	1/17/2004 4/21/2004 108249253928380	0 --- 25 ft --- Mon	-- --- 44.5 ft	Reformed Church of Firth OwnerID: 76753 7th & May Street Firth NE 68358
G-126887B WellID: 158287 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 NENW 530N 1535W Map It	1/17/2004 4/21/2004 108249523115663	0 --- 25 ft --- Mon	-- --- 45 ft	Reformed Church of Firth OwnerID: 76753 7th & May Street Firth NE 68358
G-126887C WellID: 158288 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 NENW 480N 1580W Map It	1/17/2004 4/21/2004 108249607720078	0 --- 25 ft --- Mon	-- --- 30 ft	Reformed Church of Firth OwnerID: 76753 7th & May Street Firth NE 68358
G-147417 WellID: 189391 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 7E 35 NESE 1591S 758E Map It 40°31' 41.600" -96°35' 37.500"	9/22/2005 12/13/2007 119750643416118	--- 15 gpm 158 ft 190 ft PRO	1 in 200 ft 241 ft	Ben Faz OwnerID: 96525 4400 East 2nd Street Firth NE 68358
G-149317 WellID: 192439 View Details View Logs View Scans	D I	Lancaster Nemaha 7N 7E 35 NENE 810N 256E Map It 40°32' 10.200" -96°35' 31.000"	9/11/2002 6/2/2008 121138323324367	--- --- 107 ft 110 ft PRO	-- --- 246 ft	Daniel D & Barbara Jo Moseman OwnerID: 99148 28221 South 96th Street Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-150220 WellID: 193879 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWSW Map It 40°31' 26.160" -96°36' 28.560"	6/18/2008 8/26/2008 121968047628955	--- --- --- --- PRO	--- --- 252 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450
G-150221 WellID: 193880 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWSW Map It 40°31' 26.220" -96°36' 28.560"	6/19/2008 8/26/2008 121968096722071	--- --- --- --- PRO	--- --- 190 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450
G-150222 WellID: 193881 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWSW Map It 40°31' 26.280" -96°36' 28.560"	6/19/2008 8/26/2008 12196813638674	--- --- --- --- PRO	--- --- 140 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450
G-150223 WellID: 193882 View Details View Logs View Scans	Q A	Lancaster Nemaha 7N 7E 35 SWSW Map It 40°31' 26.340" -96°36' 28.560"	6/19/2008 8/26/2008 12196818578680	--- --- --- --- PRO	--- --- 86 ft	Nemaha Natural Resources District OwnerID: 8775 62161 Hwy 136 Tecumseh NE 68450
G-151236 WellID: 194990 View Details View Logs View Scans	G A	Lancaster Nemaha 7N 7E 35 NENW 344N 1965W Map It	10/8/2008 11/13/2008 ---	--- --- --- --- PRO	--- --- 205 ft	Larry & Linda Deboer OwnerID: 100834 608 Abraham St Firth NE 68358
WellID: 196053 View Details View Logs View Scans	D U	Lancaster Nemaha 7N 7E 35 SWNW 1522N 833W Map It 40°32' 2.760" -96°36' 25.560"	 12/1/2008 ---	--- --- --- --- PRO	--- --- ---	David Rice OwnerID: 101431 PO Box 424 Firth NE 68358
G-152633A WellID: 198293 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1903N 543W Map It 40°31' 59.120" -96°36' 28.780"	4/10/2009 4/23/2009 12/1/2009 124041605412030	--- --- 5.9 ft --- PRO	--- --- 20 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-152633B WellID: 198294 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1903N 568W Map It 40°31' 59.300" -96°36' 29.180"	4/10/2009 4/23/2009 12/1/2009 12404182764479	--- --- 11.1 ft --- PRO	--- --- 20 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-152633C WellID: 198295 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 1900N 489W Map It 40°31' 59.770" -96°36' 30.030"	4/10/2009 4/23/2009 12/1/2009 12404189086374	--- --- 9.8 ft --- PRO	--- --- 20 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-152633D WellID: 198296 View Details View Logs View Scans	Q X	Lancaster Nemaha 7N 7E 35 SWNW 2001N 568W Map It 40°31' 58.690" -96°36' 29.790"	4/10/2009 4/23/2009 12/1/2009 124041937026974	--- --- 12.2 ft --- PRO	--- --- 20 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
WellID: 203838 View Details View Logs View Scans	Q U	Lancaster Nemaha 7N 7E 35 SWNW 1906N 594W Map It 40°31' 58.970" -96°36' 28.670"	12/1/2009 ---	--- --- --- --- PRO	--- --- 20 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
WellID: 203839 View Details View Logs View Scans	Q U	Lancaster Nemaha 7N 7E 35 SWNW 1854N 564W Map It 40°31' 59.470" -96°36' 29.030"	12/1/2009 ---	--- --- --- --- PRO	--- --- 20 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
WellID: 203840 View Details View Logs View Scans	Q U	Lancaster Nemaha 7N 7E 35 SWNW 1762N 489W Map It 40°32' 0.370" -96°36' 30.000"	12/1/2009 ---	--- --- --- --- PRO	--- --- 20 ft	Firth Cooperative Company OwnerID: 50583 3rd & Main Box 278 Firth NE 68358
G-164456 WellID: 220112 View Details View Logs View Scans	D I	Lancaster Nemaha 7N 7E 35 NWNE 886N 1949E Map It 40°32' 9.300" -96°35' 52.920"	8/28/2012 10/26/2012 135121613126660	--- --- 85 ft --- PRO	--- --- 232 ft	Kevin Houfek OwnerID: 122119 302 May Street Firth NE 68358
Next						

Return to Search Page
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REGISTERED GROUNDWATER WELLS DATA RETRIEVAL
Search Results Maximum 1000 Per Page

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, 1969, 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.

8 Records Found

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-097881 WellID: 114527 View Details View Logs View Scans	D A	Lancaster Nemaha 7N 8E 36 NWNW Map It 40°32' 3.490" -96°28' 46.150"	10/24/1997 9/24/1998 --	--- 10 gpm 61 ft 65 ft PRO	1 in 100 ft 182 ft	Cathy L Heetderks OwnerID: 39787 28180 South 176th Road Adams NE 68301
G-148658 WellID: 188130 N316 View Details View Logs View Scans	I A	Lancaster Nemaha 7N 8E 36 SENW Map It 40°32' 1.750" -96°28' 26.730"	2/29/2008 4/3/2008 12057700787309	100 1200 gpm 59 ft 100 ft PRO	8 in 160 ft 240 ft	Cathy L Heetderks OwnerID: 39787 28180 South 176th Road Adams NE 68301
WellID: 189636 View Details View Logs View Scans	D U	Lancaster Nemaha 7N 8E 36 SENE 1660N 840E Map It	11/1/2007 --	--- --- --- --- PRO	--- --- ---	Lyle De Yong OwnerID: 96690 5816 Brookview Drive Lincoln NE 68506

Registration# Well ID Permit Number	Use Status	County Name NRD Name Well Location Footage Latitude Longitude	Completion Date Filing Date Decommission Date Times Replaced Online Registration ID (NOLID)	Acres Irrigated Gallons/Minute Static Level Pumping Level Series	Pump Column Diameter Pump Depth Well Depth	Owner's Name Owner's ID Address
G-184815 WellID: 252202 View Details View Logs View Scans	S A	Lancaster Nemaha 7N 8E 36 NWNE Map It 40°32' 13.340" -96°28' 13.150"	12/5/2017 4/26/2018 ---	--- 48 gpm 120 ft 130 ft PRO	2 in 200 ft 259 ft	Nick Heetderks OwnerID: 118403 14171 Firth Road Firth NE 68358
G-184814 WellID: 252203 View Details View Logs View Scans	S A	Lancaster Nemaha 7N 8E 36 NWNE Map It 40°32' 13.310" -96°28' 13.060"	12/1/2017 4/26/2018 ---	--- 48 gpm 120 ft 130 ft PRO	2 in 200 ft 250 ft	Nick Heetderks OwnerID: 118403 14171 Firth Road Firth NE 68358
G-187659 WellID: 257746 View Details View Logs View Scans	O A	Lancaster Nemaha 7N 8E 36 NESE 2438S 207E Map It 40°31' 46.800" -96°27' 51.400"	5/13/2019 7/17/2019 156329484624725	--- --- 96 ft --- PRO	--- --- 254 ft	Lancaster County Rural Water District 1 OwnerID: 38358 310 Fir St Bennet NE 68317
G-187660 WellID: 257747 View Details View Logs View Scans	O A	Lancaster Nemaha 7N 8E 36 NWSE 2480S 1614E Map It 40°31' 47.400" -96°28' 9.600"	5/14/2019 7/17/2019 156330638614555	--- --- 97.6 ft --- PRO	--- --- 195 ft	Lancaster County Rural Water District 1 OwnerID: 38358 310 Fir St Bennet NE 68317
G-187661 WellID: 257748 View Details View Logs View Scans	O A	Lancaster Nemaha 7N 8E 36 NWSE 2520S 2556E Map It 40°31' 47.900" -96°28' 21.800"	5/15/2019 7/17/2019 156330922424149	--- --- 117 ft --- PRO	--- --- 290 ft	Lancaster County Rural Water District 1 OwnerID: 38358 310 Fir St Bennet NE 68317

Next

- 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.
- Data copy of requested contacts.

Legend and Notes

Section 6

Manure Production & Utilization

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PrairieLand Dairy, LLC

Nutrient Production Worksheet Maximum Capacity

A	B	C	D	E	F	G
Manure Type / Amount <small>(See Manure Production Summary)</small>	Nutrient	Lbs. / Unit <small>(See Manure Analysis Summary)</small>	Nutrient Production Actual Inventory <small>(A x C)</small>	Nutrient Production Maximum Inventory <small>(D x % Increase)</small>	% Available After Application <small>(NebGuide G1335)</small>	Total lbs. Nutrient Available <small>(ExF)</small>
Actual Inventory Dairy Cattle			<u>3,500</u>	Maximum Capacity Dairy Cattle		<u>3,500</u>
						% Increase 0.0
Solid Manure (Tons) 9,609	Ammonium N	3.95	37,954	37,954	0%	0
	Organic N	32.95	316,608	316,608	47%	148,806
	Phosphorus	36.45	350,238	350,238	100%	350,238
Effluent (Acre Inches) 7,926,622	Ammonium N	192.00	56,047	56,047	50%	28,024
	Organic N	42.80	12,494	12,494	57%	7,122
	Phosphorus	47.75	13,939	13,939	100%	13,939
Slurry Manure (Gallons) 16,093,444	Ammonium N	7.15	115,068	115,068	95%	109,315
	Organic N	1.60	25,750	25,750	57%	14,677
	Phosphorus	1.75	0	0	100%	0



Total Ammonium N: 137,338 lbs.
 Total 1st Yr. Organic N: 92,537 lbs.
 Total 2nd Yr. Organic N: 53,228 lbs.
 Total 3rd Yr. Organic N: 24,840 lbs.
 Total N Available All Sources: 307,943 lbs.
 Total Phosphorus Available: 364,177 lbs.

Prairieland Dairy, LLC

Percent Nitrogen Available after Application

<u>Ammonium Nitrogen</u>	<u>Lbs. N Available</u>
Dry Manure Preplant Application and Not Incorporated	0%
Effluent Sprinkler Application	50%
Slurry Application Incorporated Immediately	95%
Slurry Application Not Incorporated	0%
<u>Availability of Organic Nitrogen in Solid Manure</u>	
Solid Manure First Year Availability	25%
Solid Manure Second Year Availability	15%
Solid Manure Third Year Availability	7%
Total Availability of Solid Manure Application	47%
<u>Availability of Organic Nitrogen in Effluent</u>	
Effluent First Year Availability	35%
Effluent Second Year Availability	15%
Effluent Third Year Availability	7%
Total Availability of Effluent Application	57%
<u>Availability of Organic Nitrogen in Slurry</u>	
Slurry Manure First Year Availability	35%
Slurry Manure Second Year Availability	15%
Slurry Manure Third Year Availability	7%
Total Availability of Slurry Manure Application	57%
Values based on NebGuide G1335 Figure 2	

FIELD PLAN - 5 YEAR NUTRIENT PROJECTION



Prairieland Dairy, LLC

Field Management Description:	A. Irrigated Corn Silage/Triticale	Site # in Rotation:	2-3, 13, 15, 18
	Effluent Application		

Field Plan For Nitrogen

Year	Previous Crop	Planned Crop	Expected Yield T/ac	Total Crop N Need lb/ac	Soil N lb/ac	Previous Crop Legume N lb/ac	Nitrogen Credits		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
							Prior Manure Organic N						
							2nd year lb/ac	3rd year lb/ac					
1	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	11.3	245	81	164	0
	Triticale	Triticale	10	24									
2	Corn Silage	Corn Silage	25	263	30	0	4.7	0.0	11.3	241	81	159	0
	Triticale	Triticale	10	24									
3	Corn Silage	Corn Silage	25	263	30	0	4.7	2.2	11.3	238	81	157	0
	Triticale	Triticale	10	24									
4	Corn Silage	Corn Silage	25	263	30	0	4.7	2.2	11.3	238	81	157	0
	Triticale	Triticale	10	24									
5	Corn Silage	Corn Silage	25	263	30	0	4.7	2.2	11.3	238	81	157	0
	Triticale	Triticale	10	24									

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 Silage	Corn Silage	25	150	155	35	0	-120
	Triticale	Triticale	10	5				
2	Corn Silage	Corn Silage	25	150	155	35	0	-241
	Triticale	Triticale	10	5				
3	Corn Silage	Corn Silage	25	150	155	35	0	-361
	Triticale	Triticale	10	5				
4	Corn Silage	Corn Silage	25	150	155	35	0	-481
	Triticale	Triticale	10	5				
5	Corn Silage	Corn Silage	25	150	155	35	0	-602
	Triticale	Triticale	10	5				

- * 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



Prairieland Dairy, LLC

Field Management Description:	G. Irrigated Corn Silage/Triticale	Site # in Rotation: 5	
	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			Irr. N lb/ac	Nitrogen Need			
						Previous Crop Legume N lb/ac	Prior Manure Organic N			Manure Application lb/ac	Planned Manure N Application 1st yr Avail lb/ac	Planned Commercial N Application lb/ac	Nitrogen Balance lb/ac
							2nd year lb/ac	3rd year lb/ac					
1	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	11.3	245	99	146	0
	Triticale	Triticale	10	24									
2	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	11.3	245	0	245	0
	Triticale	Triticale	10	24									
3	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	11.3	245	99	146	0
	Triticale	Triticale	10	24									
4	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	11.3	245	0	245	0
	Triticale	Triticale	10	24									
5	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	11.3	245	99	146	0
	Triticale	Triticale	10	24									

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 Silage	Corn Silage	25	150	155	437	0	282
	Triticale	Triticale	10	5				
2	Corn Silage	Corn Silage	25	150	155	0	0	127
	Triticale	Triticale	10	5				
3	Corn Silage	Corn Silage	25	150	155	437	0	409
	Triticale	Triticale	10	5				
4	Corn Silage	Corn Silage	25	150	155	0	0	254
	Triticale	Triticale	10	5				
5	Corn Silage	Corn Silage	25	150	155	437	0	536
	Triticale	Triticale	10	5				

- * 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.
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- * 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



Prairieland Dairy, LLC

Field Management Description:	H. Irrigated Corn Soybean Rotation	Site # in Rotation:	19-21, 25
	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	Previous Crop Legume N lb/ac	Nitrogen Credits			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	
							Prior Manure Organic N		2nd year lb/ac						3rd year lb/ac
							2nd year lb/ac	3rd year lb/ac							
1	Soybeans	Corn	221	265	30	45	0.0	0.0	11.3	178	99	80	0		
2	Corn	Soybeans	71	261	30	0	59.3	0.0	11.3	161	0	0	0		
3	Soybeans	Corn	221	265	30	45	0.0	27.7	11.3	151	99	52	0		
4	Corn	Soybeans	71	261	30	0	59.3	0.0	11.3	161	0	0	0		
5	Soybeans	Corn	221	265	30	45	0.0	27.7	11.3	151	0	151	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	221	73	73	437	0	365
2	Corn	Soybeans	71	54	54	0	0	310
3	Soybeans	Corn	221	73	73	437	0	675
4	Corn	Soybeans	71	54	54	0	0	620
5	Soybeans	Corn	221	73	73	0	0	548

- * 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.
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- * 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



Prairieland Dairy, LLC

Field Management Description:	I. Dryland Corn Soybean Rotation	Site # in Rotation: 23, 26, 28-33
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				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
						Previous Crop Legume N lb/ac	Prior Manure Organic N							
							2nd year lb/ac	3rd year lb/ac						
1	Soybeans	Corn	174	209	30	45	0.0	0.0	0.0	134	134	0	0	
2	Corn	Soybeans	56	208	30	0	80.3	0.0	0.0	98	0	0	0	
3	Soybeans	Corn	174	209	30	45	0.0	37.5	0.0	97	0	97	0	
4	Corn	Soybeans	56	208	30	0	0.0	0.0	0.0	178	0	0	0	
5	Soybeans	Corn	174	209	30	45	0.0	0.0	0.0	134	0	134	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	174	58	58	592	0	535
2	Corn	Soybeans	56	43	43	0	0	491
3	Soybeans	Corn	174	58	58	0	0	434
4	Corn	Soybeans	56	43	43	0	0	391
5	Soybeans	Corn	174	58	58	0	0	333

- * 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.
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- * 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



Prairieland Dairy, LLC

Field Management Description:	J. Dryland Corn Silage/Triticale	Site # in Rotation:	4, 7, 11-12
	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			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
						Previous Crop Legume N lb/ac	Prior Manure Organic N						
							2nd year lb/ac	3rd year lb/ac					
1	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	0.0	257	99	158	0
	Triticale	Triticale	10	24									
2	Corn Silage	Corn Silage	25	263	30	0	59.3	0.0	0.0	197	0	197	0
	Triticale	Triticale	10	24									
3	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	0.0	257	99	158	0
	Triticale	Triticale	10	24									
4	Corn Silage	Corn Silage	25	263	30	0	59.3	0.0	0.0	197	0	197	0
	Triticale	Triticale	10	24									
5	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	0.0	257	0	257	0
	Triticale	Triticale	10	24									

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 Silage	Corn Silage	25	150	155	437	0	282
	Triticale	Triticale	10	5				
2	Corn Silage	Corn Silage	25	150	155	0	0	127
	Triticale	Triticale	10	5				
3	Corn Silage	Corn Silage	25	150	155	437	0	409
	Triticale	Triticale	10	5				
4	Corn Silage	Corn Silage	25	150	155	0	0	254
	Triticale	Triticale	10	5				
5	Corn Silage	Corn Silage	25	150	155	0	0	99
	Triticale	Triticale	10	5				

- * 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



Prairieland Dairy, LLC

Field Management Description:	P. Dryland Corn Soybean Rotation	Site # in Rotation:	Site 22
Slurry Application			

Field Plan For Nitrogen

Year	Previous Crop	Planned Crop	Expected Yield bu/ac	Total Crop N Need lb/ac	Soil N lb/ac	Previous Crop Legume N lb/ac	Nitrogen Credits		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
							Prior Manure	Organic N					
							2nd year lb/ac	3rd year lb/ac					
1	Soybeans	Corn	174	209	30	45	0.0	0.0	0.0	134	134	0	0
2	Corn	Soybeans	56	208	30	0	4.4	0.0	0.0	174	0	0	0
3	Soybeans	Corn	174	209	30	45	0.0	2.0	0.0	132	132	0	0
4	Corn	Soybeans	56	208	30	0	4.3	0.0	0.0	174	0	0	0
5	Soybeans	Corn	174	209	30	45	0.0	2.0	0.0	132	132	0	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	174	58	58	32	0	-26
2	Corn	Soybeans	56	43	43	0	0	-69
3	Soybeans	Corn	174	58	58	31	0	-95
4	Corn	Soybeans	56	43	43	0	0	-138
5	Soybeans	Corn	174	58	58	32	0	-165

- * 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



Prairieland Dairy, LLC

Field Management Description:	Q. Dryland Corn Silage/Triticale	Site # in Rotation:	1-3, 10, 13, 15, 17-18
	Slurry 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			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
						Previous Crop Legume N lb/ac	Prior Manure Organic N						
							2nd year lb/ac	3rd year lb/ac					
1	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	0.0	257	176	80	0
	Triticale	Triticale	10	24									
2	Corn Silage	Corn Silage	25	263	30	0	5.8	0.0	0.0	251	176	74	0
	Triticale	Triticale	10	24									
3	Corn Silage	Corn Silage	25	263	30	0	5.8	2.7	0.0	248	176	72	0
	Triticale	Triticale	10	24									
4	Corn Silage	Corn Silage	25	263	30	0	0.0	2.7	0.0	254	176	77	0
	Triticale	Triticale	10	24									
5	Corn Silage	Corn Silage	25	263	30	0	5.8	0.0	0.0	251	176	74	0
	Triticale	Triticale	10	24									

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 Silage	Corn Silage	25	150	155	42	0	-113
	Triticale	Triticale	10	5				
2	Corn Silage	Corn Silage	25	150	155	42	0	-226
	Triticale	Triticale	10	5				
3	Corn Silage	Corn Silage	25	150	155	0	0	-382
	Triticale	Triticale	10	5				
4	Corn Silage	Corn Silage	25	150	155	42	0	-495
	Triticale	Triticale	10	5				
5	Corn Silage	Corn Silage	25	150	155	0	0	-650
	Triticale	Triticale	10	5				

* 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



Prairieland Dairy, LLC

Field Management Description:	S. Irrigated Corn Silage/Triticale	6, 14, 16
Slurry 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				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
						Previous Crop Legume N lb/ac	Prior Manure Organic N		Irr. N lb/ac				
							2nd year lb/ac	3rd year lb/ac					
1	Corn Silage	Corn Silage	25	263	30	0	0.0	0.0	11.3	221	88	133	0
	Triticale	Triticale	10	24									
2	Corn Silage	Corn Silage	25	263	30	0	2.9	0.0	11.3	218	0	218	0
	Triticale	Triticale	10	24									
3	Corn Silage	Corn Silage	25	263	30	0	0.0	1.3	11.3	220	88	132	0
	Triticale	Triticale	10	24									
4	Corn Silage	Corn Silage	25	263	30	0	2.9	0.0	11.3	218	0	218	0
	Triticale	Triticale	10	24									
5	Corn Silage	Corn Silage	25	263	30	0	0.0	1.3	11.3	220	88	132	0
	Triticale	Triticale	10	24									

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 Silage	Corn Silage	25	150					155	21	0	-134
	Triticale	Triticale	10	5								
2	Corn Silage	Corn Silage	25	150					155	0	0	-289
	Triticale	Triticale	10	5								
3	Corn Silage	Corn Silage	25	150					155	21	0	-424
	Triticale	Triticale	10	5								
4	Corn Silage	Corn Silage	25	150					155	0	0	-579
	Triticale	Triticale	10	5								
5	Corn Silage	Corn Silage	25	150					155	21	0	-713
	Triticale	Triticale	10	5								

* 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

PrairieLand Dairy, LLC

Nutrients Required for Crop Growth

Crop	Irrigated Corn	Dryland Corn	Irrigated Soybeans	Dryland Soybeans	Corn Silage	Triticale	Totals
Crop Yield bu/ac	221	174	71	56	25.0	10.0	
Crop Acres	370	324	370	324	1221	1221	3,829
Total N Required ¹ lbs.	97,916	67,707	96,700	67,397	320,474	29,301	679,495
Total P Required ¹ lbs.	26,927	18,619	20,124	14,026	183,128	6,348	269,173
Total N Required for Crop	<u>679,495</u>	Lbs.	Total P ₂ O ₅ Required for Crop		<u>269,173</u>	Lbs.	
Total N Available all Sources ²	<u>307,943</u>	Lbs.	Total P ₂ O ₅ Available all Sources ²		<u>364,177</u>	Lbs.	
Un-utilized Manure N	<u>0</u>	Lbs.	Un-utilized Manure P ₂ O ₅		<u>95,004</u>	Lbs.	
Number of acres to utilize all Nitrogen produced:	<u>1735</u>		Number of acres to utilize all Phosphorus produced:		<u>5181</u>		

¹Nutrient Required based on **Wardguide**

²See Nutrient Production Worksheet

Prairieland Dairy, LLC

Manure Production Summary

Values are derived from the Agricultural Waste Management Field Handbook Part 651 (Table 4-5)

	A	B	C	D	E	F	G	H
Animal Type	No. of head	Average Weight	Volume Ft ³ /d/1000#	% moisture	Days	Ft ³ Manure Excreted	Gallons of Manure Excreted	Tons of Manure Excreted
Dairy Cows (Freestall Barns)	3,500	1400	1.7	88.40%	365	3,040,450	22,742,566	9,609
* Assume the mechanical solid separators will take out 10% of the weight of liquid manure in solids but will not lower the total gallons produced.								
Drainage Type			Gallons/Day		Days		Total Gallons	
Parlor Washwater			3,500		365		1,277,500	

3,040,450 - Ft³ of Manure Excreted = (((A * B * C / 1000) * E)) [AWMFH]
 22,742,566 - Gallons of Manure Excreted = (F * 7.48 gal/Ft³)
 960,873 - Tons of Manure Excreted = (((G * 8.45 lbs/gal) * 10%) / 2000) [AWMFH]

* 33% of the dairy liquid is managed as an effluent and 67% of dairy liquid is managed as a slurry

9,609 - Tons of Solid Manure Produced

24,020,066 - Total gallons of Liquid Manure Produced

16,093,444 - Gallons of Slurry (2/3 of the Liquid Manure Produced)

7,926,622 - Gallons of Effluent (1/3 of Liquid Manure Produced)

Prairieland Dairy, LLC

Manure Averages

	Ammonium Nitrogen			Organic Nitrogen			Phosphorus		
	Solid Manure Lbs. / Ton	Effluent Lbs. / acre inch	Slurry Manure Lbs. / 1000 Gallons	Solid Manure Lbs. / Ton	Effluent Lbs. / acre inch	Slurry Manure Lbs. / 1000 Gallons	Solid Manure Lbs. / Ton	Effluent Lbs. / acre inch	Slurry Manure Lbs. / 1000 Gallons
Dairy Averages	3.95	192.00	7.15	32.95	42.80	1.60	36.45	47.75	1.75
329	4.2			32.7			37.4		
330	3.7			33.2			35.5		
11173		180	6.7		46.4	1.7		51	1.9
11174		204	7.6		39.2	1.5		44.5	1.6

Values from Ward Analysis Reports



Ag Testing - Consulting

Account No: 20850

Manure Analysis Report

NUTRIENT ADVISORS
449 E DEERE ST
WEST POINT NE 68788

Date Received: 2/21/2019
 Date Reported: 2/22/2019

Lab No.: 329

Results for: PRAIRIELAND DAIRY
 Sample ID: YARD STOCKPILE
 Sample Desc.: COMPOST 1 2/19

	Analysis Dry Basis	Analysis As Received	Lbs./Ton As Received
Organic N, %N	2.46	1.63	32.7
Ammonium, %N	0.314	0.21	4.2
Nitrate, %N	0.008	0.01	0.1
Total N, %N	2.774	1.84	36.9
Phosphorus, %P2O5	2.81	1.87	37.4
Potassium, %K2O	1.32	0.88	17.5
Sulfur, %S	0.57	0.38	7.6
Calcium, %Ca	3.19	2.12	42.3
Magnesium, %Mg	0.51	0.34	6.7
Sodium, %Na	0.54	0.36	7.2
Zinc, ppm ZN	382.5	254	0.5
Iron, ppm Fe	11170.3	7420	14.8
Manganese, ppm Mn	323.9	215	0.4
Copper, ppm Cu	52.5	35	0.1
Boron, ppm B	15.6		0.0
Soluble Salts, mmho/cm	40.38		34.3
pH	5.7		
Moisture, %	33.57		
Dry Matter (TS), %	66.43		

"<" - Not Detected / Below Detection Limit

Reviewed By: Nick Ward

Bus:308-234-2418
 Fax:308-234-1940

web site
www.wardlab.com

4007 Cherry Ave., P.O. Box 738
 Kearney, Nebraska 68848-0788



Ag Testing - Consulting

Account No: 20850

Manure Analysis Report

NUTRIENT ADVISORS
449 E DEERE ST
WEST POINT NE 68788

Date Received: 2/21/2019
 Date Reported: 2/22/2019

Lab No.: 330

Results for: PRAIRIELAND DAIRY
 Sample ID: YARD STOCKPILE
 Sample Desc.: COMPOST 2 2/19

	Analysis Dry Basis	Analysis As Received	Lbs./Ton As Received
Organic N, %N	2.52	1.66	33.2
Ammonium, %N	0.282	0.19	3.7
Nitrate, %N	< 0.001	0	0.0
Total N, %N	2.802	1.85	36.9
Phosphorus, %P2O5	2.7	1.78	35.5
Potassium, %K2O	1.23	0.81	16.2
Sulfur, %S	0.54	0.36	7.1
Calcium, %Ca	2.96	1.95	38.9
Magnesium, %Mg	0.45	0.3	6
Sodium, %Na	0.51	0.34	6.7
Zinc, ppm ZN	337.2	222	0.4
Iron, ppm Fe	9745.2	6415	12.8
Manganese, ppm Mn	299.3	197	0.4
Copper, ppm Cu	50.8	33	0.1
Boron, ppm B	16.8		0.0
Soluble Salts, mmho/cm	39.44		33.2
pH	5.7		
Moisture, %	34.17		
Dry Matter (TS), %	65.83		

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Account No: 20850

Slurry Analysis Report

NUTRIENT ADVISORS
449 E DEERE ST
WEST POINT NE 68788

Date Received: 5/30/2019
Date Reported: 5/31/2019

Lab No.: 11173

Results for: PRAIRIELAND DAIRY
Sample ID: EFFLUENT
Sample Desc.: BIG CELL 5/19

	Analysis As Received	Lbs per Acre Inch	Lbs. per 1000 gal.
Organic N, ppm N	204.5	46.4	1.7
Ammonium, ppm N	794	180	6.7
Nitrate, ppm N	0.8	0.2	0
Total N, ppm N	998.5	226.4	8.4
Phosphorus, ppm P2O5	225	51	1.9
Potassium, ppm K2O	1041.9	236.2	8.7
Sulfur, ppm S	64.9	14.7	0.5
Calcium, ppm Ca	430.1	97.5	3.6
Magnesium, ppm Mg	141.3	32	1.2
Sodium, ppm Na	471.5	106.9	4
Zinc, ppm ZN	3.9	0.9	0
Iron, ppm Fe	19.5	4.4	0.2
Manganese, ppm Mn	2.1	0.5	0
Copper, ppm Cu	0.6	0.1	0
Boron, ppm B	0.7	0.2	0
Soluble Salts, mmho/cm	11.27		57
pH	7.2		
Dry Matter (TS), %	1.02		

"<" - Not Detected / Below Detection Limit

Reviewed By: Raymond Ward

Bus:308-234-2418
Fax:308-234-1940

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Kearney, Nebraska 68848-0788



Ag Testing - Consulting

Account No: 20850

Slurry Analysis Report

NUTRIENT ADVISORS
449 E DEERE ST
WEST POINT NE 68788

Date Received: 5/30/2019
 Date Reported: 5/31/2019

Lab No.: 11174

Results for: PRAIRIELAND DAIRY
 Sample ID: EFFLUENT
 Sample Desc.: SMALL CELL 5/19

	Analysis As Received	Lbs per Acre Inch	Lbs. per 1000 gal.
Organic N, ppm N	173	39.2	1.5
Ammonium, ppm N	899.9	204	7.6
Nitrate, ppm N	0.8	0.2	0
Total N, ppm N	1072.9	243.2	9.1
Phosphorus, ppm P2O5	196.2	44.5	1.6
Potassium, ppm K2O	1248.4	283	10.5
Sulfur, ppm S	89.8	20.3	0.8
Calcium, ppm Ca	461.6	104.6	3.9
Magnesium, ppm Mg	138.4	31.4	1.2
Sodium, ppm Na	614.4	139.3	5.2
Zinc, ppm ZN	4.2	0.9	0
Iron, ppm Fe	27.9	6.3	0.2
Manganese, ppm Mn	2.4	0.6	0
Copper, ppm Cu	1	0.2	0
Boron, ppm B	0.8	0.2	0
Soluble Salts, mmho/cm	12.96		65
pH	7.4		
Dry Matter (TS), %	1.19		

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 Kearney, Nebraska 68848-0788



Laboratories, Inc.



Ag Testing - Consulting

Account No: 20850

Manure Analysis Report

NUTRIENT ADVISORS

449 E DEERE ST
WEST POINT

NE 68788

Date Received: 1/30/2020

Date Reported: 1/31/2020

Lab No.: 177

Results for: PRAIRIELAND DAIRY
Sample ID: YARD STOCKPILE
Sample Desc.: COMPOST 1 1/20

	Analysis Dry Basis	Analysis As Received	Lbs./Ton As Received
Organic N, %N	1.83	1.23	24.6
Ammonium, %N	0.151	0.1	2
Nitrate, %N	< 0.001	< 0.001	0.0
Total N, %N	1.981	1.33	26.6
Phosphorus, %P2O5	1.84	1.24	24.7
Potassium, %K2O	1.14	0.77	15.4
Sulfur, %S	0.33	0.22	4.4
Calcium, %Ca	2.25	1.51	30.3
Magnesium, %Mg	0.51	0.34	6.8
Sodium, %Na	0.35	0.24	4.8
Zinc, ppm ZN	192.1	129	0.3
Iron, ppm Fe	14219	9569	19.1
Manganese, ppm Mn	355.2	239	0.5
Copper, ppm Cu	28.3	19	0.0
Boron, ppm B	13.2		0.0
Soluble Salts, mmho/cm	24.24		20.9
pH	6.4		
Moisture, %	32.7		
Dry Matter (TS), %	67.3		

"<" - Not Detected / Below Detection Limit

Reviewed By: Nick Ward

Bus:308-234-2418

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Kearney, Nebraska 68848-0788

Table 4-5 Dairy manure characterization—as excreted(a) In units per day-animal ^{1/}

Components	Units	Lactating cow ^{2/} Milk production, lb/d				Milk-fed calf	Calf	Heifer	Dry cow ^{2/}
		50	75	100	125	125 lb	330 lb	970 lb	
Weight	lb/d-a	133	148	164	179		27	54	85
Volume	ft ³ /d-a	2.1	2.4	2.6	2.9		0.44	0.87	1.4
Moisture	% wet basis	87	87	87	87		83	83	87
Total solids	lb/d-a	17	19	21	23		3.0	8.3	11.0
VS ^{3/}	lb/d-a	14	16	18	20		3.0	7.1	9.3
BOD	lb/d-a	2.9						1.2	1.4
N	lb/d-a	0.90	0.97	1.04	1.11	0.017	0.14	0.26	0.50
P ^a	lb/d-a	0.15	0.17	0.19	0.21		0.02	0.04	0.07
K ^a	lb/d-a	0.41	0.45	0.49	0.52		0.04	0.11	0.16

^{1/} ASAE D384.2, March 2005^{2/} Assumes 1,375 lb lactating cow and 1,660 lb dry cow. Excretion values for P and K not in bold are based on the assumption that intake is equal to excretion^{3/} VS based on 85% of TS

(b) In units per day per 1,000 lb animal unit

Components	Units	Lactating cow milk production, lb/d				Milk-fed calf	Calf	Heifer	Dry cow
		50	75	100	125	125 lb	330 lb	970 lb	
Weight	lb/d/1000 lb AU	97	108	119	130		83	56	51
Volume	ft ³ /d/1000 lb AU	1.6	1.7	1.9	2.1		1.3	0.90	0.84
Moisture	% wet basis	87	87	87	87		83	83	87
Total solids	lb/d/1000 lb AU	12	14	15	17		9.2	8.5	6.6
VS	lb/d/1000 lb AU	9.2	11	12	13		7.7	7.3	5.6
BOD	lb/d/1000 lb AU	2.1						1.2	0.84
N	lb/d/1000 lb AU	0.66	0.71	0.76	0.81	0.11	0.42	0.27	0.30
P	lb/d/1000 lb AU	0.11	0.12	0.14	0.15		0.05	0.05	0.042
K	lb/d/1000 lb AU	0.30	0.33	0.35	0.38		0.11	0.12	0.10

(c) Jersey cows in units per day per 1,000-lb animal unit ^{1/}

Components	Units	Lactating cow milk production, lb/d		
		45	60	75
Weight	lb/d/1000 lb AU	116	130	144
Total solids	lb/d/1000 lb AU	15	17	19
N	lb/d/1000 lb AU	0.72	0.80	0.88
P	lb/d/1000 lb AU	0.12	0.13	0.15
K	lb/d/1000 lb AU	0.42	0.46	0.50

^{1/} Excretion values were determined using intake based equations. Although the intake-based equations were developed for Holsteins, Blake et al. (1986) and Kauffman and St-Pierre (2001) found similar dry matter digestibility between breeds. Excretion estimates were determined using average dry matter intakes for Jersey cows (NRC 2001). Nutrient excretion estimates were based on cow consuming a diet containing 17 percent CP, 0.38 percent P, and 1.5 percent K.

Table 4-6 Dairy water use for various operations

(a) Milking center

Operation		Water use
Bulk Tank	Automatic	50–60 gal/wash
	Manual	30–40 gal/wash
Pipeline	In parlor	75–125 gal/wash
Pail milkers		30–40 gal/wash
Miscellaneous equipment		30 gal/d
Cow	Automatic	1–4.5 gal/wash/cow
Preparation	Estimated avg.	2 gal/wash/cow
	Manual	0.25–0.5 gal/wash/d
Parlor floor		
	Cleaned with a hose	20–40 gal/milking
	Flush	800–2100 gal/milking
	Well water pre-cooler	2 gal/gal of milk cooled
Milkhouse		10–20 gal/d

(b) Alley flushing^{2/}

Alley slope (%)	Flow depth (in)	Flow rate (gpm) ^{1/}	Flush volume (gal) ^{1/}
1.0	7.0	1,306	220
1.5	5.0	933	156
2.0	4.0	747	125
2.5	3.4	635	106
3.0	3.0	560	94

^{1/} Per foot of alley width^{2/} Table adapted from the Midwest Plan Service Dairy Housing and Equipment Handbook, 2000**Table 4-7** Dairy waste characterization—milking center^{1/}

Component	Units	Milking center ^{2/}			
		MH	MH+MP	MH+MP+HA ^{3/}	MH+MP+HA ^{4/}
Volume	ft ³ /d/1000 lb	0.22	0.60	1.4	1.6
Moisture	%	100	99	100	99
TS	% w.b.	0.28	0.60	0.30	1.5
VS	lb/1000 gal	13	35	18	100
FS	lb/1000 gal	11	15	6.7	25
COD	lb/1000 gal	25	42		
BOD	lb/1000 gal		8.4		
N	lb/1000 gal	0.72	1.7	1.0	7.5
P	lb/1000 gal	0.58	0.83	0.23	0.83
K	lb/1000 gal	1.5	2.5	0.57	3.3
C:N ratio		10	12	10	7.0

^{1/} Adapted from the 1992 version of the AWMFH^{2/} MH—Milk house; MP—Milking parlor; HA—Holding area^{3/} Holding area scraped and flushed—manure excluded^{4/} Holding area scraped and flushed—manure included

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)

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

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

Crop	Yield Unit	N (Nitrogen)	P ₂ O ₅ (Phosphate)	K ₂ O (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

$N \text{ lbs/A} = (\text{yield} \times N \text{ req}) - (\text{ppm topsoil NO}_3\text{-N} \times .3 \times \text{depth in inches}) - (\text{ppm subsoil NO}_3\text{-N} \times .3 \times \text{depth in inches})$
– legume credit – manure credit – irrigation water credit.

If no subsoil sample, assume 2 ppm NO₃-N for sandy soils and 5 ppm NO₃-N for loamy or clayey subsoils.

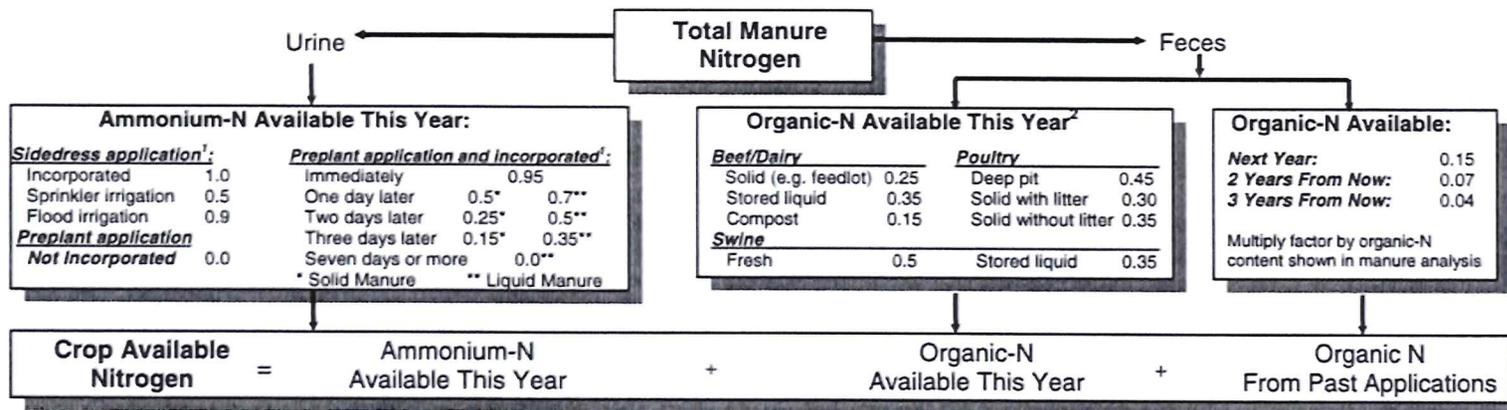
SULFUR RECOMMENDATIONS

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

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

$S \text{ req} = \text{Yield goal} \times S \text{ req factor}$

$\text{Soil S} = \text{ppm S} \times .3 \times \text{depth in inches with a maximum of 8 in.}$



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

²Organic-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

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

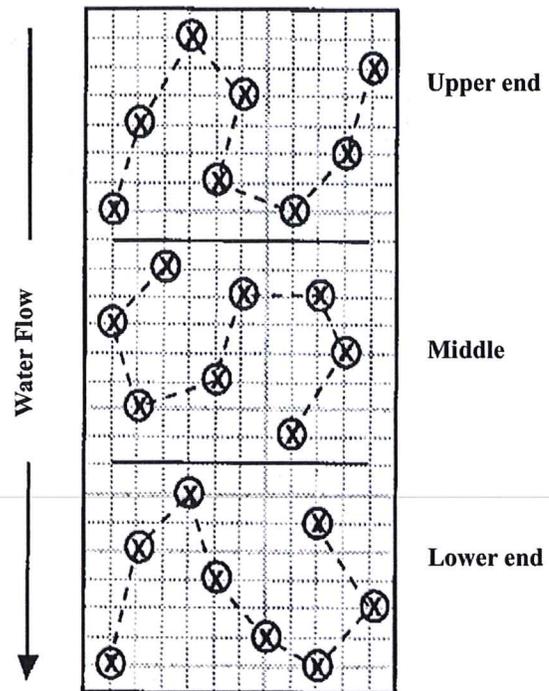


Figure 1. Dividing and sampling a furrow-irrigated field.

of irrigation water that infiltrates the soil will influence the amount and depth of nitrate-nitrogen in the soil.

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).

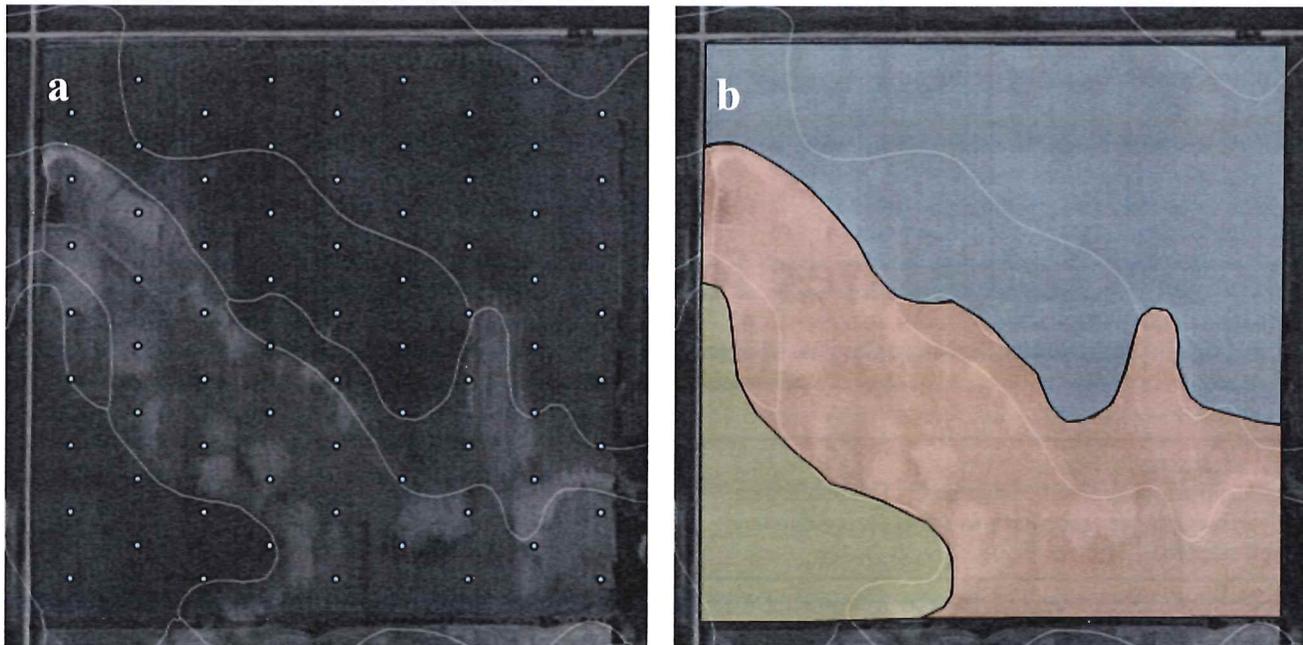


Figure 2. Examples of grid and management zone approaches to collecting soil samples. Figure 2a has 72 sample points. Within each of the three management zones in Figure 2b, 10-15 cores should be collected and composited into a sample representing each zone.

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

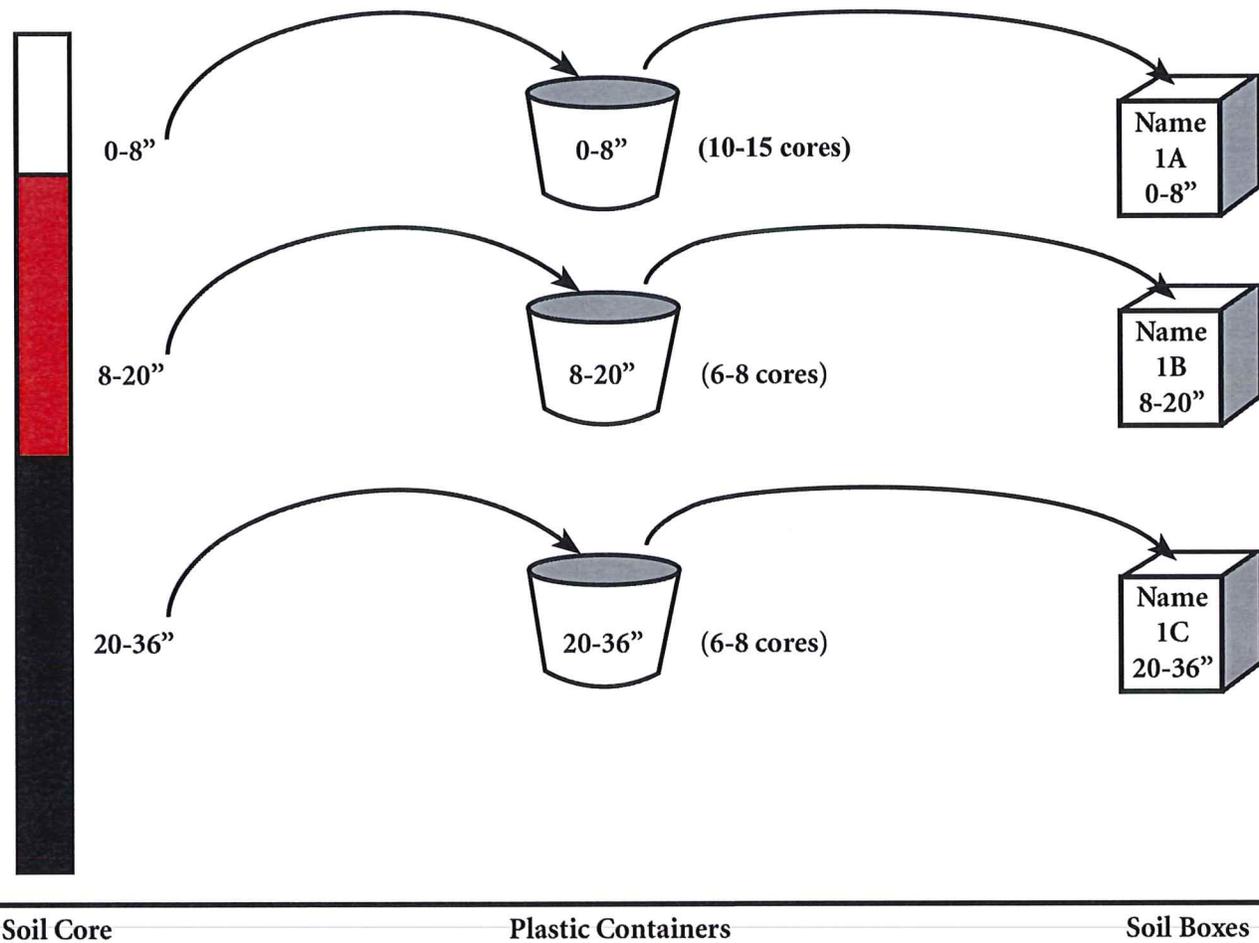


Figure 3. Division of soil cores by depth, with retention of a well-mixed subsample into labeled boxes or sample bags.

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 subsurface 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 subsurface sample is broken into segments. A surface sample of 0-8 inches, combined with a subsurface 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 over-estimated. *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 subsurface sample. Normally very little contamination occurs from one depth to another with a soil probe. A

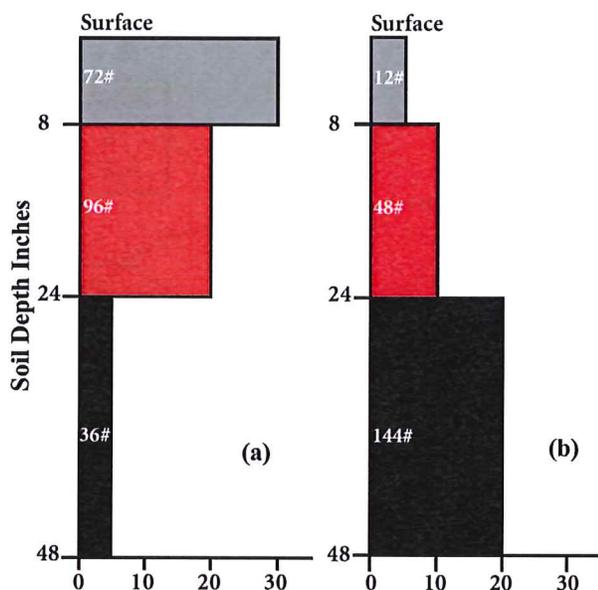


Figure 4. Two potential patterns of vertical distribution of nitrate-N in the root zone. Both contain 204 lb nitrate-N/acre.

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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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

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*).

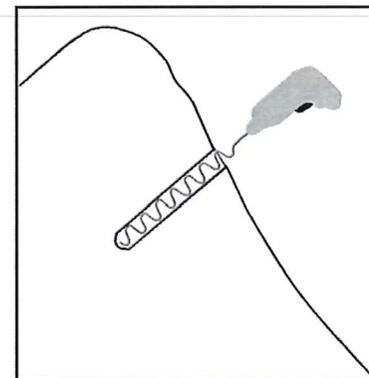


Figure 2. Using an auger bit to sample a manure pile.

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.

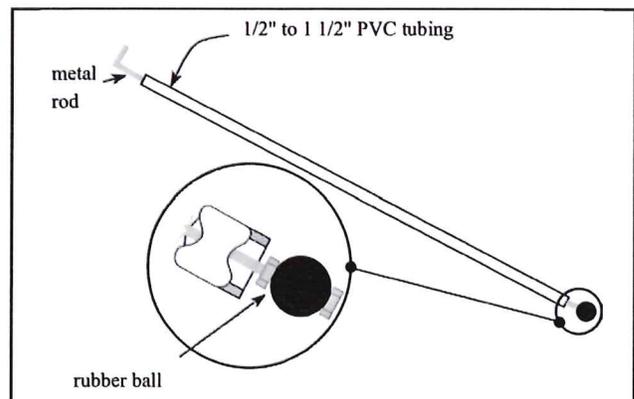


Figure 5. PVC pipe sampler.

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

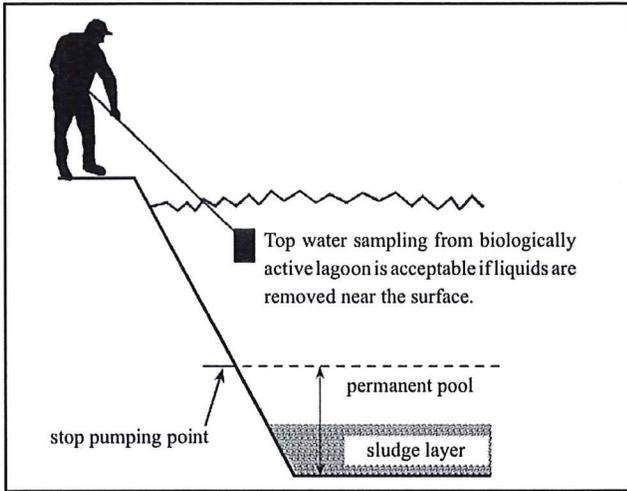


Figure 6. Sampling from a lagoon.

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.



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 (P₂O₅ and K₂O) 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 13611 “B” St. Omaha, NE 68144 402-334-7770 https://www.midwestlabs.com/	Olsen’s Agricultural Laboratory 210 E. 1st St., P.O. Box 370 McCook, NE 69001 308-345-3670 http://www.olsenlab.com/	Platte Valley Laboratories 914 Hwy. 30, P.O. Box 807 Gibbon, NE 68840 308-468-5975 http://www.soillab.com/	Servi-Tech Laboratories 1602 Park West Dr., P.O. Box 169 Hastings, NE 68902 402-463-3522 800-557-7509 http://www.servitechlabs.com	Ward Laboratories 4007 Cherry Ave., P.O. Box 788 Kearney, NE 68848-0788 308-234-2418 800-887-7645 http://www.wardlab.com/

This publication has been peer reviewed.



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

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture.

University of Nebraska–Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.

2018 STATE AGRICULTURE OVERVIEW

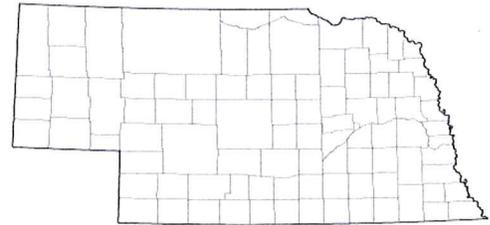
Nebraska

† Survey Data from [Quick Stats](#) as of: Jun/05/2019

Farms Operations[†]

Farm Operations - Area Operated, Measured in Acres / Operation
 Farm Operations - Number of Operations
 Farm Operations - Acres Operated

980
 45,900
 45,000,000



Livestock Inventory[†]

Cattle, Cows, Beef - Inventory (First of Jan. 2019)
 Cattle, Cows, Milk - Inventory (First of Jan. 2019)
 Cattle, Incl Calves - Inventory (First of Jan. 2019)
 Cattle, On Feed - Inventory (First of Jan. 2019)
 Goats, Milk - Inventory (First of Jan. 2019)
 Sheep, Incl Lambs - Inventory (First of Jan. 2019)
 Hogs - Inventory (First of Dec. 2018)

1,941,000
 59,000
 6,800,000
 2,750,000
 4,000
 75,000
 3,500,000

Milk Production[†]

Milk - Production, Measured in Lb / Head
 Milk - Production, Measured in \$
 Milk - Production, Measured in Lb

24,000
 233,280,000
 1,440,000,000

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	Price per Unit	Value of Production in Dollars
CORN						
CORN, GRAIN		9,310,000	192 BU / ACRE	1,787,520,000 BU	3.55 \$ / BU	6,345,696,000
CORN, IRRIGATED, GRAIN		5,313,000	215.8 BU / ACRE	1,146,654,000 BU		
CORN, NON-IRRIGATED, GRAIN		3,997,000	160.3 BU / ACRE	640,866,000 BU		
CORN, NON-IRRIGATED	4,117,000					
CORN, SILAGE		220,000	21 TONS / ACRE	4,620,000 TONS		
CORN	9,600,000					
CORN, IRRIGATED	5,483,000					
SOYBEANS						
SOYBEANS	5,700,000	5,650,000	59 BU / ACRE	333,350,000 BU	8.3 \$ / BU	2,766,805,000
SOYBEANS, NON-IRRIGATED	2,895,000	2,874,000	52.9 BU / ACRE	152,150,000 BU		
SOYBEANS, IRRIGATED	2,805,000	2,776,000	65.3 BU / ACRE	181,200,000 BU		
HAY & HAYLAGE						
HAY & HAYLAGE		2,730,000	2.59 TONS / ACRE, DRY BASIS	7,084,000 TONS, DRY BASIS		706,260,000
HAY & HAYLAGE, ALFALFA	120,000	870,000	4.26 TONS / ACRE, DRY BASIS	3,704,000 TONS, DRY BASIS		
HAY & HAYLAGE, (EXCL ALFALFA)		1,860,000	1.82 TONS / ACRE, DRY BASIS	3,380,000 TONS, DRY BASIS		
HAY						
HAY		2,700,000	2.59 TONS / ACRE	6,985,000 TONS	105 \$ / TON	696,390,000
HAY, ALFALFA		850,000	4.3 TONS / ACRE	3,655,000 TONS	114 \$ / TON	416,670,000
HAY, (EXCL ALFALFA)		1,850,000	1.8 TONS / ACRE	3,330,000 TONS	84 \$ / TON	279,720,000
WHEAT						
WHEAT	1,100,000	1,010,000	49 BU / ACRE	49,490,000 BU	4.75 \$ / BU	235,078,000
WHEAT, WINTER	1,100,000	1,010,000	49 BU / ACRE	49,490,000 BU	4.75 \$ / BU	235,078,000
WHEAT, WINTER, IRRIGATED	95,000	84,000	75.4 BU / ACRE	6,334,000 BU		
WHEAT, WINTER, NON-IRRIGATED	1,005,000	926,000	46.6 BU / ACRE	43,156,000 BU		
POTATOES						
POTATOES	19,500	19,300	485 CWT / ACRE	9,361,000 CWT	10.4 \$ / CWT	97,354,000
SORGHUM						
SORGHUM, GRAIN		170,000	94 BU / ACRE	15,980,000 BU	5.6 \$ / CWT	50,113,000
SORGHUM	230,000					
SORGHUM, SILAGE		20,000	11 TONS / ACRE	220,000 TONS		
MILLET						
MILLET, PROSO	95,000	89,000	32 BU / ACRE	2,848,000 BU	4.4 \$ / BU	12,531,000
PEAS						
PEAS, DRY EDIBLE	58,000	49,000	1,840 LB / ACRE	902,000 CWT	10.2 \$ / CWT	9,200,000
SUNFLOWER						
SUNFLOWER	37,000	33,500	1,414 LB / ACRE	47,380,000 LB	15.5 \$ / CWT	8,687,000
OATS						

OATS	125,000	22,000	69 BU / ACRE	1,518,000 BU	2.75 \$ / BU	4,175,000
CHICKPEAS						
CHICKPEAS	12,500	12,000	1,940 LB / ACRE	233,000 CWT		
HAYLAGE						
HAYLAGE, (EXCL ALFALFA)		15,000	6.8 TONS / ACRE	102,000 TONS		
HAYLAGE, ALFALFA		25,000	4 TONS / ACRE	100,000 TONS		
HAYLAGE		40,000	5.05 TONS / ACRE	202,000 TONS		
SUGARBEETS						
SUGARBEETS	45,500	44,100	31.9 TONS / ACRE	1,407,000 TONS		

(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

Census State Profile: Nebraska
Ranked Items Within The U.S., 2012

Item	Quantity	U.S. Rank	Universe ¹
MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD (\$1,000)			
Total value of agricultural products sold	23,068,756	4	50
Value of crops, including nursery and greenhouse	11,377,933	5	50
Value of livestock, poultry, and their products	11,690,823	4	50
VALUE OF SALES BY COMMODITY GROUP (\$1,000)			
Grains, oilseeds, dry beans, and dry peas	10,698,861	4	50
Tobacco	-	-	19
Cotton and cottonseed	-	-	17
Vegetables, melons, potatoes and sweet potatoes	101,141	23	50
Fruit, tree nuts, and berries	3,157	44	50
Nursery, greenhouse, floriculture and sod	46,016	38	50
Cut Christmas trees and short rotation woody crops	1,027	30	49
Other crops and hay	527,732	11	50
Poultry and eggs	216,370	27	50
Cattle and calves	10,098,166	3	50
Milk from cows	219,724	26	50
Hogs and pigs	1,085,828	6	50
Sheep, goats, wool, mohair, and milk	14,289	18	50
Horses, ponies, mules, burros, and donkeys	22,809	19	50
Aquaculture	3,550	40	50
Other animals and other animal products	30,086	13	50
TOP CROP ITEMS (acres)			
Corn for grain	9,087,851	3	49
Soybeans for beans	4,983,253	6	45
Forage-land used for all hay and haylage, grass silage, and greenchop	2,487,312	5	50
Wheat for grain, all	1,309,269	10	49
Winter wheat for grain	1,302,674	7	48
TOP LIVESTOCK INVENTORY ITEMS (number)			
Layers	9,351,688	14	50
Cattle and calves	6,385,675	2	50
Hogs and pigs	2,992,576	6	50
Pullets for laying flock replacement	2,579,664	15	50
Broilers and other meat-type chickens	908,965	28	50

Other State Highlights, 2012

Economic Characteristics	Quantity
Farm by value of sales	
Less than \$1,000	8,731
\$1,000 to \$2,499	1,917
\$2,500 to \$4,999	2,224
\$5,000 to \$9,999	2,850
\$10,000 to \$19,999	2,996
\$20,000 to \$24,999	1,002
\$25,000 to \$39,999	2,457
\$40,000 to \$49,999	1,254
\$50,000 to \$99,999	5,071
\$100,000 to \$249,999	7,116
\$250,000 to \$499,999	5,634
\$500,000 or more	8,717
Total farm production expenses (\$1,000)	19,175,997
Average per farm (\$)	383,758
Net cash farm income of the operations (\$1,000)	5,426,292
Average per farm (\$)	108,593

Operator Characteristics	Quantity
Principal operators by primary occupation	
Farming	29,819
Other	20,150
Principal operators by sex	
Male	45,878
Female	4,091
Average age of principal operator	55.7
All operators by race²	
American Indian or Alaska Native	114
Asian	34
Black or African American	32
Native Hawaiian or Other Pacific Islander	-
White	74,514
More than one race	92
All operators of Spanish, Hispanic or Latino Origin ²	494

explanations, definitions, and methodology.

¹ Universe is number of states in U.S. with item.

² Data were collected for a maximum of three operators per farm.

(D) Withheld to avoid disclosing data for individual operations.

- Represents zero.

Note: See "Census of Agriculture, Volume 1, Geographic Area Series" for complete footnotes.

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
Alfalfa	4.4	ton/acre	55	12	242	53
Grain Sorghum	94.0	bushels/acre	1.15	0.27	108	25
Oats	69.0	bushels/acre	1.3	0.25	90	17
Potatoes	485.0	cwt.	0.5	0.13	243	63
Sugar Beets	31.9	ton/acre	8	1.4	255	45
Sunflowers	15.5	cwt.	5	1.2	78	19
Wheat	49.0	bushels/acre	2.4	0.52	118	25

A - "2018 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 Sales Agreement

Seller: Prairieland Dairy, LLC

Date: _____

Address: 13000 Pella Rd

Firth, NE 68358

Buyer: _____

Address: _____

Phone: _____

Application Details

Annual Acres Available: _____

Previous crop(s): _____ Planned crop(s): _____ Yield Goal: _____

Application fee: **current custom applicator rates determined by custom applicator**

Application rate to be determined by buyer.

Payment Terms: Due 30 days post completion of application. Seller reserves the right to file a lien against the crops of the stated fields in the event of non-payment.

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 will provide buyer with current laboratory results of the manure fertilizer product. Nutrient Advisors will use current 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. These recommendations will be itemized on the nutrient budgets provided to buyer for each application site. The seller and Nutrient Advisors 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 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: _____

Buyer: _____

By: _____

By: _____

Date: _____

Date: _____

Section 7

Application Site Maps

1 mile radius maps

Aerial Maps

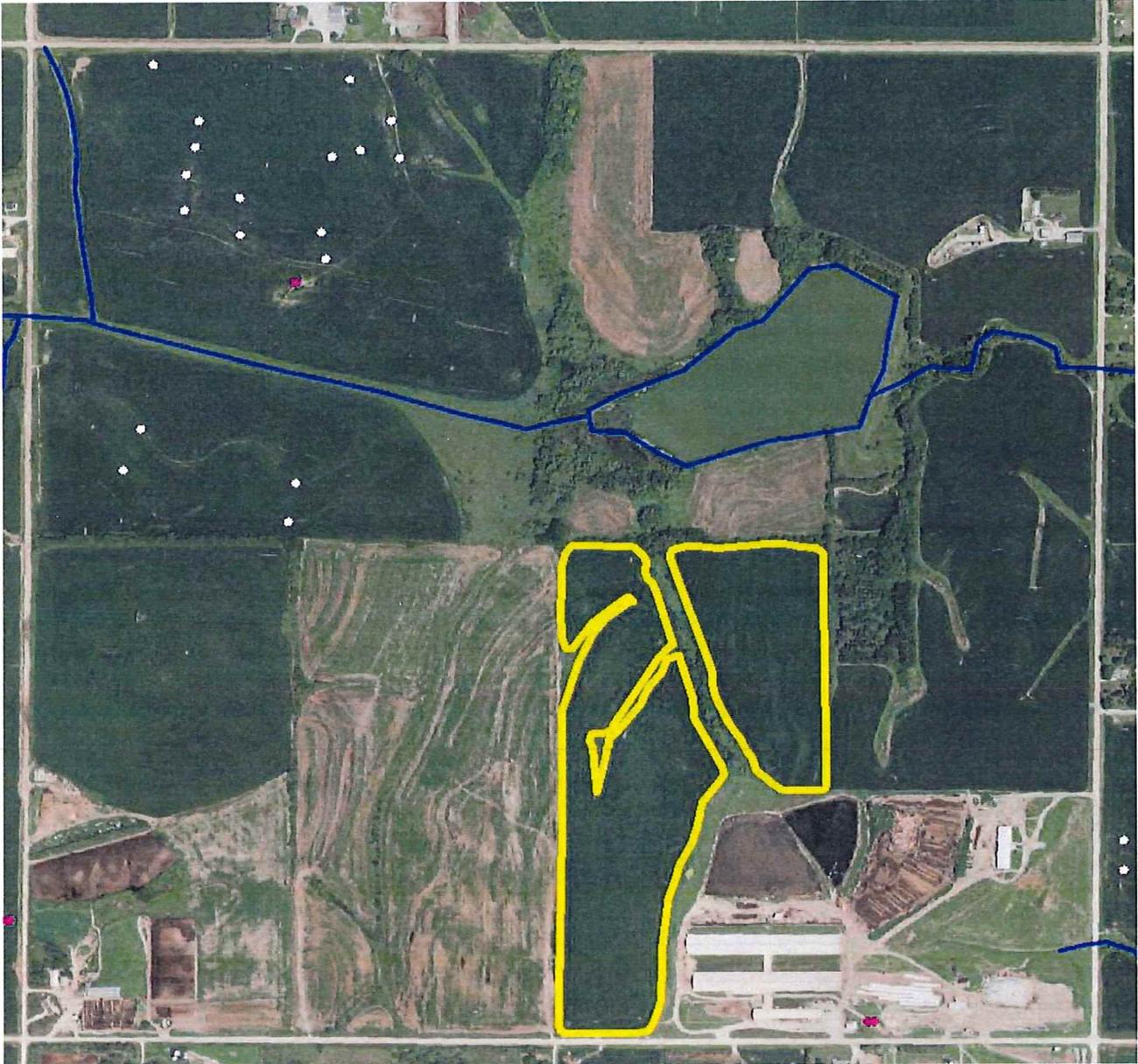
Soils Maps

Phosphorus Index

Soil Analysis Results (as applicable)

Land Application Agreements

Prairieland Dairy, LLC



Layer Key

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

Name: Site 1 West of Dairy

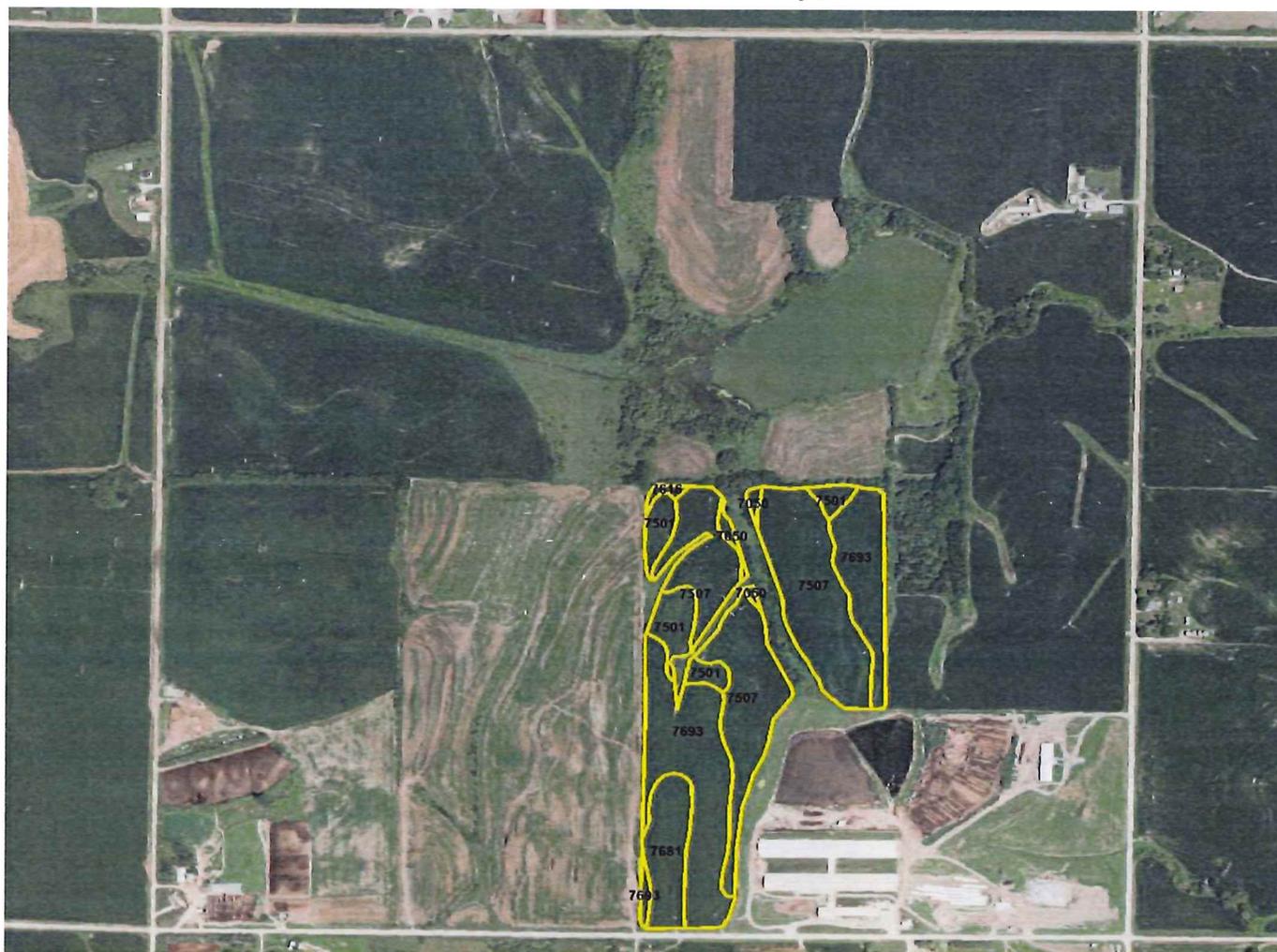
Landowner: Prairieland Dairy, LLC

Legal: Pt. W1/2 SE1/4
S20-T7N-R8E

Acres: 48.34



Prairieland Dairy, LLC



Area Symbol: NE109_Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class 'c	Irr Class 'c	SRPG	*n NCCPI Soybeans
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	22.51	46.6%		IVe	58	35
7693	Wymore silty clay loam, 2 to 6 percent slopes	16.33	33.8%		IIIe	69	60
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	4.49	9.3%		IIIe		35
7631	Wymore silty clay loam, 1 to 3 percent slopes	4.27	8.8%		IIe	72	60
7050	Kennebec silt loam, occasionally flooded	0.50	1.0%		IIw	73	84
7616	Steinauer loam, 6 to 11 percent slopes	0.24	0.5%		IVe	56	64
Weighted Average						57.7	*n 46.3

Name: Site 1 West of Dairy

Landowner: Prairieland Dairy, LLC

County: Lancaster

Legal: Pt. W1/2 SE1/4
S20-T7N-R8E

Acres: 48.34



NEBRASKA PHOSPHORUS LOSS ASSESSMENT RATING

Livestock Operation: Prairieland Dairy, LLC
 Crop Producer: Prairieland Dairy, LLC

Field ID: Site 1 - West of Dairy
 Legal Desc: 20-7-8E
 Completion Date: February 2020

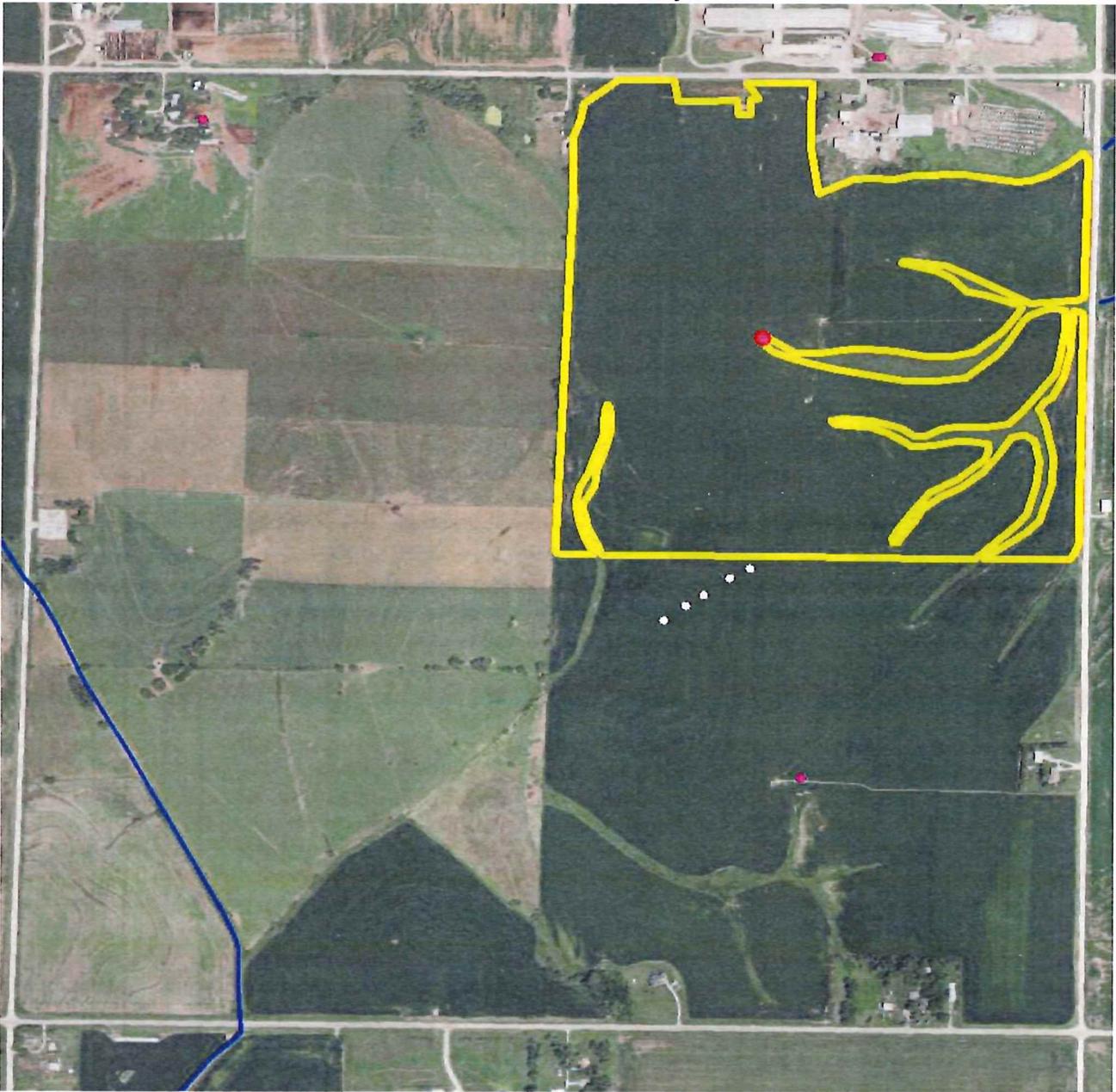


Prepared by: Nutrient Advisors

County	Lancaster
Field	Site 1 - West of Dairy
Option	7507
Erosion, S&R	4.8
Sediment trap	Grass Waterway
Field radius	430.0
Filter width	0-10 ft
Enrichment	Tillage
Land use	Conservation Till without contouring Alfalfa-Meadow/High Residue Crop/Small grain - mt
Soil type	Pawnee clay loam, 7 to 11 percent slopes, eroded
Soil P ppm	50.0
Applied P lbs	75.0
	Incorporate or Inject Within 24 Hours
Irrigation	None
Rate gpm	
Furrow slope%	
Manure	3.0
P-Index Value	1.8
Rating	Low

©Nutrient Advisors L.L.C. West Point, Nebraska 402-372-2236

Prairieland Dairy, LLC



Layer Key

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

Name: Site 2 South Field North

Landowner: Clifford P Obbink

Legal: NE1/4
S29-T7N-R8E

Acres: 127.40



REPORT NUMBER: 19-303-0404
 ACCOUNT NUMBER: 18237



PAGE 1/1
 REPORT DATE: NOV 5, 2019

NUTRIENT ADVISORS SOIL
 449 E DEERE ST
 WEST POINT, NE 68788-

PRAIRIELAND DAIRY
 PRAIRIELAND DAIRY
 WEST OF DAIRY

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)						pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)												
				PHOSPHORUS			POTASSIUM K	MAGNESIUM Mg	CALCIUM Ca	SODIUM Na	SOIL pH		BUFFER INDEX	K	Mg	Ca	H	Na							
				L.O.I.	WEAK BRAY 1:7	STRONG BRAY 1:7	BICARBONATE P OLSEN	ppm	RATE	ppm	RATE		ppm	RATE	ppm	RATE	1:1		meq/100g	%	%	%	%	%	
				%	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE	ppm	RATE									
35066011	WDW	3.7	H	120	VH	144	VH	88	VH	438	VH	612	VH	3500	H			7.1	0.0	23.7	4.7	21.5	73.8	0.0	

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction														
	Surface			Sub 1			Sub 2			Total	SULFUR S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	EXCESS LIME	SOLUBLE SALTS							
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	RATE	mmhos/cm	1:1	RATE	
WDW	9	22	0-8	2	10	8-24				32	13	M	9.6	VH										0.5	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-6

REPORT NUMBER: 19-361-0084
 ACCOUNT NUMBER: 18237



PAGE 1/1
 REPORT DATE: DEC 31, 2019

NUTRIENT ADVISORS SOIL
 449 E DEERE ST
 WEST POINT, NE 68788-

PRAIRIELAND DAIRY
 PRAIRIELAND DAIRY
 WEST OF DAIRY

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)						pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)												
				PHOSPHORUS			POTASSIUM	MAGNESIUM	CALCIUM	SODIUM	SOIL pH		BUFFER INDEX	K	Mg	Ca	H	Na							
				P ₁	P ₂	BICARBONATE P	K	Mg	Ca	Na	1:1			%	%	%	%	%							
				WEAK BRAY 1:7	STRONG BRAY 1:7	OLSEN	ppm	RATE	ppm	RATE	ppm		RATE	ppm	RATE	ppm	RATE	ppm	RATE						
35700119	WDE	4.4	H	57	VH	129	VH	42	VH	417	VH	498	VH	3607	H			7.0	0.0	23.3	4.6	17.8	77.6	0.0	

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction								EXCESS LIME RATE	SOLUBLE SALTS 1:1 RATE						
	Surface		Sub 1		Sub 2		Total	SULFUR S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B													
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE			ppm	RATE	ppm	RATE	RATE	mmhos/cm
WDE	14	34	0-8	4	19	8-24			53	14	M	6.6	VH													

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-7

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Clifford Obbink

811 Country VW	Firth	NE	68358	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: Pl. NE1/4 & N1/2 SE1/4, S29-T7N-R8E

Total Acres: 210.61 Useable Acres: 175.95 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

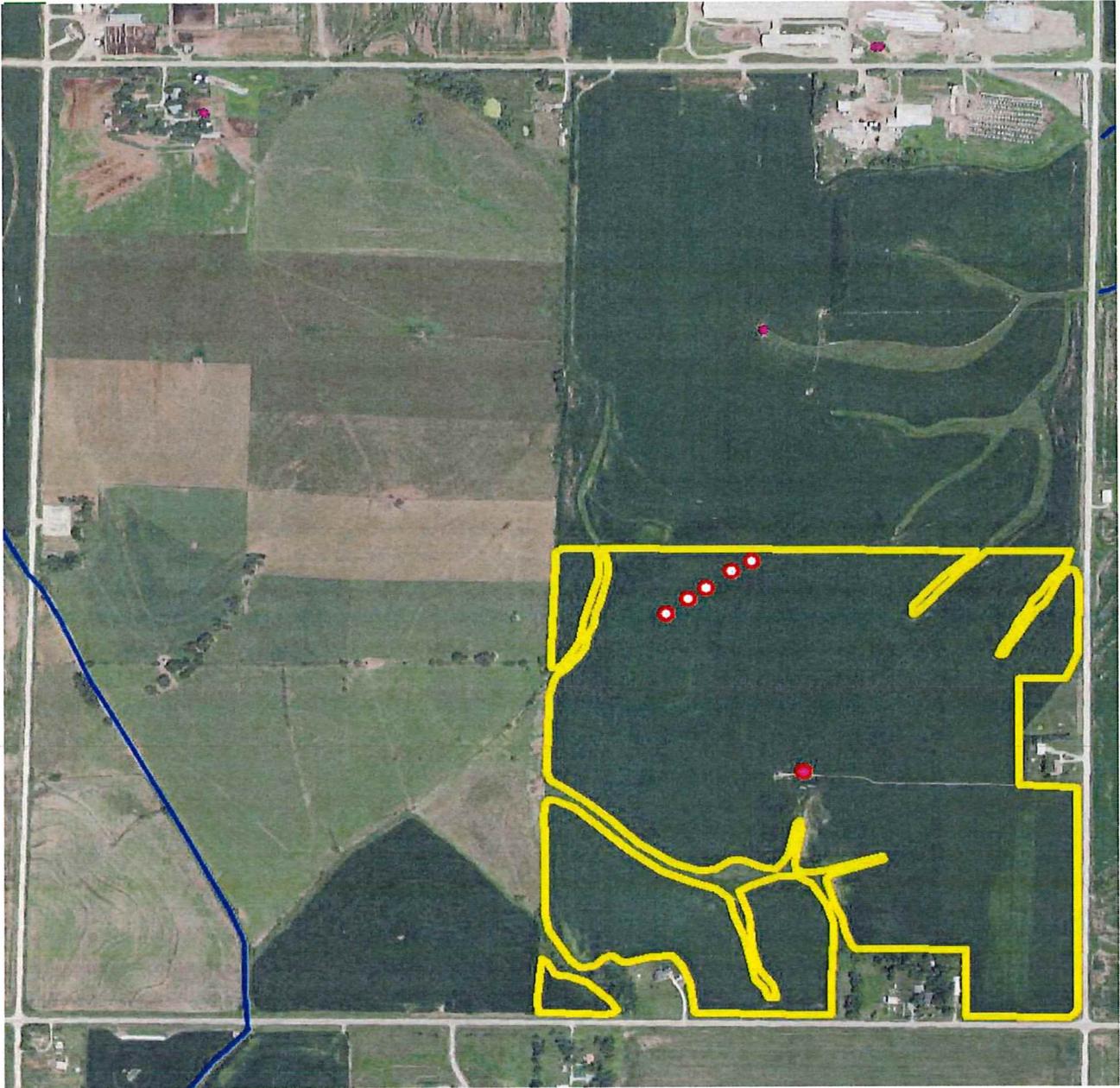
Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: *Clifford Obbink* Date: 12-16-19
 Landowner

[Signature] Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 3 South Field South
Landowner: Clifford P Obbink, Obbink Farms, Inc., & David & Chrystal Obbink
Legal: SE1/4
S29-T7N-R8E
Acres: 135.20



REPORT NUMBER: 19-303-0407

ACCOUNT NUMBER: 18237



PAGE 1/1

REPORT DATE: NOV 5, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
SOUTH FIELD N- SITE 2

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)				pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)									
				P ₁		P ₂		BICARBONATE P OLSEN		POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca			SODIUM Na		SOIL pH	BUFFER INDEX	K	Mg	Ca	H	Na	
				WEAK BRAY 1:7		STRONG BRAY 1:7		ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE			1:1	%	%	%	%	%
				ppm	RATE	ppm	RATE															ppm	RATE	ppm	RATE	ppm
35066030	SFND	3.7	H	67	VH	109	VH	70	VH	459	VH	747	VH	3706	H			7.1	0.0	26.6	4.4	23.4	69.7	0.0	2.5	
35066032	SFNN	3.5	M	79	VH	102	VH	80	VH	924	VH	660	VH	3216	M			7.3	0.0	24.7	9.6	22.3	64.9	0.0	3.2	
35066034	SFNN	2.5	L	85	VH	103	VH	100	VH	846	VH	696	VH	3263	M			7.5	0.0	25.1	8.6	23.1	65.1	0.0	3.2	
35066036	SFNN	3.2	M	73	VH	109	VH	77	VH	970	VH	731	VH	3246	M			7.8	0.0	25.8	9.6	23.6	63.1	0.0	3.7	
35066038	SFNS	3.6	H	77	VH	89	VH	79	VH	1043	VH	718	VH	3282	M			7.6	0.0	26.1	10.2	22.9	63.0	0.0	3.9	

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction										EXCESS LIME RATE	SOLUBLE SALTS 1:1					
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu			BORON B		RATE	mmhos/cm	RATE	
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE				
SFND	12	29	0-8	6	29	8-24				58	19	H	4.4	H												0.6	L
SFNN	25	60	0-8	26	125	8-24				185	14	M	7.6	VH												0.6	L
SFNN	14	34	0-8	20	96	8-24				130	14	M	6.8	VH												0.6	L
SFNN	22	53	0-8	15	72	8-24				125	14	M	7.4	VH												0.7	L
SFNS	30	72	0-8	30	144	8-24				216	15	M	7.8	VH												0.7	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-11

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Clifford Obbink

811 Country VW	Firth	NE	68358	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: Pl. NE1/4 & N1/2 SE1/4, S29-T7N-R8E

Total Acres: 210.61 Useable Acres: 175.95 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

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: *Clifford Obbink* Date: 12-16-19
 Landowner/Operator

[Signature] Date: 7-14-20
 Livestock Operator (Authorized Representative)

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Obbink Farms, Inc.

811 Country View Ln	Firth	NE	68358	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: N1/2 SW1/4 SE1/4 & SE1/4 SE1/4, S29-T7N-R8E

Total Acres: 53.23 Useable Acres: 48.55 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

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: *[Signature]* Date: 12-16-19
 Landowner

[Signature] Date: 7-14-20
 Livestock Operator (Authorized Representative)

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

<u>13000 Pella Road</u>	<u>Firth</u>	<u>NE</u>	<u>68358</u>	<u>402-791-2238</u>
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: David & Chrystal Obbink

<u>12800 Firth Rd</u>	<u>Firth</u>	<u>NE</u>	<u>68358</u>	<u></u>
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: SW1/4, S21-T7N-R8E

Total Acres: 156.27 Useable Acres: 145.20 Irrigated Dryland

Legal Description: S1/2 SW1/4 SE1/4, S29-T7N-R8E

Total Acres: 18.85 Useable Acres: 14.52 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

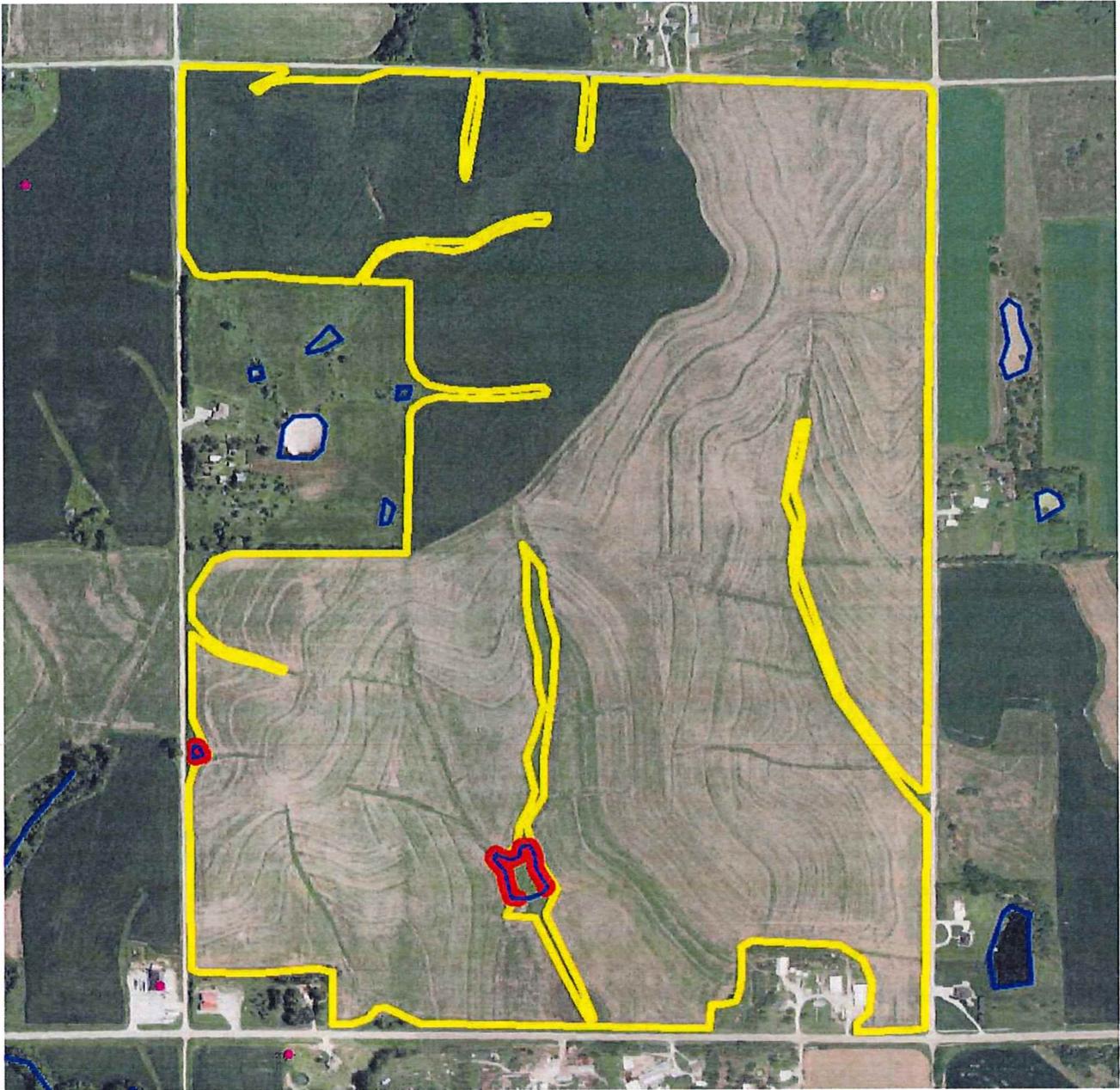
Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: David Obbink Date: 12-14-19
Landowner

Bob Date: 2-14-20
Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 4

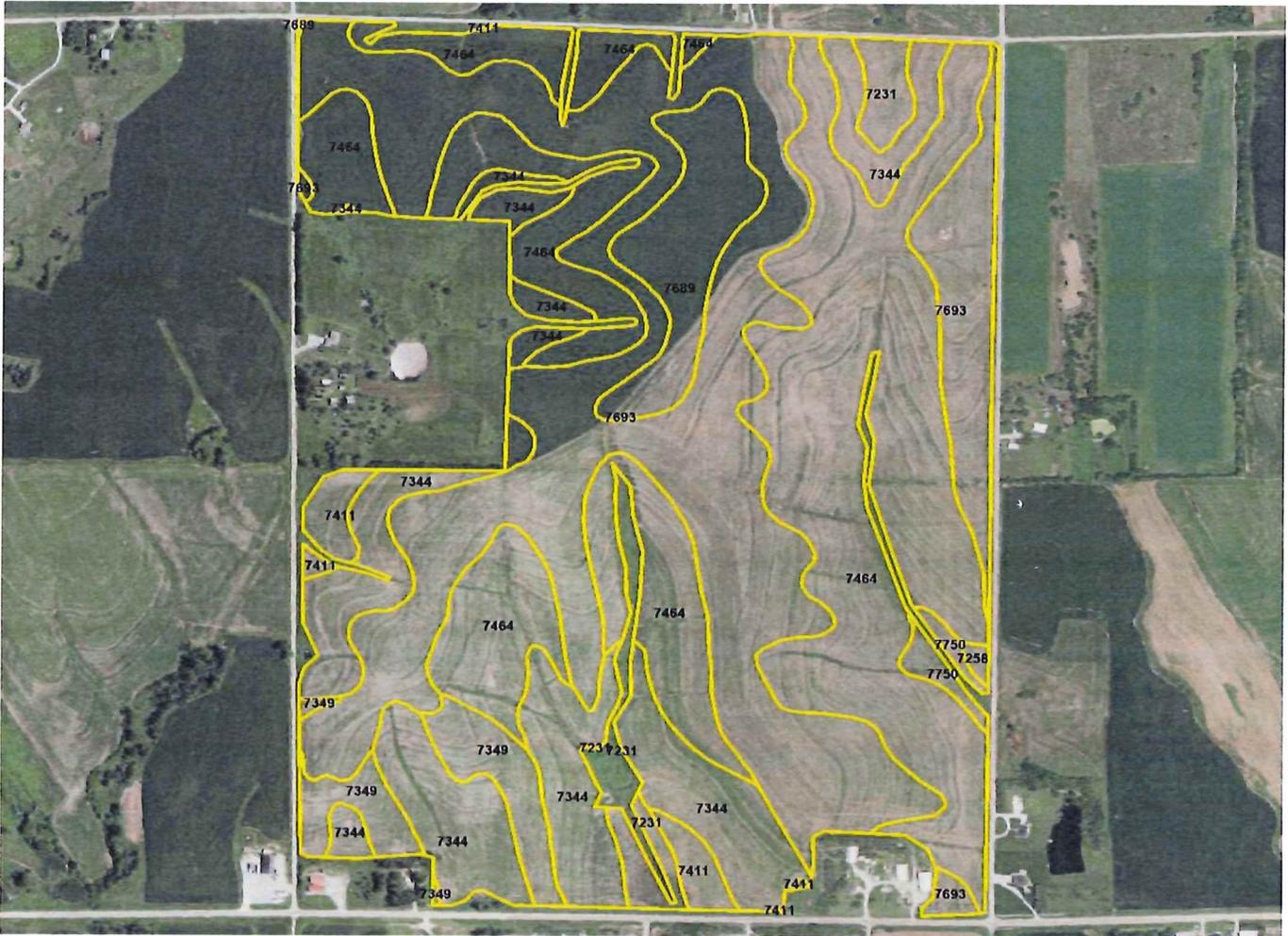
Landowner: Vinson & Harriet VanEngen

Legal: Pt.
S19-T6N-R8E

Acres: 383.00



Prairieland Dairy, LLC



Area Symbol: NE067, Soil Area Version: 22

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7464	Otoe silty clay loam, 6 to 11 percent slopes, eroded	140.37	36.6%		IVe	66	44
7693	Wymore silty clay loam, 2 to 6 percent slopes	131.80	34.4%		IIIe	69	60
7344	Malmo, eroded-Pawnee complex, 6 to 11 percent slopes	62.65	16.4%		IVe	52	38
7689	Wymore silty clay loam, 0 to 2 percent slopes	17.55	4.6%		IIIs	72	61
7349	Malmo clay loam, 2 to 6 percent slopes, eroded	13.29	3.5%		IIIe	58	39
7231	Judson silt loam, 2 to 6 percent slopes	7.69	2.0%		IIe	80	63
7411	Cortland-Malmo complex, 6 to 11 percent slopes, eroded	6.41	1.7%		IVe	54	43
7750	Nodaway silt loam, occasionally flooded	2.76	0.7%		IIW	74	83
7258	Deroin sity clay loam, 6 to 11 percent slopes, eroded	0.50	0.1%		IVe	71	59
Weighted Average						64.9	*n 49.9

Name: Site 4

Landowner: Vinson & Harriet VanEngen

County: Gage

Legal: Pt.
S19-T6N-R8E
Acres: 383.00



REPORT NUMBER: 19-303-0406
 ACCOUNT NUMBER: 18237



PAGE 1/1
 REPORT DATE: NOV 5, 2019

NUTRIENT ADVISORS SOIL
 449 E DEERE ST
 WEST POINT, NE 68788-

PRAIRIELAND DAIRY
 PRAIRIELAND DAIRY
 SOUTH FIELD S- SITE 2 3

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. % RATE		PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)				pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)								
				P ₁		P ₂		BICARBONATE P OLSEN		POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca			SODIUM Na		SOIL pH	BUFFER INDEX	K	Mg	Ca	H	Na
				WEAK BRAY 1:7		STRONG BRAY 1:7		ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE							
				ppm	RATE	ppm	RATE																		
35066019	SFS DW	3.1	M	34	VH	99	VH	38	VH	408	VH	713	VH	3388	H			7.1	0.0	23.9	4.4	24.9	70.7	0.0	
35066021	SFS N	3.8	H	56	VH	102	VH	54	VH	580	VH	716	VH	3709	H			7.4	0.0	26.7	5.6	22.3	69.4	0.0	2.7
35066023	SFS M	3.6	H	60	VH	107	VH	50	VH	594	VH	607	VH	3238	H			7.4	0.0	22.8	6.7	22.2	71.1	0.0	
35066025	SFS S	3.1	M	32	VH	67	VH	37	VH	326	VH	641	VH	3614	H			7.0	0.0	24.8	3.4	21.5	72.8	0.0	2.3
35066028	SFS DE	3.8	H	45	VH	92	VH			268	VH	595	VH	3675	H			6.7	0.0	24.0	2.9	20.7	76.4	0.0	

SAMPLE ID	NITRATE-N (FIA)									DTPA Extraction																		
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu		BORON B		EXCESS LIME	SOLUBLE SALTS 1:1				
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	RATE	mmhos/cm	RATE	
SFS DW	10	24	0-8	7	34	8-24				58	10	L	4.2	H													0.4	L
SFS N	16	38	0-8	6	29	8-24				67	11	L	5.5	H													0.5	L
SFS M	9	22	0-8	5	24	8-24				46	9	L	6.3	VH													0.4	L
SFS S	8	19	0-8	4	19	8-24				38	16	M	4.7	H													0.5	L
SFS DE	10	24	0-8	3	14	8-24				38	7	L	2.9	M													0.3	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-17

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And

Landowner/Operator: Vinson Van Engen
11814 E. State Hwy 41 Adams NE 68301 402-988-5415
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: N $\frac{1}{2}$ & S $\frac{1}{2}$ of Sec 19-6-8
 Total Acres: _____ Useable Acres: 380 Irrigated Dryland

Legal Description: SW $\frac{1}{4}$ of SE $\frac{1}{2}$ of sec 17-6-8
 Total Acres: _____ Useable Acres: 34 Irrigated Dryland

Legal Description: E $\frac{1}{2}$ of NE $\frac{1}{4}$ of sec 24-6-7
 Total Acres: _____ Useable Acres: 68 Irrigated Dryland

Legal Description: N $\frac{1}{2}$ of SW $\frac{1}{4}$ of sec 35-6-8
 Total Acres: _____ Useable Acres: 75 Irrigated Dryland

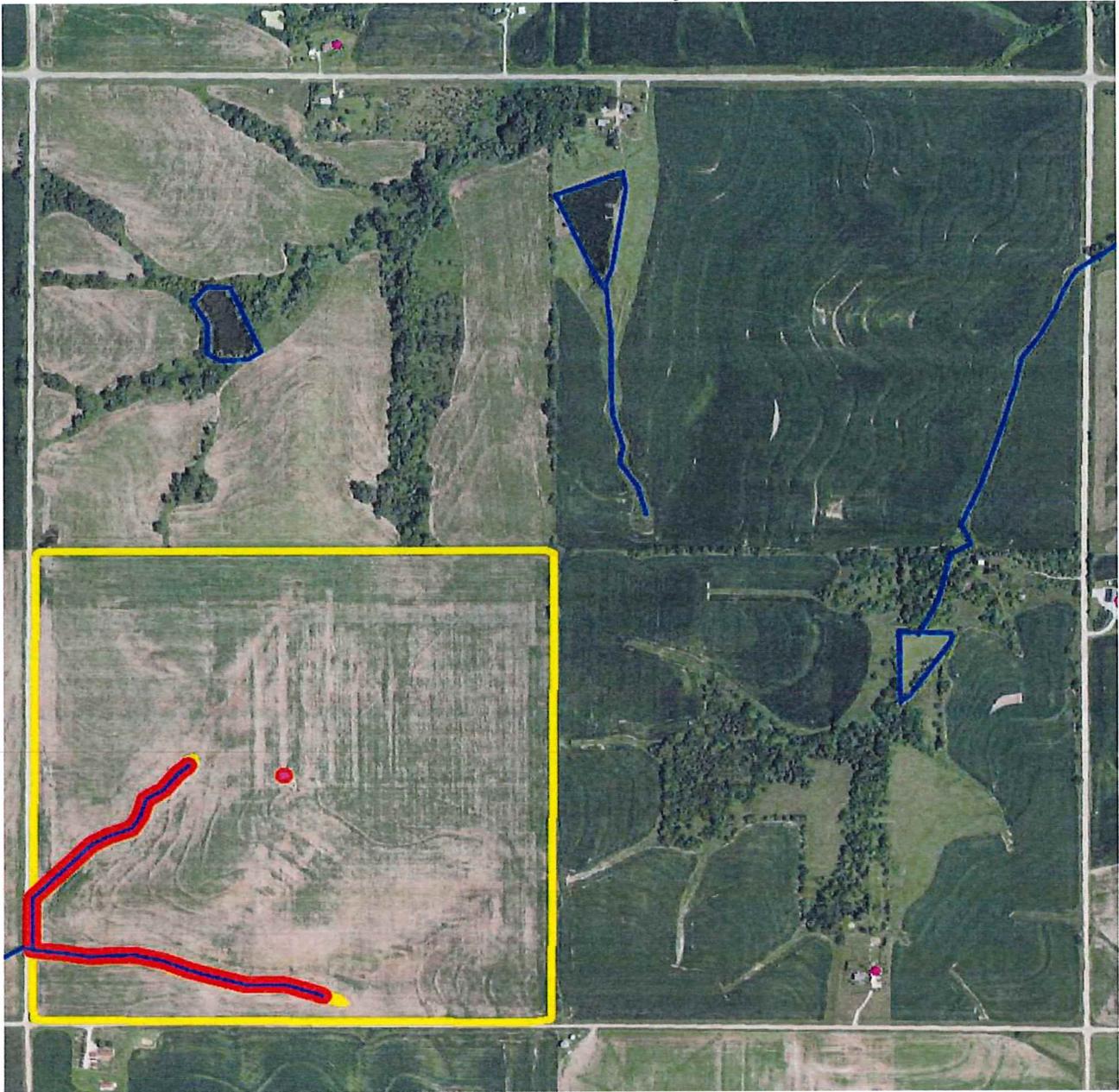
Legal Description: NE $\frac{1}{4}$ of NW $\frac{1}{4}$ sec 25-6-7
 Total Acres: _____ Useable Acres: 37 Irrigated Dryland

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: Vinson Van Engen Date: 1-2-20
 Landowner/Operator (Authorized Representative)

Doc Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 5

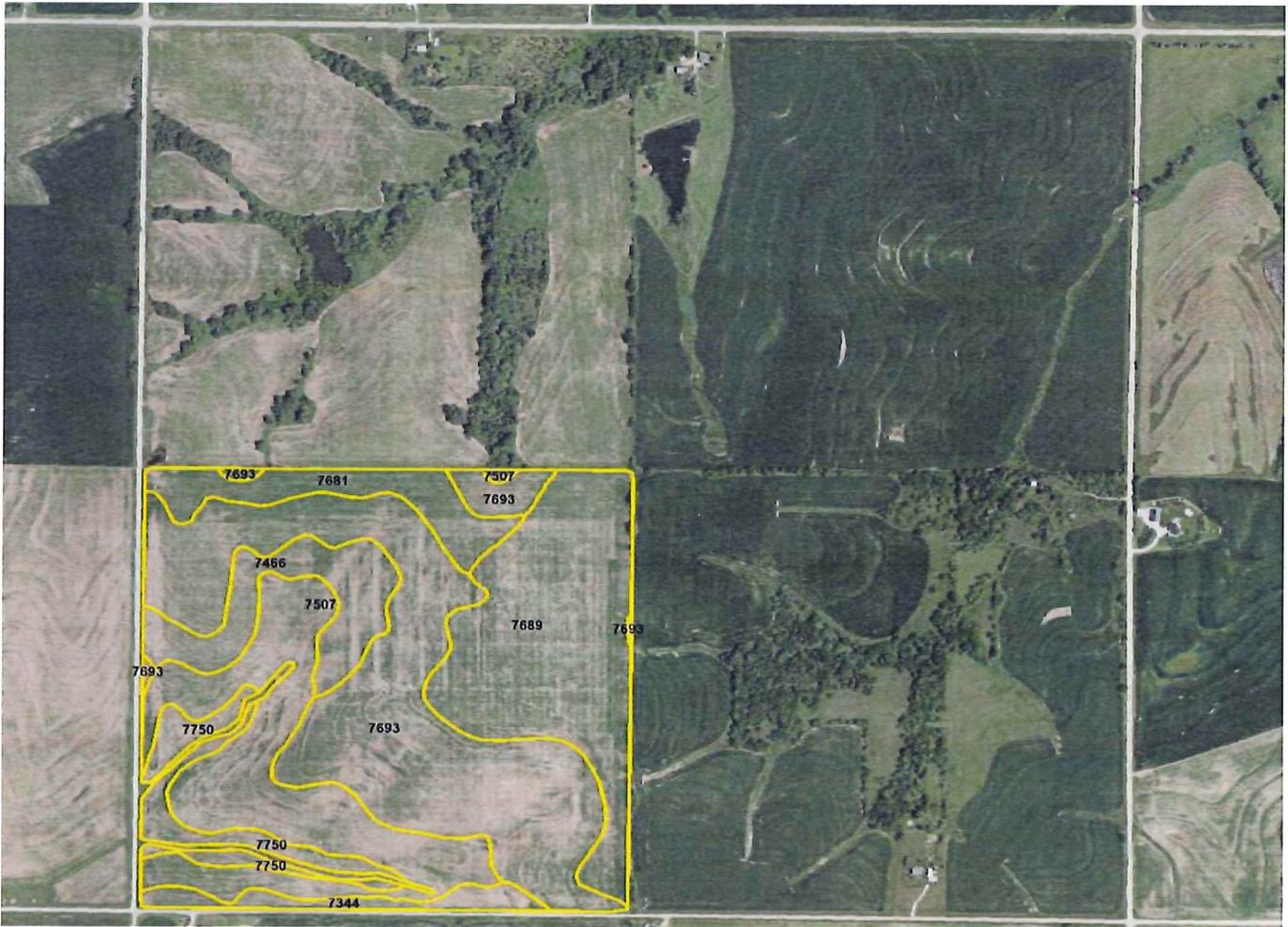
Landowner: Steven R & Dena K DeBoer

Legal: SW1/4
S33-T7N-R8E

Acres: 153.10



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class %c	Irr Class %c	SRPG	'n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	53.12	34.7%	IIIe	IIIe	69	60
7689	Wymore silty clay loam, 0 to 2 percent slopes	34.16	22.3%	IIIs	IIIs	72	61
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	30.75	20.1%	IVe		58	35
7466	Otoe silty clay, 6 to 11 percent slopes, eroded	12.10	7.9%	IVe	IVe	66	47
7681	Wymore silty clay loam, 1 to 3 percent slopes	9.36	6.1%	IIe	IIe	72	60
7750	Nodaway silt loam, occasionally flooded	9.16	6.0%	IIw	IIw	74	88
7344	Malmo, eroded-Pawnee complex, 6 to 11 percent slopes	4.45	2.9%	IVe		52	38
Weighted Average						67.2	'n 55.2

Name: Site 5

Landowner: Steven R & Dena K DeBoer

County: Lancaster

Legal: SW1/4
S33-T7N-R8E

Acres: 153.10



Nutrient Application Agreement

This agreement is hereby made between DeBoer Farms Inc. (landowner) and Cliff Obbink representing PrairieLand Dairy

1. PrairieLand Dairy requires access to the below described land for the purposes of applying nutrients in the form of solid and/or liquid manure from the facility.
2. PrairieLand Dairy may or may not spread manure in any given year of this agreement.
3. Owner agrees to allow PrairieLand Dairy to spread manure on said premises at such times as are mutually agreeable by both PrairieLand Dairy and said owner.
4. Owner may specify application rate if desired but application rate will not exceed normal agronomic rates.
5. This Agreement shall continue from year to year without further renewal, except if either party desires to change or cancel this Agreement they shall do so in writing on or before September 1, of any given year for the following year.
6. Owner agrees to provide the following land tracts for manure and nutrient applications:

Previously on file with NDEQ
County

Office Use Only	Common Name	Legal Description <small>Example: NE1/4 of SW1/4 S 14, T 11, R 4W</small>	County	Irrigated ?	ACRES
	North Pivot	S 1/2 NW 1/4 + NE 1/2 SW 1/4 S 17 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	160
	West Pivot	S 1/2 SW 1/4 S 17 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	80
	East Pivot	SE 1/4 S 17 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	160
	Steve's	SW 1/4 S 33 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	160
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No	560
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No	

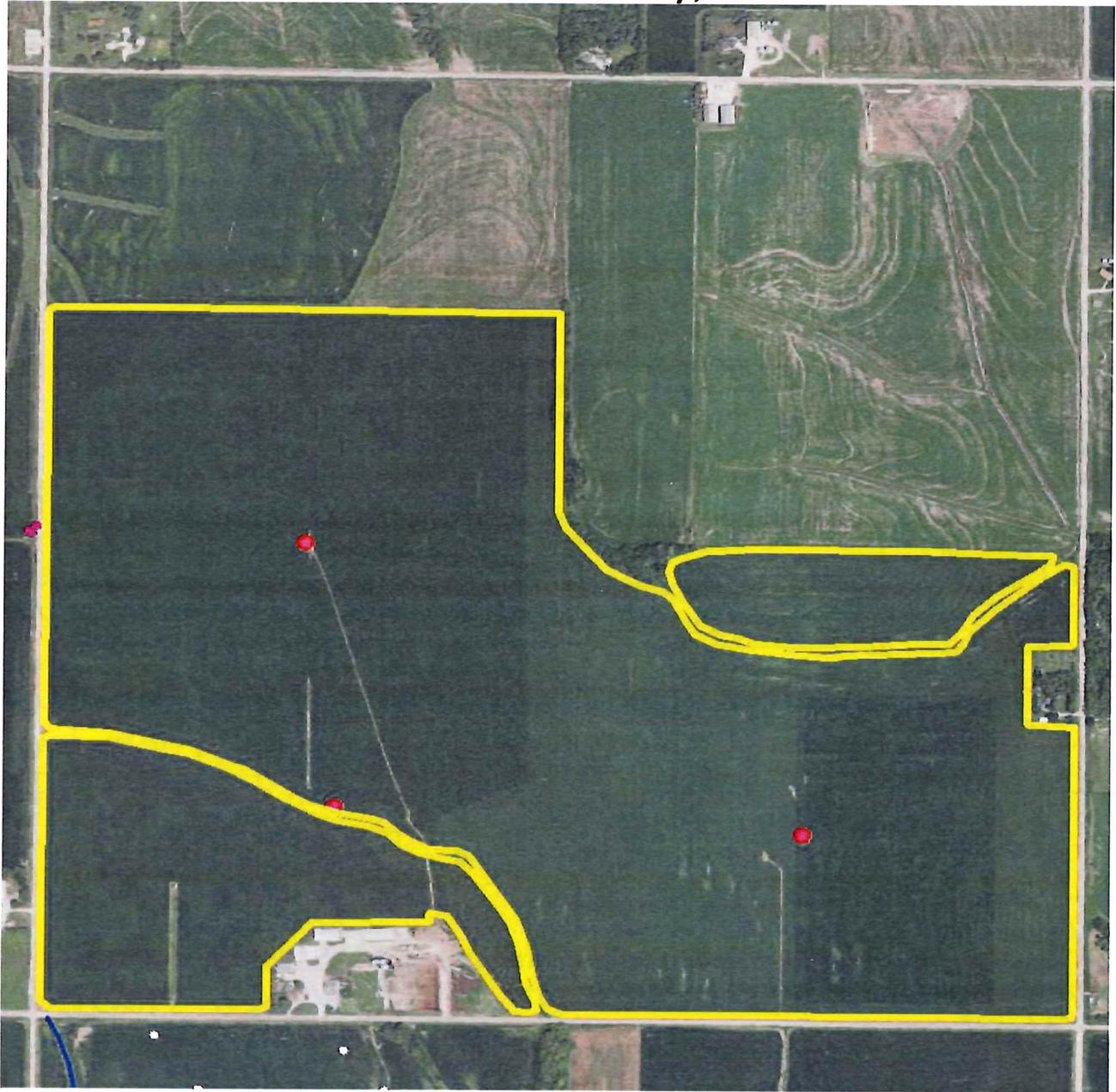
Steve DeBoer
Land Owner (signature)
2-26-07
Date

Cliff Obbink
Cliff Obbink (signature)
2-27-09
Date

DeBoer Farms Inc.
Titled Owner(s): Steve DeBoer
Address: 12350 Princeton Rd
City State Zip: Firth NE 68358
Phone: 402-791-2028

****Please note. County average yields will have to be used unless insurance yield documentation from the past 3 years is provided for each tract of land. Typically, when county averages are used, more acres are required to meet the acres needed.**

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 6

Landowner: DeBoer Farms, Inc.

Legal: S1/2 & S1/2 NW1/4
S17-T7N-R8E

Acres: 365.30



REPORT NUMBER: 19-316-0571

ACCOUNT NUMBER: 18237



PAGE 1/1

REPORT DATE: NOV 18, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
SITE 6

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. % RATE		PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)				pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)								
				P ₁		P ₂		BICARBONATE P OLSEN		POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca			SODIUM Na		SOIL pH	BUFFER INDEX	K	Mg	Ca	H	Na
				WEAK BRAY 1:7	STRONG BRAY 1:7	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE							
				ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE	1:1	%	%	%	%	%	
35292661	6 WW	3.7	H	13	L	32	M			173	M	481	VH	3028	H			6.3	6.7	21.9	2.0	18.3	69.1	10.6	
35292663	6 W	3.2	M	15	M	51	H			203	H	555	VH	3584	H			6.8	0.0	23.1	2.3	20.0	77.7	0.0	
35292666	6 MW	3.1	M	16	M	51	H	15	M	257	H	653	VH	4061	H			7.2	0.0	26.4	2.5	20.6	76.9	0.0	
35292668	6 WM	3.4	M	25	H	90	VH	22	H	255	VH	538	VH	3545	H			7.1	0.0	22.9	2.9	19.6	77.5	0.0	
35292670	6 SW	3.8	H	18	M	37	M			205	H	431	VH	3206	H			6.9	0.0	20.1	2.6	17.9	79.5	0.0	
35292672	6 EM	3.6	H	17	M	43	H			205	M	589	VH	3419	H			6.6	6.8	23.9	2.2	20.5	71.5	5.8	
35292674	6 ME	3.7	H	10	L	39	M			219	H	619	VH	3594	H			6.8	0.0	23.7	2.4	21.8	75.8	0.0	
35292676	6 E	3.7	H	22	H	52	H			310	VH	667	VH	3794	H			6.9	0.0	25.3	3.1	22.0	74.9	0.0	
35292678	6 EE	3.4	M	85	VH	117	VH			337	VH	561	VH	3570	H			6.8	0.0	23.4	3.7	20.0	76.3	0.0	
35292680	6 NE	3.0	M	9	L	17	L			221	H	565	VH	3087	M			6.2	6.6	23.5	2.4	20.0	65.7	11.9	

7-24

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction										EXCESS LIME RATE	SOLUBLE SALTS 1:1					
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu			BORON B		RATE	mmhos/cm	RATE	
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE				
6 WW	8	19	0-8	5	24	8-24				43	12	L	1.3	M												0.4	L
6 W	3	7	0-8	3	14	8-24				21	8	L	1.5	M												0.3	L
6 MW	4	10	0-8	4	19	8-24				29	7	L	2.2	M												0.4	L
6 WM	4	10	0-8	6	29	8-24				39	7	L	2.1	M												0.3	L
6 SW	2	5	0-8	2	10	8-24				15	5	VL	1.9	M												0.3	L
6 EM	1	2	0-8	1	5	8-24				7	7	L	1.3	M												0.2	L
6 ME	4	10	0-8	2	10	8-24				20	5	VL	1.2	M												0.3	L
6 E	3	7	0-8	2	10	8-24				17	7	L	2.8	M												0.3	L
6 EE	1	2	0-8	2	10	8-24				12	8	L	4.4	H												0.3	L
6 NE	3	7	0-8	2	10	8-24				17	8	L	0.9	L												0.2	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

Nutrient Application Agreement

This agreement is hereby made between DeBoer Farms Inc. (landowner) and Cliff Obbink representing PrairieLand Dairy

1. PrairieLand Dairy requires access to the below described land for the purposes of applying nutrients in the form of solid and/or liquid manure from the facility.
2. PrairieLand Dairy may or may not spread manure in any given year of this agreement.
3. Owner agrees to allow PrairieLand Dairy to spread manure on said premises at such times as are mutually agreeable by both PrairieLand Dairy and said owner.
4. Owner may specify application rate if desired but application rate will not exceed normal agronomic rates.
5. This Agreement shall continue from year to year without further renewal, except if either party desires to change or cancel this Agreement they shall do so in writing on or before September 1, of any given year for the following year.
6. Owner agrees to provide the following land tracts for manure and nutrient applications:

Previously on file with NDEQ
County

Office Use Only	Common Name	Legal Description <small>Example: NE1/4 of SW1/4 S 14, T 11, R 4W</small>	County	Irrigated ?	ACRES
	North Pivot	S 1/2 NW 1/4 + N 1/2 SW 1/4 S 17 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	160
	West Pivot	S 1/2 SW 1/4 S 17 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	80
	East Pivot	SE 1/4 S 17 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	160
	Stevens	SW 1/4 S 33 T 7 R 8	Lancaster	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	160
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No	560
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No	

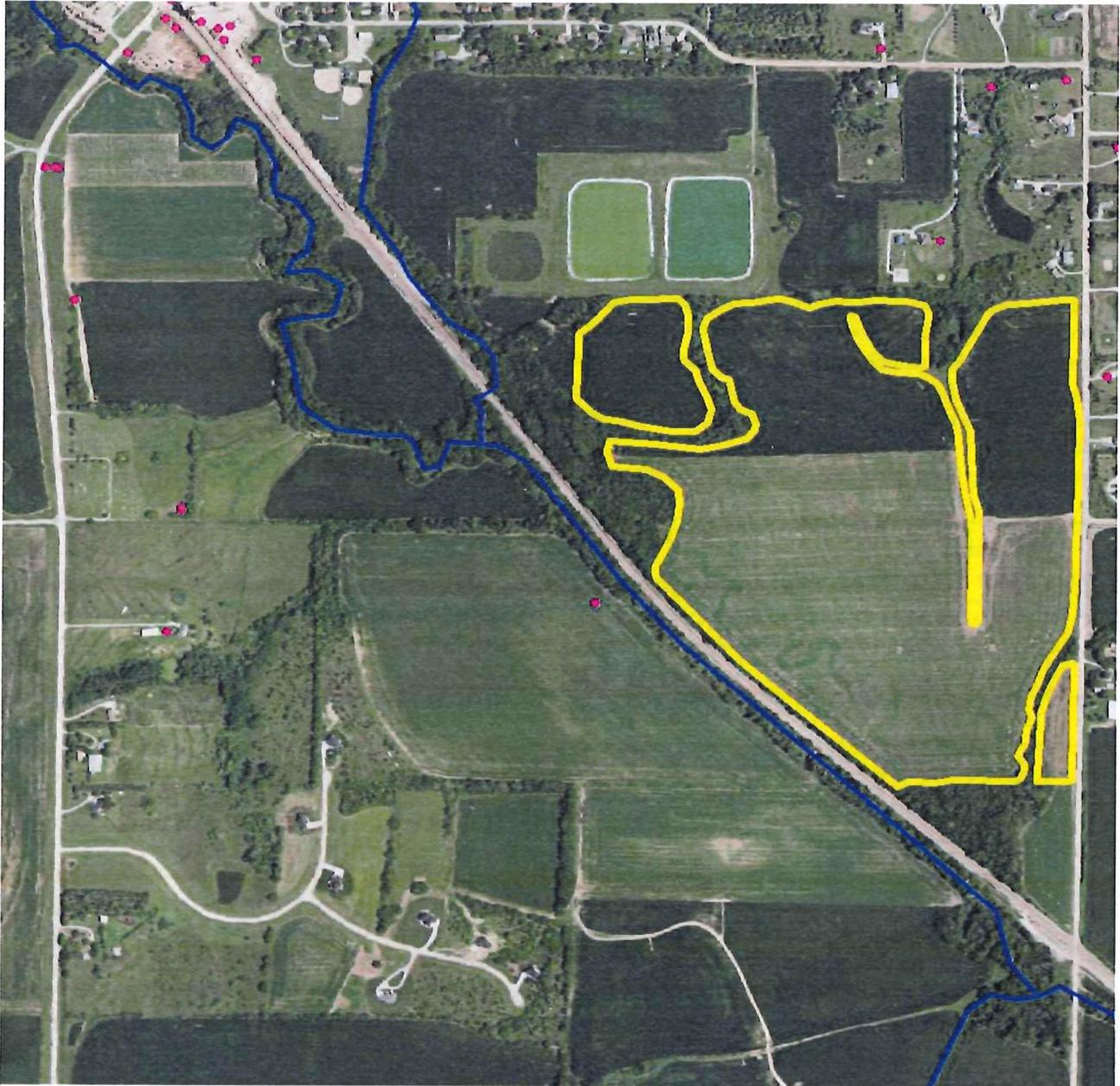
Steve DeBoer
Land Owner (signature)
2-26-09
Date

Cliff Obbink 700
Cliff Obbink (signature)
2-27-09
Date

DeBoer Farms Inc.
Titled Owner(s): Steve DeBoer
Address: 12350 Princeton Rd
City State Zip: Firth NE 68358
Phone: 402-791-2028

**Please note. County average yields will have to be used unless insurance yield documentation from the past 3 years is provided for each tract of land. Typically, when county averages are used, more acres are required to meet the acres needed.

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 7 Firth South

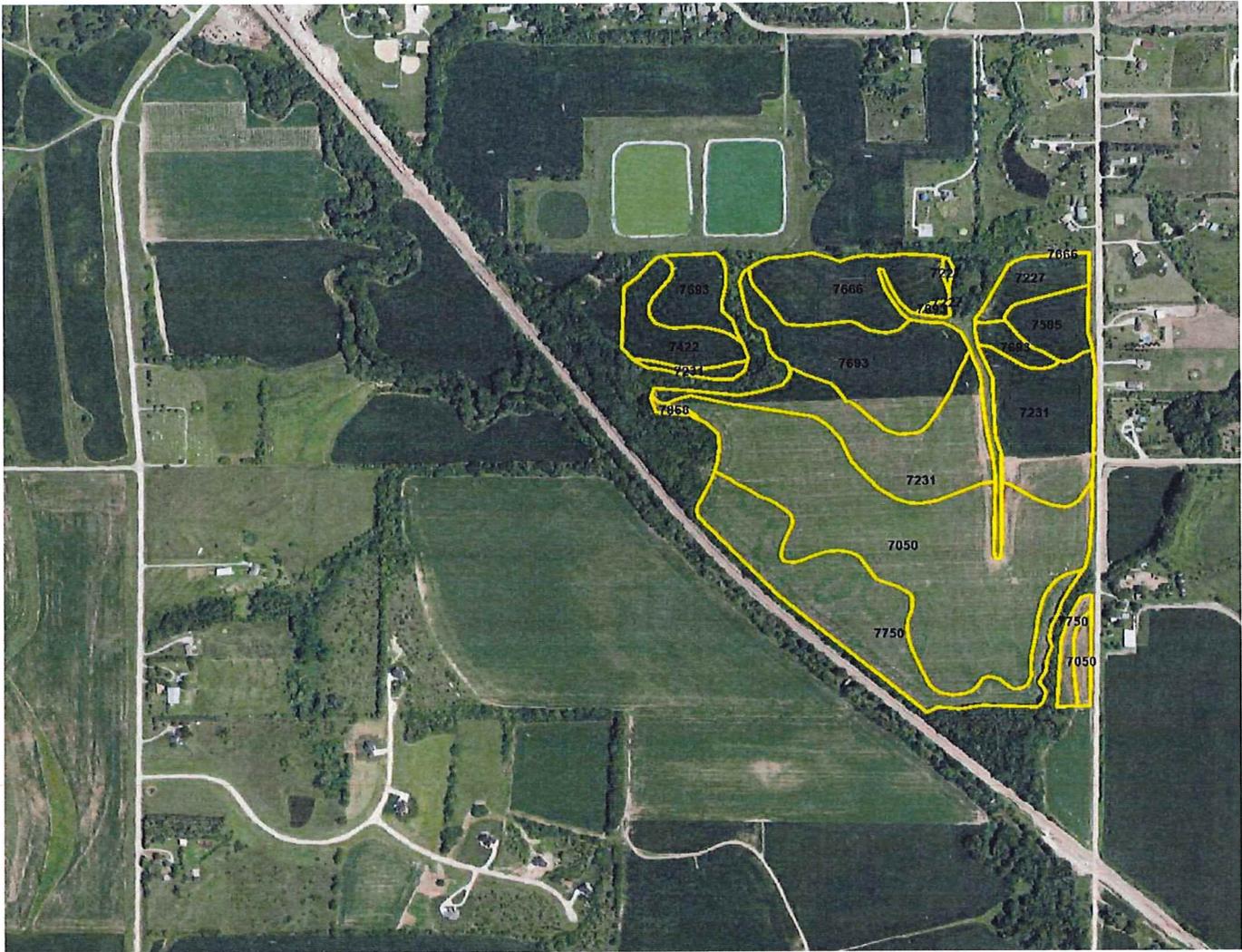
Landowner: Larry K Schweitzer

Legal: SE1/4
S35-T7N-R7E

Acres: 118.70



Prairieland Dairy, LLC



Area Symbol: NE067, Soil Area Version: 22

Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7050	Kennebec silt loam, occasionally flooded	33.20	28.0%		IIw	75	84
7750	Nodaway silt loam, occasionally flooded	18.01	15.2%		IIw	74	88
7693	Wymore silty clay loam, 2 to 6 percent slopes	17.88	15.1%	IIIe	IIIe	69	60
7231	Judson silt loam, 2 to 6 percent slopes	17.01	14.3%		IIe	74	68
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	9.10	7.7%	IIIe	IVe	60	46
7231	Judson silt loam, 2 to 6 percent slopes	6.08	5.1%		IIe	80	68
7050	Kennebec silt loam, occasionally flooded	5.27	4.4%		IIw	73	84
7422	Morrill clay loam, 6 to 11 percent slopes, eroded	4.78	4.0%		IVe	63	51
7227	Burchard clay loam, 6 to 11 percent slopes	3.66	3.1%	IIIe	IVe	63	53
7585	Shelby clay loam, 7 to 12 percent slopes	3.40	2.9%		IVe		63
7868	Nodaway silt loam, channeled, occasionally flooded	0.31	0.3%		Vlw	74	61
Weighted Average						70.2	*n 72

Name: Site 7 Firth South

Landowner: Larry K Schweitzer

County: Lancaster & Gage

Legal: SE1/4
S35-T7N-R7E

Acres: 118.70



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REPORT NUMBER: 19-266-0192

ACCOUNT NUMBER: 18237



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REPORT DATE: SEP 28, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
FIRTH SOUTH - SITE 7

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)						pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)												
				PHOSPHORUS			POTASSIUM K	MAGNESIUM Mg	CALCIUM Ca	SODIUM Na	SOIL pH		BUFFER INDEX	K	Mg	Ca	H	Na							
				P ₁	P ₂	BICARBONATE P OLSEN																			
				L.O.I. % RATE	WEAK BRAY 1:7 ppm RATE	STRONG BRAY 1:7 ppm RATE	ppm RATE	ppm RATE	ppm RATE	ppm RATE	1:1		%	%	%	%	%								
34837484	FSSE	3.6	H	44	VH	96	VH			198	H	343	VH	2930	H			6.3	6.7	20.1	2.5	14.2	72.9	10.4	

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction																
	Surface			Sub 1				Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu		BORON B		EXCESS LIME	SOLUBLE SALTS 1:1		
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	RATE	mmhos/cm	RATE
FSSE	5	12	0-8	4	19	8-24				31	6	VL	2.4	M												0.2	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

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REPORT NUMBER: 19-303-0405

ACCOUNT NUMBER: 18237



PAGE 1/1

REPORT DATE: NOV 5, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
FIRTH SOUTH - SITE 7

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)				pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)								
				P ₁		P ₂		BICARBONATE P OLSEN		POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca			SODIUM Na		SOIL pH	BUFFER INDEX	K	Mg	Ca	H	Na
				L.O.I.		WEAK BRAY 1:7		STRONG BRAY 1:7		ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE							
				%	RATE	ppm	RATE	ppm	RATE										ppm	RATE	ppm	RATE	ppm	RATE	ppm
35066013	FS NW	2.9	M	13	L	24	M			178	M	515	VH	2947	M			6.2	6.7	22.2	2.1	19.3	66.4	12.2	
35066015	FS NE	3.5	M	43	VH	123	VH	26	VH	211	H	434	VH	2886	H			7.0	0.0	18.6	2.9	19.4	77.7	0.0	
35066017	FS SW	3.2	M	30	H	65	VH			160	M	307	VH	2647	H			6.4	6.8	17.8	2.3	14.4	74.4	8.9	

7-29

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction															
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu		BORON B		EXCESS LIME	SOLUBLE SALTS		
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	RATE	mmhos/cm	1:1	RATE
FS NW	5	12	0-8	2	10	8-24				22	6	VL	1.8	M											0.2	L
FS NE	8	19	0-8	5	24	8-24				43	6	VL	3.3	H											0.3	L
FS SW	6	14	0-8	3	14	8-24				28	4	VL	2.3	M											0.2	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

Nutrient Application Agreement

This agreement is hereby made between LARRY Schweitzer (landowner) and
 Cliff Obbink representing PrairieLand Dairy

1. PrairieLand Dairy requires access to the below described land for the purposes of applying nutrients in the form of solid and/or liquid manure from the facility.
2. PrairieLand Dairy may or may not spread manure in any given year of this agreement.
3. Owner agrees to allow PrairieLand Dairy to spread manure on said premises at such times as are mutually agreeable by both PrairieLand Dairy and said owner.
4. Owner may specify application rate if desired but application rate will not exceed normal agronomic rates.
5. This Agreement shall continue from year to year without further renewal, except if either party desires to change or cancel this Agreement they shall do so in writing on or before September 1, of any given year for the following year.
6. Owner agrees to provide the following land tracts for manure and nutrient applications:

Office Use Only	Common Name	Legal Description <small>Example: NE1/4 of SW1/4 S 14, T 11, R 4W</small>	County	Irrigated ?
	Schweitzer	SE 1/4 S35 T 7 R 7	LANCASTER	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No
		S T R		<input type="checkbox"/> Yes <input type="checkbox"/> No

1.27 AC

Previously on file with NDEQ

Larry Schweitzer
 Land Owner (signature)

2/27/2009
 Date

Titled Owner(s): LARRY SCHWEITZER

Address: 5120 N. 57th

City State Zip: LINCOLN, NE 68507

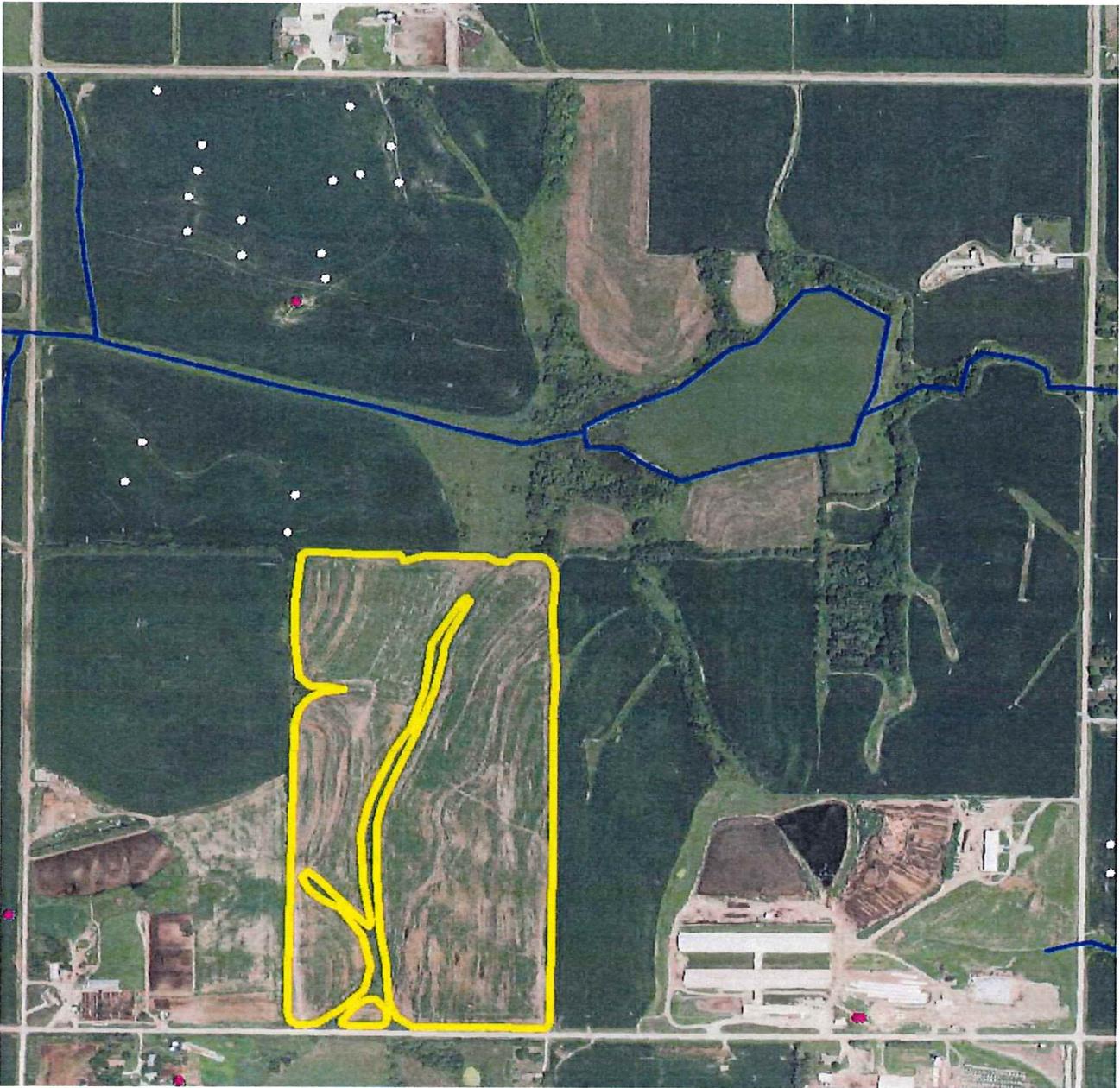
Phone: 402-466-7321

Cliff Obbink
 Cliff Obbink (signature)

2-27-09
 Date

**Please note. County average yields will have to be used unless insurance yield documentation from the past 3 years is provided for each tract of land. Typically, when county averages are used, more acres are required to meet the acres needed.

Prairieland Dairy, LLC



Layer Key

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

Name: Site 10

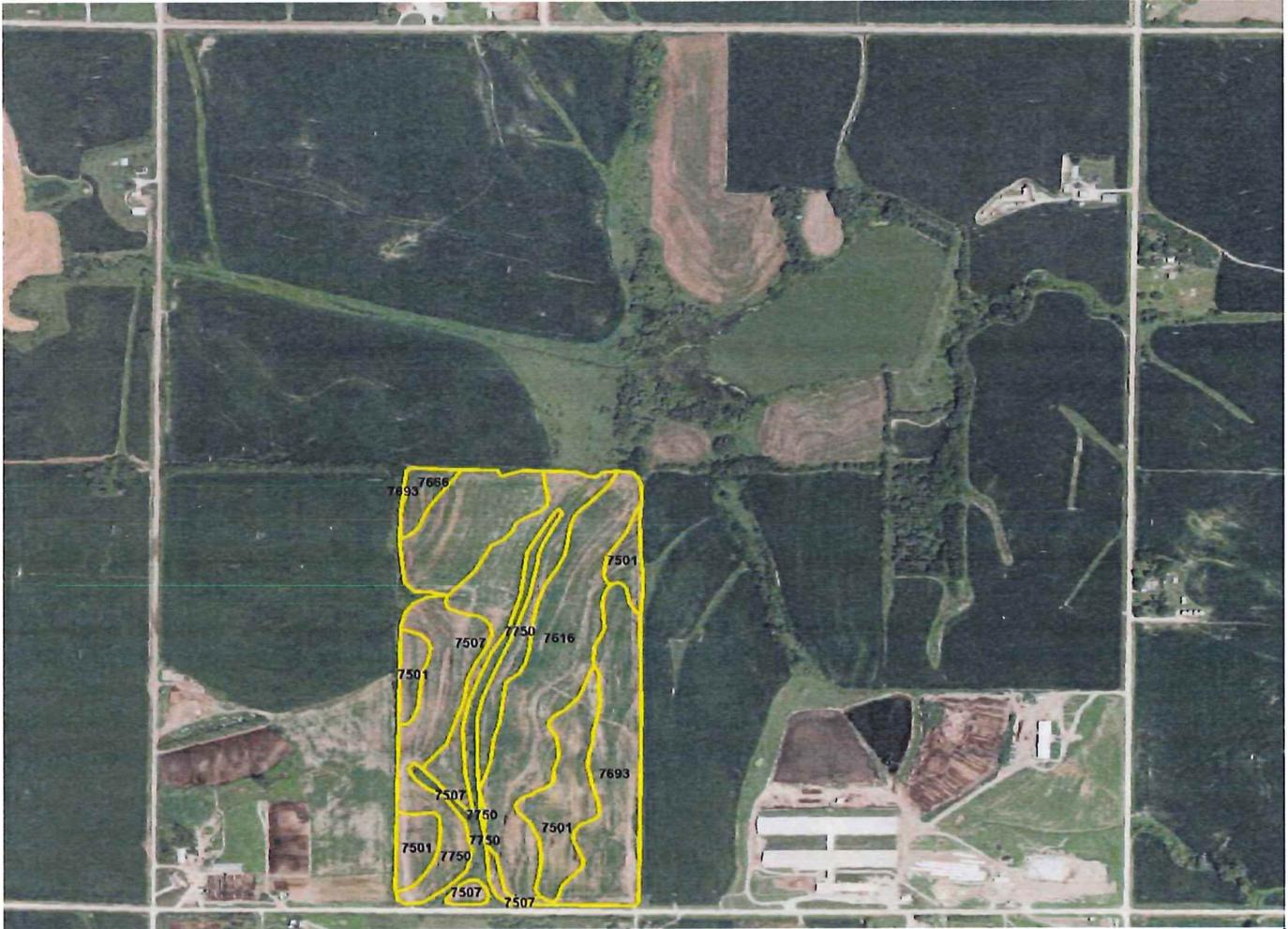
Landowner: Nicholas J & Jennifer Heetderk

Legal: E1/2 SW1/4
S20-T7N-R8E

Acres: 72.23



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	18.76	26.0%	IVe		58	35
7616	Steinauer loam, 6 to 11 percent slopes	17.37	24.0%	IVe		56	64
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	11.74	16.3%	IIIe			35
7750	Nodaway silt loam, occasionally flooded	11.64	16.1%	IIw	IIw	74	88
7693	Wymore silty clay loam, 2 to 6 percent slopes	11.23	15.5%	IIIe	IIIe	69	60
7686	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	1.49	2.1%	IIIe	IVe	60	46
Weighted Average						52.4	*n 54.6

Name: Site 10

Landowner: Nicholas J & Jennifer Heetderk

County: Lancaster

Legal: E1/2 SW1/4
S20-T7N-R8E

Acres: 72.23



Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Prairieland Dairy, LLC

<u>13000 Pella Rd</u>	<u>Firth</u>	<u>NE</u>	<u>68358</u>	<u>402-791-2238</u>
(Address)	(City)	(State)	(Zip)	(Phone)

And
Landowner/Operator: Nick Heetderus

<u>14171</u>	<u>Firth</u>	<u>Rd NE</u>	<u>68358</u>	<u>402-791-0235</u>
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: 20-7-8 E 1/2 SW 1/4
 Total Acres: 80 Useable Acres: 77.63 Irrigated Dryland

Legal Description: ~~21-7-8 NE 1/4~~
 Total Acres: ~~47.152~~ Useable Acres: ~~47.42~~ Irrigated Dryland

Legal Description: 33-7-8 NE 1/4
 Total Acres: 160 Useable Acres: 137 Irrigated Dryland

Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

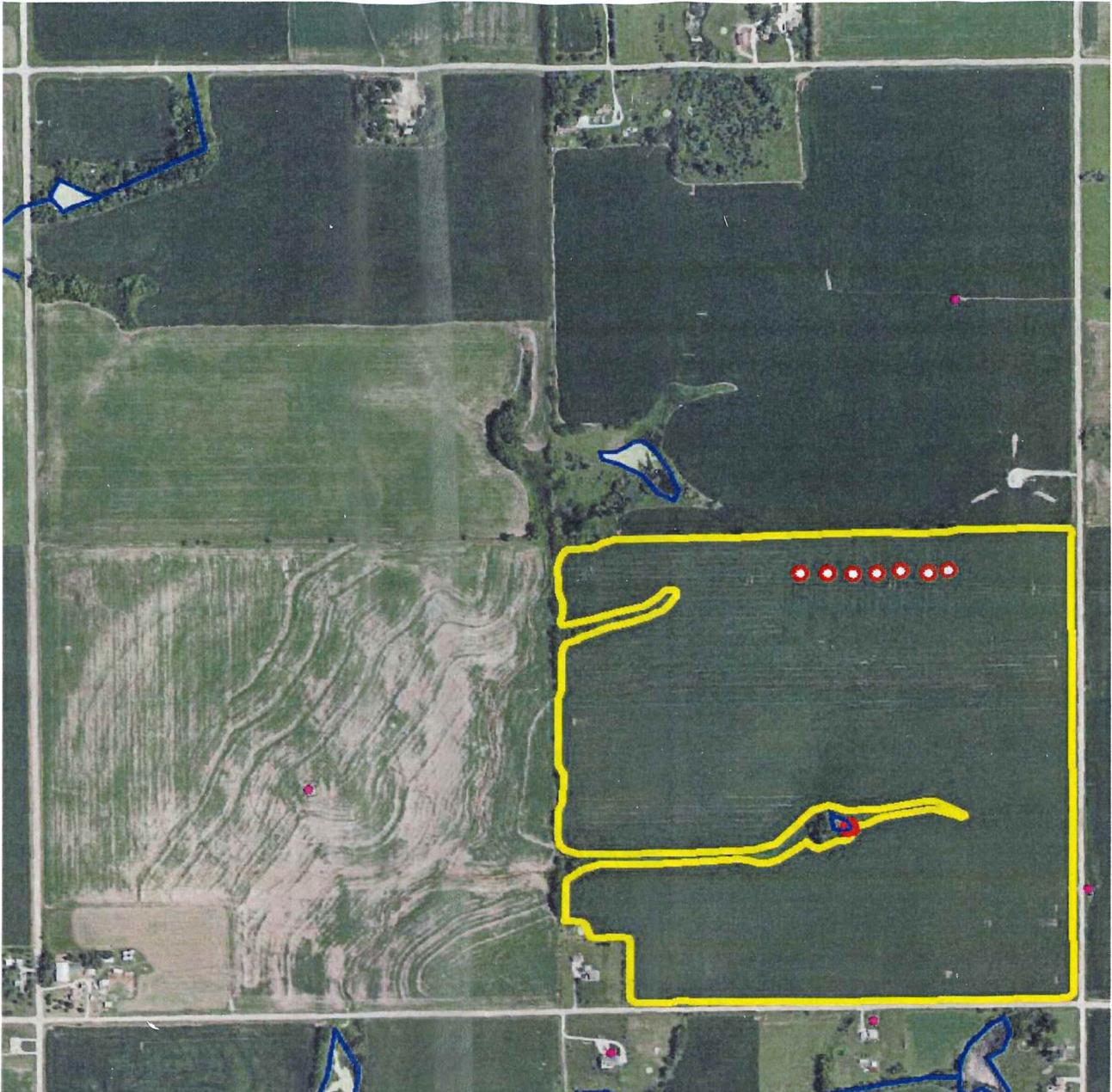
Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: Nick Heetderus Date: 12/16/17
 Landowner/Operator (Authorized Representative)

Bob Date: 7-28-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 11

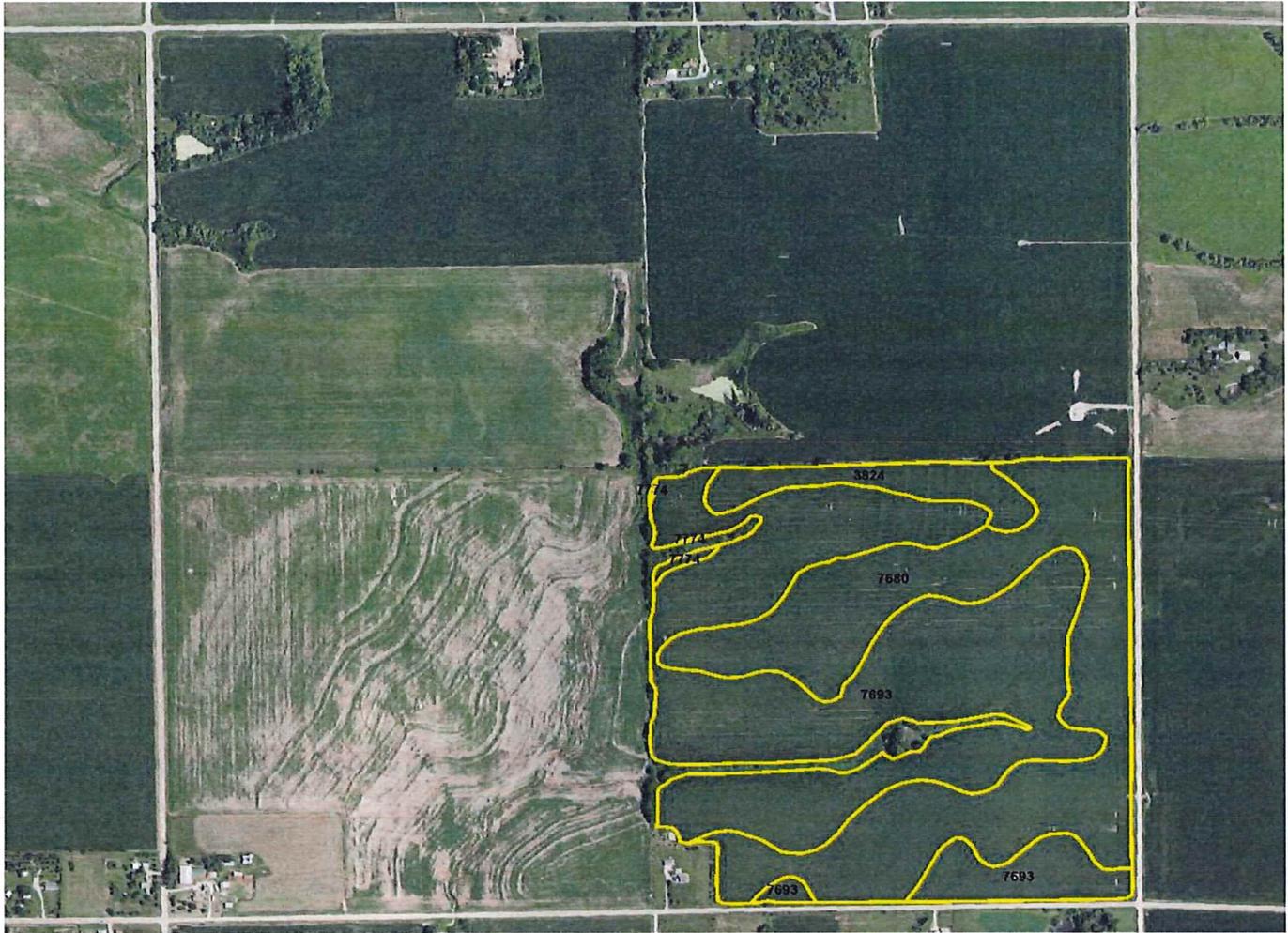
Landowner: Ivan W Walvoord Unified Credit Trust
& Jerry & Jamie Prange

Legal: SE1/4
S24-T7N-R7E

Acres: 144.50



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	78.80	54.5%	IIIe	IIIe	69	60
7680	Wymore silty clay loam, 0 to 1 percent slopes	57.59	39.9%	IIIs	IIIs	74	61
3824	Crete silt loam, 0 to 1 percent slopes	7.46	5.2%	IIIs	IIIs	73	63
7774	Colo-Nodaway silty clay loams, frequently flooded	0.65	0.4%	IIIw		60	55
Weighted Average						71.2	*n 60.5

Name: Site 11

Landowner: Ivan W Walvoord Unified Credit Trust
& Jerry & Jamie Prange

County: Lancaster

Legal: SE1/4
S24-T7N-R7E
Acres: 144.50



© Nutrient Advisors (402) 372-2236



NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
TIMS RYE-SITE 11

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		PHOSPHORUS						POTASSIUM		MAGNESIUM		CALCIUM		SODIUM		pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)				
				P ₁		P ₂		BICARBONATE P OLSEN		K		Mg		Ca		Na		SOIL pH	BUFFER INDEX		K	Mg	Ca	H	Na
				WEAK BRAY 1:7		STRONG BRAY 1:7		ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE								
				ppm	RATE	ppm	RATE											ppm	RATE		ppm	RATE	ppm	RATE	ppm
34764776	TR N	3.2	M	40	VH	59	VH			230	VH	488	VH	2540	M			5.9	6.6	21.0	2.8	19.4	60.5	17.3	
34764778	TR MN	4.0	H	108	VH	135	VH			327	VH	397	VH	2016	M			5.9	6.6	17.1	4.9	19.3	58.9	16.9	
34764781	TR MS	4.4	H	78	VH	113	VH			419	VH	621	VH	2942	M			6.4	6.7	23.1	4.7	22.4	63.7	9.2	
34764783	TR S	3.4	M	86	VH	137	VH			232	VH	378	VH	2017	H			6.5	6.8	14.9	4.0	21.1	67.7	7.2	

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction										EXCESS LIME RATE	SOLUBLE SALTS 1:1				
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu			BORON B		RATE	mmhos/cm	RATE
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE			
	ppm	lbs/A	IN	ppm	lbs/A	IN	ppm	lbs/A	IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE	RATE	mmhos/cm	RATE
TR N	20	48	0-8	7	34	8-24				82	7	L	3.6	H											0.3	L
TR MN	19	46	0-8	7	34	8-24				80	8	L	6.0	VH											0.3	L
TR MS	16	38	0-8	4	19	8-24				57	9	L	5.7	H											0.3	L
TR S	17	41	0-8	5	24	8-24				65	7	L	6.7	VH											0.3	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-36



NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
TIMS RYE-SITE 11

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)								pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)				
				P ₁		P ₂		BICARBONATE P OLSEN		POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca		SODIUM Na		SOIL pH	BUFFER INDEX		K	Mg	Ca	H	Na
				WEAK BRAY 1:7	STRONG BRAY 1:7	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE								
				L.O.I. %	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		meq/100g	%	%	%	%
36057437	TR N	2.6	M	31	VH	38	M			318	VH	732	VH	3373	M			6.3	6.6	26.6	3.1	22.9	63.4	10.6	
36057439	TR MN	2.8	M	59	VH	84	VH			362	VH	761	VH	3758	M			6.2	6.6	29.7	3.1	21.4	63.3	12.2	
36057441	TR MS	3.1	M	80	VH	126	VH			435	VH	669	VH	3218	M			6.3	6.7	25.5	4.4	21.9	63.1	10.6	
36057443	TR S	3.0	M	44	VH	70	VH			365	VH	840	VH	3652	M			6.5	6.7	29.1	3.2	24.1	62.7	7.5	2.5

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction										EXCESS LIME RATE	SOLUBLE SALTS 1:1				
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu			BORON B		mmhos/cm	RATE	
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE			
	ppm	lbs/A	IN	ppm	lbs/A	IN	ppm	lbs/A	IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE	RATE		
TR N	9	22	0-8	8	38	8-24				60	11	L	1.7	M											0.4	L
TR MN	21	50	0-8	8	38	8-24				88	14	M	4.0	H											0.7	L
TR MS	14	34	0-8	10	48	8-24				82	10	L	3.6	H											0.5	L
TR S	23	55	0-8	7	34	8-24				89	14	M	3.7	H											0.7	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-37

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Jerry & Jamie Prange

10300 Pella Rd	Firth	NE	68358	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: Pt. SW1/4 SE1/4, S24-T7N-R7E

Total Acres: 20.01 Useable Acres: 13.83 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

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: 3-1-20
 Landowner

 Date: 2-14-20
 Livestock Operator (Authorized Representative)

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dalry, LLC

13000 Palla Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Ivan Walvoord Unified Credit Trust c/o Union Bank-Gessert

PO Box 82535	Lincoln	NE	68501	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: E1/2 SE1/4 & Pt. W1/2 SE1/4, S24-T7N-R7E

Total Acres: 136.34 Useable Acres: 130.7 Irrigated Dryland

Legal Description: Pt. W1/2, S29-T7N-R8E

Total Acres: 272.10 Useable Acres: 261.4 Irrigated Dryland

Legal Description: Pt. E1/2 NW1/4, S22-T7N-R8E

Total Acres: 67.05 Useable Acres: 62.84 Irrigated Dryland

Legal Description: W 1/2 SE 1/4 S27-7-8

Total Acres: _____ Useable Acres: 60A Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

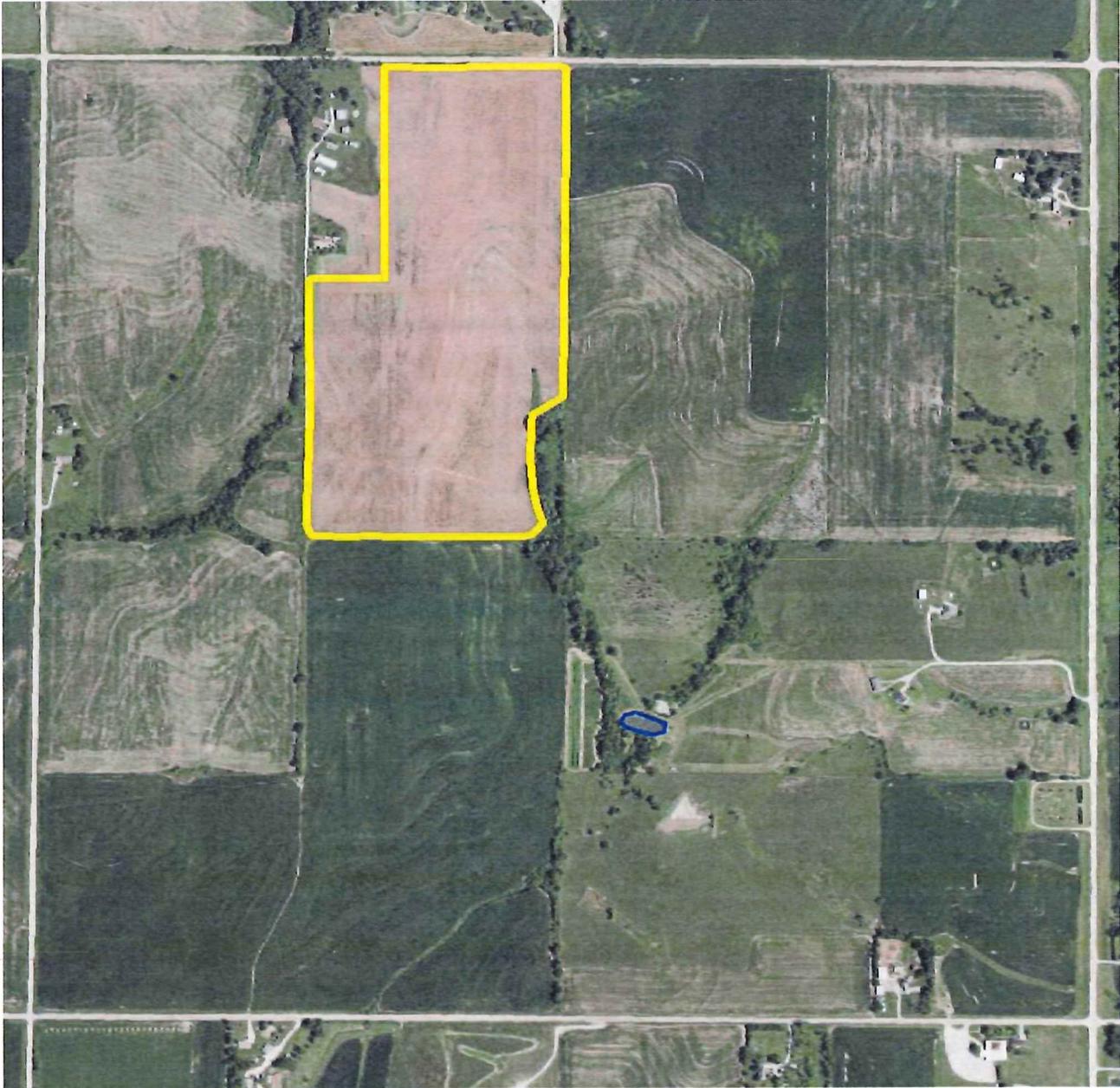
1. This agreement allows the said Livestock Operation to spread livestock manure on said landowners/operators property.
2. The Landowner/Operator hereby consents to the Operation spreading manure on said premises at such times as are mutually agreeable by the parties. The Operation may or may not spread 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: Tim Catechew Date: 10-8-19
Landowner

Janis Walvoord Date: 7-14-20
Livestock Operator (Authorized Representative)

300

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 12

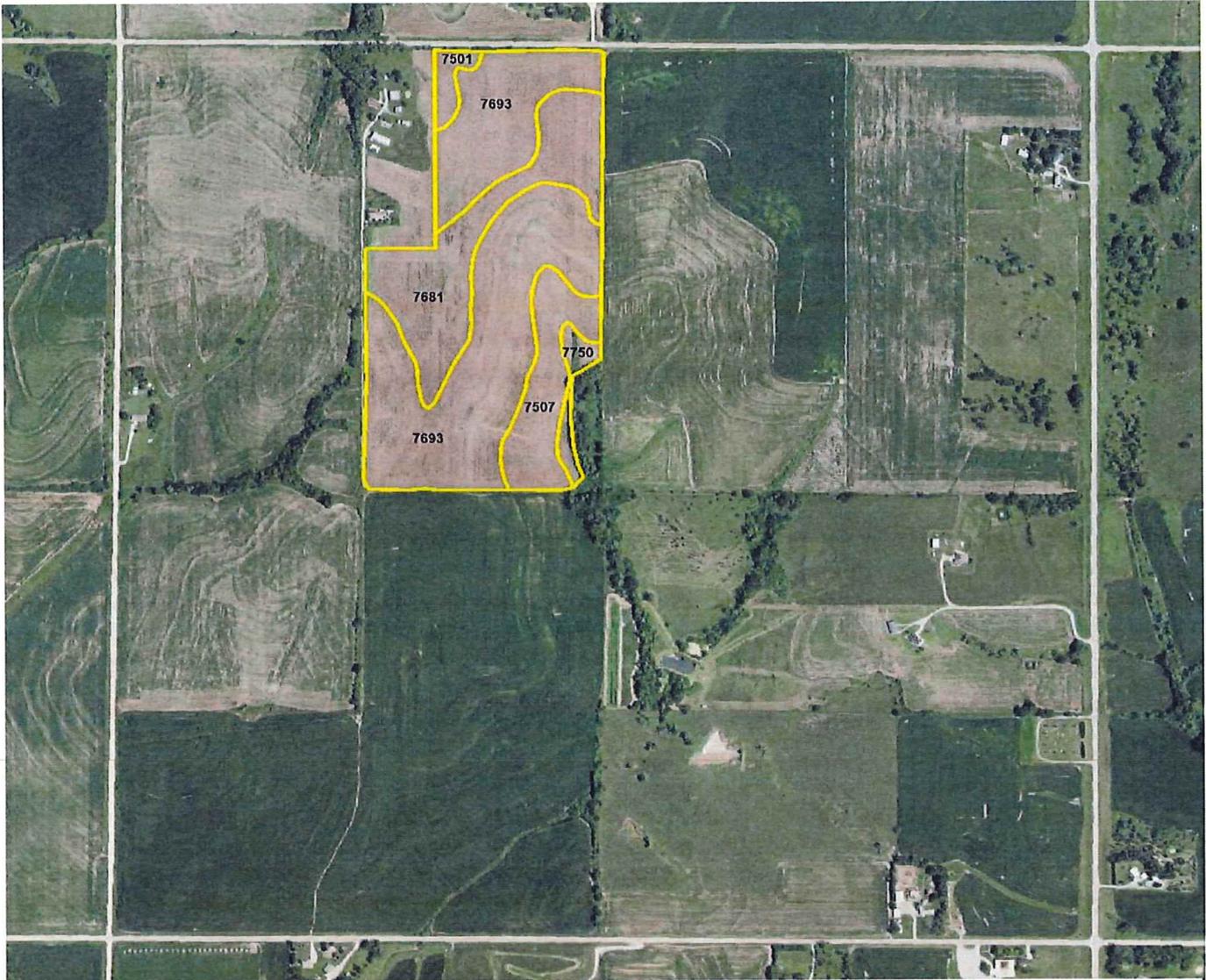
Landowner: Ivan W Walvoord Unified Credit Trust

Legal: E1/2 NW1/4
S22-T7N-R8E

Acres: 62.84



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	39.55	58.7%		IIIe	69	60
7681	Wymore silty clay loam, 1 to 3 percent slopes	15.68	23.3%		IIe	72	60
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	7.78	11.6%		IVe	58	35
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	2.56	3.8%		IIIe		35
7750	Nodaway silt loam, occasionally flooded	1.75	2.6%		IIw	74	83
Weighted Average						65.9	*n 56.9

Name: Site 12

Landowner: Ivan W Walvoord Unified Credit Trust

County: Lancaster

Legal: E1/2 NW1/4
S22-T7N-R8E

Acres: 62.84



Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Ivan Walvoord Unified Credit Trust c/o Union Bank-Gessert

PO Box 82535	Lincoln	NE	68501	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: E 1/2 SE 1/4 & Pt. W 1/2 SE 1/4, S24-T7N-R7E

Total Acres: 136.34 Useable Acres: 130.7 Irrigated Dryland

Legal Description: Pt. W 1/2, S29-T7N-R8E

Total Acres: 272.10 Useable Acres: 261.4 Irrigated Dryland

Legal Description: Pt. E 1/2 NW 1/4, S22-T7N-R8E

Total Acres: 67.05 Useable Acres: 62.84 Irrigated Dryland

Legal Description: W 1/2 SE 1/4 S27-7-8

Total Acres: _____ Useable Acres: 60.0A Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

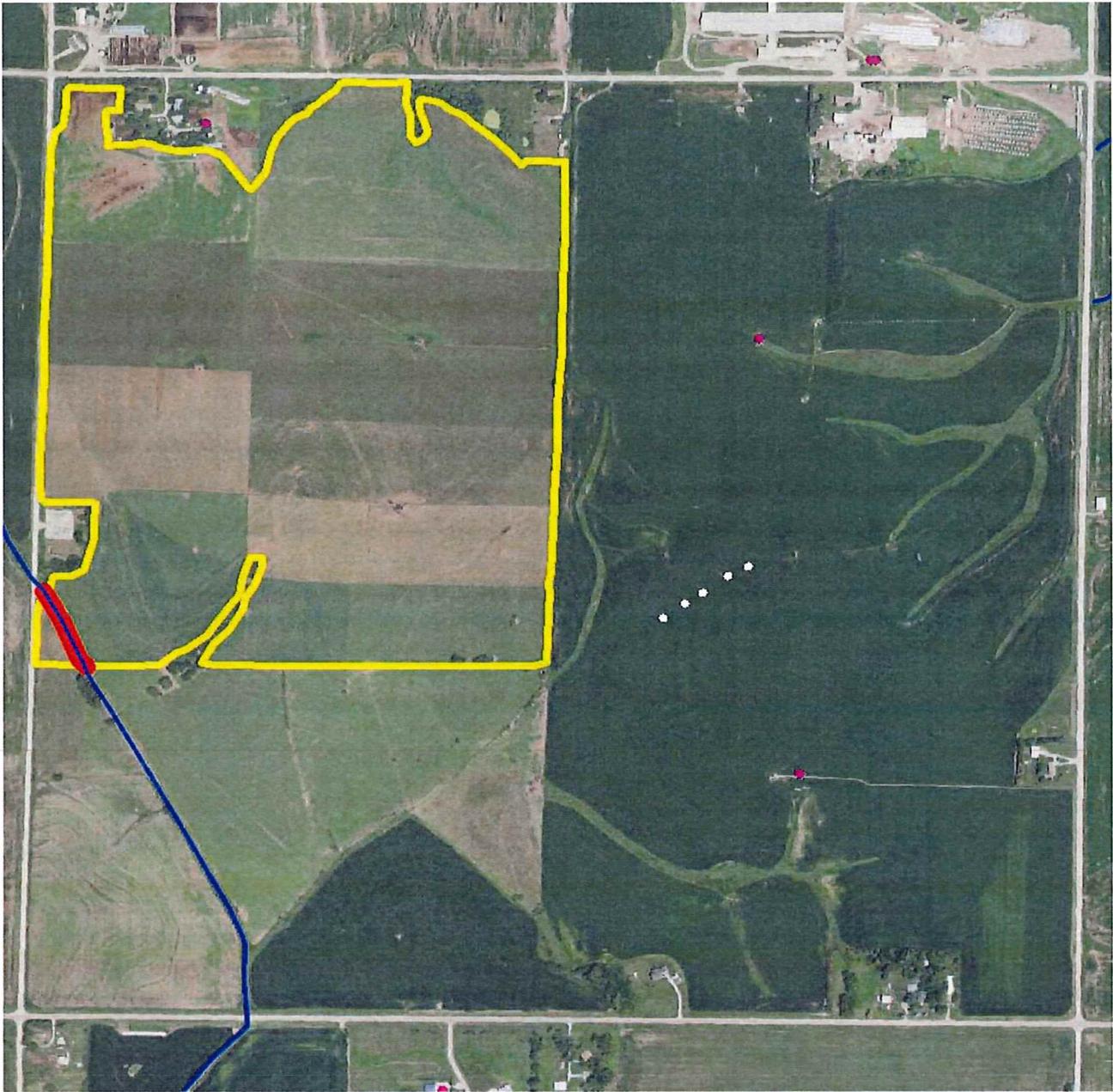
1. This agreement allows the said Livestock Operation to spread livestock manure on said landowners/operators property.
2. The Landowner/Operator hereby consents to the Operation spreading manure on said premises at such times as are mutually agreeable by the parties. The Operation may or may not spread 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: *Jim Satchew* Date: 10-8-19
Landowner

Janis Walvoord Date: 7-14-20
Livestock Operator (Authorized Representative)

800

Prairieland Dairy, LLC



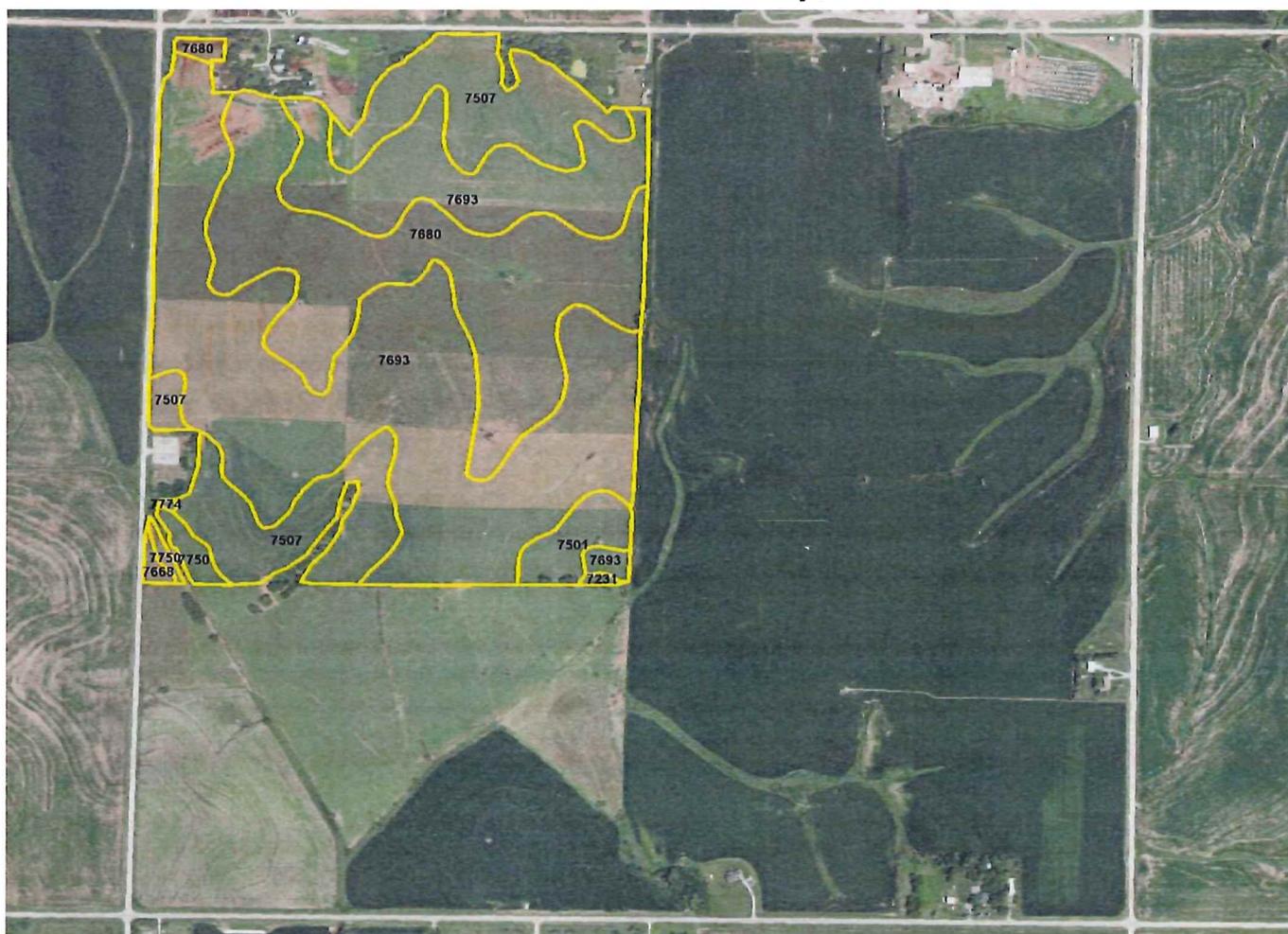
Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 13
Landowner: Ivan W Walvoord Unified Credit Trust
& Tim & Keri Pritschau
Legal: NW1/4 & N1/2 SW1/4
S29-T7N-R8E
Acres: 173.80



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	91.28	52.5%	IIIe	IIIe	69	60
7680	Wymore silty clay loam, 0 to 1 percent slopes	43.43	25.0%	IIIs	IIIs	74	61
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	31.10	17.9%	IVe		58	35
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	4.55	2.6%	IIIe			35
7750	Nodaway silt loam, occasionally flooded	2.39	1.4%	IIW	IIW	74	88
7668	Mayberry silty clay loam, 6 to 11 percent slopes, eroded	0.56	0.3%	IVe		56	45
7231	Judson silt loam, 2 to 6 percent slopes	0.31	0.2%	IIe		74	68
7774	Colo-Nodaway silty clay loams, frequently flooded	0.18	0.1%	IIIW		60	55
Weighted Average						66.5	*n 55.5

Name: Site 13

Landowner: Ivan W Walvoord Unified Credit Trust
& Tim & Keri Pritschau

County: Lancaster

Legal: NW1/4 & N1/2 SW1/4
S29-T7N-R8E

Acres: 173.80



© Nutrient Advisors (402) 372-2236

REPORT NUMBER: 19-303-0403

ACCOUNT NUMBER: 18237



PAGE 1/1

REPORT DATE: NOV 5, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
TIM P- SITE 13

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)				pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)								
				P ₁		P ₂		BICARBONATE P OLSEN		POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca			SODIUM Na		SOIL pH	BUFFER INDEX	K	Mg	Ca	H	Na
				L.O.I.		WEAK BRAY 1:7		STRONG BRAY 1:7		ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE							
				%	RATE	ppm	RATE	ppm	RATE										ppm	RATE	ppm	RATE	ppm	RATE	ppm
35066001	TimPD	4.0	H	39	VH	75	VH			454	VH	688	VH	3756	H			6.9	0.0	25.7	4.5	22.3	73.2	0.0	
35066003	TimPN	4.5	H	120	VH	132	VH	125	VH	1104	VH	689	VH	3153	M			7.5	0.0	24.3	11.6	23.6	64.8	0.0	
35066005	TimPMN	3.7	H	51	VH	89	VH	55	VH	790	VH	737	VH	3049	M			7.1	0.0	23.4	8.7	26.2	65.1	0.0	
35066007	TimPMS	3.7	H	26	H	60	VH	33	VH	624	VH	736	VH	3534	H			7.3	0.0	25.4	6.3	24.1	69.6	0.0	
35066009	TimPS	3.9	H	22	H	39	M	28	VH	692	VH	730	VH	3368	H			7.0	0.0	24.7	7.2	24.6	68.2	0.0	

7-45

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction										EXCESS LIME RATE	SOLUBLE SALTS 1:1					
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu			BORON B		RATE	mmhos/cm	RATE	
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE				
TimPD	8	19	0-8	3	14	8-24				33	9	L	1.5	M												0.5	L
TimPN	7	17	0-8	8	38	8-24				55	15	M	4.7	H												0.5	L
TimPMN	7	17	0-8	7	34	8-24				51	7	L	4.3	H												0.4	L
TimPMS	13	31	0-8	6	29	8-24				60	6	VL	3.2	H												0.6	L
TimPS	13	31	0-8	6	29	8-24				60	7	L	3.1	H												0.5	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Tim & Keri Pritschau

12421 Pella Rd	Firth	NE	68358	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: Pt. NE1/4 NW1/4, S29-T7N-R8E

Total Acres: 20.01 Useable Acres: 17.52 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

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: 1-9-20
Landowner

 Date: 7-14-20
Livestock Operator (Authorized Representative)

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation; Prairieland Dalry, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Ivan Walvoord Unified Credit Trust c/o Union Bank-Gessert

PO Box 82535	Lincoln	NE	68501	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: E 1/2 SE 1/4 & Pt. W 1/2 SE 1/4, S24-T7N-R7E

Total Acres: 136.34 Useable Acres: 130.7 Irrigated Dryland

Legal Description: Pt. W 1/2, S29-T7N-R8E

Total Acres: 272.10 Useable Acres: 261.4 Irrigated Dryland

Legal Description: Pt. E 1/2 NW 1/4, S22-T7N-R8E

Total Acres: 67.05 Useable Acres: 62.84 Irrigated Dryland

Legal Description: W 1/2 SE 1/4 S27-7-8

Total Acres: _____ Useable Acres: 60A Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

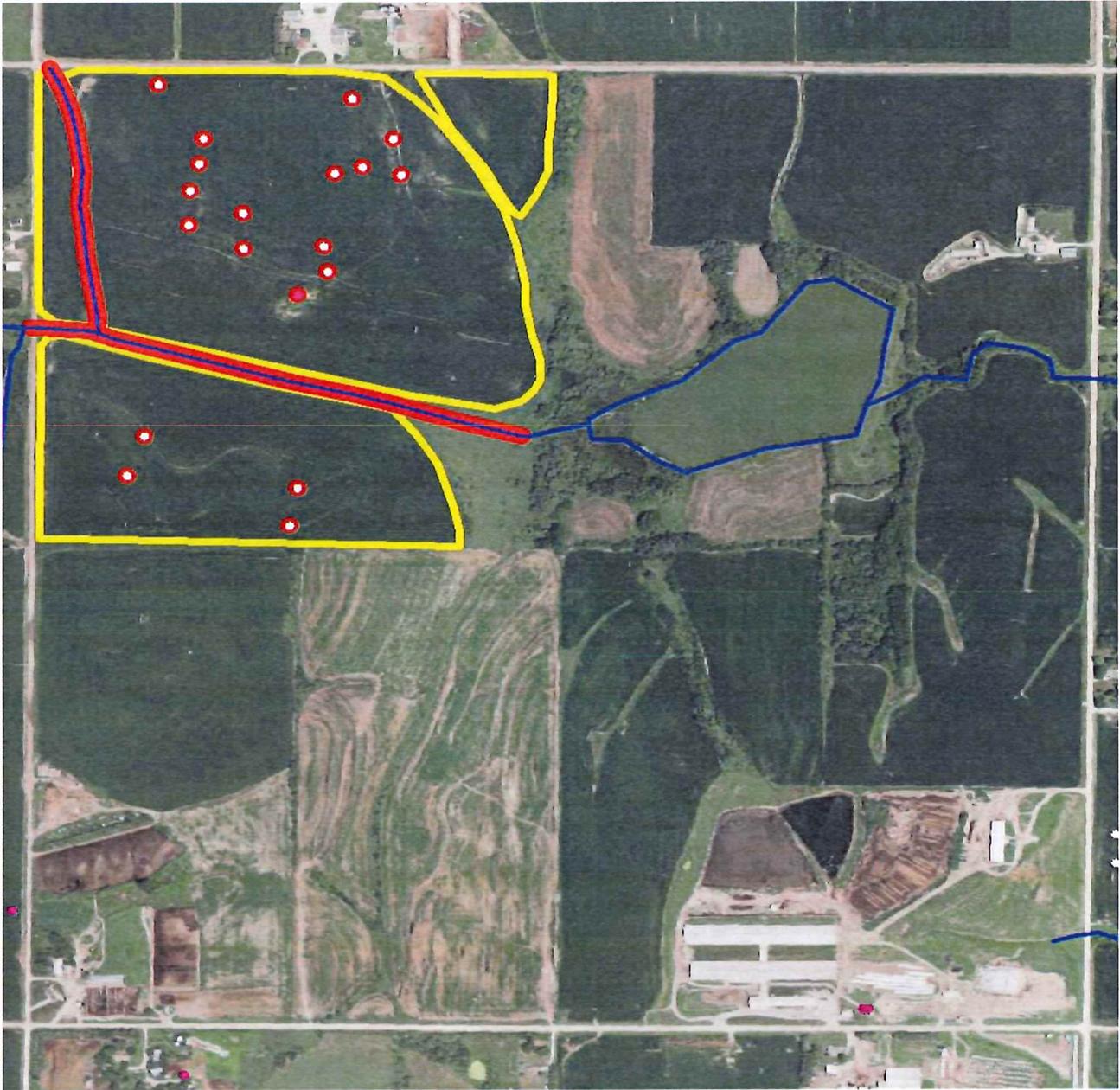
1. This agreement allows the said Livestock Operation to spread livestock manure on said landowners/operators property.
2. The Landowner/Operator hereby consents to the Operation spreading manure on said premises at such times as are mutually agreeable by the parties. The Operation may or may not spread 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: *Tom Cartee* Date: 10-8-19
Landowner

Janis Walvoord Date: 7-14-20
Livestock Operator (Authorized Representative)

308

Prairieland Dairy, LLC



Layer Key

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

Name: Site 14

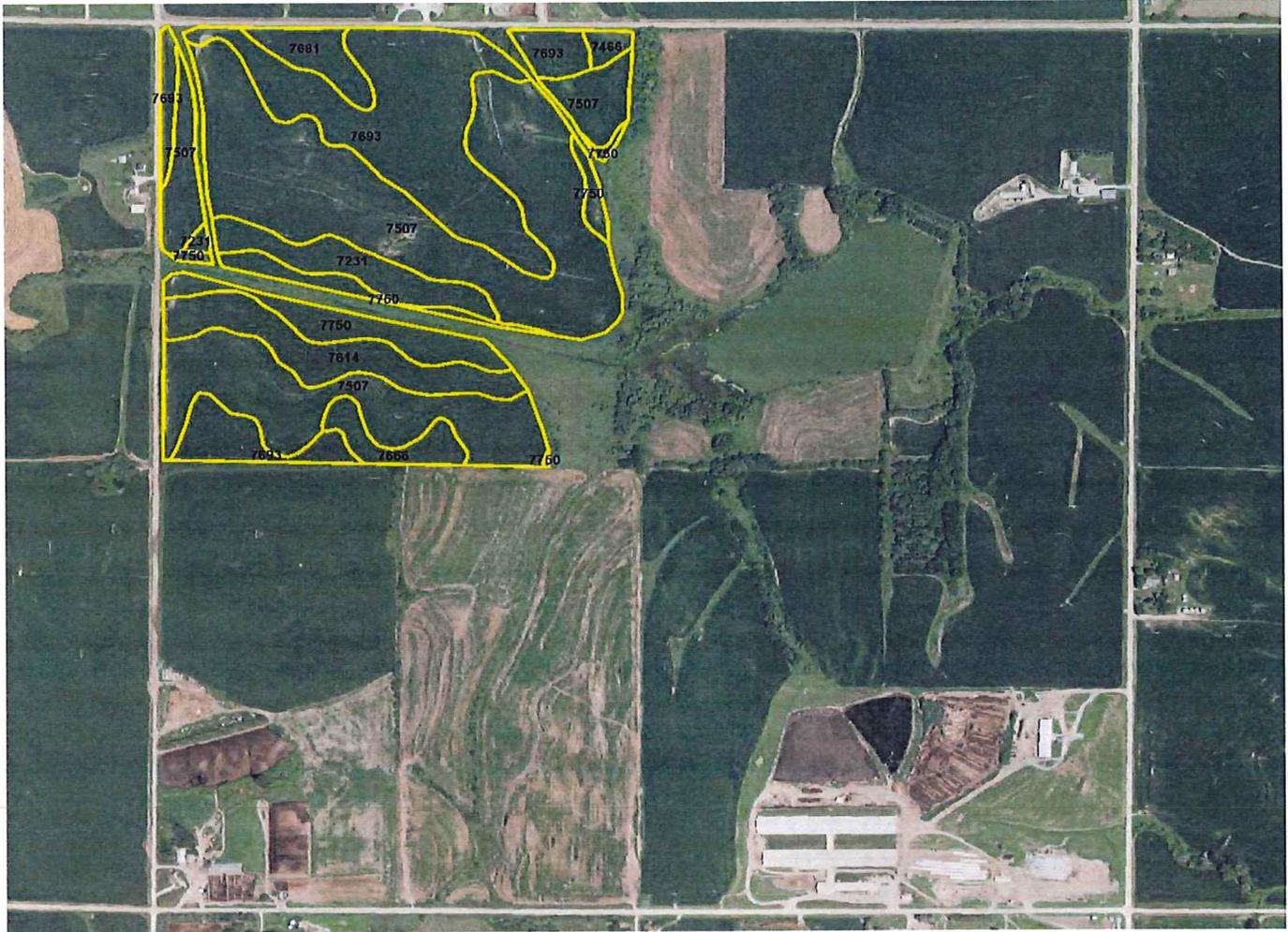
Landowner: Prairieland Dairy, LLC

Legal: Pt. NW1/4
S20-T7N-R8E

Acres: 129.80



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	63.80	49.2%	IVe		58	35
7693	Wymore silty clay loam, 2 to 6 percent slopes	31.04	23.9%	IIle	IIle	69	60
7750	Nodaway silt loam, occasionally flooded	11.24	8.7%	IIw	IIw	74	88
7614	Steinauer clay loam, 6 to 11 percent slopes, eroded	9.57	7.4%	IVe		55	53
7231	Judson silt loam, 2 to 6 percent slopes	6.80	5.2%	IIe		74	68
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	3.23	2.5%	IIle	IVe	60	46
7681	Wymore silty clay loam, 1 to 3 percent slopes	3.15	2.4%	IIe	IIe	72	60
7466	Otoe silty clay, 6 to 11 percent slopes, eroded	0.97	0.7%	IVe	IVe	66	47
Weighted Average						63.1	*n 49.6

Name: Site 14

Landowner: Prairieland Dairy, LLC

County: Lancaster

Legal: Pt. NW1/4
S20-T7N-R8E

Acres: 129.80



REPORT NUMBER: 19-266-0193

ACCOUNT NUMBER: 18237



PAGE 1/1

REPORT DATE: SEP 28, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
NWPIVOT

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

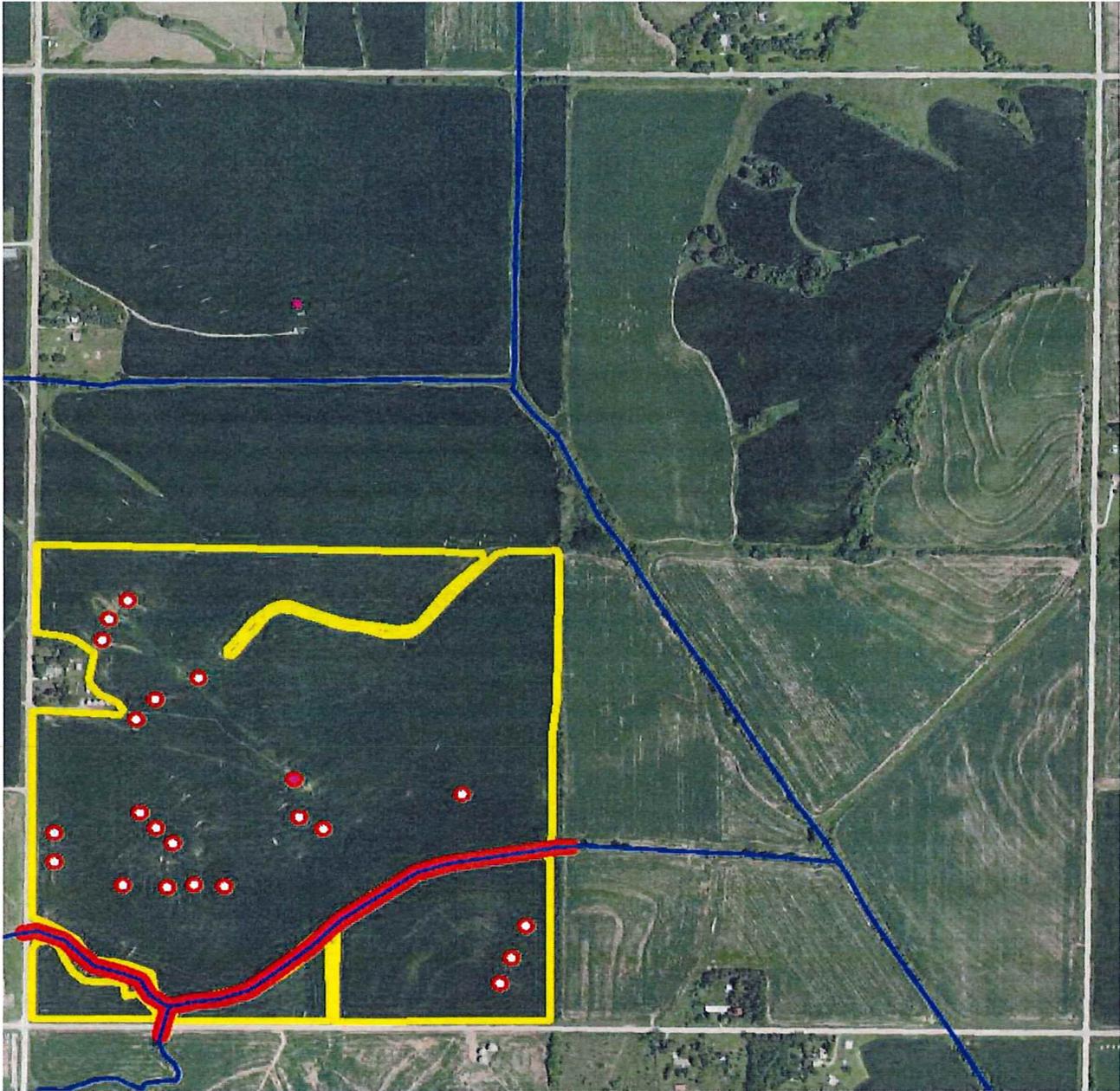
LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. % RATE		PHOSPHORUS						NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)				pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)								
				P ₁		P ₂		BICARBONATE P OLSEN		POTASSIUM K		MAGNESIUM Mg		CALCIUM Ca			SODIUM Na		SOIL pH	BUFFER INDEX	K	Mg	Ca	H	Na
				WEAK BRAY 1:7		STRONG BRAY 1:7		ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		ppm	RATE							
				ppm	RATE	ppm	RATE												ppm	RATE	ppm	RATE	ppm	RATE	ppm
34837486	NWP W	3.5	M	81	VH	165	VH	52	VH	307	VH	730	VH	3566	H			6.9	0.0	25.6	3.1	23.8	69.6	0.0	3.5
34837488	NWP M	3.4	M	85	VH	155	VH	52	VH	295	VH	680	VH	3464	H			7.0	0.0	24.8	3.1	22.8	70.0	0.0	4.1
34837490	NWP E	3.1	M	113	VH	151	VH	63	VH	273	VH	670	VH	3390	H			7.0	0.0	24.2	2.9	23.1	69.9	0.0	4.1
34837492	NWP NE	2.3	L	20	M	64	VH			168	L	540	VH	4117	H			6.2	6.6	29.0	1.5	15.5	71.0	12.0	
34837494	NWP S	3.1	M	90	VH	140	VH	56	VH	286	H	560	VH	4221	H			7.1	0.0	27.1	2.7	17.2	77.8	0.0	2.3

7-50

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction												EXCESS LIME RATE	SOLUBLE SALTS 1:1			
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu		BORON B			RATE	mmhos/cm	RATE	
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN		lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm					RATE
NWP W	26	62	0-8	7	34	8-24				96	15	M	4.9	H												0.6	L
NWP M	20	48	0-8	7	34	8-24				82	15	M	5.3	H												0.5	L
NWP E	27	65	0-8	11	53	8-24				118	16	M	6.2	VH												0.6	L
NWP NE	11	26	0-8	4	19	8-24				45	12	L	1.3	M												0.7	L
NWP S	19	46	0-8	6	29	8-24				75	15	M	4.7	H												0.6	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

Prairieland Dairy, LLC



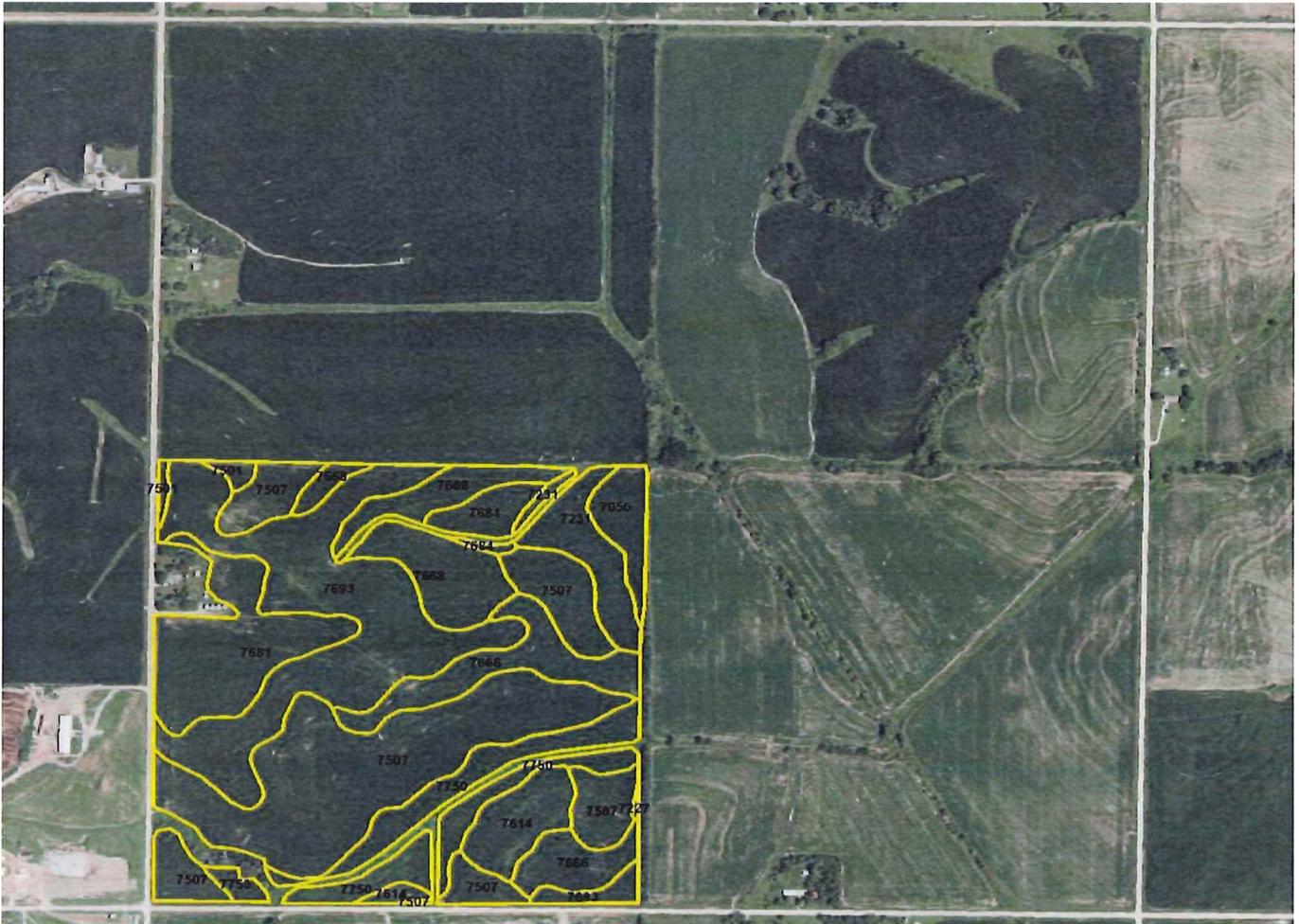
Layer Key

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

Name: Site 15 East Pivot
Landowner: David B & Chrystal J Obbink
Legal: SW1/4
S21-T7N-R8E
Acres: 145.20



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	43.22	29.8%	IVe		58	35
7693	Wymore silty clay loam, 2 to 6 percent slopes	30.83	21.2%	IIle	IIle	69	60
7750	Nodaway silt loam, occasionally flooded	13.78	9.5%	IIw	IIw	74	88
7681	Wymore silty clay loam, 1 to 3 percent slopes	13.30	9.2%	Ile	Ile	72	60
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	12.10	8.3%	IIle	IVe	60	46
7668	Mayberry silty clay loam, 6 to 11 percent slopes, eroded	11.97	8.2%	IVe		56	45
7231	Judson silt loam, 2 to 6 percent slopes	6.43	4.4%	Ile		74	68
7614	Steinauer clay loam, 6 to 11 percent slopes, eroded	5.98	4.1%	IVe		55	53
7050	Kennebec silt loam, occasionally flooded	3.36	2.3%	IIw		73	84
7684	Wymore silty clay loam, 3 to 6 percent slopes, eroded	3.16	2.2%	IIle	IVe	70	49
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	0.91	0.6%	IIle			35
7227	Burchard clay loam, 6 to 11 percent slopes	0.16	0.1%	IIle	IVe	68	53
Weighted Average						64	*n 53

Name: Site 15 East Pivot

Landowner: David B & Chrystal J Obbink

County: Lancaster

Legal: SW1/4
S21-T7N-R8E
Acres: 145.20



REPORT NUMBER: 19-266-0190

ACCOUNT NUMBER: 18237



PAGE 1/1

REPORT DATE: SEP 28, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
EAST PIVOT

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		PHOSPHORUS						POTASSIUM		MAGNESIUM		CALCIUM		SODIUM		pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)					
				P ₁		P ₂		BICARBONATE P OLSEN		K		Mg		Ca		Na		SOIL pH	BUFFER INDEX		K	Mg	Ca	H	Na	
				L.O.I.		WEAK BRAY 1:7		STRONG BRAY 1:7		ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE									ppm
				%	RATE	ppm	RATE	ppm	RATE									ppm	RATE		ppm	RATE	ppm	RATE	ppm	
34837467	EPN	2.9	M	120	VH	155	VH	93	VH	326	VH	710	VH	3251	H			7.1	0.0	23.0	3.6	25.7	70.7	0.0		
34837469	EP MN	3.1	M	82	VH	122	VH	64	VH	363	VH	732	VH	3295	H			7.1	0.0	24.2	3.8	25.2	68.3	0.0		
34837471	EP MS	3.2	M	91	VH	165	VH	75	VH	313	VH	604	VH	3049	H			7.1	0.0	21.1	3.8	23.9	72.3	0.0		
34837473	EP S	2.7	M	32	VH	65	VH	27	VH	193	M	503	VH	3856	H			7.0	0.0	24.0	2.1	17.5	80.4	0.0		

SAMPLE ID	NITRATE-N (FIA)										DTPA Extraction															
	Surface			Sub 1			Sub 2			Total	SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu		BORON B		EXCESS LIME RATE	SOLUBLE SALTS 1:1		
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN	lbs/A	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE		mmhos/cm	RATE	
EPN	6	14	0-8	2	10	8-24				24	11	L	6.6	VH											0.3	L
EP MN	10	24	0-8	3	14	8-24				38	18	M	5.2	H											0.4	L
EP MS	8	19	0-8	3	14	8-24				33	12	L	6.0	VH											0.4	L
EP S	16	38	0-8	9	43	8-24				81	17	M	3.6	H											0.6	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-53

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

<u>13000 Pella Road</u>	<u>Firth</u>	<u>NE</u>	<u>68358</u>	<u>402-791-2238</u>
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: David & Chrystal Obbink

<u>12800 Firth Rd</u>	<u>Firth</u>	<u>NE</u>	<u>68358</u>	<u></u>
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: SW1/4, S21-T7N-R8E

Total Acres: <u>156.27</u>	Useable Acres: <u>145.20</u>	Irrigated <input checked="" type="checkbox"/>	Dryland <input type="checkbox"/>
----------------------------	------------------------------	---	----------------------------------

Legal Description: S1/2 SW1/4 SE1/4, S29-T7N-R8E

Total Acres: <u>18.85</u>	Useable Acres: <u>14.52</u>	Irrigated <input checked="" type="checkbox"/>	Dryland <input type="checkbox"/>
---------------------------	-----------------------------	---	----------------------------------

Legal Description: _____

Total Acres: _____	Useable Acres: _____	Irrigated <input type="checkbox"/>	Dryland <input type="checkbox"/>
--------------------	----------------------	------------------------------------	----------------------------------

Legal Description: _____

Total Acres: _____	Useable Acres: _____	Irrigated <input type="checkbox"/>	Dryland <input type="checkbox"/>
--------------------	----------------------	------------------------------------	----------------------------------

Legal Description: _____

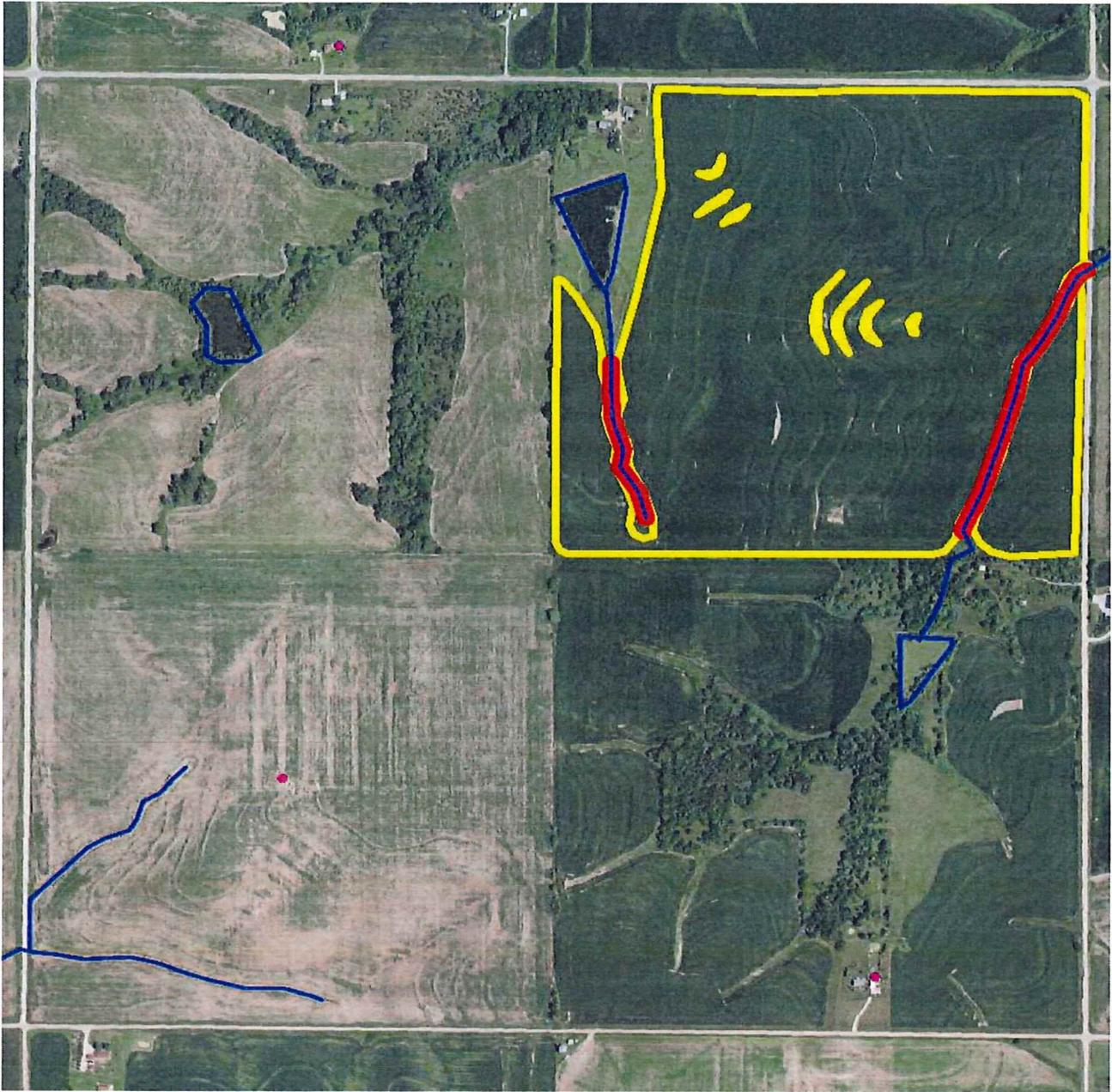
Total Acres: _____	Useable Acres: _____	Irrigated <input type="checkbox"/>	Dryland <input type="checkbox"/>
--------------------	----------------------	------------------------------------	----------------------------------

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: David Obbink Date: 12-16-19
 Landowner

Bob Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



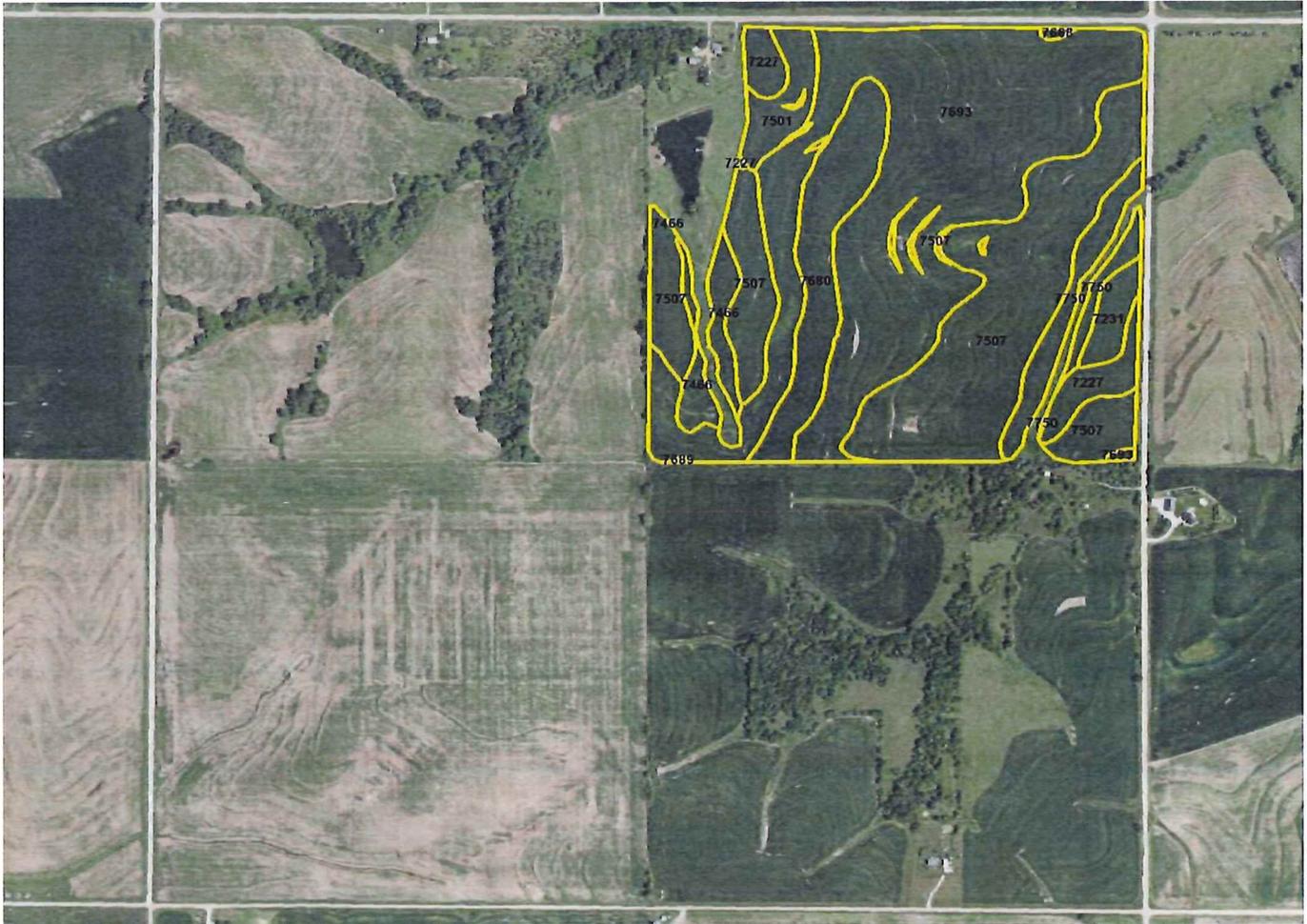
Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 16
Landowner: Nicholas J & Jennifer Heetderks
Legal: NE1/4 S33-T7N-R8E
Acres: 135.30



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	59.84	43.9%	IIIe	IIIe	69	60
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	41.01	30.1%	IVe		58	35
7680	Wymore silty clay loam, 0 to 1 percent slopes	11.93	8.8%	IIIs	IIIs	74	61
7750	Nodaway silt loam, occasionally flooded	6.72	4.9%	IIW	IIW	74	88
7466	Otoe silty clay, 6 to 11 percent slopes, eroded	4.89	3.6%	IVe	IVe	66	47
7227	Burchard clay loam, 6 to 11 percent slopes	4.87	3.6%	IIIe	IVe	68	53
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	4.35	3.2%	IIIe			35
7231	Judson silt loam, 2 to 6 percent slopes	2.44	1.8%	IIe		74	68
7668	Mayberry silty clay loam, 6 to 11 percent slopes, eroded	0.19	0.1%	IVe		56	45
7689	Wymore silty clay loam, 0 to 2 percent slopes	0.06	0.0%	IIIs	IIIs	72	61
Weighted Average						64.1	*n 52.6

Name: Site 16
Landowner: Nicholas J & Jennifer Heetderks
County: Lancaster

Legal: NE1/4
 S33-T7N-R8E
Acres: 135.30



Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Prairieland Dairy, LLC

13000 Pella Rd	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And
 Landowner/Operator: Nick Heetderus

<u>14171</u>	<u>FIRTH</u>	<u>RD NE</u>	<u>68358</u>	<u>402-791-0235</u>
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: 20-7-8 E 1/2 SW 1/4
 Total Acres: 80 Useable Acres: 77.63 Irrigated Dryland

Legal Description: ~~21-7-8 NE 1/4~~
 Total Acres: ~~147.152~~ Useable Acres: ~~147.42~~ Irrigated Dryland

Legal Description: 33-7-8 NE 1/4
 Total Acres: 160 Useable Acres: 137 Irrigated Dryland

Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

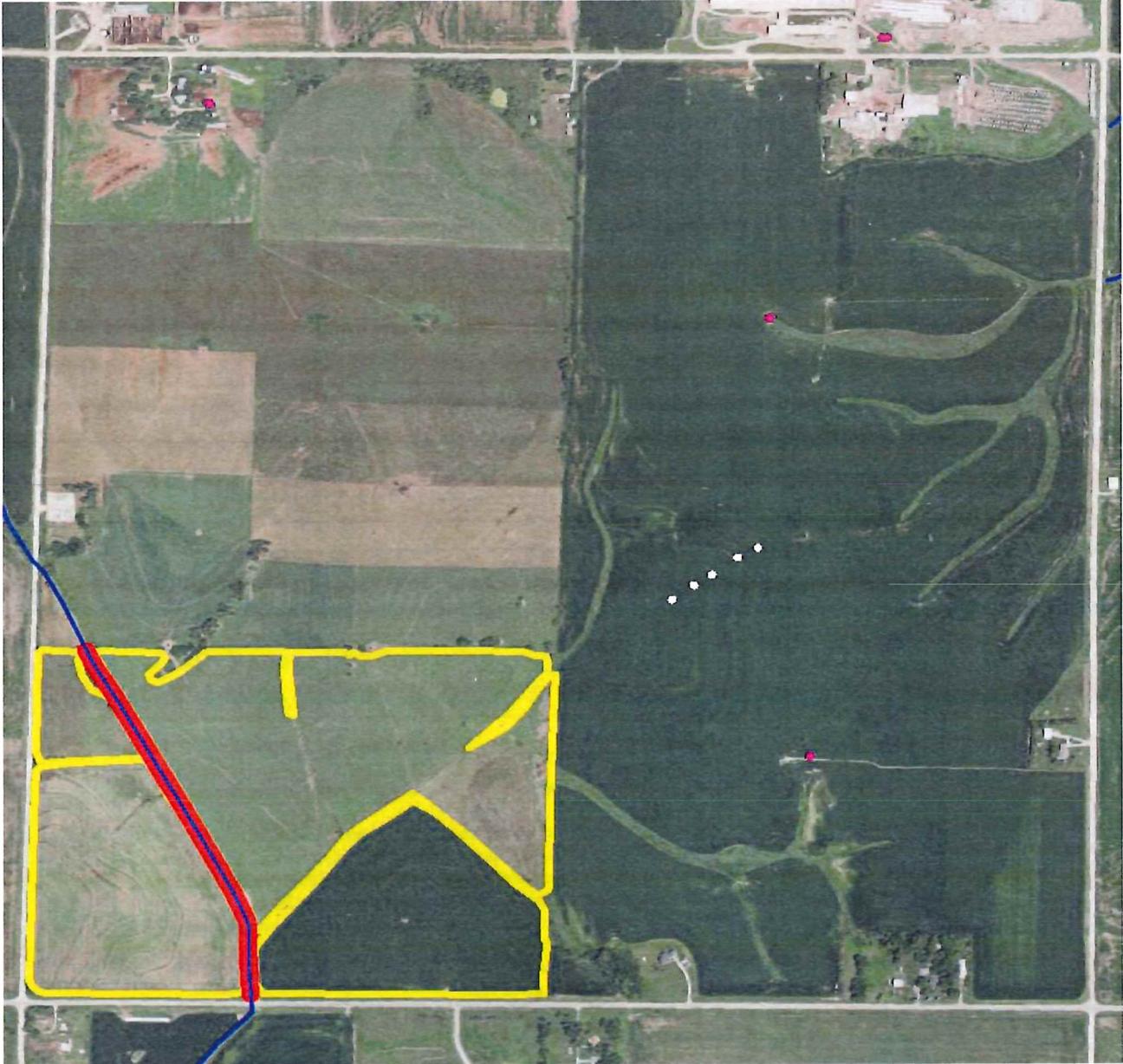
Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: Nick Heetderus Date: 12/16/17
 Landowner/Operator (Authorized Representative)

Bob Date: 7-28-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



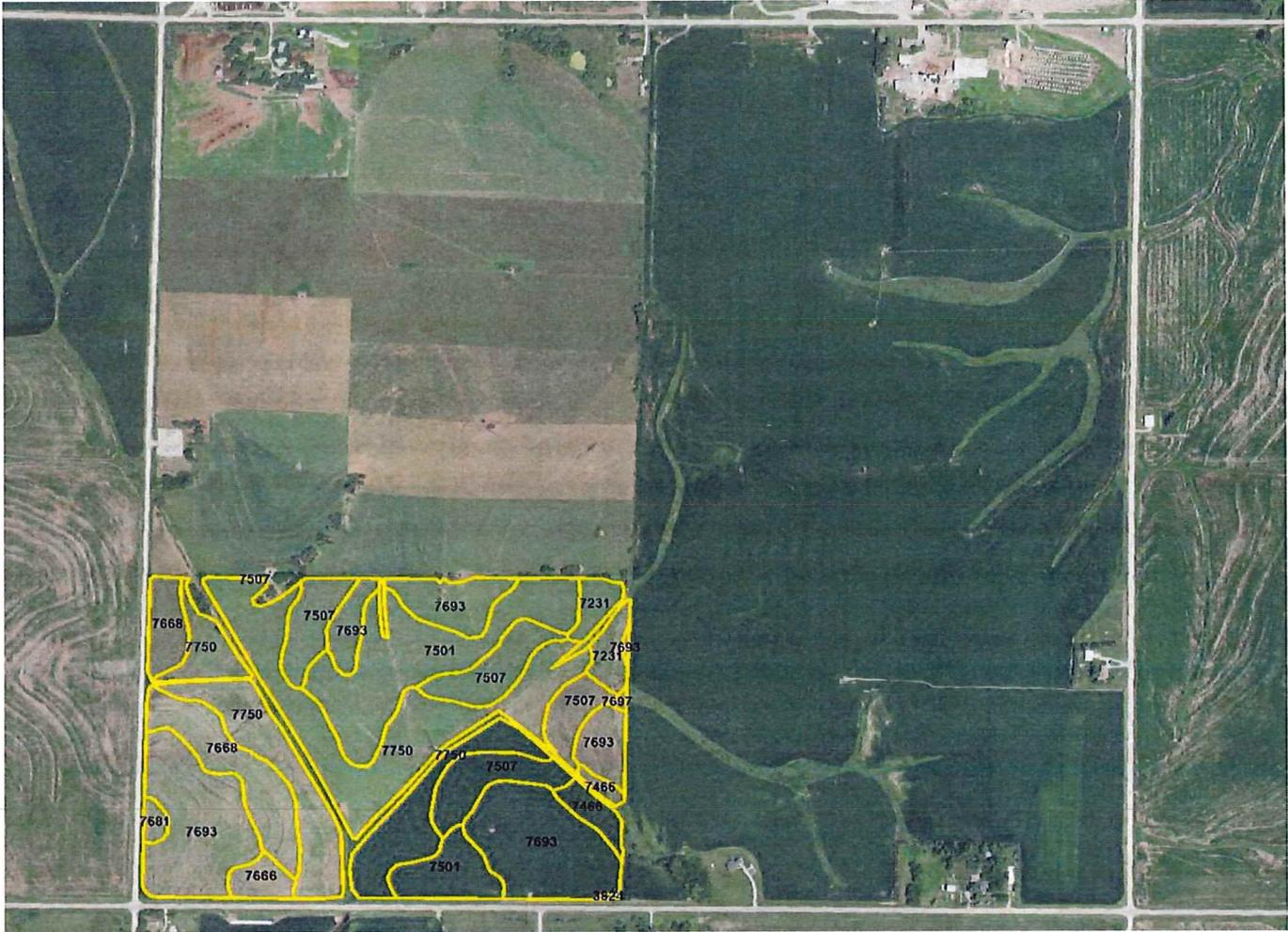
Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 17
Landowner: Ivan W Walvoord Unified Credit Trust
Legal: S1/2 SW1/4 & S1/2 N1/2 SW1/4 S29-T7N-R8E
Acres: 106.20



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7750	Nodaway silt loam, occasionally flooded	32.13	30.3%	IIw	IIw	74	88
7693	Wymore silty clay loam, 2 to 6 percent slopes	27.73	26.1%	IIIe	IIIe	69	60
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	16.68	15.7%	IIIe			35
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	13.11	12.3%	IVe		58	35
7668	Mayberry silty clay loam, 6 to 11 percent slopes, eroded	8.90	8.4%	IVe		56	45
7231	Judson silt loam, 2 to 6 percent slopes	3.14	3.0%	IIe		74	63
7466	Otoe silty clay, 6 to 11 percent slopes, eroded	1.97	1.9%	IVe	IVe	66	47
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	1.62	1.5%	IIIe	IVe	60	46
7681	Wymore silty clay loam, 1 to 3 percent slopes	0.69	0.6%	IIe	IIe	72	60
7697	Wymore silty clay loam, 6 to 11 percent slopes	0.17	0.2%	IVe	IIIe	61	58
3824	Crete silt loam, 0 to 1 percent slopes	0.06	0.1%	IIIs	IIIs	73	63
Weighted Average						57.2	*n 60

Name: Site 17
Landowner: Ivan W Walvoord Unified Credit Trust
County: Lancaster

Legal: S1/2 SW1/4 & S1/2 N1/2 SW1/4 S29-T7N-R8E
Acres: 106.20



Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation; PrairieLand Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Ivan Walvoord Unified Credit Trust c/o Union Bank-Gessert

PO Box 82535	Lincoln	NE	68501	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: E 1/2 SE 1/4 & Pt. W 1/2 SE 1/4, S24-T7N-R7E

Total Acres: 136.34 Useable Acres: 130.7 Irrigated Dryland

Legal Description: Pt. W 1/2, S29-T7N-R8E

Total Acres: 272.10 Useable Acres: 261.4 Irrigated Dryland

Legal Description: Pt. E 1/2 NW 1/4, S22-T7N-R8E

Total Acres: 67.05 Useable Acres: 62.84 Irrigated Dryland

Legal Description: W 1/2 SE 1/4 S27-7-8

Total Acres: _____ Useable Acres: 60A Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

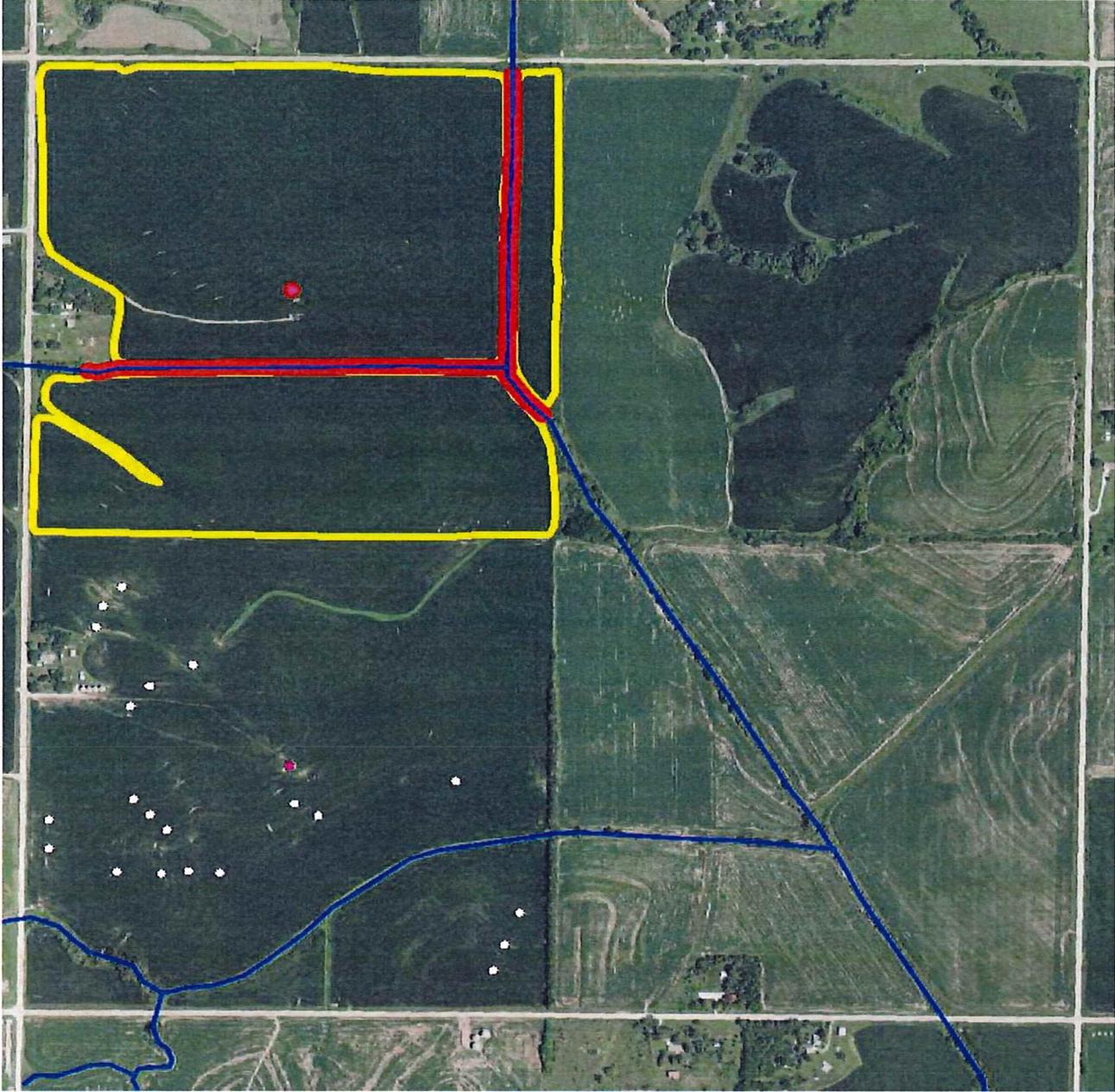
1. This agreement allows the said Livestock Operation to spread livestock manure on said landowners/operators property.
2. The Landowner/Operator hereby consents to the Operation spreading manure on said premises at such times as are mutually agreeable by the parties. The Operation may or may not spread 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: *Tom Sautter* Date: 10-8-19
Landowner

James Walvoord Date: 7-14-20
Livestock Operator (Authorized Representative)

800

Prairieland Dairy, LLC



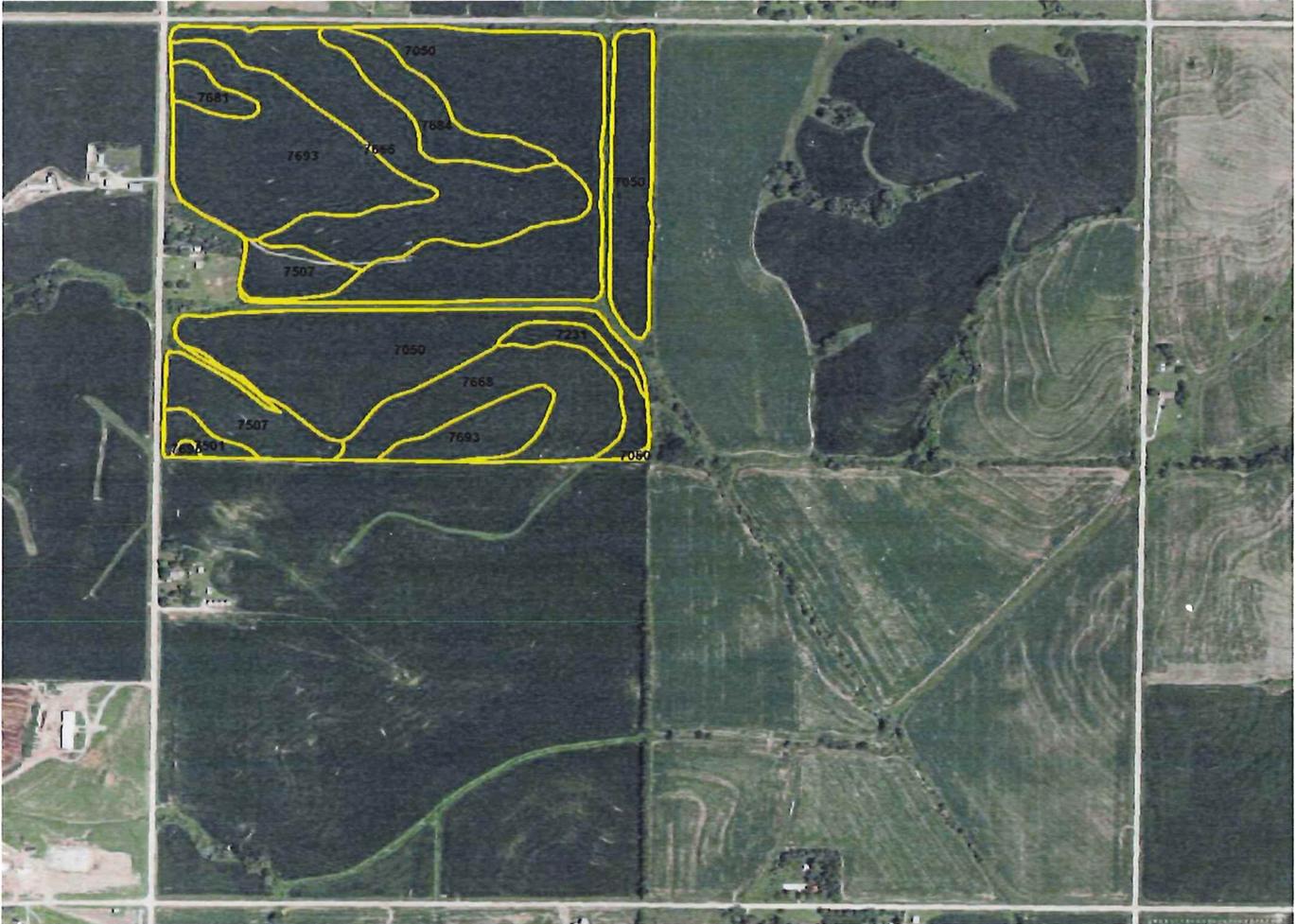
Layer Key

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

Name: Site 18
Landowner: Janet L Kroese
Legal: NW1/4
S21-T7N-R8E
Acres: 140.80



Prairieland Dairy, LLC



Area Symbol: NE109_Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7050	Kennebec silt loam, occasionally flooded	56.29	40.0%		IIw	73	84
7693	Wymore silty clay loam, 2 to 6 percent slopes	25.03	17.8%		IIIe	69	60
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	22.18	15.8%		IIIe	60	48
7668	Mayberry silty clay loam, 6 to 11 percent slopes, eroded	13.17	9.4%		IVe	56	45
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	10.38	7.4%		IVe	58	35
7684	Wymore silty clay loam, 3 to 6 percent slopes, eroded	6.48	4.6%		IIIe	70	49
7231	Judson silt loam, 2 to 6 percent slopes	3.47	2.5%		IIe	74	68
7681	Wymore silty clay loam, 1 to 3 percent slopes	2.03	1.4%		IIe	72	60
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	1.77	1.3%		IIIe		35
Weighted Average						66.5	*n 63.5

Name: Site 18

Landowner: Janet L Kroese

County: Lancaster

Legal: NW1/4
S21-T7N-R8E
Acres: 140.80



REPORT NUMBER: 19-266-0191

ACCOUNT NUMBER: 18237



PAGE 1/1

REPORT DATE: SEP 28, 2019

NUTRIENT ADVISORS SOIL
449 E DEERE ST
WEST POINT, NE 68788-

PRAIRIELAND DAIRY
PRAIRIELAND DAIRY
NICKS

SOIL ANALYSIS REPORT

Analytical results provided by Midwest Laboratories, Inc.

NEUTRAL AMMONIUM ACETATE (EXCHANGEABLE)

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER		PHOSPHORUS						POTASSIUM		MAGNESIUM		CALCIUM		SODIUM		pH		CATION EXCHANGE CAPACITY C.E.C. meq/100g	PERCENT BASE SATURATION (COMPUTED)				
				P ₁		P ₂		BICARBONATE P OLSEN		K		Mg		Ca		Na		SOIL pH	BUFFER INDEX		K	Mg	Ca	H	Na
				%	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE				ppm	RATE	1:1	%	%
34837475	Nick N	2.7	M	33	VH	75	VH	24	VH	240	H	696	VH	3561	H			7.1	0.0	24.2	2.5	24.0	73.5	0.0	
34837477	Nick MN	2.9	M	37	VH	80	VH			251	VH	630	VH	3010	H			6.7	0.0	20.9	3.1	25.1	71.8	0.0	
34837480	Nick MS	2.2	L	41	VH	89	VH	32	VH	227	VH	512	VH	3312	H			7.4	0.0	21.4	2.7	19.9	77.4	0.0	
34837482	Nick S	2.9	M	49	VH	130	VH	32	VH	284	H	548	VH	4358	H			7.2	0.0	27.1	2.7	16.9	80.4	0.0	

DTPA Extraction

SAMPLE ID	NITRATE-N (FIA)										SULFUR S		ZINC Zn		MANGANESE Mn		IRON Fe		COPPER Cu		BORON B		EXCESS LIME RATE	SOLUBLE SALTS 1:1		
	Surface		Sub 1		Sub 2		Total	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	ppm	RATE	RATE		mmhos/cm	RATE	
	ppm	lbs/A	depth IN	ppm	lbs/A	depth IN																				ppm
Nick N	2	5	0-8	2	10	8-24				15	6	VL	4.0	H											0.2	L
Nick MN	4	10	0-8	4	19	8-24				29	7	L	3.6	H											0.2	L
Nick MS	5	12	0-8	2	10	8-24				22	8	L	3.0	M											0.2	L
Nick S	23	55	0-8	23	110	8-24				165	12	L	4.1	H											0.7	L

Recommendations generated are pre-plant recommendations. For sidedress application recommendations, contact the lab.

7-63

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Prairieland Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Janet Kroese

809 Country View Ln	Firth	NE	68358	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: NW1/4, S21-T7N-R8E

Total Acres: 150.73 Useable Acres: 140.80 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

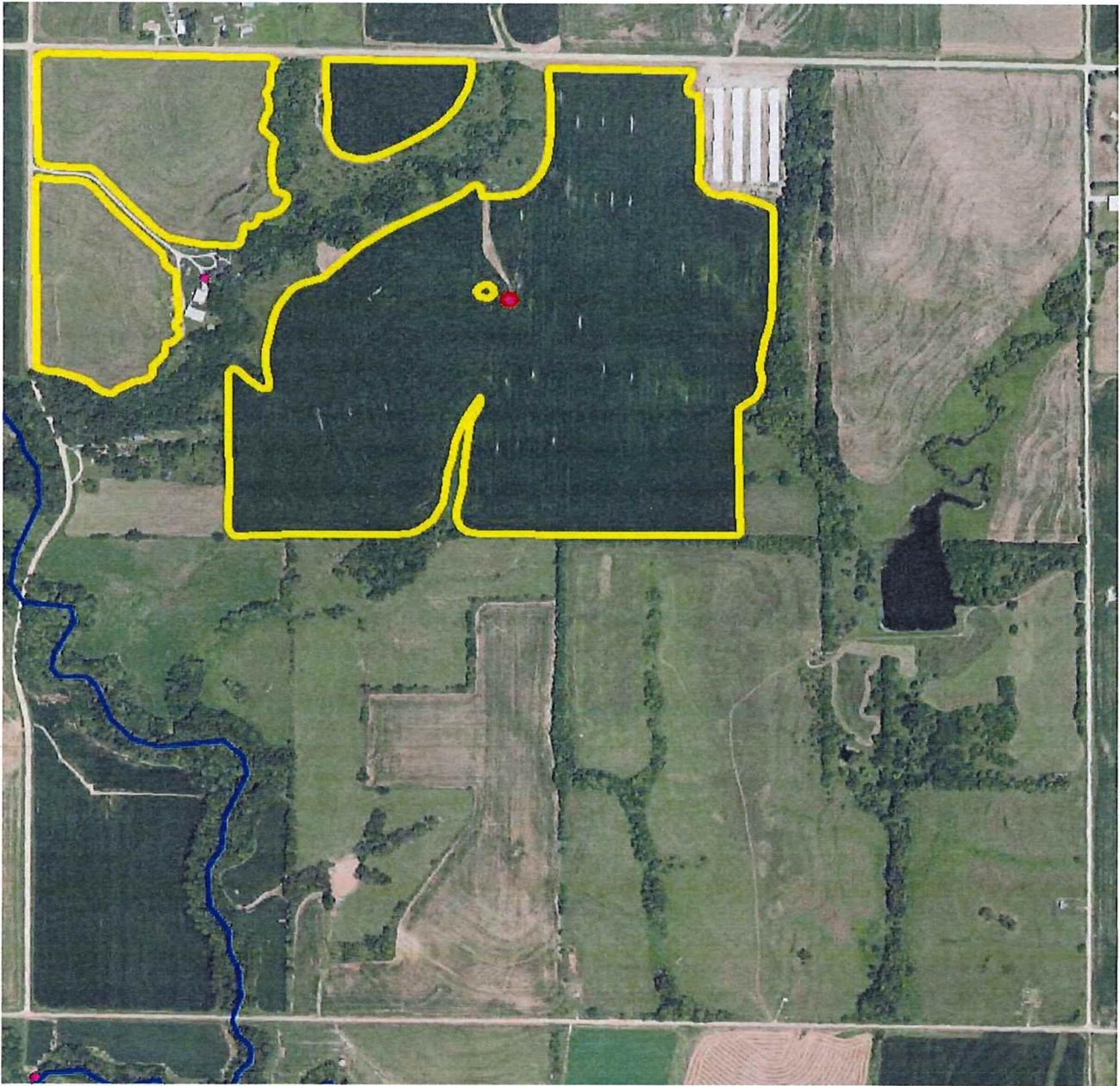
Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: *Janet Kroese* Date: Dec. 13, 2019
 Landowner

Jol Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

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

Name: Site 19

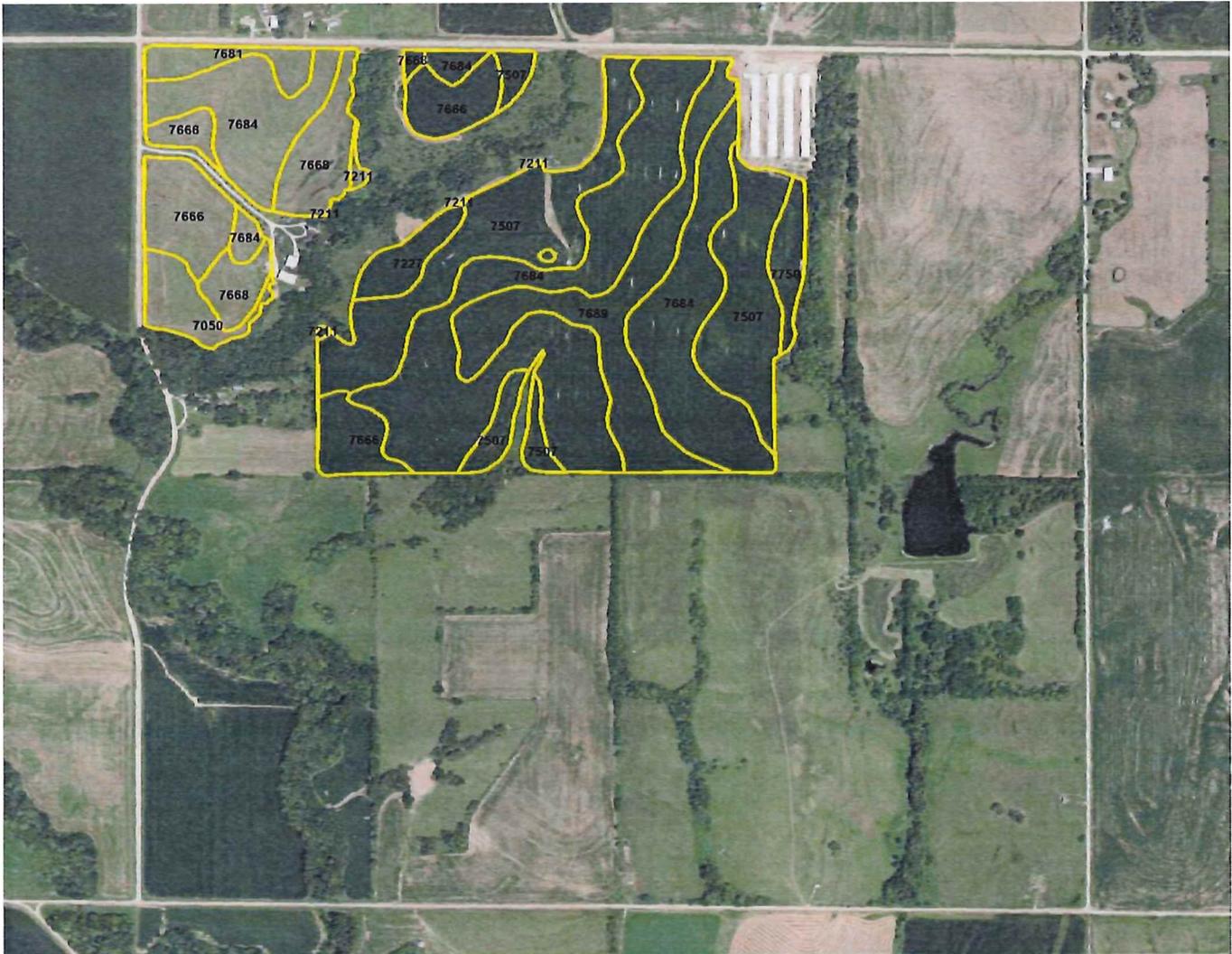
Landowner: Cathy Heetderks

Legal: NW1/4 & W1/2 NE1/4
S36-T7N-R8E

Acres: 156.40



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans	
7684	Wymore silty clay loam, 3 to 6 percent slopes, eroded	63.48	40.8%		IIIe	IVe	70	49
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	34.36	22.1%		IVe		58	35
7689	Wymore silty clay loam, 0 to 2 percent slopes	17.01	10.9%		IIIs	IIIs	72	61
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	16.67	10.7%		IIIe	IVe	60	46
7668	Mayberry silty clay loam, 6 to 11 percent slopes, eroded	9.37	6.0%		IVe		56	45
7050	Kennebec silt loam, occasionally flooded	4.33	2.8%		IIw		73	84
7681	Wymore silty clay loam, 1 to 3 percent slopes	3.34	2.1%		IIe	IIe	72	60
7227	Burchard clay loam, 6 to 11 percent slopes	3.33	2.1%		IIIe	IVe	68	53
7750	Nodaway silt loam, occasionally flooded	3.05	2.0%		IIw	IIw	74	88
7211	Burchard-Nodaway complex, 2 to 30 percent slopes	0.46	0.3%		Vle		44	43
Weighted Average						65.7	*n 48.7	

Name: Site 19
Landowner: Cathy Heetderks
County: Lancaster

Legal: NW1/4 & W1/2 NE1/4
 S36-T7N-R8E
Acres: 156.40



Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And
 Landowner/Operator: Cathy Heetderks
29180 5176th Adams NE 68001 402-788-2272
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: 36-7-8 NW 1/4, W 1/2 NE 1/4
 Total Acres: 210 Useable Acres: 155 Irrigated Dryland

Legal Description: Sec. 20-5-6 E 1/2 NW 80 AC
 Total Acres: 80 Useable Acres: 80 Irrigated Dryland

Legal Description: Sec. 20-5-6 W 1/2 NE 80.00
 Total Acres: 80 Useable Acres: 80 Irrigated Dryland

Legal Description: Sec 20-5-6 W 1/2 NW 80
 Total Acres: 80 Useable Acres: 80 Irrigated Dryland

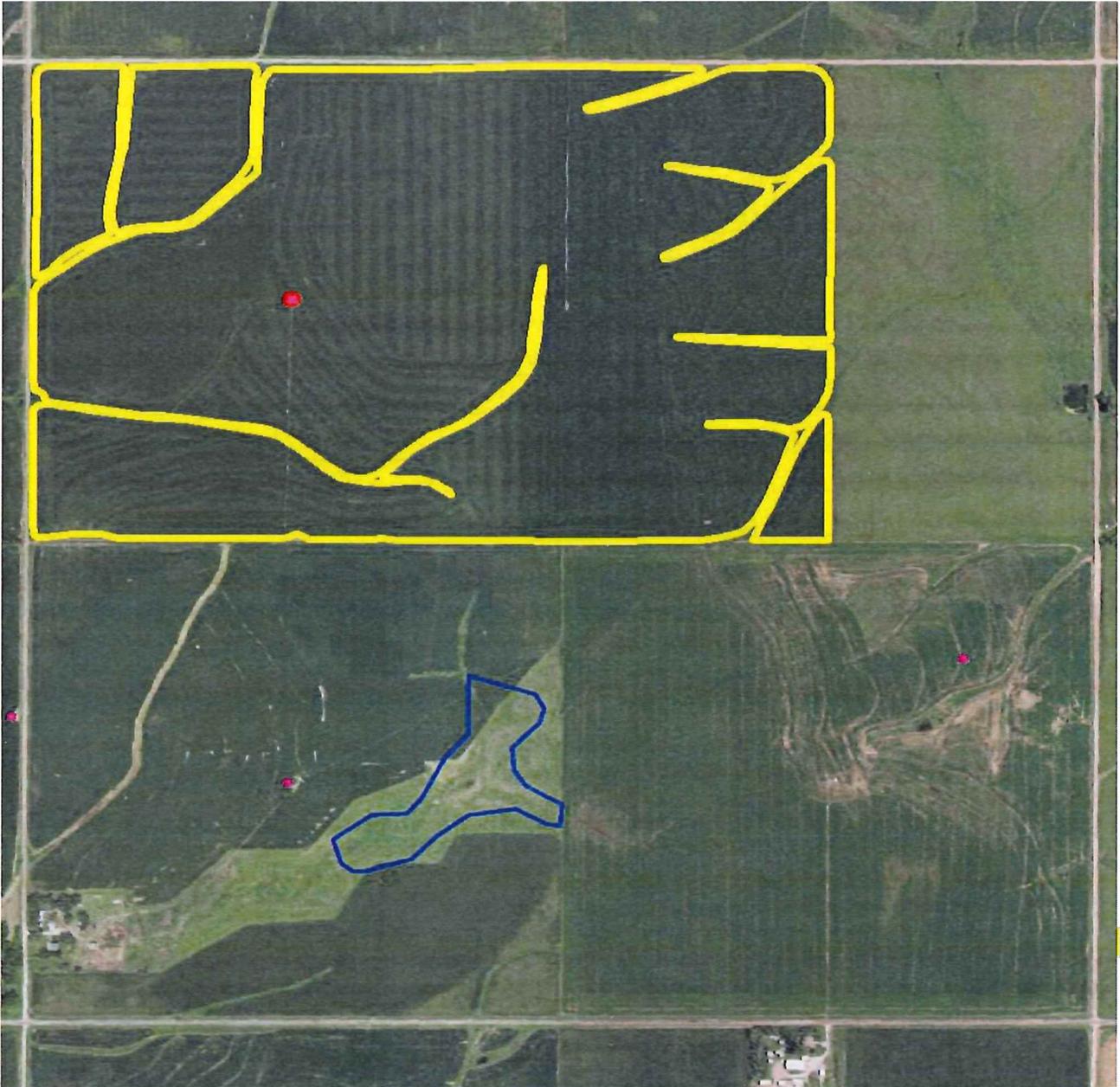
Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: Cathy H. Heetderks Date: 12-18-19
 Landowner/Operator (Authorized Representative)

[Signature] Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

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

Name: Site 20

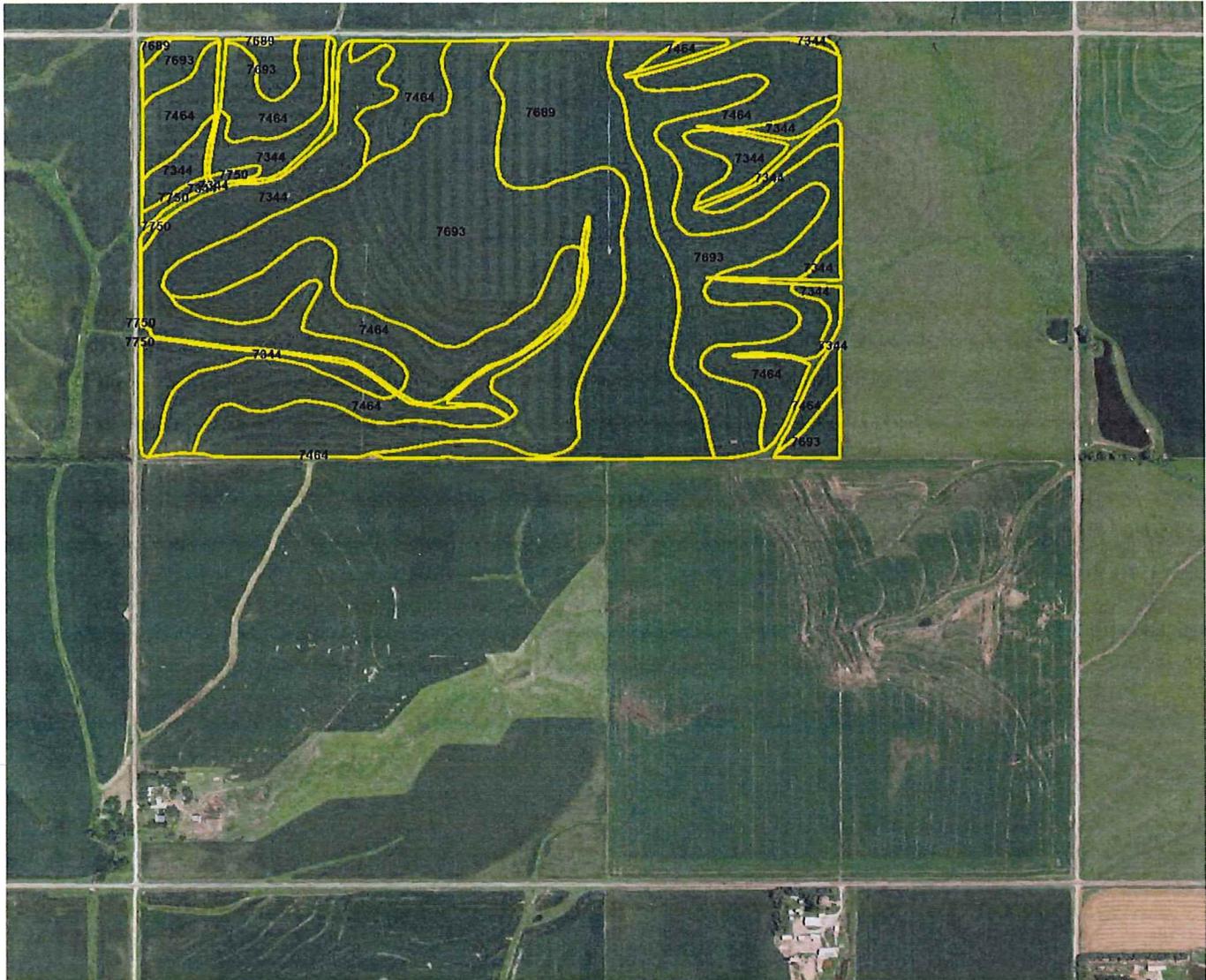
Landowner: Cathy Heetderks

Legal: NW 1/4 & W 1/2 NE 1/4
S20-T5N-R6E

Acres: 228.20



Prairieland Dairy, LLC



Area Symbol: NE067, Soil Area Version: 22

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	90.17	38.0%	IIIe	IIIe	69	60
7464	Otoe silty clay loam, 6 to 11 percent slopes, eroded	71.82	30.3%	IVe		66	44
7344	Malmo, eroded-Pawnee complex, 6 to 11 percent slopes	40.33	17.0%	IVe		52	38
7689	Wymore silty clay loam, 0 to 2 percent slopes	33.04	13.9%	IIIs	IIIs	72	61
7750	Nodaway silt loam, occasionally flooded	1.75	0.7%	IIW	IIW	74	88
Weighted Average						65.7	*n 51.8

Name: Site 20

Landowner: Cathy Heetderks

County: Gage

Legal: NW1/4 & W1/2 NE1/4
S20-T5N-R6E

Acres: 228.20



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And
 Landowner/Operator: Cathy Heetderks
29180 5176th Adams NE 68501 402-788-2272
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: 36-7-8 NW 1/4, W 1/2 NE 1/4
 Total Acres: 220 Useable Acres: 155 Irrigated Dryland

Legal Description: Sec. 20-5-6 E. 1/2 NW 80 AC
 Total Acres: 80 Useable Acres: 80 Irrigated Dryland

Legal Description: Sec. 20-5-6 W 1/2 NE 80.00
 Total Acres: 80 Useable Acres: 80 Irrigated Dryland

Legal Description: Sec. 20-5-6 W 1/2 NW 80
 Total Acres: 80 Useable Acres: 80 Irrigated Dryland

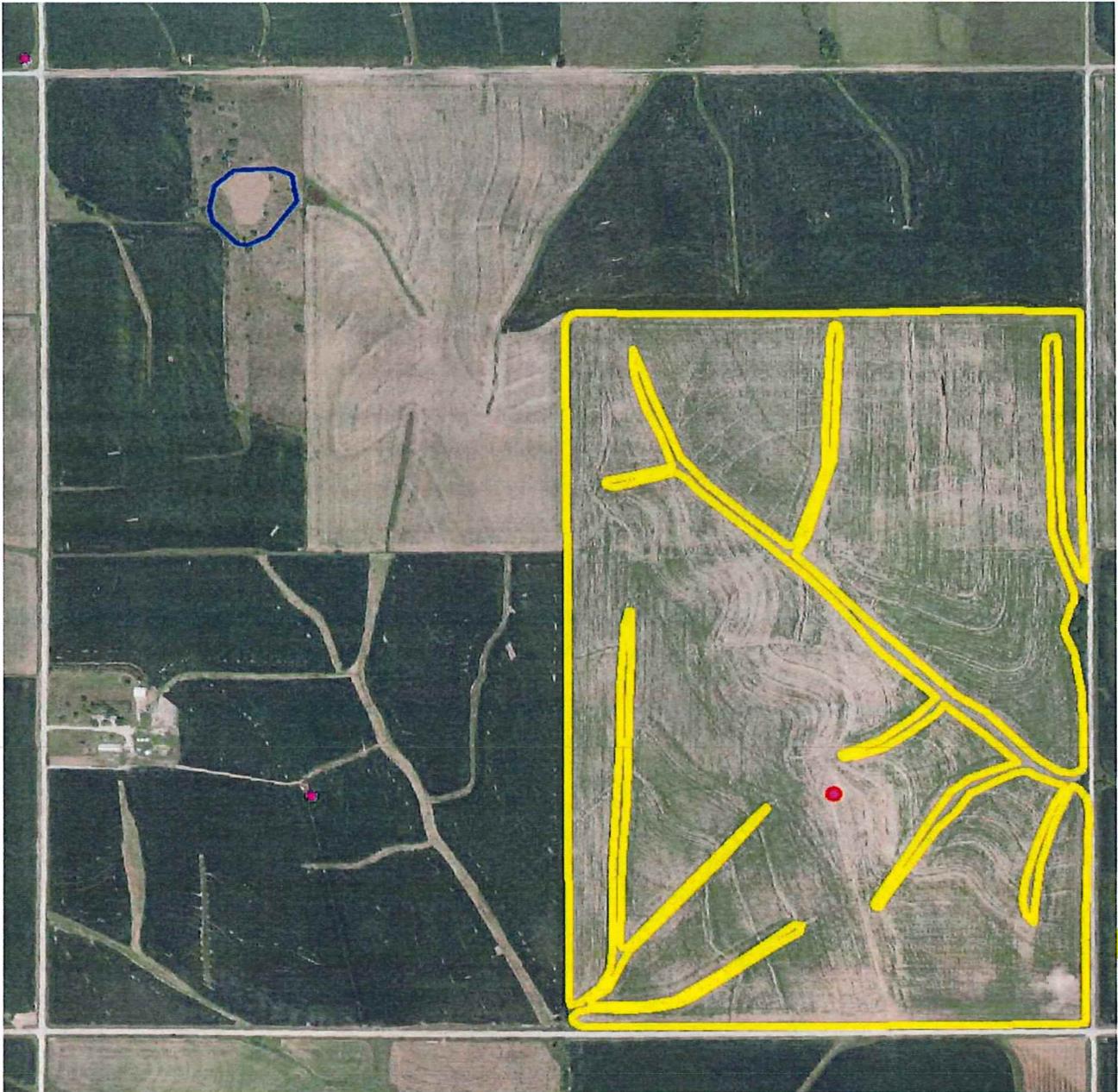
Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: Cathy H. Heetderks Date: 12-18-19
 Landowner/Operator (Authorized Representative)

[Signature] Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 21

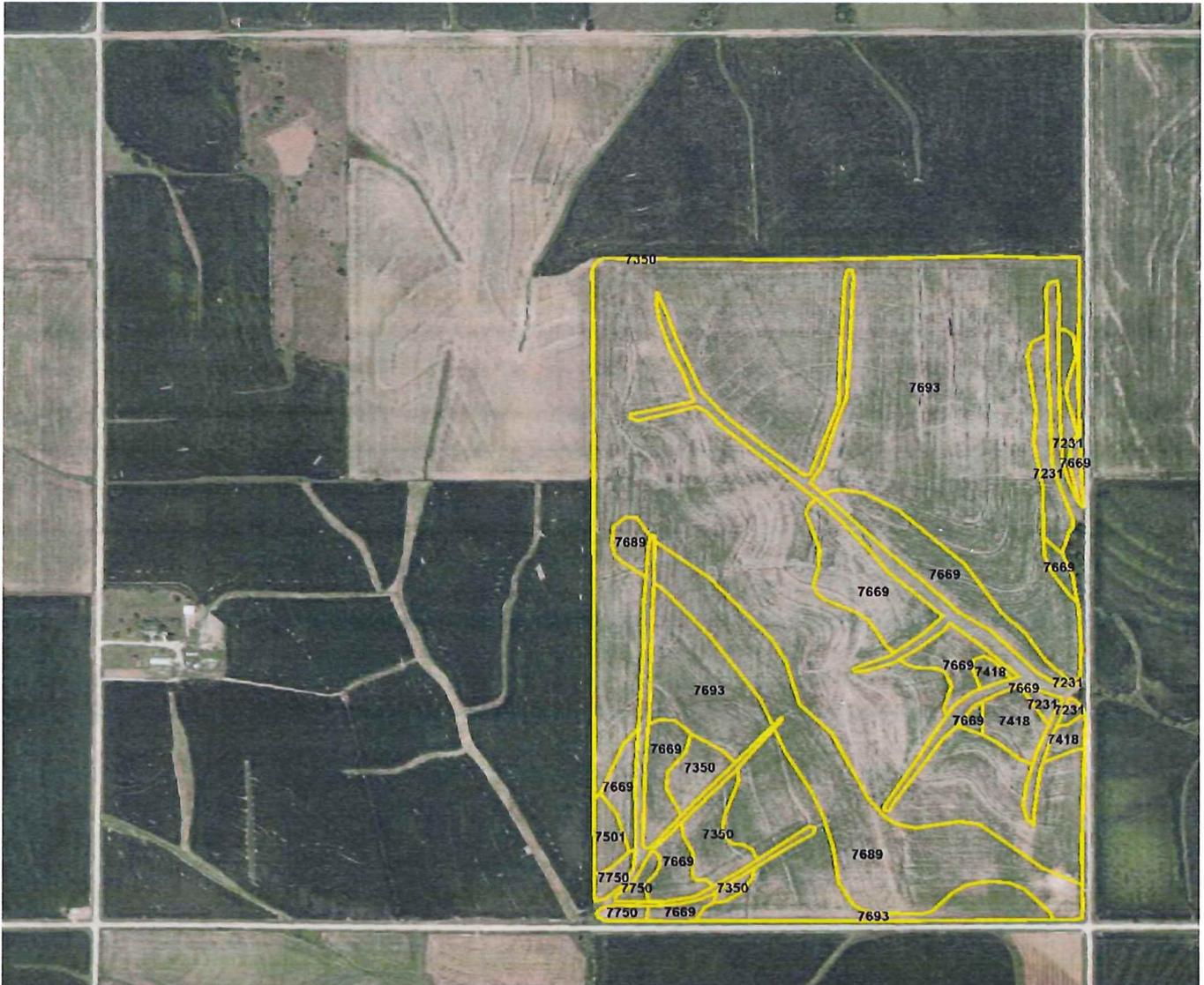
Landowner: Garry Heetderks

Legal: S1/2 NE1/4 & SE1/4
S21-T5N-R9E

Acres: 217.50



Prairieland Dairy, LLC



Area Symbol: NE097, Soil Area Version: 20

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	159.91	68.7%	IIIe	IIIe	70	60
7669	Mayberry clay loam, 3 to 11 percent slopes	28.42	12.2%	IIIe	IVe	60	53
7689	Wymore silty clay loam, 0 to 2 percent slopes	23.16	10.0%	IIIs	IIIs	73	61
7231	Judson silt loam, 2 to 6 percent slopes	7.24	3.1%	IIe		79	68
7350	Maimo clay, 3 to 11 percent slopes, eroded	5.88	2.5%	IVe		55	36
7418	Morrill clay loam, 6 to 11 percent slopes	4.20	1.8%	IIIe	IVe	66	61
7750	Nodaway silt loam, occasionally flooded	2.54	1.1%	IIW	IIW	74	88
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	1.28	0.6%	IIIe			35
Weighted Average						68.6	*n 59.1

Name: Site 21

Landowner: Garry Heetderks

County: Johnson

Legal: S1/2 NE1/4 & SE1/4
S21-T5N-R9E

Acres: 217.50



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And Landowner/Operator: Garry S. Heetderks

28180 S. 176th Adams, NE 68301
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: Sec. 21-5-9 S0 S2 NE 4

Total Acres: 80 Useable Acres: 80 Irrigated Dryland

Legal Description: Sec. 21-5-9 160A. SE 4

Total Acres: 160 Useable Acres: 160 Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____

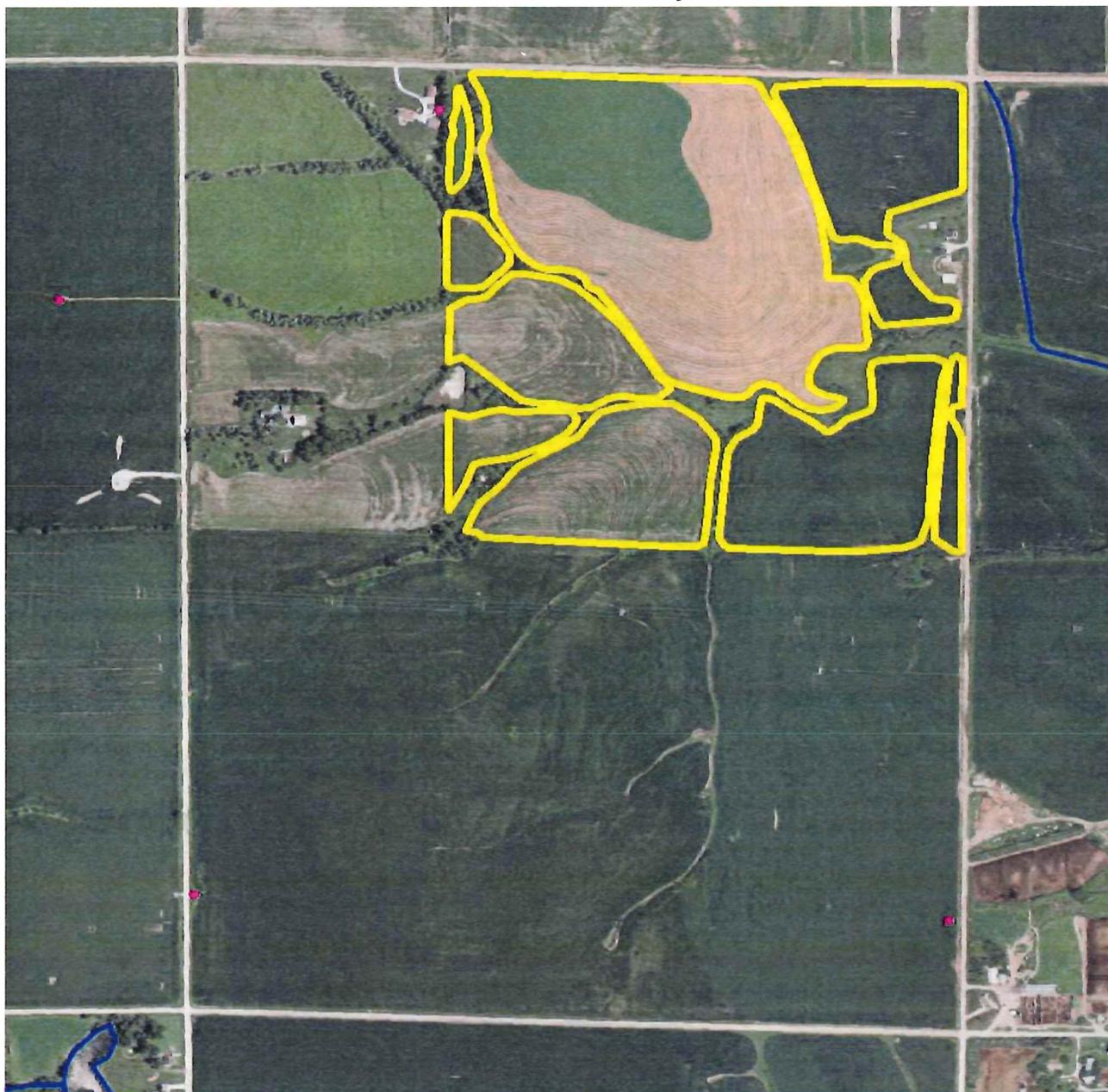
Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: 12-18-19
 Landowner/Operator (Authorized Representative)

 Date: 7-16-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 22

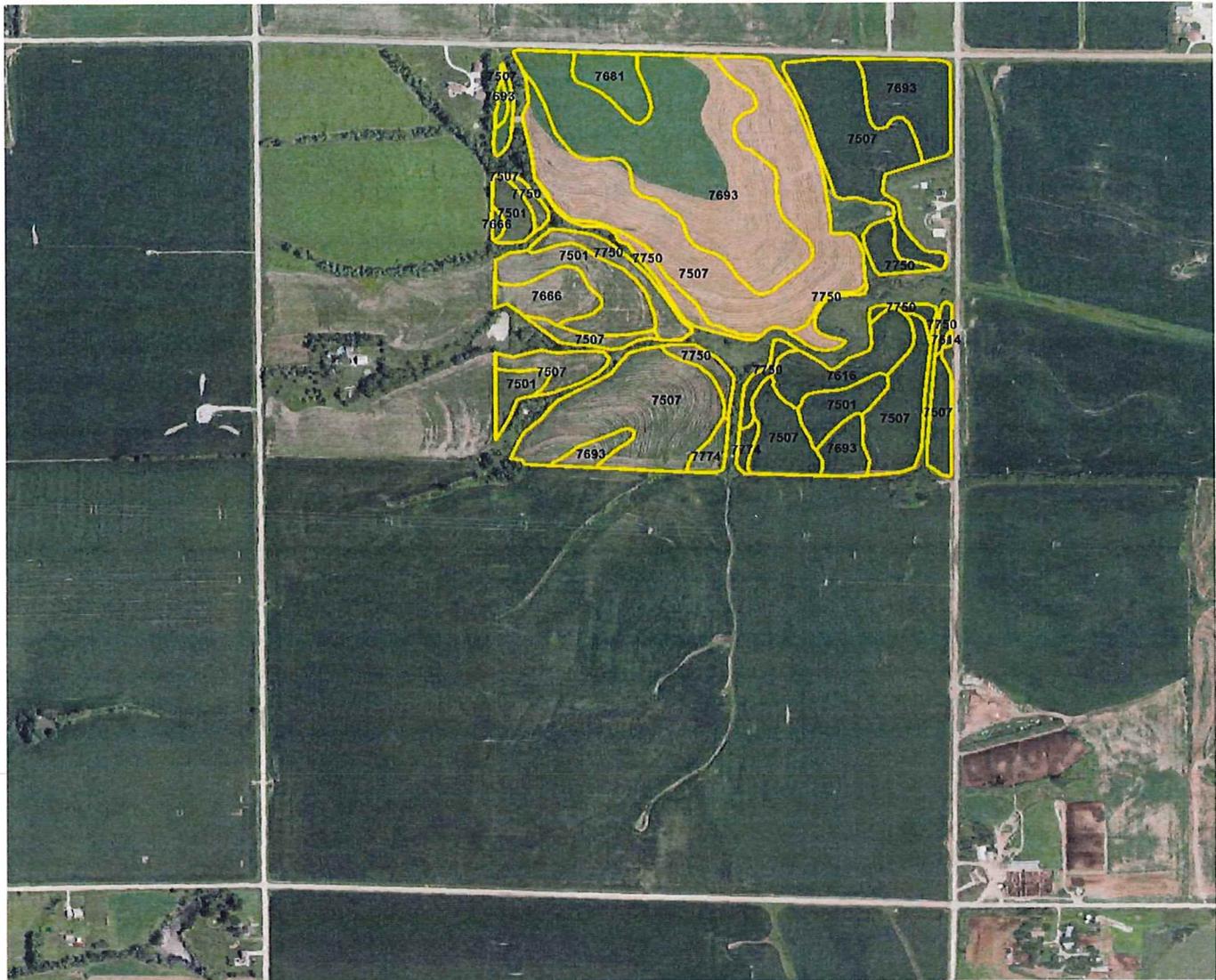
Landowner: Larry Edgar

Legal: NE1/4
S19-T7N-R8E

Acres: 127.60



Prairieland Dairy, LLC



Area Symbol: NE109_Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	57.35	47.0%		IVe	58	35
7693	Wymore silty clay loam, 2 to 6 percent slopes	33.52	27.4%		IIIe	69	60
7501	Pawnee clay loam, 4 to 8 percent slopes, eroded	10.43	8.5%		IIIe		35
7750	Nodaway silt loam, occasionally flooded	9.20	7.5%		IIw	74	88
7616	Steinauer loam, 6 to 11 percent slopes	4.27	3.5%		IVe	56	64
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	3.19	2.6%		IIIe	60	46
7681	Wymore silty clay loam, 1 to 3 percent slopes	2.78	2.3%		IIe	72	60
7774	Colo-Nodaway silty clay loams, frequently flooded	1.34	1.1%		IIIw	60	55
7614	Steinauer clay loam, 6 to 11 percent slopes, eroded	0.06	0.0%		IVe	55	53
Weighted Average						57.6	*n 48

Name: Site 22

Landowner: Larry Edgar

County: Lancaster

Legal: NE1/4
S19-T7N-R8E

Acres: 127.60



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And

Landowner/Operator: Harry Edgar
25705 S. 120th Firth Ne 68358 402 480-0693
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: A/E 1/4, 19-7-8
 Total Acres: 171/60 Useable Acres: 131 Irrigated Dryland

Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

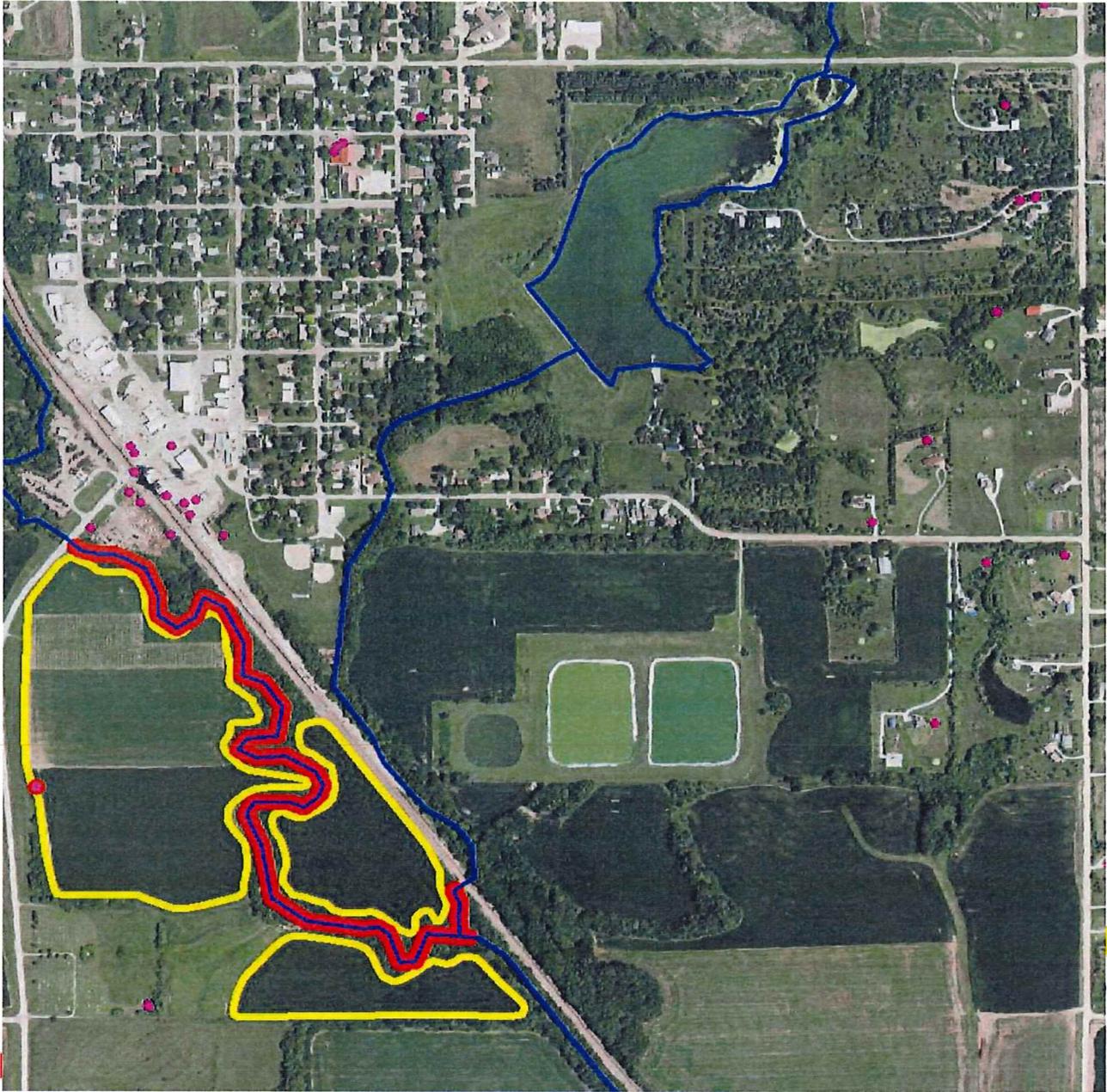
Legal Description: _____
 Total Acres: _____ Useable Acres: _____ Irrigated Dryland

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: [Signature] Date: Jan. 7, 2020
 Landowner/Operator (Authorized Representative)

[Signature] Date: 7-14-21
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 23

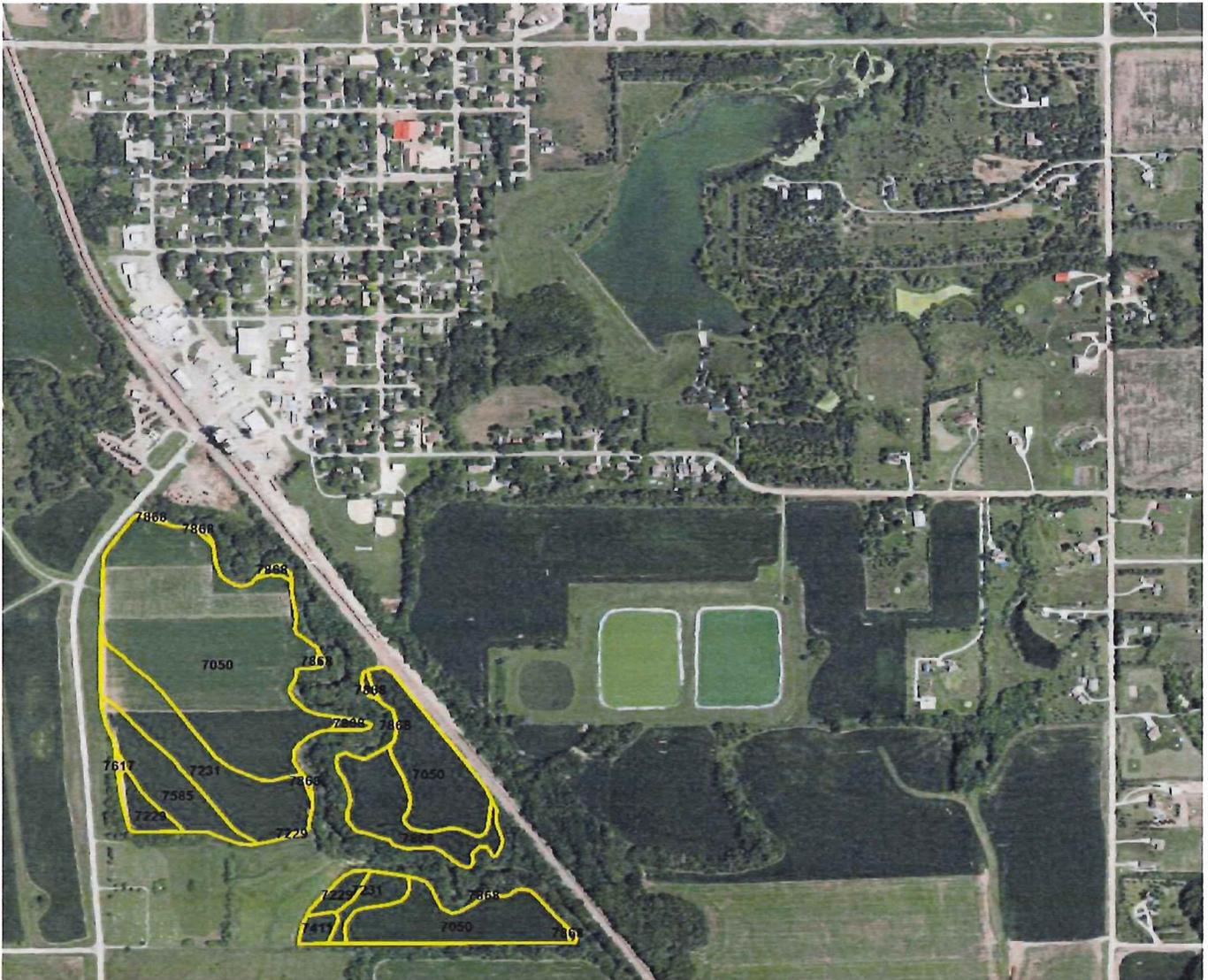
Landowner: Larry & Linda Deboer

Legal: W1/2 SW1/4
S35-T7N-R7E

Acres: 61.54



Prairieland Dairy, LLC



Area Symbol: NE067, Soil Area Version: 22

Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7050	Kennebec silt loam, occasionally flooded	37.92	63.2%		IIw	73	84
7231	Judson silt loam, 2 to 6 percent slopes	9.63	16.0%		IIe	74	68
7868	Nodaway silt loam, channeled, occasionally flooded	5.26	8.8%		VIw	74	61
7585	Shelby clay loam, 7 to 12 percent slopes	4.32	7.2%		IVe		63
7229	Burchard clay loam, 11 to 17 percent slopes	2.04	3.4%		IVe	62	50
7411	Cortland-Malmo complex, 6 to 11 percent slopes, eroded	0.64	1.1%		IVe	IVe	43
7050	Kennebec silt loam, occasionally flooded	0.13	0.2%		IIw	75	84
7617	Steinauer loam, 11 to 30 percent slopes	0.09	0.1%		VIe	33	46
Weighted Average						67.4	*n 76.3

Name: Site 23

Landowner: Larry & Linda Deboer

County: Lancaster

Legal: W1/2 SW1/4
S35-T7N-R7E

Acres: 61.54



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Prairieland Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And

Landowner/Operator: Larry and Linda DeBoer
7320 E. Gay Firth NE 68358 402-890-2446
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: S 35 T 7 N R 7 E W 1/2 SW 1/4
 Total Acres: 85 Useable Acres: 60 Irrigated Dryland

Legal Description: ~~NE 1/4 E 1/2 NW 1/4 S 34 T 7 N R 7 E~~
 Total Acres: ~~303~~ Useable Acres: ~~303~~ Irrigated Dryland

Legal Description: NE 1/4 SW 1/4 N 1/2 SE 1/4 P SE 1/4 SE 1/4 S 22 T 7 N R 7 E
 Total Acres: 140 Useable Acres: 140 Irrigated Dryland

Legal Description: S 35 T 7 R 6 SE 1/2
 Total Acres: 135 Useable Acres: 135 Irrigated Dryland

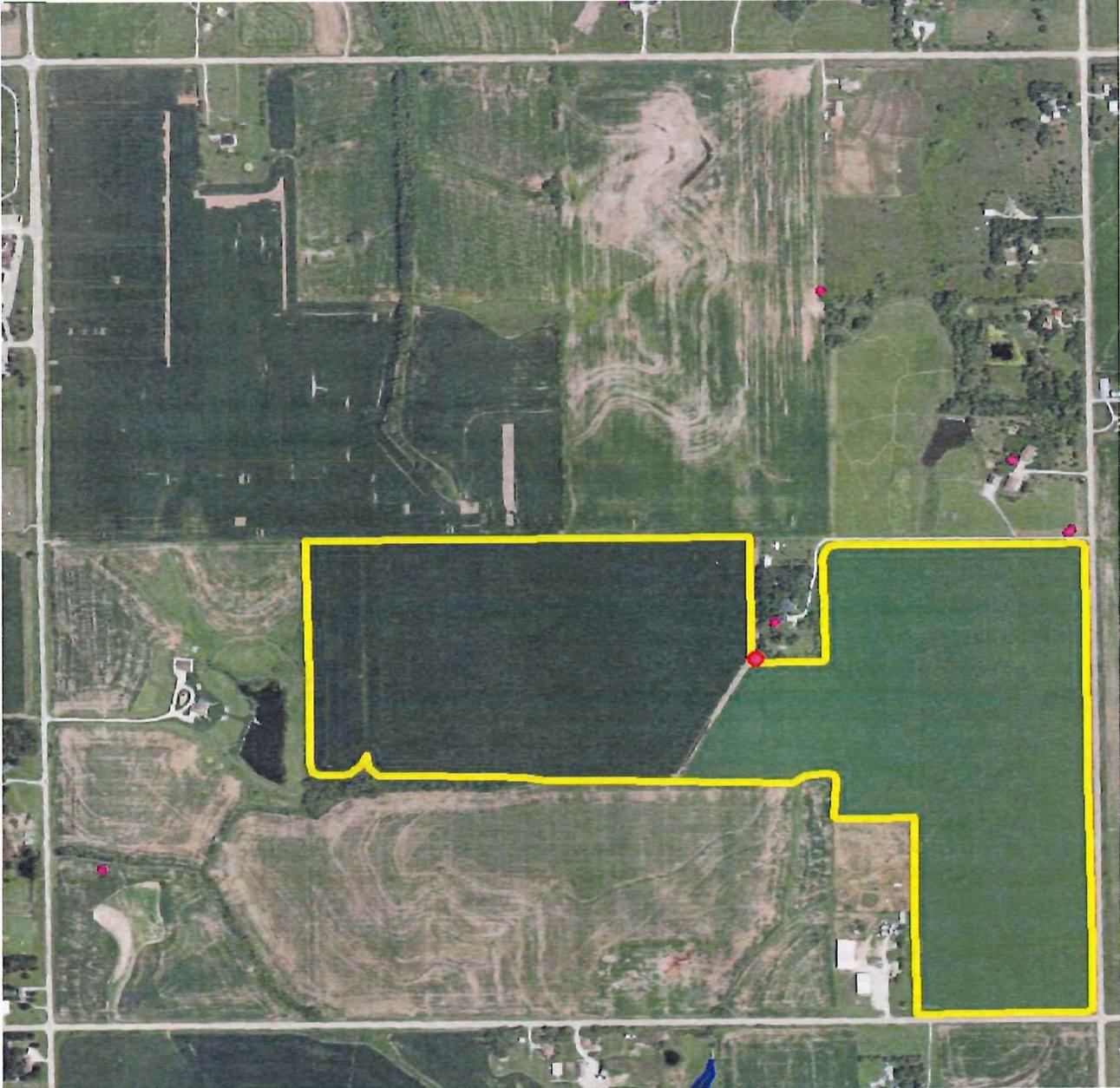
Legal Description: ~~S 35 T 7 R 6 N 1/2 NW 1/4 P NE 1/2 NW 1/2 N SE 1/4~~
 Total Acres: ~~126~~ Useable Acres: ~~126~~ Irrigated Dryland

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: Linda DeBoer Date: 12/12/19
 Landowner/Operator (Authorized Representative)

JCD Date: 7.14.20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 25

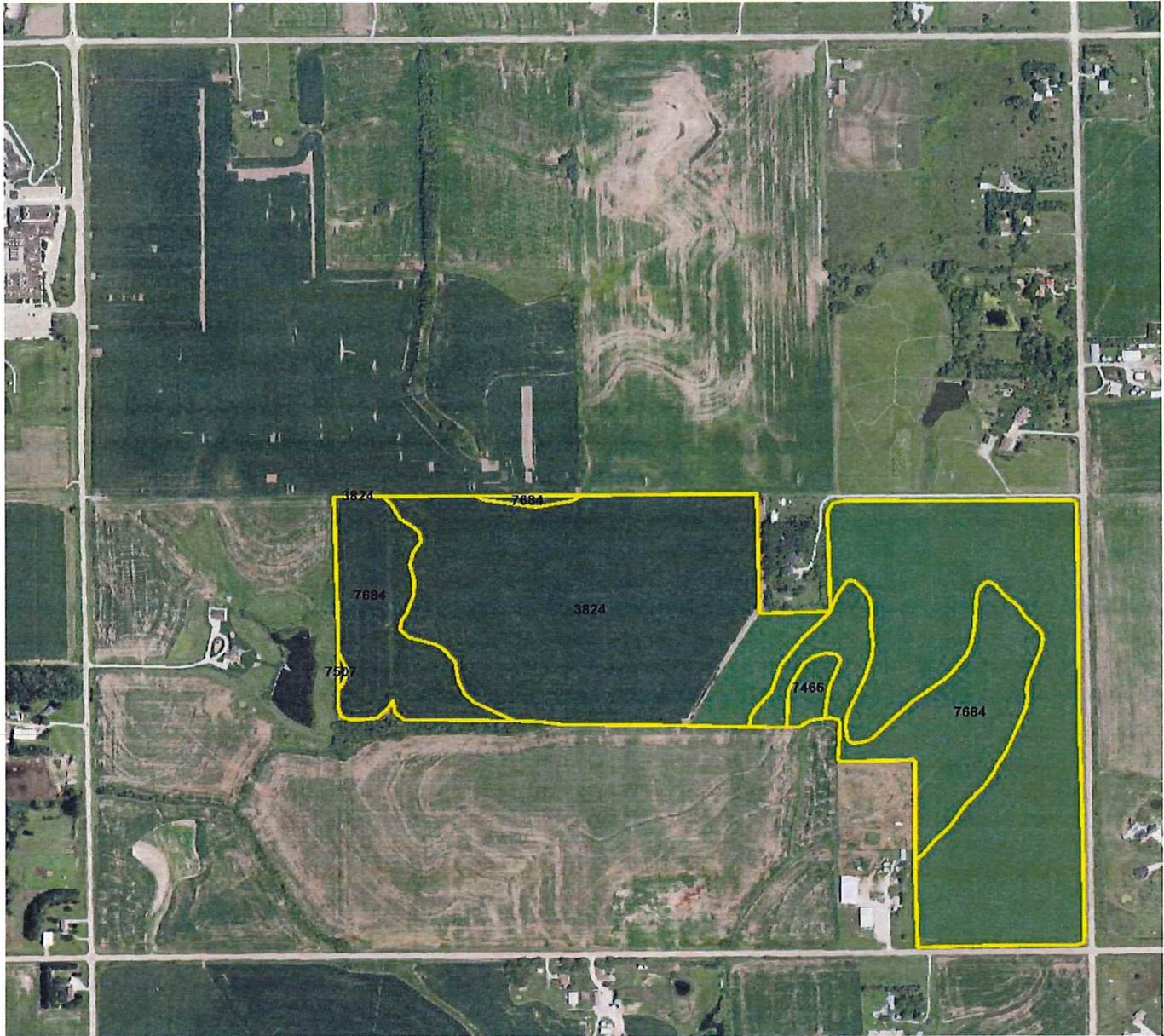
Landowner: Larry & Linda Deboer

Legal: NE1/4 SW1/4 & N1/2 SE1/4 & Pt. SE1/4 SE1/4
S22-T7N-R7E

Acres: 137.80



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
3824	Crete silt loam, 0 to 1 percent slopes	100.78	74.2%	IIIs	IIIs	73	63
7684	Wymore silty clay loam, 3 to 6 percent slopes, eroded	33.10	24.4%	IIIe	IVe	70	49
7466	Otoe silty clay, 6 to 11 percent slopes, eroded	1.78	1.3%	IVe	IVe	66	47
7507	Pawnee clay loam, 6 to 11 percent slopes, eroded	0.12	0.1%	IVe		58	35
Weighted Average						72.2	*n 59.4

Name: Site 25

Landowner: Larry & Linda Deboer

County: Lancaster

Legal: NE1/4 SW1/4 & N1/2 SE1/4 & Pt. SE1/4 SE1/4
S22-T7N-R7E

Acres: 137.80



© Nutrient Advisers (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Prairieland Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And

Landowner/Operator: Larry and Linda DeBoer

7320 E. Gay Firth NE 68358 402-890-2446
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: S 35 T 7 N R 7 E W 1/2 SW 1/4

Total Acres: 85 Useable Acres: 60 Irrigated Dryland

Legal Description: ~~NE 1/4 E 1/2 NW 1/4 S 34 T 7 N R 7 E~~

Total Acres: ~~303~~ Useable Acres: ~~303~~ Irrigated Dryland

Legal Description: NE 1/4 SW 1/4 N 1/2 SE 1/4 P SE 1/4 SE 1/4 S 22 T 7 N R 7 E

Total Acres: 140 Useable Acres: 140 Irrigated Dryland

Legal Description: S 35 T 7 R 6 SE 1/2

Total Acres: 135 Useable Acres: 135 Irrigated Dryland

Legal Description: ~~S 35 T 7 R 6 N 1/2 NW 1/4 P NE 1/4 NW 1/2 N SE 1/4~~

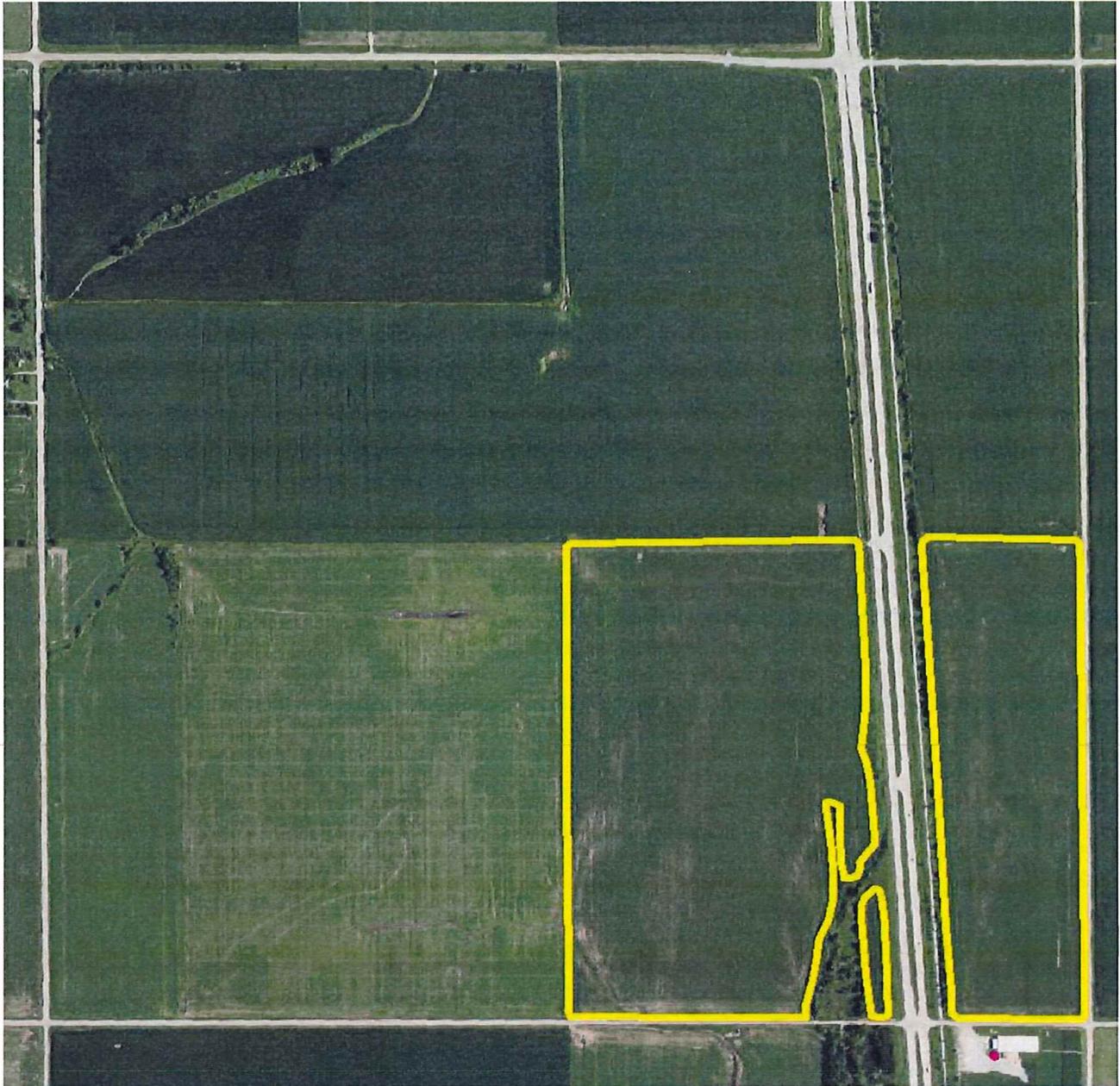
Total Acres: ~~126~~ Useable Acres: ~~126~~ Irrigated Dryland

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: Linda DeBoer Date: 12/12/19
 Landowner/Operator (Authorized Representative)

JCH Date: 7.14.20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 26

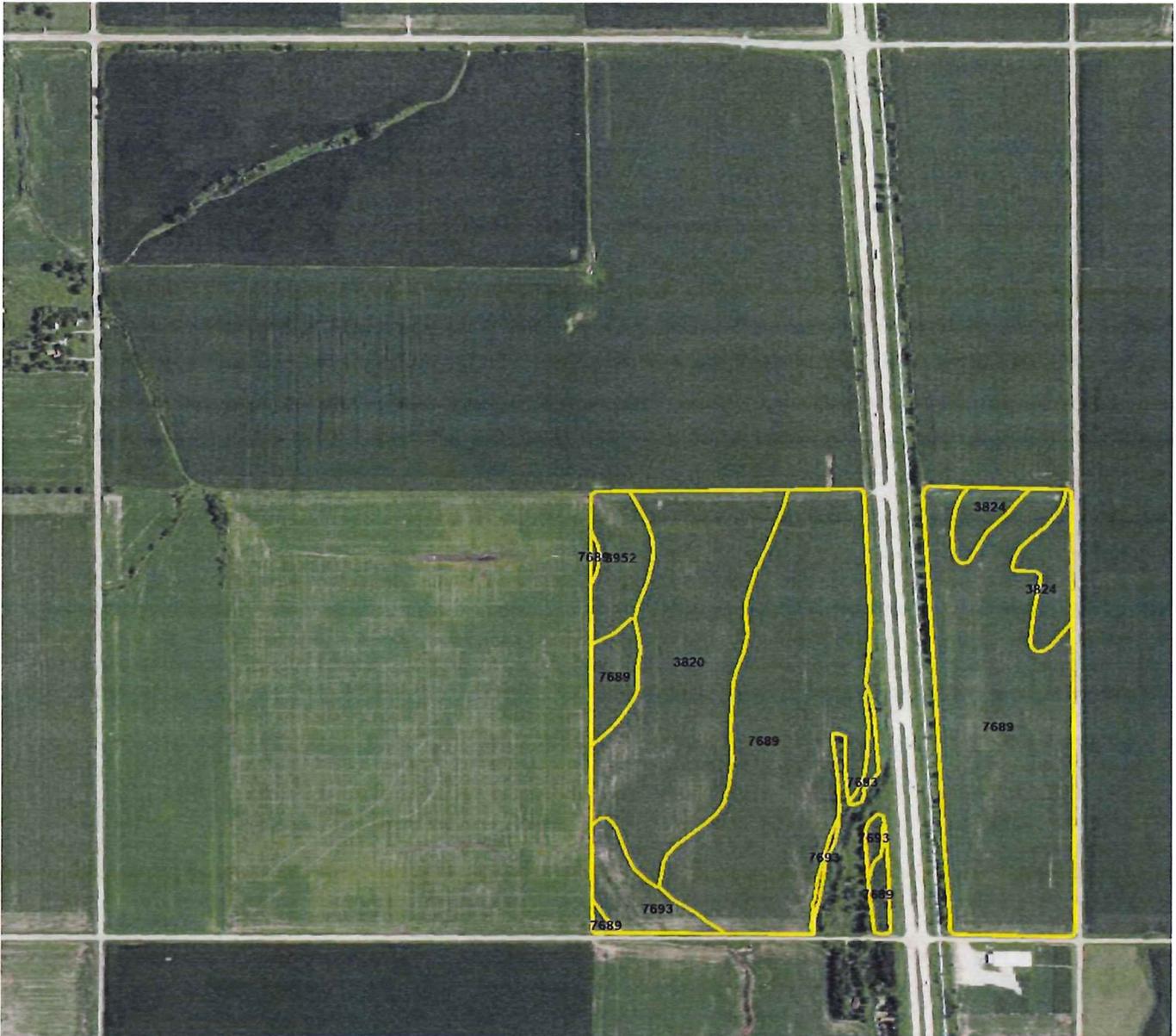
Landowner: Larry & Linda Deboer

Legal: SE1/4
S35-T7N-R6E

Acres: 130.30



Prairieland Dairy, LLC



Area Symbol: NE109_Soil Area Version: 24

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7689	Wymore silty clay loam, 0 to 2 percent slopes	79.53	62.9%	Ils	Ils	72	61
3820	Butler silt loam, 0 to 1 percent slopes	30.35	24.0%	IIw	IIw	71	62
7693	Wymore silty clay loam, 2 to 6 percent slopes	5.93	4.7%	IIIe	IIIe	69	60
3824	Crete silt loam, 0 to 1 percent slopes	5.47	4.3%	Ils	Ils	73	63
3952	Fillmore silt loam, frequently ponded	5.15	4.1%	IVw	IVw	47	43
Weighted Average						70.6	*n 60.5

Name: Site 26

Landowner: Larry & Linda Deboer

County: Lancaster

Legal: SE1/4
S35-T7N-R6E

Acres: 130.30



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And
 Landowner/Operator: Larry and Linda DeBoer
7320 E. Gage Firth NE 68358 402-890-2446
 (Address) (City) (State) (Zip) (Phone)

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

Legal Description: S 35 T 7 N R 7 E W 1/2 SW 1/4
 Total Acres: 85 Useable Acres: 60 Irrigated Dryland

Legal Description: ~~NE 1/4 E 1/2 NW 1/4 S 34 T 7 N R 7 E~~
 Total Acres: ~~303~~ Useable Acres: ~~303~~ Irrigated Dryland

Legal Description: NE 1/4 SW 1/4 N 1/2 SE 1/4 P SE 1/4 SE 1/4 S 22 T 7 N R 7 E
 Total Acres: 140 Useable Acres: 140 Irrigated Dryland

Legal Description: S 35 T 7 R 6 SE 1/2
 Total Acres: 135 Useable Acres: 135 Irrigated Dryland

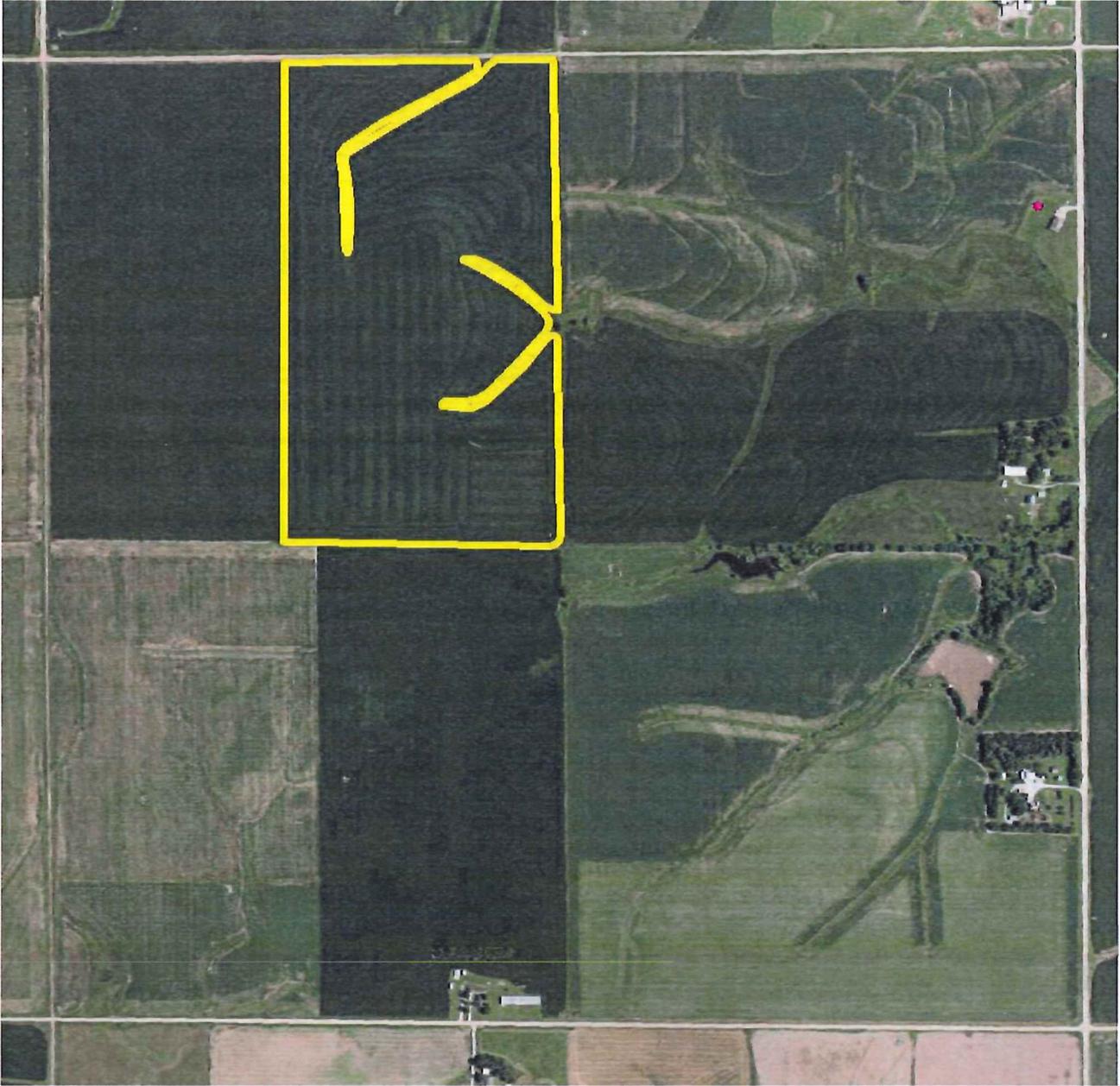
Legal Description: ~~S 35 T 7 R 6 N 1/2 NW 1/4 P NE 1/4 NW 1/4 N SE 1/4~~
 Total Acres: ~~126~~ Useable Acres: ~~126~~ Irrigated Dryland

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: Linda DeBoer Date: 12/12/19
 Landowner/Operator (Authorized Representative)

Boer Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 28

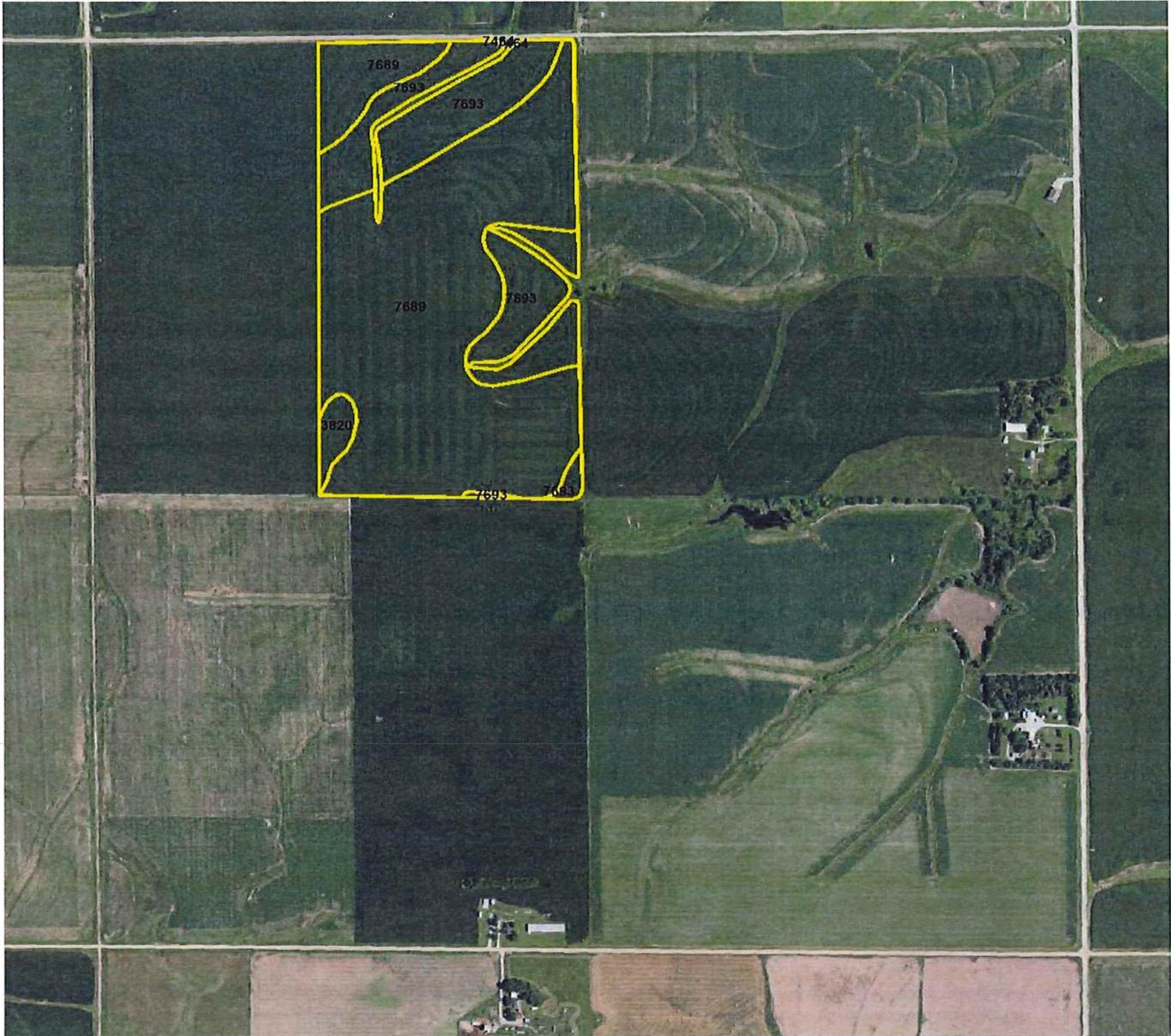
Landowner: Vinson & Harriet VanEngen

Legal: E1/2 NW1/4
S5-T5N-R7E

Acres: 81.93



Prairieland Dairy, LLC



Area Symbol: NE067, Soil Area Version: 22

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7689	Wymore silty clay loam, 0 to 2 percent slopes	56.96	70.1%		lls	72	61
7693	Wymore silty clay loam, 2 to 6 percent slopes	23.11	28.4%		llle	69	60
3820	Butler silt loam, 0 to 1 percent slopes	1.20	1.5%		llw	67	67
Weighted Average						71.1	*n 60.8

Name: Site 28

Landowner: Vinson & Harriet VanEngen

County: Gage

Legal: E1/2 NW1/4
S5-T5N-R7E

Acres: 81.93



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Prairieland Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And
 Landowner/Operator: Vinson Van Engen
11814 E. State Hwy 41 Adams NE 68301 402-988-5415
 (Address) (City) (State) (Zip) (Phone)

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

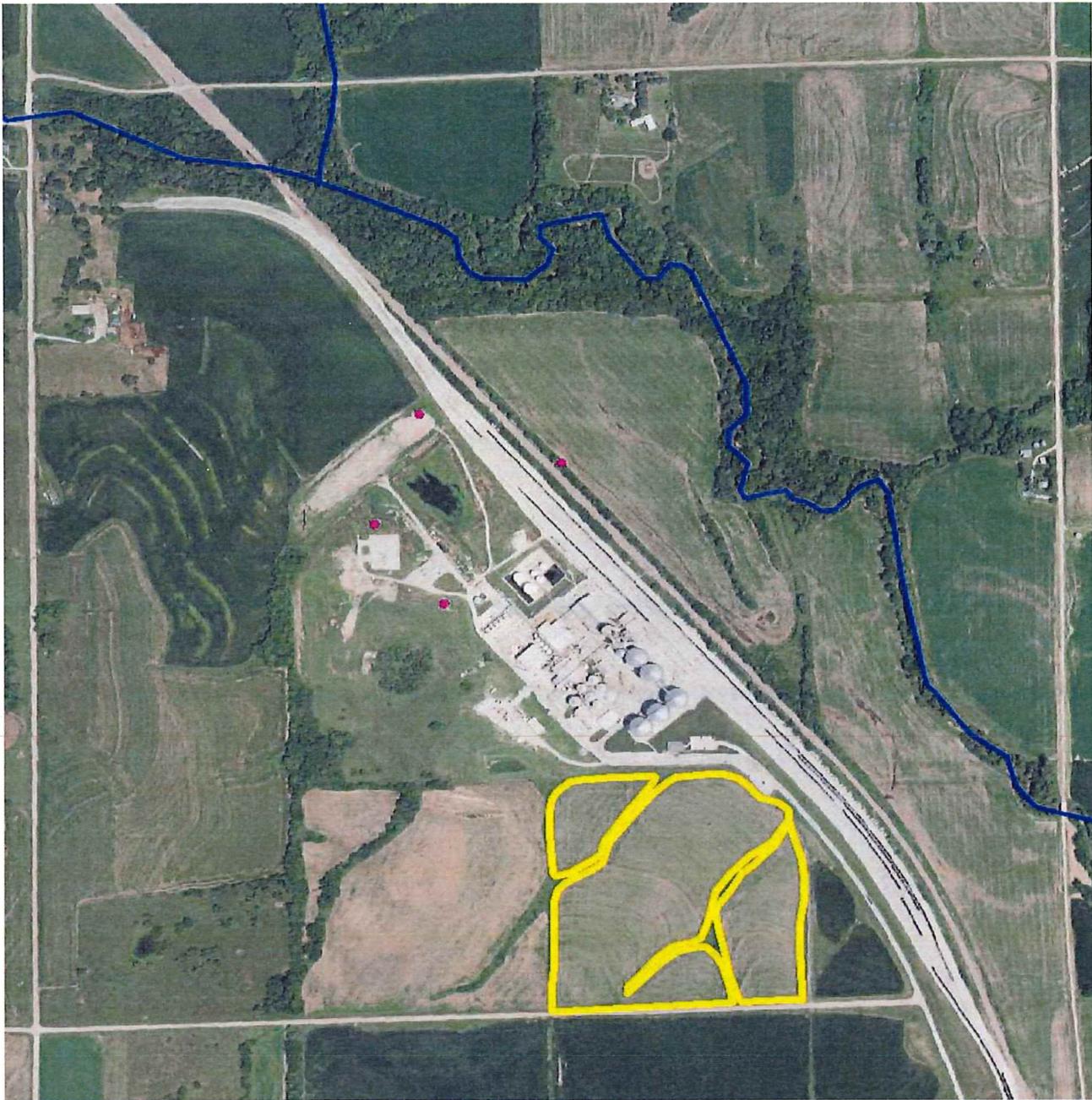
- Legal Description: E 1/2 of NW 1/4 of sec 5-5-7
- Total Acres: _____ Useable Acres: 77 Irrigated Dryland
- Legal Description: _____
- Total Acres: _____ Useable Acres: _____ Irrigated Dryland
- Legal Description: _____
- Total Acres: _____ Useable Acres: _____ Irrigated Dryland
- Legal Description: _____
- Total Acres: _____ Useable Acres: _____ Irrigated Dryland
- Legal Description: _____
- 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: Vinson Van Engen Date: 1-2-20
 Landowner/Operator (Authorized Representative)

[Signature] Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

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

Name: Site 29
Landowner: Vinson & Harriet VanEngen
Legal: SW1/4 SE1/4
S17-T6N-R8E
Acres: 33.59



Prairieland Dairy, LLC



Area Symbol: NE087, Soil Area Version: 22

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7411	Cortland-Malmo complex, 6 to 11 percent slopes, eroded	11.31	31.6%	IVe	IVe	54	43
7231	Judson silt loam, 2 to 6 percent slopes	10.16	28.4%	IIe		80	68
7464	Otoe silty clay loam, 6 to 11 percent slopes, eroded	6.81	19.0%	IVe		66	44
7693	Wymore silty clay loam, 2 to 6 percent slopes	4.28	12.0%	IIIe	IIIe	69	60
7750	Nodaway silt loam, occasionally flooded	3.19	8.9%	IIw	IIw	74	88
Weighted Average						67.3	*n 56.3

Name: Site 29

Landowner: Vinson & Harriet VanEngen

County: Gage

Legal: SW1/4 SE1/4
S17-T6N-R8E

Acres: 33.59



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And

Landowner/Operator: Vinson Van Engen
11814 E. State Hwy 41 Adams NE 68301 402-988-5415
 (Address) (City) (State) (Zip) (Phone)

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

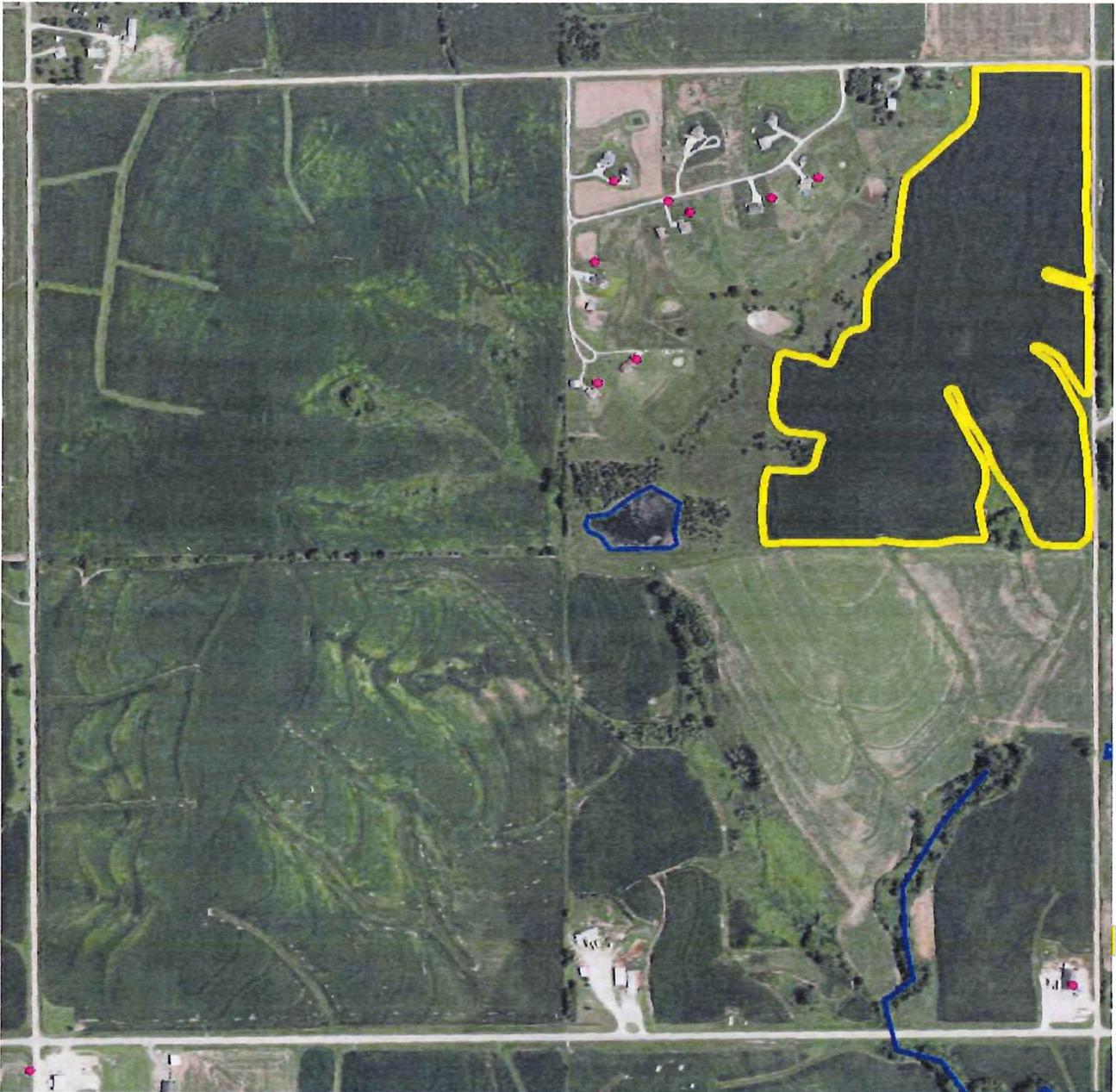
- Legal Description: N $\frac{1}{2}$ & S $\frac{1}{2}$ of Sec 19-6-8
 Total Acres: _____ Useable Acres: 380 Irrigated Dryland
- Legal Description: SW $\frac{1}{4}$ of SE $\frac{1}{2}$ of sec 17-6-8
 Total Acres: _____ Useable Acres: 34 Irrigated Dryland
- Legal Description: E $\frac{1}{2}$ of NE $\frac{1}{4}$ of sec 24-6-7
 Total Acres: _____ Useable Acres: 68 Irrigated Dryland
- Legal Description: N $\frac{1}{2}$ of SW $\frac{1}{4}$ of sec 35-6-8
 Total Acres: _____ Useable Acres: 75 Irrigated Dryland
- Legal Description: NE $\frac{1}{4}$ of NW $\frac{1}{4}$ sec 25-6-7
 Total Acres: _____ Useable Acres: 37 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: Vinson Van Engen Date: 1-2-20
 Landowner/Operator (Authorized Representative)

Del Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

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

Name: Site 30

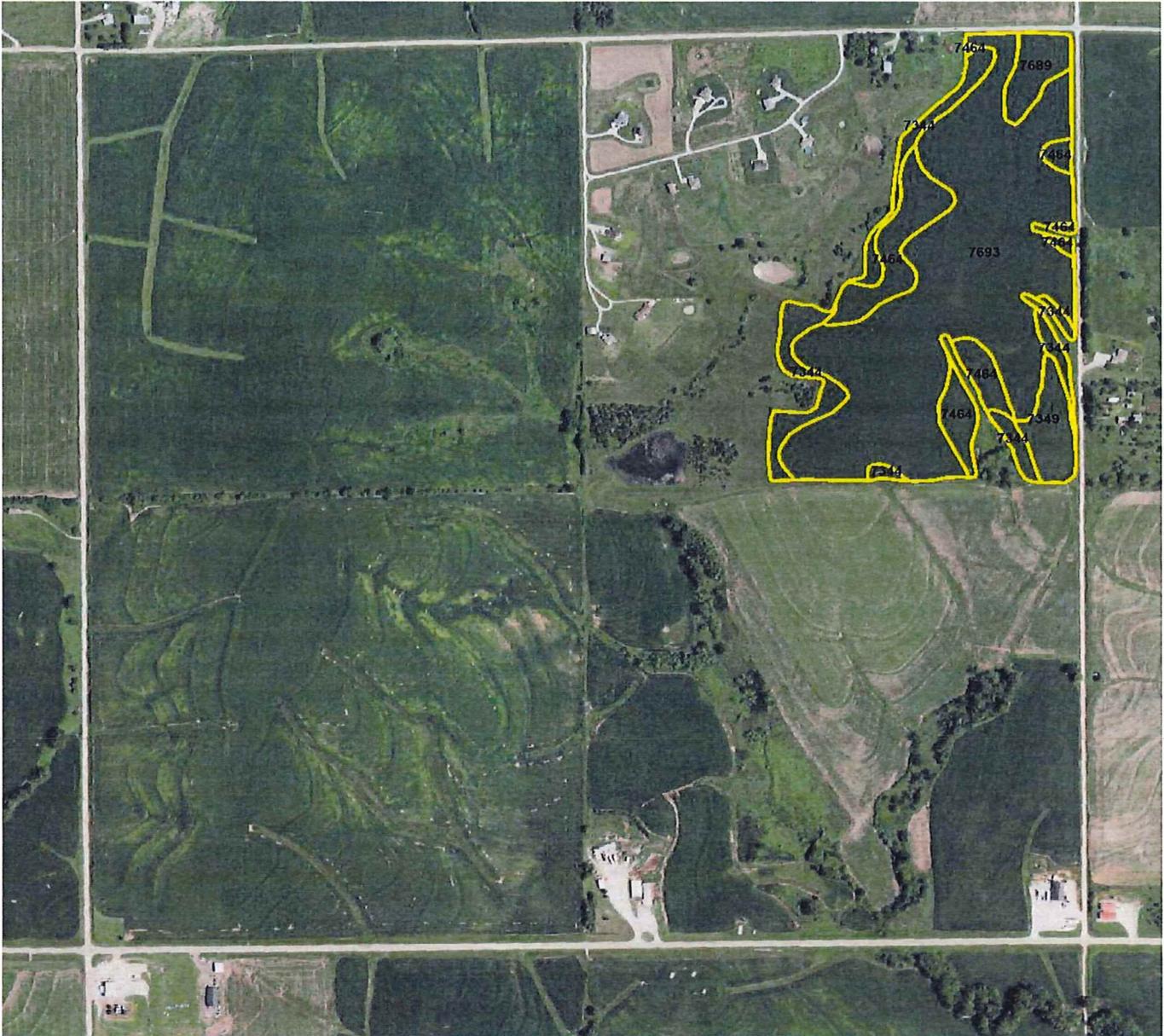
Landowner: Vinson VanEngen

Legal: Pt. E1/2 NE1/4
S24-T6N-R7E

Acres: 65.94



Prairieland Dairy, LLC



Area Symbol: NF067, Soil Area Version: 22

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	43.23	65.7%	IIIe	IIIe	69	60
7464	Otoe silty clay loam, 6 to 11 percent slopes, eroded	9.03	13.7%	IVe		66	44
7344	Malmo, eroded-Pawnee complex, 6 to 11 percent slopes	7.94	12.1%	IVe		52	38
7349	Malmo clay loam, 2 to 6 percent slopes, eroded	3.07	4.7%	IIIe	IVe	58	39
7689	Wymore silty clay loam, 0 to 2 percent slopes	2.52	3.8%	IIs	IIs	72	61
Weighted Average						66.1	*n 54.2

Name: Site 30

Landowner: Vinson VanEngen

County: Gage

Legal: Pt. E1/2 NE1/4
S24-T6N-R7E

Acres: 65.94



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Vinson Van Engen
11814 E. State Hwy 41 Adams NE 68301 402-988-5415
(Address) (City) (State) (Zip) (Phone)

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

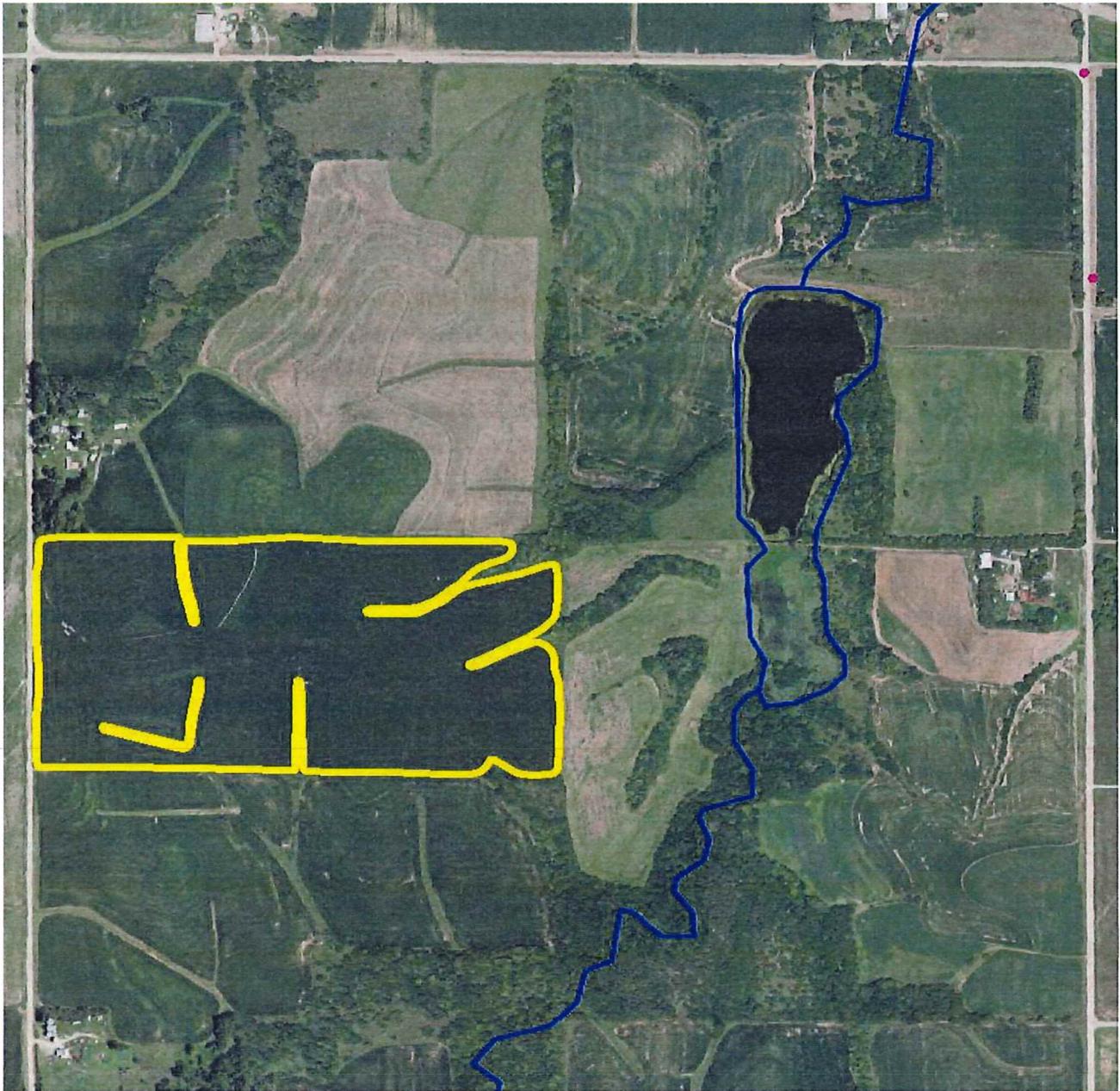
- | | | | | |
|---|--|---------------------------|------------------------------------|---|
| Legal Description: <u>N$\frac{1}{2}$ & S$\frac{1}{2}$ of Sec 19-6-8</u> | | Useable Acres: <u>380</u> | Irrigated <input type="checkbox"/> | Dryland <input checked="" type="checkbox"/> |
| Total Acres: _____ | | | | |
| Legal Description: <u>SW$\frac{1}{4}$ of SE$\frac{1}{2}$ of sec 17-6-8</u> | | Useable Acres: <u>34</u> | Irrigated <input type="checkbox"/> | Dryland <input checked="" type="checkbox"/> |
| Total Acres: _____ | | | | |
| Legal Description: <u>E$\frac{1}{2}$ of NE$\frac{1}{4}$ of sec 24-6-7</u> | | Useable Acres: <u>68</u> | Irrigated <input type="checkbox"/> | Dryland <input checked="" type="checkbox"/> |
| Total Acres: _____ | | | | |
| Legal Description: <u>N$\frac{1}{2}$ of SW$\frac{1}{4}$ of sec 35-6-8</u> | | Useable Acres: <u>75</u> | Irrigated <input type="checkbox"/> | Dryland <input checked="" type="checkbox"/> |
| Total Acres: _____ | | | | |
| Legal Description: <u>NE$\frac{1}{4}$ & NW$\frac{1}{4}$ sec 25-6-7</u> | | Useable Acres: <u>37</u> | Irrigated <input type="checkbox"/> | Dryland <input checked="" type="checkbox"/> |
| Total Acres: _____ | | | | |

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: Vinson Van Engen Date: 1-2-20
 Landowner/Operator (Authorized Representative)

[Signature] Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

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

Name: Site 31

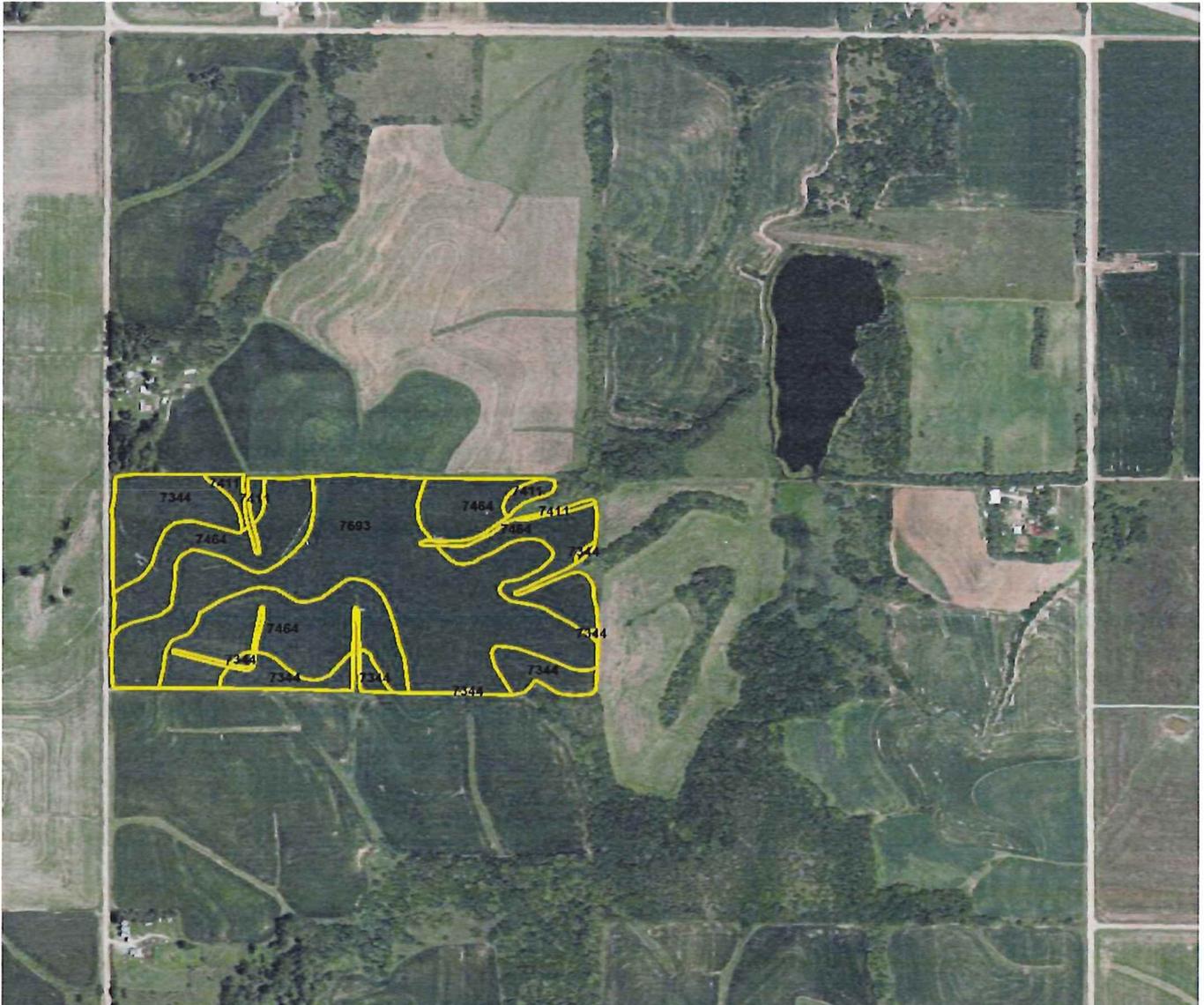
Landowner: Vinson & Harriet VanEngen

Legal: N1/2 SW1/4
S35-T6N-R8E

Acres: 72.24



Prairieland Dairy, LLC



Area Symbol: NE067, Soil Area Version: 22

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7693	Wymore silty clay loam, 2 to 6 percent slopes	30.21	41.6%	IIIe	IIIe	69	60
7464	Otoe silty clay loam, 6 to 11 percent slopes, eroded	29.07	40.0%	IVe		66	44
7344	Malmo, eroded-Pawnee complex, 6 to 11 percent slopes	11.30	15.6%	IVe		52	38
7411	Cortland-Malmo complex, 6 to 11 percent slopes, eroded	2.04	2.8%	IVe	IVe	54	43
Weighted Average						64.7	*n 49.7

Name: Site 31

Landowner: Vinson & Harriet VanEngen

County: Gage

Legal: N1/2 SW1/4
S35-T6N-R8E

Acres: 72.24



Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And

Landowner/Operator: Vinson Van Engen
11814 E. State Hwy 41 Adams NE 68301 402-988-5415
 (Address) (City) (State) (Zip) (Phone)

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

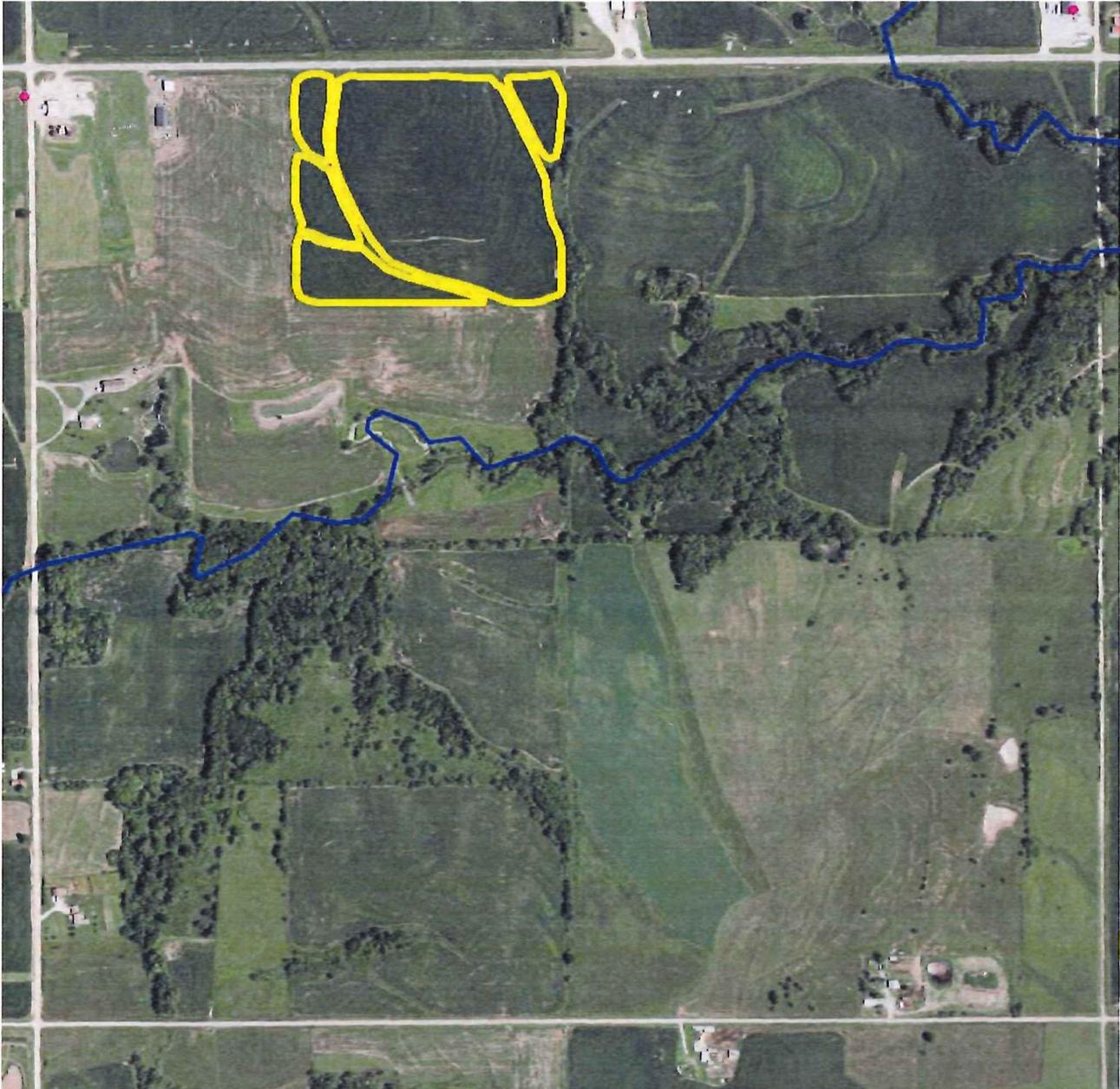
- Legal Description: N $\frac{1}{2}$ & S $\frac{1}{2}$ of Sec 19-6-8
 Total Acres: _____ Useable Acres: 380 Irrigated Dryland
- Legal Description: SW $\frac{1}{4}$ of SE $\frac{1}{2}$ of sec 17-6-8
 Total Acres: _____ Useable Acres: 34 Irrigated Dryland
- Legal Description: E $\frac{1}{2}$ of NE $\frac{1}{4}$ of sec 24-6-7
 Total Acres: _____ Useable Acres: 68 Irrigated Dryland
- Legal Description: N $\frac{1}{2}$ of SW $\frac{1}{4}$ of sec 35-6-8
 Total Acres: _____ Useable Acres: 75 Irrigated Dryland
- Legal Description: NE $\frac{1}{4}$ & NW $\frac{1}{4}$ sec 25-6-7
 Total Acres: _____ Useable Acres: 37 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: Vinson Van Engen Date: 1-2-20
 Landowner/Operator (Authorized Representative)

Del Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



Layer Key

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

Name: Site 32

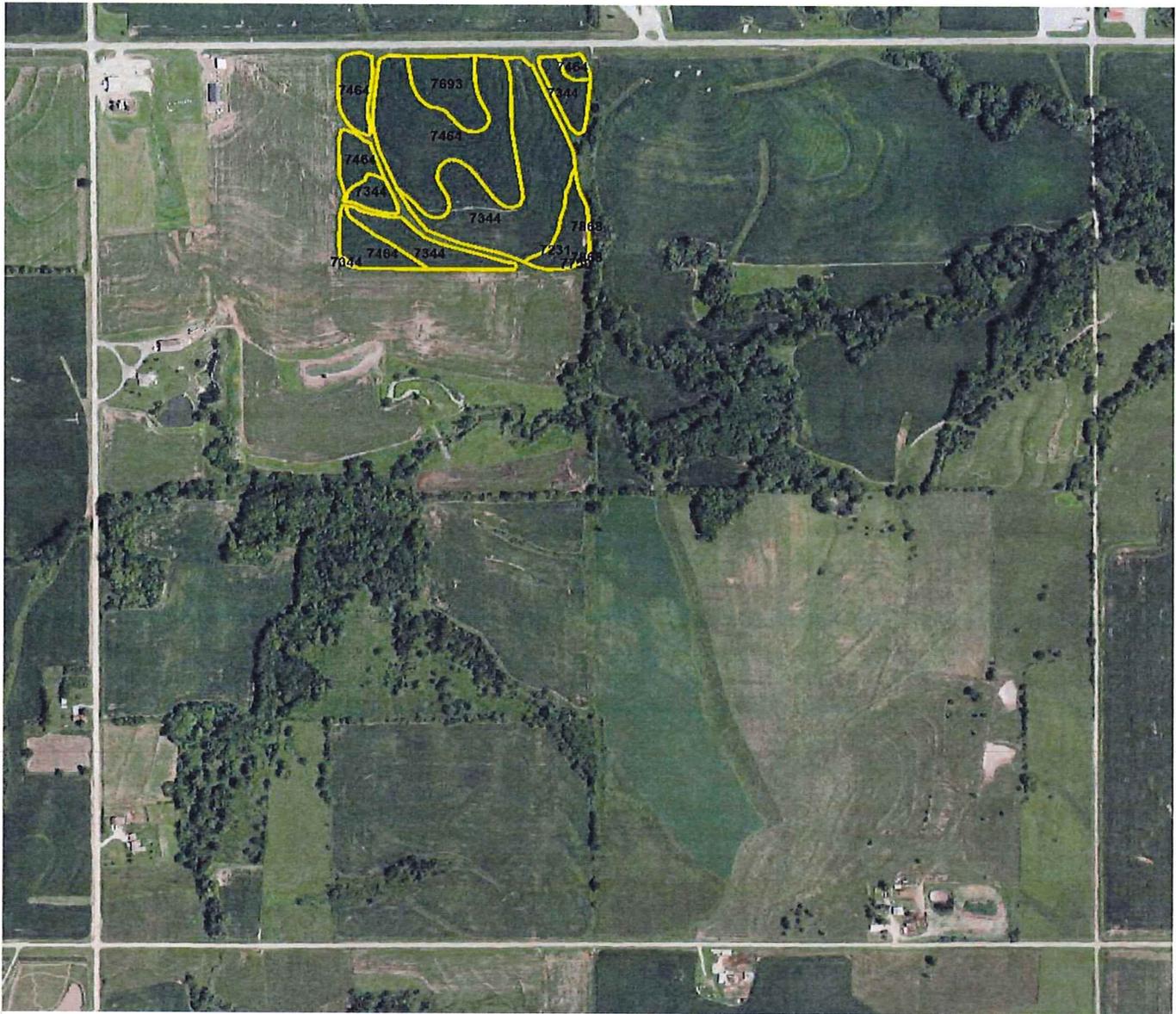
Landowner: Vinson & Harriet VanEngen

Legal: NE1/4 NW1/4
S25-T6N-R7E

Acres: 34.45



Prairieland Dairy, LLC



Area Symbol: NE067, Soil Area Version: 22

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7344	Malmo, eroded-Pawnee complex, 6 to 11 percent slopes	16.44	44.6%	IVe		52	38
7464	Otoe silty clay loam, 6 to 11 percent slopes, eroded	15.42	41.8%	IVe		66	44
7693	Wymore silty clay loam, 2 to 6 percent slopes	2.90	7.9%	IIIe	IIIe	69	60
7231	Judson silt loam, 2 to 6 percent slopes	2.13	5.8%	IIe		80	68
Weighted Average						60.8	*n 44

Name: Site 32

Landowner: Vinson & Harriet VanEngen

County: Gage

Legal: NE1/4 NW1/4
S25-T6N-R7E

Acres: 34.45



© Nutrient Advisors (402) 372-2236

Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: PrairieLand Dairy, LLC

13000 Pella Rd Firth NE 68358 402-791-2238
 (Address) (City) (State) (Zip) (Phone)

And

Landowner/Operator: Vinson Van Engen
11814 E. State Hwy 41 Adams NE 68301 402-988-5415
 (Address) (City) (State) (Zip) (Phone)

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

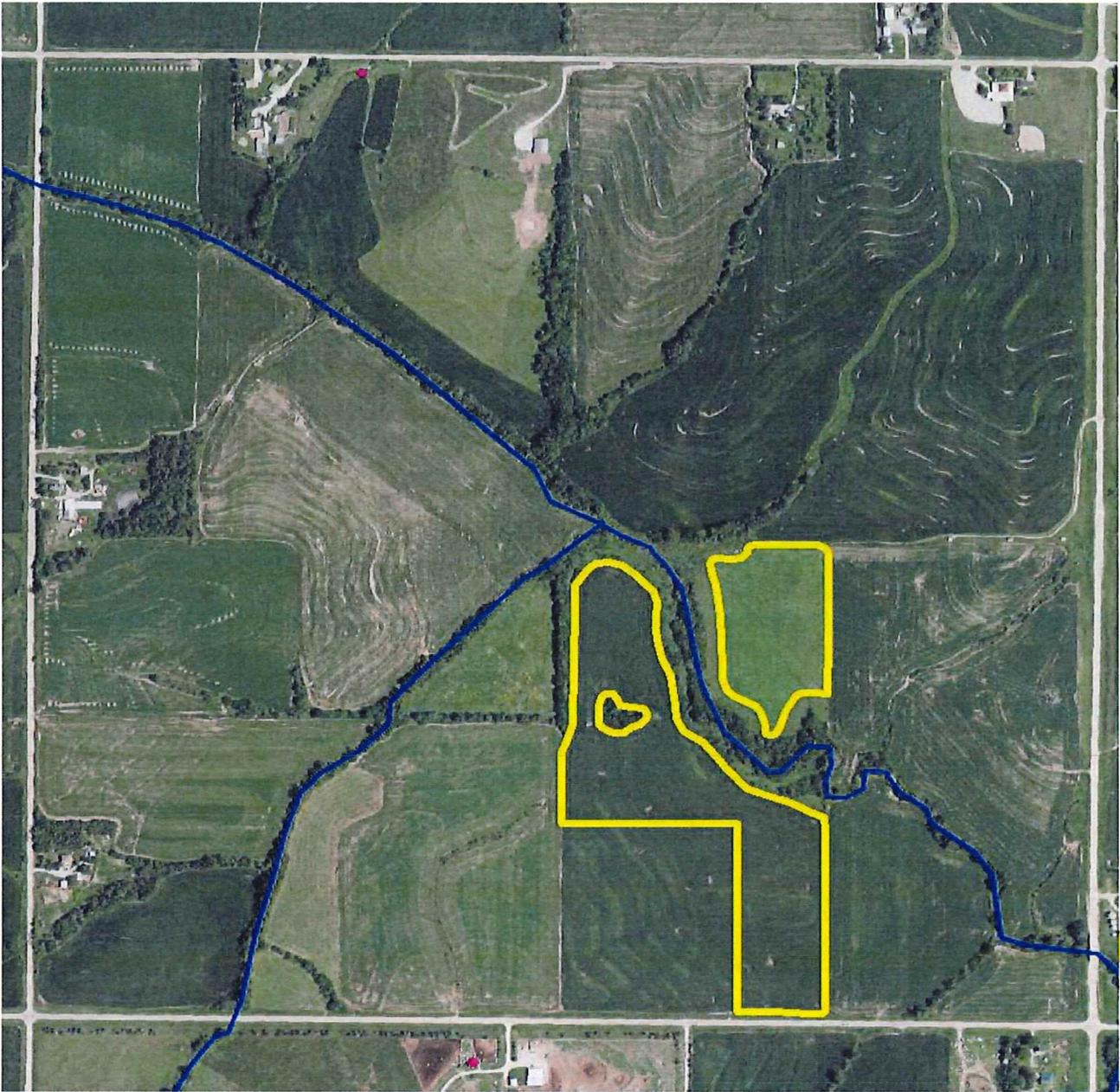
- Legal Description: N $\frac{1}{2}$ & S $\frac{1}{2}$ of Sec 19-6-8
 Total Acres: _____ Useable Acres: 380 Irrigated Dryland
- Legal Description: SW $\frac{1}{4}$ of SE $\frac{1}{2}$ of sec 17-6-8
 Total Acres: _____ Useable Acres: 34 Irrigated Dryland
- Legal Description: E $\frac{1}{2}$ of NE $\frac{1}{4}$ of sec 24-6-7
 Total Acres: _____ Useable Acres: 68 Irrigated Dryland
- Legal Description: N $\frac{1}{2}$ of SW $\frac{1}{4}$ of sec 35-6-8
 Total Acres: _____ Useable Acres: 75 Irrigated Dryland
- Legal Description: NE $\frac{1}{4}$ & NW $\frac{1}{4}$ sec 25-6-7
 Total Acres: _____ Useable Acres: 37 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.
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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: Vinson Van Engen Date: 1-2-20
 Landowner/Operator (Authorized Representative)

Del Date: 7-14-20
 Livestock Operator (Authorized Representative)

Prairieland Dairy, LLC



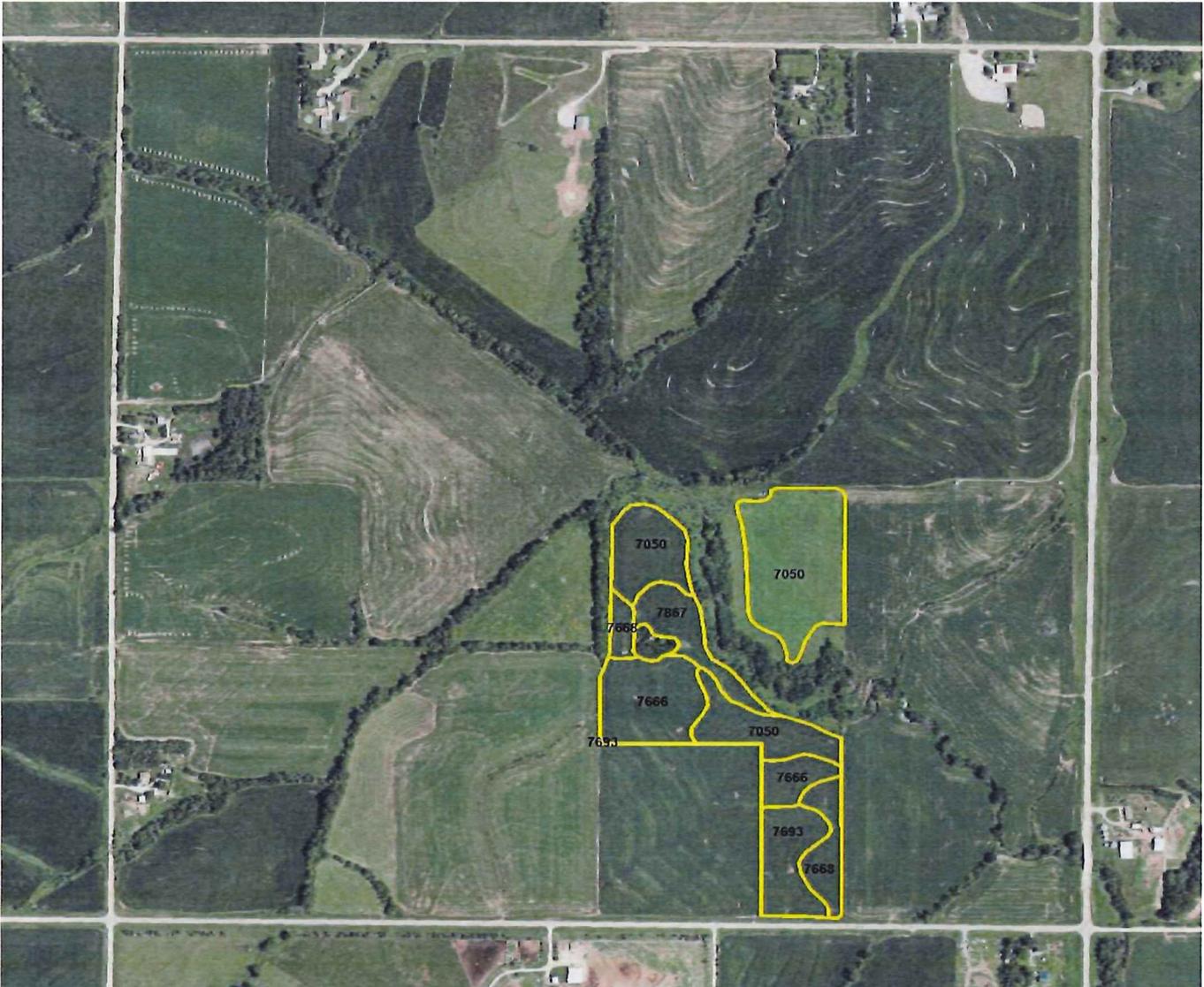
Layer Key

	Boundary
	Registered Wells
	Setbacks
	Streams/Water
	Tile Inlets

Name: Site 33
Landowner: Ivan Walvoord Unified Credit Trust
Legal: Pt. W1/2 SE1/4 S27-T7N-R8E
Acres: 39.91



Prairieland Dairy, LLC



Area Symbol: NE109, Soil Area Version: 25

Code	Soil Description	Acres	Percent of field	Non-Irr Class *c	Irr Class *c	SRPG	*n NCCPI Soybeans
7050	Kennebec silt loam, occasionally flooded	19.45	47.3%		IIw	73	82
7666	Mayberry silty clay loam, 3 to 6 percent slopes, eroded	9.02	22.0%		IIIe	IVe	60
7693	Wymore silty clay loam, 2 to 6 percent slopes	5.08	12.4%		IIIe	IIIe	69
7668	Mayberry silty clay loam, 6 to 11 percent slopes, eroded	3.88	9.4%		IVe		56
7867	Nodaway silt loam, channeled, frequently flooded	3.66	8.9%		VIw		59
Weighted Average						66.8	*n 65.8

Name: Site 33
Landowner: Ivan Walvoord Unified Credit Trust

Legal: Pt. W1/2 SE1/4 S27-T7N-R8E
Acres: 39.91

County: Lancaster



Land Application Area Agreement for Livestock Manure

This agreement made between the:

Livestock Operation: Prairieland Dairy, LLC

13000 Pella Road	Firth	NE	68358	402-791-2238
(Address)	(City)	(State)	(Zip)	(Phone)

And

Landowner/Operator: Ivan Walvoord Unified Credit Trust c/o Union Bank-Gessert

PO Box 82535	Lincoln	NE	68501	
(Address)	(City)	(State)	(Zip)	(Phone)

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

Legal Description: E1/2 SE1/4 & Pt. W1/2 SE1/4, S24-T7N-R7E

Total Acres: 136.34 Useable Acres: 130.7 Irrigated Dryland

Legal Description: Pt. W1/2, S29-T7N-R8E

Total Acres: 272.10 Useable Acres: 261.4 Irrigated Dryland

Legal Description: Pt. E1/2 NW1/4, S22-T7N-R8E

Total Acres: 67.05 Useable Acres: 62.84 Irrigated Dryland

Legal Description: W 1/2 SE 1/4 S27-7-8

Total Acres: _____ Useable Acres: 60A Irrigated Dryland

Legal Description: _____

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.
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By: Jim Cartee Date: 10-8-19
Landowner

Janis Walvoord Date: 7-14-20
Livestock Operator (Authorized Representative)

Jal

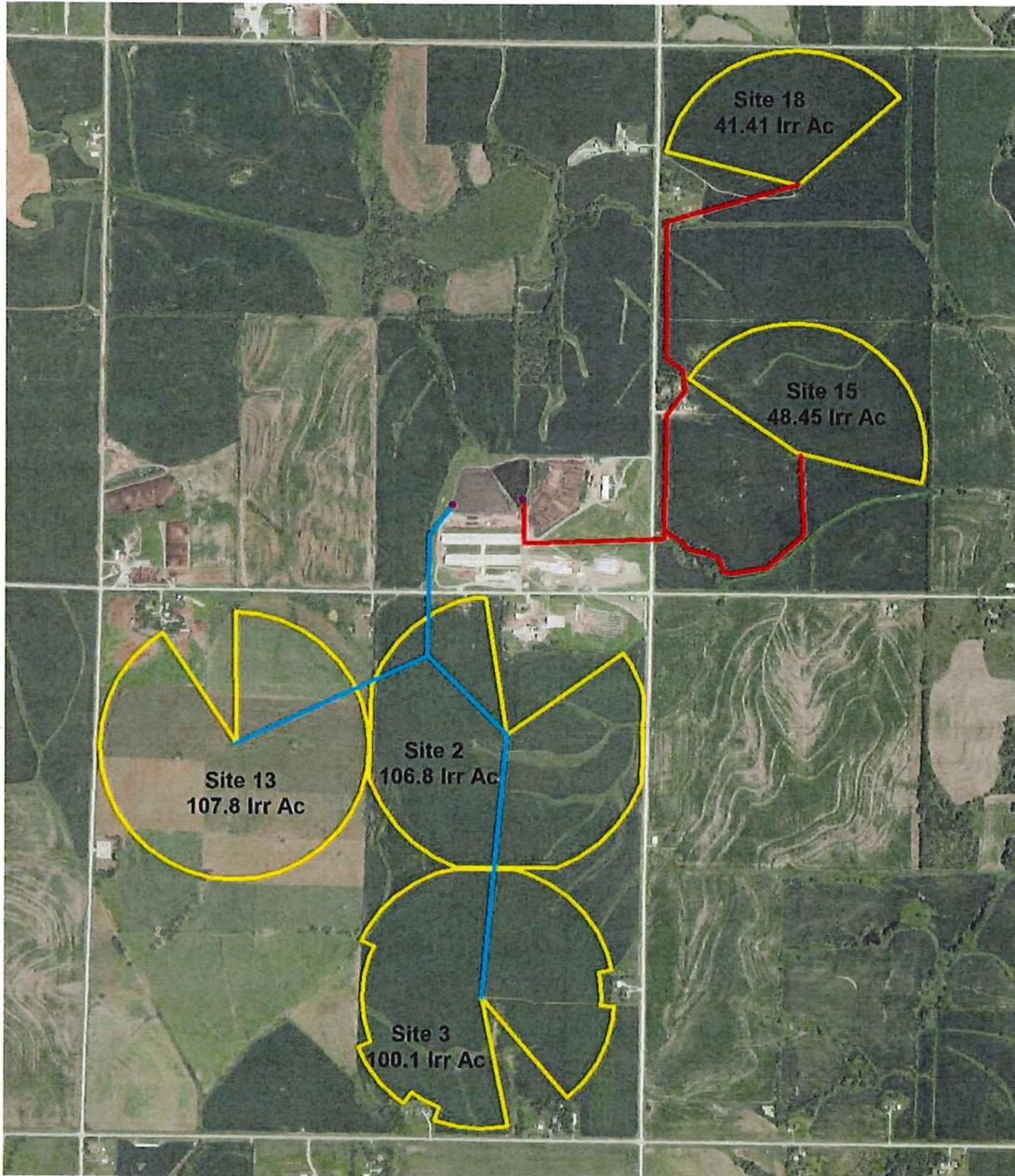
Section 8

Effluent Distribution Plan

Effluent Distribution Plan Map 8-1

Effluent Distribution Plan Summary 8-2

Effluent Distribution Plan



Layer Key

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

Prairieland Dairy, LLC

County: Lancaster

Township: Panama

Legal: S21&29-T7N-R8E



Prairieland Dairy, LLC Effluent Distribution Plan

Effluent water from the holding pond at Prairieland Dairy, LLC is dewatered to application sites 2, 3, 13, 15, & 18. This system uses an 850 gpm pump and power unit and connects from the holding pond to the center pivot point on sites 2, 3, and 13 via underground pipe and via surface hose on sites 15 & 18. This is a total disconnect system; all sites may receive fresh irrigation water.

Section 9

Reference Documents

CSU Irrigation Water Quality Criteria Fact Sheet 0.506.....	9-1
NebGuide G84-690, Estimating Soil Moisture by Appearance & Feel....	9-5
Nutrient Budget Example.....	9-14

Irrigation Water Quality Criteria

Fact Sheet No. 0.506

Crop Series | Irrigation



by T.A. Bauder, R.M. Waskom, P.L. Sutherland and J. G. Davis*

Salt-affected soils develop from a wide range of factors including: soil type, field slope and drainage, irrigation system type and management, fertilizer and manuring practices, and other soil and water management practices. In Colorado, perhaps the most critical factor in predicting, managing, and reducing salt-affected soils is the quality of irrigation water being used. Besides affecting crop yield and soil physical conditions, irrigation water quality can affect fertility needs, irrigation system performance and longevity, and how the water can be applied. Therefore, knowledge of irrigation water quality is critical to understanding what management changes are necessary for long-term productivity.

Irrigation Water Quality Criteria

Soil scientists use the following categories to describe irrigation water effects on crop production and soil quality:

- Salinity hazard - total soluble salt content
- Sodium hazard - relative proportion of sodium to calcium and magnesium ions
- pH - acid or basic
- Alkalinity - carbonate and bicarbonate
- Specific ions: chloride, sulfate, boron, and nitrate.

Another potential irrigation water quality impairment that may affect suitability for cropping systems is microbial pathogens.

Quick Facts

- Knowledge of irrigation water quality is critical to understanding management for long-term productivity.
- Irrigation water quality is evaluated based upon total salt content, sodium and specific ion toxicities.
- In many areas of Colorado, irrigation water quality can significantly influence crop productivity.



Corn plant damaged by saline sprinkler water.

Salinity Hazard

Table 1. General guidelines for salinity hazard of irrigation water based upon conductivity.

Limitations for use	Electrical Conductivity (dS/m)*
None	≤ 0.75
Some	0.76 - 1.5
Moderate ¹	1.51 - 3.00
Severe ²	≥ 3.00

*dS/m at 25° C = mmhos/cm

¹Leaching required at higher range.

²Good drainage needed and sensitive plants may have difficulty at germination.

The most influential water quality guideline on crop productivity is the water salinity hazard as measured by electrical conductivity (EC_w). The primary effect of high EC_w water on crop productivity is the inability of the plant to compete with ions in the soil solution for water (physiological drought). The higher the EC, the less water is available to plants, even though the soil may appear wet. Because plants can only transpire "pure" water, usable plant water in the soil solution decreases dramatically as EC increases.

The amount of water transpired through a crop is directly related to yield; therefore, irrigation water with high EC_w reduces yield

*T.A. Bauder, Colorado State University Extension water quality specialist; R.M. Waskom, director, Colorado Water Institute; P.L. Sutherland, USDA/NRCS area resource conservationist; and J.G. Davis, Extension soils specialist and professor, soil and crop sciences. 10/2014

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Table 2. Potential yield reduction from saline water for selected irrigated crops.¹

Crop	0%	% yield reduction		
		10%	25%	50%
		EC _w ²		
Barley	5.3	6.7	8.7	12
Wheat	4.0	4.9	6.4	8.7
Sugarbeet ³	4.7	5.8	7.5	10
Alfalfa	1.3	2.2	3.6	5.9
Potato	1.1	1.7	2.5	3.9
Corn (grain)	1.1	1.7	2.5	3.9
Corn (silage)	1.2	2.1	3.5	5.7
Onion	0.8	1.2	1.8	2.9
Dry Beans	0.7	1.0	1.5	2.4

¹Adapted from "Quality of Water for Irrigation." R.S. Ayers. Jour. of the Irrig. and Drain. Div., ASCE. Vol 103, No. IR2, June 1977, p. 140.

²EC_w = electrical conductivity of the irrigation water in dS/m at 25°C.

³Sensitive during germination. EC_w should not exceed 3 dS/m for garden beets and sugarbeets.

Definitions

Abbrev.	Meaning
mg/L	milligrams per liter
meq/L	milliequivalents per liter
ppm	parts per million
dS/m	deciSiemens per meter
μS/cm	microSiemens per centimeter
mmho/cm	millimhos per centimeter
TDS	total dissolved solids

Table 3. Conversion factors for irrigation water quality laboratory reports.

Component	To Convert	Multiply By	To Obtain
Water nutrient or TDS	mg/L	1.0	ppm
Water salinity hazard	1dS/m	1.0	1mmho/cm
Water salinity hazard	1mmho/cm	1,000	1 μmho/cm
Water salinity hazard	EC _w (dS/m)	640	TDS (mg/L)
Water salinity hazard	EC _w (dS/m) for EC < 5 dS/m	800	TDS (mg/L)
Water NO ₃ N, SO ₄ -S, B applied	ppm	0.23	lb per acre inch of water
Irrigation water	acre inch	27,150	gallons of water

Table 4. Guidelines for assessment of sodium hazard of irrigation water based on SAR and EC_w².

Irrigation water SAR	Potential for Water Infiltration Problem	
	Unlikely	Likely
	-----EC _w ² (dS/m)-----	
0-3	> 0.7	< 0.2
3-6	> 1.2	< 0.4
6-12	> 1.9	< 0.5
12-20	> 2.9	< 1.0
20-40	> 5.0	< 3.0

²Modified from R.S. Ayers and D.W. Westcot. 1994. Water Quality for Agriculture, Irrigation and Drainage Paper 29, rev. 1, Food and Agriculture Organization of the United Nations, Rome.

Table 5. Susceptibility ranges for crops to foliar injury from saline sprinkler water.

	Na or Cl concentration (mg/L) causing foliar injury			
Na concentration	<46	46-230	231-460	>460
Cl concentration	<175	175-350	351-700	>700
	Apricot	Pepper	Alfalfa	Sugarbeet
	Plum	Potato	Barley	Sunflower
	Tomato	Corn	Sorghum	

Foliar injury is influenced by cultural and environmental conditions. These data are presented only as general guidelines for daytime irrigation. Source: Mass (1990) Crop salt tolerance. In: Agricultural Assessment and Management Manual. K.K. Tanji (ed.). ASCE, New York. pp. 262-304.

potential (Table 2). Actual yield reductions from irrigating with high EC water varies substantially. Factors influencing yield reductions include soil type, drainage, salt type, irrigation system and management. Beyond effects on the immediate crop is the long term impact of salt loading through the irrigation water. Water with an EC_w of 1.15 dS/m contains approximately 2,000 pounds of salt for every acre foot of water. You can use conversion factors in Table 3 to make this calculation for other water EC levels.

Other terms that laboratories and literature sources use to report salinity hazard are: salts, salinity, electrical conductivity (EC_w), or total dissolved solids (TDS). These terms are all comparable and all quantify the amount of dissolved "salts" (or ions, charged particles) in a water sample. However, TDS is a direct measurement of dissolved ions and EC is an indirect measurement of ions by an electrode.

Although people frequently confuse the term "salinity" with common table salt or sodium chloride (NaCl), EC measures salinity from all the ions dissolved in a sample. This includes negatively charged ions (e.g., Cl⁻, NO₃⁻) and positively charged ions (e.g., Ca⁺⁺, Na⁺). Another common source of confusion is the variety of unit systems used with EC_w. The preferred unit is deciSiemens per meter (dS/m), however millimhos per centimeter (mmho/cm) and micromhos per centimeter (μmho/cm) are still frequently used. Conversions to help you change between unit systems are provided in Table 3.

Sodium Hazard

Infiltration/Permeability Problems

Although plant growth is primarily limited by the salinity (EC_w) level of the irrigation water, the application of water with a sodium imbalance can further reduce yield under certain soil texture conditions. Reductions in water infiltration can occur when irrigation water contains high sodium relative to the calcium and magnesium contents. This condition, termed "sodicity," results from excessive soil accumulation of sodium. Sodic water is not the same as saline water. Sodicity causes swelling and dispersion of soil clays, surface crusting and pore plugging. This degraded soil structure condition in turn obstructs infiltration and may increase runoff. Sodicity causes a decrease in the downward movement of water into and through the soil, and actively growing plants roots may not get adequate water, despite pooling of water on the soil surface after irrigation.

The most common measure to assess sodicity in water and soil is called the Sodium Adsorption Ratio (SAR). The SAR defines sodicity in terms of the relative concentration of sodium (Na) compared to the sum of calcium (Ca) and magnesium (Mg) ions in a sample. The SAR assesses the potential for infiltration problems due to a sodium imbalance in irrigation water. The SAR is mathematically written below, where

$$SAR = \frac{Na^+ \text{ meq/L}}{\sqrt{\frac{(Ca^{++} \text{ meq/L}) + (Mg^{++} \text{ meq/L})}{2}}}$$

meq/L = mg/L divided by atomic weight of ion divided by ionic charge (Na⁺ = 23.0 mg/meq, Ca⁺⁺ = 20.0 mg/meq, Mg⁺⁺ = 12.15 mg/meq)

Na, Ca and Mg are the concentrations of these ions in milliequivalents per liter (meq/L). Concentrations of these ions in water samples are typically provided in milligrams per liter (mg/L). To convert Na, Ca, and Mg from mg/L to meq/L, you should divide the concentration by 22.9, 20, and 12.15 respectively.

For most irrigation waters encountered in Colorado the standard SAR formula provided above is suitable

to express the potential sodium hazard. However, for irrigation water with high bicarbonate (HCO_3) content, an "adjusted" SAR (SAR_{ADJ}) can be calculated. In this case, the amount of calcium is adjusted for the water's alkalinity, is recommended in place of the standard SAR (see pH and Alkalinity section below). Your laboratory may calculate an adjusted SAR in situations where the HCO_3 is greater than 200 mg/L or pH is greater than 8.5.

The potential soil infiltration and permeability problems created from applications of irrigation water with high "sodicity" cannot be adequately assessed on the basis of the SAR alone. This is because the swelling potential of low salinity (EC_w) water is greater than high EC_w waters at the same sodium content (Table 4). Therefore, a more accurate evaluation of the infiltration/permeability hazard requires using the electrical conductivity (EC_w) together with the SAR.

Many factors including soil texture, organic matter, cropping system, irrigation system and management affect how sodium in irrigation water affects soils. Soils most likely to show reduced infiltration and crusting from water with elevated SAR (greater than 6) are those containing more than 30% expansive (smectite) clay. Soils containing more than 30% clay include most soils in the clay loam, silty clay loam textural classes and finer and some sandy clay loams. In Colorado, smectite clays are common in areas with agricultural production.

pH and Alkalinity

The acidity or basicity of irrigation water is expressed as pH (< 7.0 acidic; > 7.0 basic). The normal pH range for irrigation water is from 6.5 to 8.4. Abnormally low pH's are not common in Colorado, but may cause accelerated irrigation system corrosion where they occur. High pH's above 8.5 are often caused by high bicarbonate (HCO_3^-) and carbonate (CO_3^{2-}) concentrations, known as alkalinity. High carbonates cause calcium and magnesium ions to form insoluble minerals leaving sodium as the dominant ion in solution. As described in the sodium hazard section, this alkaline water could intensify the impact of high SAR water on sodic soil conditions. Excessive bicarbonate

concentrates can also be problematic for drip or micro-spray irrigation systems when calcite or scale build up causes reduced flow rates through orifices or emitters. In these situations, correction by injecting sulfuric or other acidic materials into the system may be required.

Chloride

Chloride is a common ion in Colorado irrigation waters. Although chloride is essential to plants in very low amounts, it can cause toxicity to sensitive crops at high concentrations (Table 6). Like sodium, high chloride concentrations cause more problems when applied with sprinkler irrigation (Table 6). Leaf burn under sprinkler from both sodium and chloride can be reduced by night time irrigation or application on cool, cloudy days. Drop nozzles and drag hoses are also recommended when applying any saline irrigation water through a sprinkler system to avoid direct contact with leaf surfaces.

Table 6. Chloride classification of irrigation water.

Chloride (ppm)	Effect on Crops
Below 70	Generally safe for all plants.
70-140	Sensitive plants show injury.
141-350	Moderately tolerant plants show injury.
Above 350	Can cause severe problems.

Chloride tolerance of selected crops. Listing in order of increasing tolerance: (low tolerance) dry bean, onion, carrot, lettuce, pepper, corn, potato, alfalfa, sudangrass, zucchini squash, wheat, sorghum, sugar beet, barley (high tolerance). Source: Mass (1990) Crop Salt Tolerance. *Agricultural Salinity Assessment and Management Manual*. K.K. Tanji (ed.). ASCE, New York. pp 262-304.

Boron

Boron is another element that is essential in low amounts, but toxic at higher concentrations (Table 7). In fact, toxicity can occur on sensitive crops at concentrations less than 1.0 ppm. Colorado soils and irrigation waters contain enough B that additional B fertilizer is not required in most situations. Because B toxicity can occur at such low concentrations, an irrigation water analysis is advised for groundwater before applying additional B to irrigated crops.

Table 7. Boron sensitivity of selected Colorado plants (B concentration, mg/ L*)

Sensitive		Moderately Sensitive	Moderately Tolerant	Tolerant
0.5-0.75	0.76-1.0	1.1-2.0	2.1-4.0	4.1-6.0
Peach	Wheat	Carrot	Lettuce	Alfalfa
Onion	Barley	Potato	Cabbage	Sugar beet
	Sunflower	Cucumber	Corn	Tomato
	Dry Bean		Oats	

Source: Mass (1987) Salt tolerance of plants. *CRC Handbook of Plant Science in Agriculture*. B.R. Cristie (ed.). CRC Press Inc.

*Maximum concentrations tolerated in soil water or saturation extract without yield or vegetative growth reductions. Maximum concentrations in the irrigation water are approximately equal to these values or slightly less.

Sulfate

The sulfate ion is a major contributor to salinity in many of Colorado irrigation waters. As with boron, sulfate in irrigation water has fertility benefits, and irrigation water in Colorado often has enough sulfate for maximum production for most crops. Exceptions are sandy fields with <1 percent organic matter and <10 ppm $\text{SO}_4\text{-S}$ in irrigation water.

Nitrogen

Nitrogen in irrigation water (N) is largely a fertility issue, and nitrate-nitrogen ($\text{NO}_3\text{-N}$) can be a significant N source in the South Platte, San Luis Valley, and parts of the Arkansas River basins. The nitrate ion often occurs at higher concentrations than ammonium in irrigation water. Waters high in N can cause quality problems in crops such as barley and sugar beets and excessive vegetative growth in some vegetables. However, these problems can usually be overcome by good fertilizer and irrigation management. Regardless of the crop, nitrate should be credited toward the fertilizer rate especially when the concentration exceeds 10 ppm $\text{NO}_3\text{-N}$ (45 ppm NO_3^-). Table 3 provides conversions from ppm to pounds per acre inch.

Summary

The quality of irrigation water available to farmers and other irrigators has a considerable impact on what plants can be successfully grown, the productivity of these plants, and water infiltration and other soil physical conditions. The first step in understanding how an irrigation water source can affect a soil-plant system is to have it analyzed by a reputable lab. The Colorado State University Extension factsheet 0.520, [Selecting an Analytical Laboratory](#) can help you locate a lab in your area that is familiar with irrigation water quality. Additional information on understanding and managing for saline and sodic conditions is found in Colorado State University factsheets 0.503, [Managing Saline Soils](#) and 0.504, [Managing Sodic Soils](#).

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G84-690 Estimating Soil Moisture by Appearance and Feel

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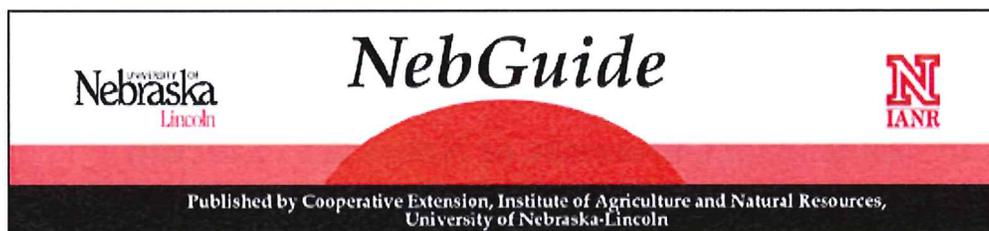
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Estimating Soil Moisture by Appearance and Feel

This NebGuide provides a guide to determining how much moisture is in different soil textures, and where it is located in the soil profile.

Norman L. Klocke, Extension Agricultural Engineer
Paul E. Fischbach, Extension Irrigation Specialist

- [Sampling and Evaluation Procedures](#)
- [Photo Guides and Descriptions for Judging Soil Moisture Levels](#)
- [Calculating Soil Moisture Status](#)

Evaluating soil moisture is one of an irrigator's most important management tools. Determining the status of the soil moisture reservoir guides the decision of not only how much to irrigate, but also when to irrigate. The "appearance and feel" method of monitoring soil moisture using a soil probe is still a valid procedure no matter how sophisticated the irrigation scheduling system. A measurement of soil moisture is essential to update knowledge of the need for and timing of irrigation, and the "appearance and feel" method can be used to obtain that information.

In addition to indicating how much moisture is in the soil, this method also reveals where that moisture is located in the profile. This information is important to the irrigator as well as the dryland farmer. The depth of water penetration from irrigation or rainfall is useful in planning and making management decisions. For example, problem areas with compacted soil layers that restrict water penetration may be detected with the soil probe.

<i>Soil texture</i>	<i>Available water</i>
	<i>inches/foot</i>
Fine sand <i>or</i> loamy sand	1.0 to 1.1
Sandy loam	1.4
Loam <i>or</i> silt loam	2.0 to 2.5
Silty clay <i>or</i> clay loam	1.8

Soil texture, the relative amounts of sand, silt or clay contained in a soil, is an indicator of the amount of water a soil will hold. Available water capacity is the maximum amount of moisture the soil will hold that plants can use. The values of available water for four basic textural classes are given in *Table I*.

The textural classification of a soil is important not only for knowing how much water potentially can be held for crop use, but also for visual inspection. Different soil types respond differently to the methods described in this NebGuide, which is one of the keys to making the soil moisture determination. The county soil survey, which can be obtained through your Cooperative Extension Service office or the Soil Conservation Service, includes discussions on soil texture and available water capacity of your soils.

Sampling and Evaluation Procedures

A soil probe, soil auger, or spade can be used to extract a soil sample. Evaluate the soil moisture at one foot intervals from the surface to the bottom of the active root zone. The active root zone for most irrigated crops is approximately 3 feet deep. When checking for water penetration or soil moisture for dryland crops, probe to the depth of 4 to 5 feet.

To begin learning the appearance and feel of your soil at particular moisture contents, start early in the spring one or two days after a heavy rain. At this point the soil moisture level should be near field capacity, or holding 100 percent of the water that it can naturally retain. Likewise, probe the soil at the end of the growing season when the profile is likely to be dry. Knowing the appearance and feel of your soil at the wet and dry ends of the spectrum will help make determinations during the midseason. Use the photos and description in the following section when assessing soil moisture. The number and location of sampling sites depends on both the uniformity of the soils in the field and the irrigation procedures. Check problem areas in the field in addition to the starting and stopping areas of your particular irrigation system. Sample a minimum of four sites in different parts of the field.

Guides for Estimating Soil Moisture

When using a soil probe to extract the samples, the following procedures will make the job easier.

- a. Scrape a clean, level area on the soil surface before inserting the probe.
- b. Insert the probe to the desired depth (at one foot increments) and turn the probe once clockwise before pulling it back to the surface.
- c. After inspecting the soil, remove all of the soil from the tube, including the tip. A fitted dowel may help. Soil left in the tip may tend to compact the next sample.
- d. Clean the probe after each use to prevent rust and hard caked soil.
- e. Replace or sharpen the tip as needed.

Procedure for evaluating soil moisture using photo guides and descriptions:

1. Determine texture of soil.
2. Squeeze small handful of soil firmly.
3. Observe the condition of the ball and your hand.
4. Attempt to form a ribbon of the soil between your thumb and forefinger.
5. Observe what happens.
6. Compare your observations with the photos and descriptions in the guides.

Photos guides and soil moisture descriptions for four soil types are provided. (Courtesy of *Estimating Soil Moisture by Feel and Appearance*, USDA Natural Resources Conservation Service.)

Fine sand and loamy fine sand soils

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

Available Soil Moisture Remaining	Appearance of soil
0-25 percent available	Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure.
25-50 percent available	 <p>Slightly moist, forms a very weak ball with well defined finger marks, light coating of loose and aggregated sand grains remains on fingers.</p>
50-75 percent available	 <p>Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon.</p>
75-100 percent available	Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon.
100 percent available	Wet, forms a weak ball, moderate to heavy soil/water coating on fingers, wet outline of soft ball remains on hand.

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

Sandy loam and fine sandy loam soils

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

Available Soil Moisture Remaining	Appearance of soil
0-25 percent available	Dry, forms a very weak ball, aggregated soil grains break away easily from ball.
25-50 percent available	 <p>Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away.</p>
50-75 percent available	 <p>Moist, forms a ball with defined finger marks, very light soil/water staining on fingers, darkened color will not stick.</p>
75-100 percent available	 <p>Wet, forms a ball with wet outline left on hand, light to medium staining on fingers, makes a weak ribbon between the thumb and forefinger.</p>
	Wet, forms a soft ball, free water appears briefly on

100 percent available

soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers.

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

Sandy clay loam, loam, and silt loam soils

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

Available Soil Moisture Remaining	Appearance of soil
0-25 percent available	Dry, soil aggregations break away easily, no staining on fingers, clods crumble with applied pressure.
25-50 percent available	 <p>Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away.</p>
50-75 percent available	 <p>Moist, forms a ball, very light staining on fingers, darkened color, pliable, forms a weak ribbon between the thumb and forefinger.</p>

75-100 percent available



Wet, forms a ball with well-defined finger marks, light to heavy soil/water coating on fingers, ribbons between thumb and forefinger.

100 percent available

Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers.

Courtesy of the United States Department of Agriculture, Natural Resource Conservation Service.

Estimating Soil Moisture by Feel and Appearance (Program Aid 1619)

Clay, clay loam, and silty clay loam soils

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

Available Soil Moisture Remaining	Appearance of soil
0-25 percent available	Dry, soil aggregations separate easily, clods are hard to crumble with applied pressure.
25-50 percent available	 <p>Slightly moist, forms a weak ball, very few soil aggregations break away, no water stains, clods flatten with applied pressure.</p>

50-75 percent available	 <p>Moist, forms a smooth ball with defined finger marks, light soil/water staining on fingers, ribbons between thumb and forefinger.</p>
75-100 percent available	 <p>Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily between thumb and forefinger.</p>
100 percent available	<p>Wet, forms a soft ball, free water appears on soil surface after squeezing or shaking, thick soil/water coating on fingers, slick and sticky.</p>

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

Calculating Soil Moisture Status

After estimating the soil moisture, the amount of water in the soil reservoir can be calculated using *Table I*. The following example illustrates the calculation:

1. Soil: Silt loam (from soil survey classification).
2. Available moisture at field capacity = 2.4 inches/foot.
3. Current soil moisture status = 50% available soil moisture remaining (from appearance and feel method evaluation).
4. Amount of soil in sample = 1 foot.
5. Available moisture remaining in sample = $(50) \times (2.4 \text{ inches/foot}) \times (1 \text{ foot}) = 1.2 \text{ inches}$.

Complete this calculation for each sample extracted. The total of the moisture remaining for all samples is the water still available in the sampled profile.

For more information on using this remaining available moisture for scheduling irrigations, refer to Extension Circulars EC 79-723 (*Irrigation Scheduling Using Soil Moisture Blocks in Deep Soil*) or EC 80-724 (*Irrigation Scheduling Using Tensiometers and Evapotranspiration on Deep Sandy Soils*). Both are available from your local Cooperative Extension Office, or by order.

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